Family Elderly Care, Home-Based Elderly Care Policies, and Labour Supply of Adult Married Children in China

by

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Summary

This thesis explores the impact of elderly care provision on the labour supply of married adult children using data from the China Health and Nutrition Survey (CHNS) for the years 2004, 2006, 2009, 2011, and 2015. It also examines the causal impact of China's home-based elderly care policy—gradually implemented across provinces since 2008—on the labour supply of married adult children.

Using the Two-Stage Least Squares (2SLS) method, it finds that for working-aged married women, elderly care responsibility significantly increases the employment probability (6.8 percentage points). However, conditional on employment, it significantly reduces weekly paid working hours (4.96 hours). Further heterogeneity analysis indicates that the financial compensation mechanism is more pronounced among older, non-coresident and non-childcare-responsibility female caregivers.

For working-aged married men, the 2SLS analysis reveals that elderly care responsibilities reduce the husbands' employment probability by 5.3 percentage points, while there is no significant impact on their paid working hours. The potential mechanisms analysis suggest that the impact of elderly care is likely driven by husband's sharing of family care responsibilities. Furthermore, the impact varies by factors such as job type (part-time/full-time), living arrangements, and care recipient.

The third empirical question of this thesis explores the causal impact of China home-based elderly care policy on the labour supply of married adult children at both extensive and intensive margins. By exploiting the variation in the timing of implementation across provinces and employing various methods, including static and dynamic two-way fixed effects and staggered difference-in-differences methods (as proposed by Sun and Abraham, 2021), the analysis reveals a robust negative impact on the employment probability of married women (5.4-8.6 percentage points). This effect is concentrated in subgroups with lower education, higher household income, and older age, while no significant effects are found for men or on the intensive margin for women.

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List of Abbreviations

CHNS	China Health and Nutrition Survey
CHARLS	China Health and Retirement Longitudinal Study
CGSS	Chinese General Social Survey
CFPS	China Family Panel Studies
2SLS	Two-stage least squares
POLS	Pooled Ordinary Least Squares
FE	Fixed Effects
IV	Instrumental Variable
TF-IDF	Term Frequency-Inverse Document Frequency
DiD	Difference-in-Differences
TWFE	Two-Way Fixed Effects
GDP	Gross Domestic Product

Chapter 1 Introduction

It is well-established in the economics literature that family elderly care is associated with the labour supply of adult caregivers at both the intensive and extensive margins (see, for example, Skira, 2015 for the US; King and Pickard, 2015 for the UK; Heger and Korfhage, 2020 for fifteen European countries; and Chai, Fu and Coyte, 2021 for China). While empirical evidence is mixed both in terms of the sign and the magnitude of the impact of the elderly care, which vary by region, time period and caregiver characteristics. In China, the impact of unpaid elderly care did not receive significant attention until 2010. As the ageing population in China continues to intensify, there is still relatively less empirical evidence compared to the international literature.

Unlike the ageing populations experienced by developed countries such as the US, the UK, and Japan, China's ageing process, as a developing country, is characterised by a large population base, rapid progression, a lack of coordination between ageing and economic development, and uneven ageing degrees among regions. At the end of 2020, the total population aged 65 in China was 177.77 million accounting for about 24.5% of the world's elderly population (World Bank Data, 2020). The percentage of China's population aged 65 and above increased from 10% to 14% in 21 years (from 2000 to 2021), which is a much shorter time span compared to developed countries (24 years in Japan, 45 years in the UK, 45 years in Switzerland, 65 years in the US, and 115 years in France). However, as a developing country, limited per capita productivity and government financial support have hindered the development of a formal social elderly care industry. Unpaid family care provided by adult children remains the primary form of elderly care in China. By 2020, the elderly dependency ratio had reached 19.69%, meaning that nearly five working-aged people have to support one elderly person aged 65 and over.

Given this ageing population background, lacking formal care systems and sufficient financial support exacerbate the burden of elderly care. As a result, the labour supply decisions of married adult children under increasing eldercare pressures go beyond mere preference-based choices. In Chinese culture, adult children, particularly married women who are often regarded as primary caregivers within families, may be compelled to withdraw from the labour market despite their reluctance to do so, or to overextend themselves to cover the additional financial costs associated with eldercare. These constrained choices have been shown to reduce life satisfaction of married adult children (Celik et al., 2018), reinforce traditional gender role stereotypes, and widen gender disparities in the labour market (Zhang, 2005 and Glauber, 2017).

Consequently, the responsibility of elderly care within families extends beyond micro-level household dynamics and may have broader socio-economic implications. Addressing this issue requires coordinated efforts from multiple levels, including families, society, and the state. The trade-off between work and family life has become a pressing concern for both adult children and policymakers.

Labour economists argue that employment decisions ultimately revolve around time allocation. Time can be used for leisure activities and for work- whether paid employment or unpaid family responsibility (Ehrenberg, Smith and Hallock, 2021). For primary caregivers of elderly parents or parents-in-law, typically women in the family, the decision to reduce labour supply in favor of providing unpaid elderly care often depends on the relative marginal utility they derive from participating in the labour market versus to providing unpaid elderly care at home.

While the labour supply of married men may be influenced by mechanisms different from those affecting their wives, key cultural and economic factors shape these differences.

Firstly, in China, women are culturally expected to be the primary caregivers within households, while men are regarded as the main economic providers. This cultural norm creates a natural asymmetry in how husbands and wives share elderly care responsibilities. The burden of caregiving often disproportionately falls on women, particularly married women, who are expected to dedicate significant time and energy to direct caregiving tasks. In contrast, while husbands may participate in caregiving, their roles are typically more focused on providing financial support rather than direct time-intensive care.

Moreover, gender-based labour market dynamics further amplify these disparities. Husbands and wives often possess differing competitive advantages in the labour market. Husbands generally have higher earnings, increasing the opportunity cost of existing in the labour market. As a result, they are more likely to maintain or even increase their labour supply when faced with eldercare demands. On the one hand, wives, who often engage in more flexible jobs, find it easier to adjust their labour supply in response to caregiving needs. While flexibility allow them to balance work and family responsibilities, it also makes them more likely to reduce their labour market participation under eldercare pressures. On the other hand, husbands—who are often secondary caregivers—may experience changes in their labour supply due to the need to assist their wives with caregiving responsibilities. As such, their labour supply may be indirectly influenced by changes in their wives' labour supply, rather than directly by elderly care duties—a phenomenon known as the added worker effect (Woytinsky, 1942).

Consequently, the distinct opportunity costs and job characteristics between husbands and wives lead to differing responses in their labour supply decisions, necessitating a detailed analysis to fully capture these dynamics and their implications for household labour supply behaviour.

Although the labour supply of wives and husbands in the family may be influenced by different mechanisms, it is crucial to explore how national policies, like the home-based elderly care policies, could impact both spouses' labour supply. At the national level, since 2008, the Chinese government has been encourageing provinces to gradually implement home-based elderly care policies tailored to their specific ageing and development characteristics, aiming to provide greater support for the elderly.[1] Although this policy could potentially impact the labour supply of adult children by providing financial support and substitutive elderly care, existing research has only focused on the evolution and development of these policies (Gao, 2011; Ding and Qu, 2019), and their formulation and implementation (Luo, 2019; Wang and Zhou, 2019). To the best of my knowledge, there is no empirical research examining the impact of these policies on caregivers' labour supply in China.

Given this background, this thesis aims to study the impact of elderly care responsibilities and home-based elderly care policies on married adult children's labour supply along both extensive and intensive margins in China. It explores the underlying mechanisms, and the heterogeneity in how husbands and wives adjust their labour supply in response to elderly care responsibilities. By exploring gendered differences in labour supply responses, this study provides a clearer understanding of shifting labour supply patterns within contemporary Chinese families.

Furthermore, it identifies vulnerable subgroups particularly sensitive to caregiving burdens, highlighting the need for targeted policy interventions. The findings offer empirical evidence that can inform the refinement and optimisation of family support policies, helping to address the work-family trade-off faced by adult children in caregiving roles.

This thesis is comprised of three empirical chapters. The first chapter examines the impact of elderly care responsibility on wives' labour supply, while the second chapter investigates the impact of elderly care responsibility on husbands' labour supply. The third chapter assesses the impact of home-based elderly care policy on both spouses' labour supply.

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[1] See Sections 2.2 and 7.2 for a detailed discussion of the home-based elderly care policies in China.

The first empirical chapter of this thesis utilises individual-level data from the China Health and Nutrition Survey (CHNS) covering the years 2004, 2006, 2009, 2011, and 2015. Unlike to other national surveys, such as the China Family Panel Studies, the Chinese General Social Survey and the China Health and Retirement Longitudinal Study, the CHNS provides comprehensive coverage of both urban and rural areas in China and includes a rich array of individual, family, and financial characteristics. These characteristics are well-established determinants of married women's labour supply (Saha and Kalita, 2015). To address potential endogeneity bias between elderly care responsibilities and the labour supply of married female caregivers, the empirical analysis employs an instrumental variable (IV) approach using Two-Stage Least Squares (2SLS). The exogenous variation in the need for care (determined by whether elderly parents or parents-in-law require care) and the total number of siblings of both spouses are used as instrumental variables for elderly care. The analysis also examines potential heterogeneous effects based on age, childcare provision, living arrangements, and the intensity of care required.

The second empirical chapter, utilising the same dataset (CHNS from 2004, 2006, 2009, 2011, and 2015) and the same empirical approach (an instrumental variable approach using 2SLS), examines the impact of family elderly care responsibilities on the labour supply of married men. It further investigates the underlying mechanisms behind identified effects and explores the heterogeneity in the impact of elderly care on husbands' labour supply, considering factors such as work type (full time/ part time), living arrangements, age groups, and the specific care recipient.[2]

The third empirical chapter utilises the same data source (CHNS) for individual-level data from the years 2004, 2006, 2009, 2011 and 2015, supplemented with province-level information on the timing of the implementation of the home-based elderly care policies collected from provincial local government websites (including government official websites of government, civil affairs bureau official websites, and elderly care office official websites), Baidu search engine and Peking University Treasure official websites. The chapter exploits the staggered

[2] To examine the impact of elderly care on wives' and husbands' labour supply, this thesis employs a separate two-stage least squares (2SLS) model in Chapters 5 and 6. As such, it implicitly assumes that individuals make labour supply decisions independently, optimising their own utility while considering their spouse's choices, aligning with a non-cooperative model. Section X discusses the theoretical models of family labour supply in greater detail.

timing of policy implementation across provinces and employs both static and dynamic two-way fixed effects models, along with staggered difference-in-differences methods as proposed by Sun and Abraham (2021). To address concerns that the timing of policy implementation may be influenced by changes in underlying local economic conditions or the ageing process, the analysis examines the relationship between provincial employment rates and policy implementation timing, controlling for province-level macroeconomic variables and time interactions in the robustness test. The successful passing of the parallel trends test further supports the validity of the exogeneity assumption. Additionally, the analysis investigates the potential mechanisms behind the core findings and explores heterogeneity by age, household total gross income and education.

The results of the first empirical chapter show that for married women, taking on elderly care responsibilities significantly increases their probability of employment by 8.6 percentage points. This positive effect suggests that when married women face increasing elderly care burden in the family, they may choose to actively participate in the labour market to earn more labour income to offset the additional costs of providing elderly care. However, this positive impact is not uniform, except in the case of the region-based household registration system of China ('Hukou'), where no differences are observed. Further analysis reveals that the negative effect on employment probability is essentially driven by specific subgroups, such as younger women and co-residing women. Specifically, elderly care reduces the employment probability of married women aged 18-34 by 34.3 percentage points. In contrast, for women nearing retirement (aged 45-52), elderly care increases employment probability by 14.8 percentage points. These differences may be attributed to variations in human capital accumulation across age groups and the structure of the Chinese pension system, which is tied to years of employment. The lower sunk costs associated with employment interruptions for younger married women compare with the older married women. In terms of the living arrangement, elderly care reduces the employment probability of co-residing married women by 17.3 percentage points. In contrast, for non-co-residing married women, the income effect of elderly care remains at the extensive margin, increasing their employment probability by 20.3 percentage points. This may be because co-residing married women are more likely to become the primary caregivers, dedicating more time and effort to caring for elderly parents and parents-in-law. While for non-co-residing married women, they have higher probability of providing more flexible method, such as financial support, as part of their caregiving responsibilities. In terms of childcare, our findings reveal a notable income effect of elderly caregiving on the labour supply of wives without childcare responsibilities. Specifically, it increases their

probability of employment by 10.6 percentage points. In contrast, for wives who are simultaneously responsible for both childcare and elderly care, caregiving does not have significant effect on married women's participation in the labour market.

However, conditional on employment, the elderly care responsibilities result in a notable reduction of paid working hours by 5.0 hours per week and this negative effect is independent on different subgroups (age, childcare and living arrangement). This suggests that while elderly care responsibilities may encourage married women to enter the workforce to mitigate the financial burden of elderly care, the demands of caregiving tend to reduce the number of paid work hours for those who are already employed. Additionally, the impact of elderly care responsibilities on labour supply appears to be independent of the intensity of care provided and household registration type.

The results of the second empirical chapter show that for married men, family elderly care responsibilities decrease the probability of employment by 5.3 percentage points. However, these responsibilities do not significantly affect the number of paid working hours among those who are employed. Further analysis suggests that the mechanism behind the impact on husbands's labour supply along the extensive margin is likely related to their role in sharing family caregiving duties. Their tendency to withdraw from the labour market entirely, rather than reducing paid working hours, may be attributed to the fact that husbands are more likely to be engaged in full-time employment. Compared to part-time work, the lower flexibility of full-time jobs in adjusting working hours for caregiving responsibilities may prevent them from modifying their paid work schedule to accommodate family caregiving needs. Additionally, the effects vary depending on factors such as, living arrangements, Hukou, and the specific characteristics of the care recipient. Specifically, elderly care responsibilities significantly reduce the employment probability for husbands, with the effect being stronger when caring for their own parents (a 14.5 percentage points reduction) compared to caring for parents-in-law (an 11.0 percentage points reduction). However, for husbands who are already employed, elderly care responsibility do not influence their number of paid working hours, regardless of whom they are caring for. When considering living arrangements, the negative impact on employment is found only among husbands who do not live with the elderly, while those co-residing with their parents or parents-in-law do not experience such effects. This difference may be explained by the fact that co-residing wives often take on the primary caregiving role, reducing their own employment opportunities, while husbands remain employed to maintain household income. Nevertheless, for co-residing husbands who are employed, their paid working hours are significantly reduced by caregiving duties. The heterogeneous effect of

elderly caregiving on husbands' labour supply is only observed in the paid working hours of urban married men (-7.5 hours per week). This may be due to the fact that, urban areas compared to rural areas, offers more flexible work arrangements and a more developed formal caregiving sector. Husbands facing elderly care pressures in urban areas have greater opportunities to adjust their paid working hours, allowing them to remain in the labour market. In contrast, in rural areas, where the traditional norm of "raising sons for old-age support" is more deeply ingrained and where job opportunities and formal caregiving resources are scarce, rural husbands have significantly fewer options to modify their paid working hours.

Finally, the third empirical chapter finds a negative impact of the home-based elderly care policy on the employment probability of married women, reducing it by 8.0 percentage points in the short-term. However, no significant impact is observed on the intensive margin of married women's labour supply or on the extensive and intensive margins of married men's labour supply. Further analysis suggests that the negative effect on wives' employment probability is likely driven by early retirement due to increased elderly care provision with the introduction of home-based elderly care policy, particularly among older cohorts. Furthermore, the negative impact of the home-based elderly care policy on wives' employment probability is observed only in subgroups that are older (-7.40 percentage points), have lower education levels (-9.1 percentage points) and live in the low-income household (-7.2 percentage points) and rural area (-10.3 percentage points).

The findings from this thesis contribute to existing academic literature in several ways. Firstly, it provides a detailed analysis of the impact of elderly care on the labour supply of both wives and husbands, offering a gendered perspective on how family elderly care responsibilities affect adult children’s labour supply at both extensive and intensive margins. Secondly, by examining the mechanisms and heterogeneity of these effects across various factors such as age, childcare, living arrangements and care recipient, the research helps us further clarify how elderly care responsibilities directly or indirectly influence the labour supply decisions of married adult children as well as which subgroup of adult children's labour supply decisions are more susceptible to the influence of family elderly care responsibility. Thirdly, the study explores the impact of home-based elderly care policies on the labour supply of both spouses at both extensive and intensive margins, filling an important gap in home-based elderly care policy evaluation by highlighting how such interventions might differentially influence the labour decisions of men and women at both short-term and long-term. These findings offer valuable insights for policymakers aiming to design more equitable and effective elderly care and labour policies. For example, providing stronger financial support to families engaged in

elderly caregiving, implementing more flexible work arrangements for husbands with caregiving responsibilities and continuously improving the regulatory system and financial support framework for home-based elderly care policies to better align with the current needs of home-based care.

The remainder of the thesis is structured as follows: Chapter 2 introduces the background of the Chinese ageing process, home-based eldely care policy and the labour supply of adult children. Chapter 3 reviews the relevant literature, including theoretical frameworks and empirical evidence. Chapter 4 details the dataset selection for the three empirical chapters that follow. Chapter 5 presents the motivation, data and method used to explore the impact of elderly care responsibility on wives' labour supply and discusses findings. Chapter 6 outlines the motivation, data, and methods for estimating the impact of elderly care responsibility on husbands' labour supply and presents the results. Chapter 7 details the motivation, data, and methods for investigating the impact of home-based elderly care policy on both spouse's labour supply and presents the findings. Finally, Chapter 8 provides the conclusion, including covering concluding remarks, implications and limitations.

Chapter 2 Background

This thesis focuses on the impact of elderly care and China' s home-based elderly care policies on the labour supply of adult children, both at the intensive and extensive margins. Therefore, in this chapter, we provide a detailed background on the development of population ageing and labour market trends in China, utilising relevant statistics from various reports and databases. Additionally, we include a section that offers an overview of China's home-based elderly care policies.

2.1 Population Ageing in China

China's rapid demographic shift toward an aging society has become one of the most pressing challenges for the China's social and economic development. With a declining birth rate and rising life expectancy, China faces a unique set of issues as its population structure undergoes significant changes. This chapter provides an overview of the key dynamics shaping China's aging population, focusing on three aspects: the evolving age structure dynamics, the phenomenon of "getting old before getting rich," and the regional imbalances of the aging challenge. Based on these ageing situations, the final subsection highlights the rapidly increasing burden of elderly care in China.

2.1.1 Age Structure Dynamics

According to the classification standard established by the United Nations in the 1956 report "Population Ageing and Its Socio-Economic Consequences," a country or region is considered to have entered an aging society when the proportion of the population aged 65 and over exceeds 7% of the total population. In 1982, the Vienna World Assembly on Ageing established that a country or region is considered to have entered the aging stage when the proportion of the population aged 60 and over exceeds 10%. These two social ageing division standards has been used today and has become an international standard. According to the fifth census in 2000 in China, China's elderly aged 60 and over account for 10.46% of the total population and elderly aged 65 and over account for 7.1%, meeting these international standards for an ageing society, marking China's transition into an ageing country.[3]

[3] The standard time of China's fifth census was 0:00 on November 1st , 2000, and its data was first released on May 15th , 2001. According to the released data, China's elderly aged 60 and

An important feature of China's ageing population is the large ageing population base. According to the data of the world bank, Figure 2.1 shows the changes in population aged 65 and over in each country over the past 60 years. It can be clearly seen that the number of people aged 65 and over in China is significantly higher than that in other countries. At the end of 2020, the total population aged 65 and over in the world was 177.77 million (World Bank Data, 2020), while China accounted for about 23.5% of the world. Among all of 31 provinces[4] in China, 16 provinces have more than 5 million people aged 65 and over, of which 6 provinces have more than 10 million elderly people (China's seventh population census, 2020).

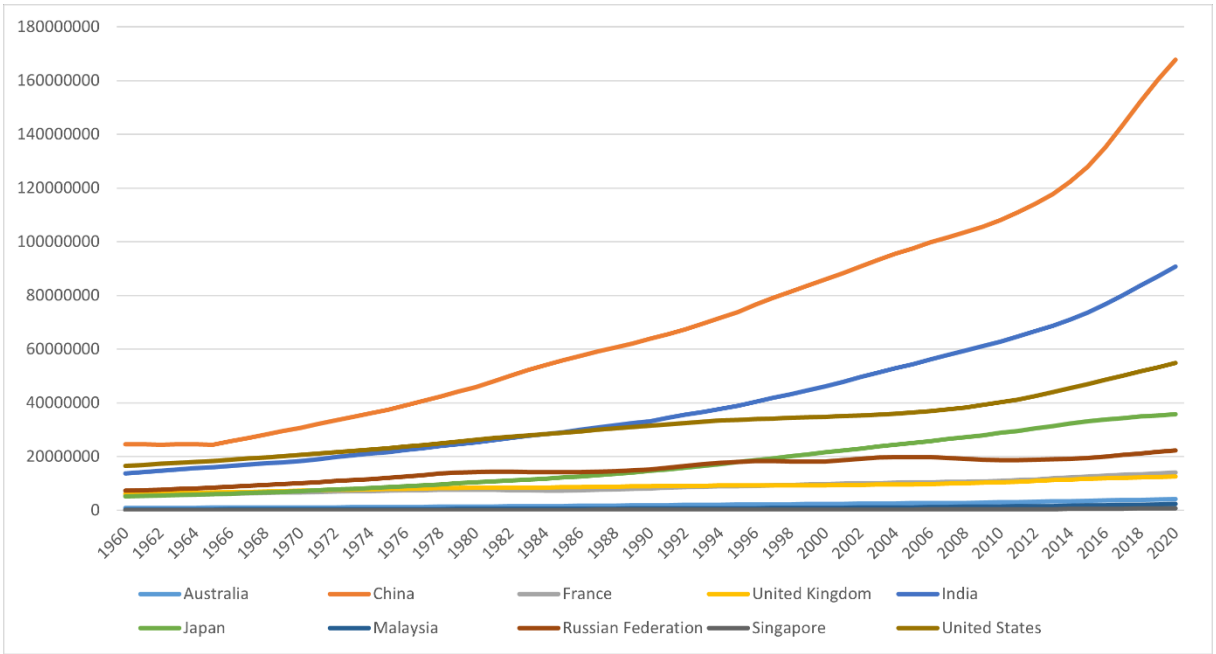

Figure 2.1 Population aged 65 and over

Source: The World Bank Data

Link: https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=CN

[Accessed: 21. 12. 2021]

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over account for 10.46% of the total population and elderly aged 65 and over account for 7.10%. However, the year-end data (projections based on census data) from China's National Bureau of statistics is slightly different from this result. It shows that at the end of 2000, China's population aged 65 and over accounted for 6.96%. At the end of 2001, it accounted for 7.10%. This may be related to the error of the data survey process, or the different approximate methods used in accounting data.

[4] Provinces: China's provincial administrative regions. It is first-class administrative regions.

With the continuous development of China's economy and the steady improvements in healthcare and social welfare, the average life expectancy of the Chinese population is expected to rise further. Consequently, it is reasonable to anticipate a continued increase in the absolute number of elderly individuals in China. Figure 2.2 shows the changes in life expectancy of China's population from 1960 to 2018. In the 58 years from 1960 to 2018, the average life expectancy of China's population increased by 32.979 years. The outline of the "healthy China 2030" plan (2016) shows that Chinese average life expectancy is expected to be 79.0 years in 2030[5]. According to the forecast data of the United Nations (2019), China's future elderly population will exceed 400 million in 2045 and reach a peak in 2050. At that time, China will be the country with the largest elderly population in the world.

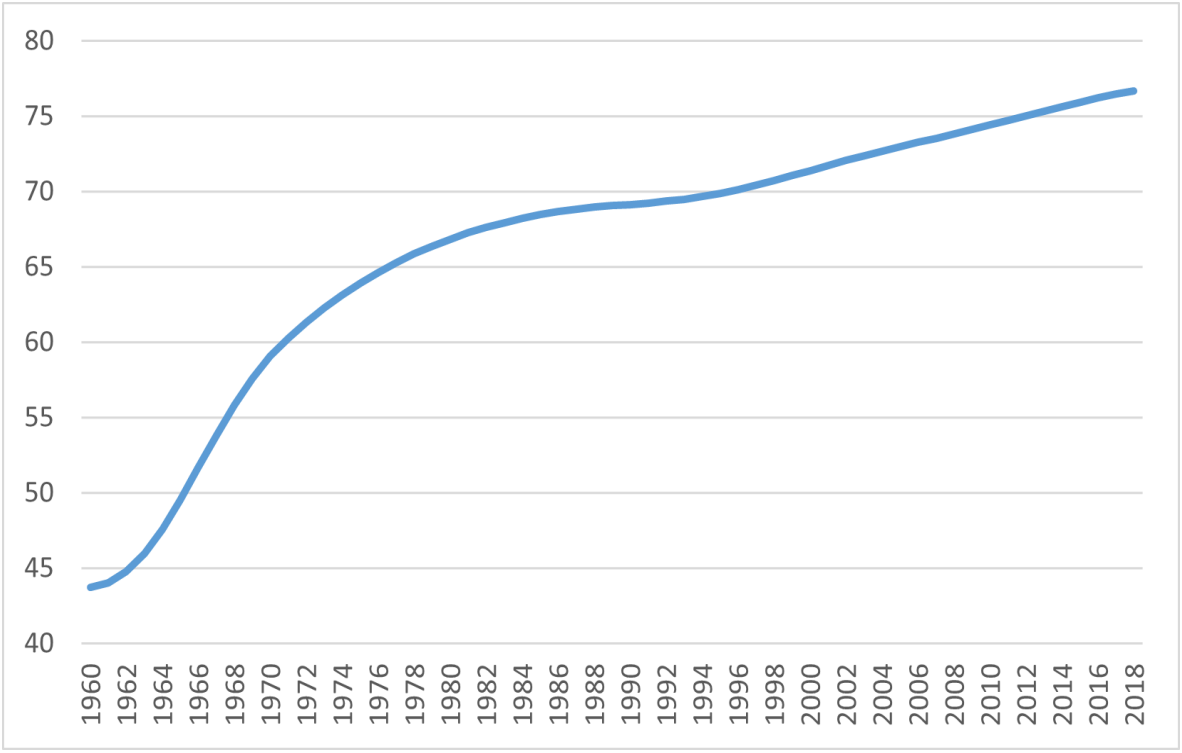

Figure 2.2 Average life span (years)

Source: The World Bank Data

Link: https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=CN

[Accessed: 04.11. 2021]

[5] "China's average life expectancy reaches 79 years" means that for people born in 2030, their average life expectancy is 79 years.

The aging dilemma in China's population structure arises, on the one hand, from the sheer size of its aging population over an extended period. On the other hand, the rapid acceleration of population aging in recent years also presents a distinct characteristic of China's demographic transition. Figure 2.3 shows the changes in the ratio of the population aged 65 and over to the total population in China from 1990 to 2020. Figure 2.4 shows the population pyramid of 2000,

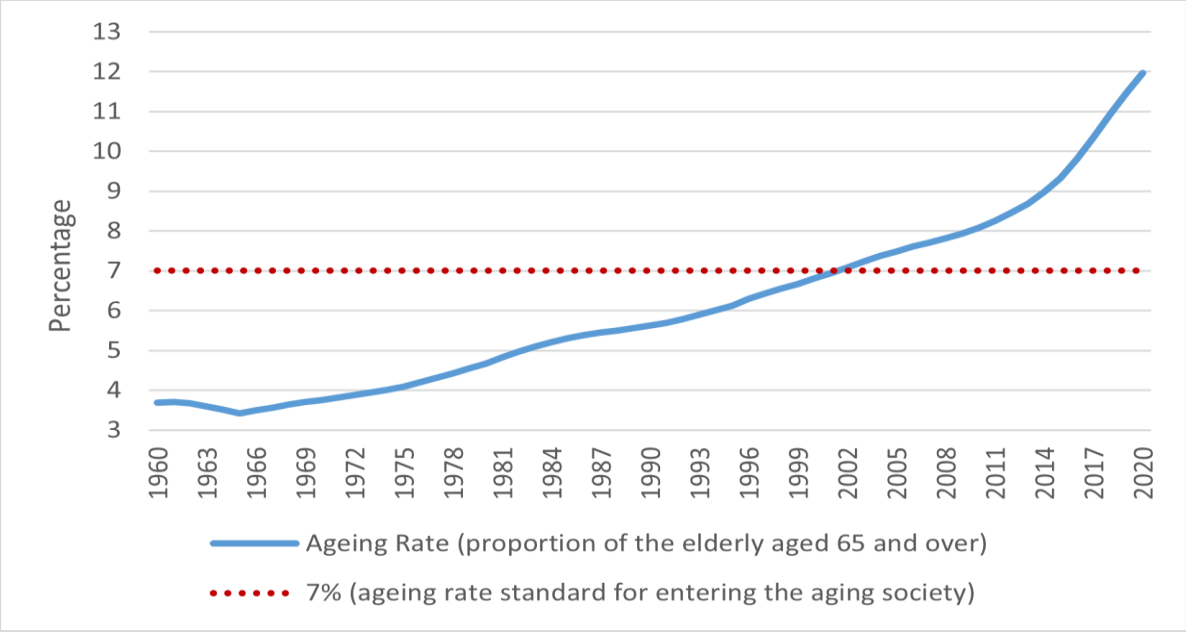

Figure 2.3 Changes in China's elderly population

Source: China National Bureau of Statistics (Annual data[6])

Link: http://www.stats.gov.cn/ [Accessed: 03.08. 2021]

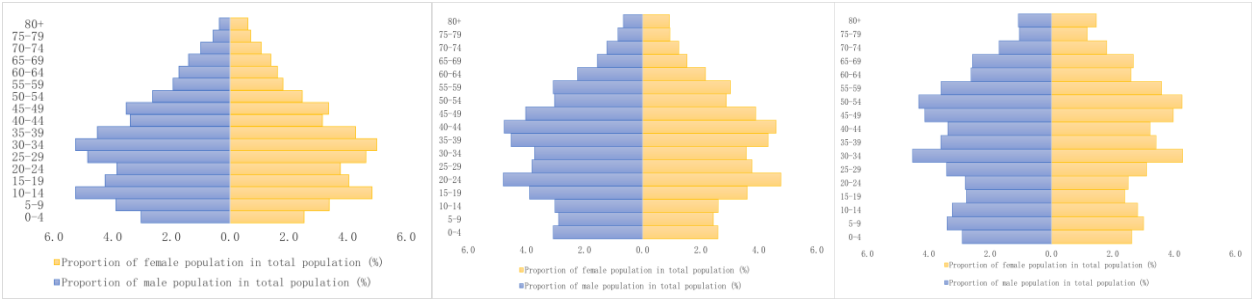

Figure 2.4 Chinese population pyramid

Source: China National Statistical Yearbook

Link: http://www.stats.gov.cn/ [Accessed: 12.12. 2021]

[6] The data of 1990, 2000 and 2010 are calculated from the census data of the current year. The data of 2020 are the points during the census, and the data of other years are revised based on the annual population sampling survey and the census data.

2010 and 2020 based on the data of China's National Bureau of statistics. We can clearly see the changes in China's population structure. The proportion of people aged 60 and over is increasing, while the proportion of people aged 14 and below is decreasing.

According to Yang (2020), in most developed countries, it took more than 45 years that the elderly aged 65 and over increased from 7% to 14%. According to the United Nations demographic database data, the author sorted out the year's corresponding to the degree of population ageing in Japan, Britain, Switzerland, the United States and France (Table 2.1). This is consistent with Yang's conclusion. It shows that even Japan, with a very high degree of ageing, has experienced 24 years. According to China's current ageing development rate, it is likely to be shorter than this time. Jing (2017) estimated that by 2050, the proportion of the elderly aged 65 and over in China will reach 26% and the proportion of the elderly aged 80 and over will reach 8%. Although China implemented the "comprehensive two-child" policy on January 1, 2016, and the "three-child" policy on July 20, 2021, both aimed at stimulating population and labour force growth to some extent, current research indicates that these policies have not been sufficient to pull China out of the aging dilemma (Wang et al., 2017). With the degree of aging in China continues to deepen, and the societal burden of elderly care is rising. This includes the need for substantial financial investment in areas such as healthcare, pension systems, and infrastructure development for the elderly. As China faces the progression of aging, whether the country can provide sufficient financial support for these growing needs has become a significant challenge.

Table 2.1 Ageing process and corresponding time comparison

	Years required
Country	**7%-14%**
Japan	24
UK	45
USA	65
Switzerland	45
France	115

Source: United Nations demographic database

Link: https://unstats.un.org/unsd/demographic-social/

[Accessed: 19.11. 2021]

2.1.2 Economic Development and Ageing in China

As a developing country, China entered an aging society later than most developed nations, but its pace of aging has been exceptionally rapid. While China has achieved broad coverage with its social security system, it remains underdeveloped, with a weak foundation and low benefit

standards. In contrast, developed countries entered an aging society with strong economic foundations and higher living standards, providing them with sufficient financial resources to meet the demands of an aging population. China's economic growth, however, began relatively late, and as a developing country with limited social capital, it now faces the challenge of aging before accumulating significant wealth (Li, 2013), giving it the distinctive characteristic of "growing old before becoming rich."

According to Huang (2020), from the perspective of Gross Domestic Product (GDP) development level, the ageing phenomenon generally occurs in developed countries when the average GDP for one person is higher than $5000 to $10000. When China entered the ageing society in the 21st century, its average GDP for one person was only $1000, still belonging to the ranks of low- and middle-income countries. Figure 2.5 shows us the per capita gross national income of Japan, Singapore, China, the United Kingdom, the United States, Malaysia, India and Brazil. China’s per capita income is still at a low level compared with several other countries with serious ageing (such as Japan, Singapore, Britain and the United States). The low national economy level and the rapid ageing development have become new obstacles to China's social and economic development.

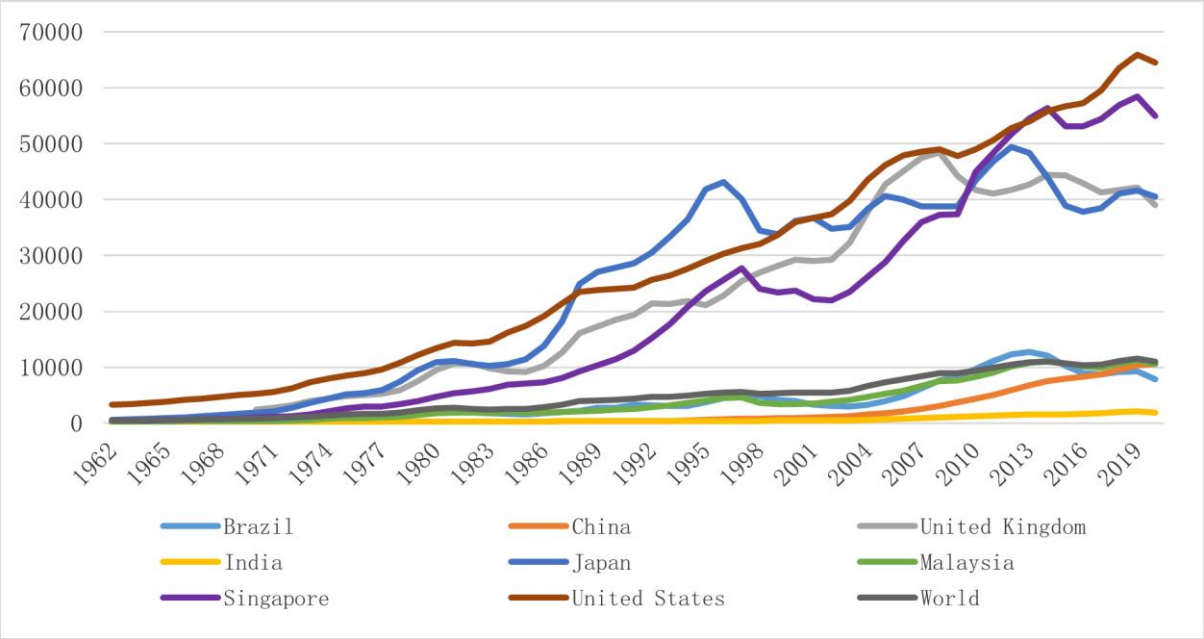

Figure 2.5 GNI per capita (atlas method) (current US$)

Source: The World Bank Data

Link: https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=CN

[Accessed: 09.11. 2021]

Notes: GNI per capita (formerly GNP per capita) is the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population.

The challenge of "growing old before becoming rich" is particularly evident in the areas of healthcare and elderly care. Health expenditure is a key indicator of a country's health security level, and as shown in Figure 2.6, the proportion of China's health expenditure relative to GDP remains notably low, with a significant gap compared to developed countries. Additionally, the international standard for elderly care suggests that there should be five nursing home beds per 100 elderly people, but China falls short of this benchmark. According to China's Elderly Care Service Development Report (2021), by the end of 2019, China had only 3.05 elderly care beds per 100 elderly individuals.

Furthermore, China's vast territory presents disparities in economic development, population mobility, and cultural openness across regions. These factors have a profound impact on the health conditions of the elderly and the attitudes and approaches to elderly care in different areas. As a result, there are significant regional variations in the degree of aging throughout the country, which will be discussed in the next section.

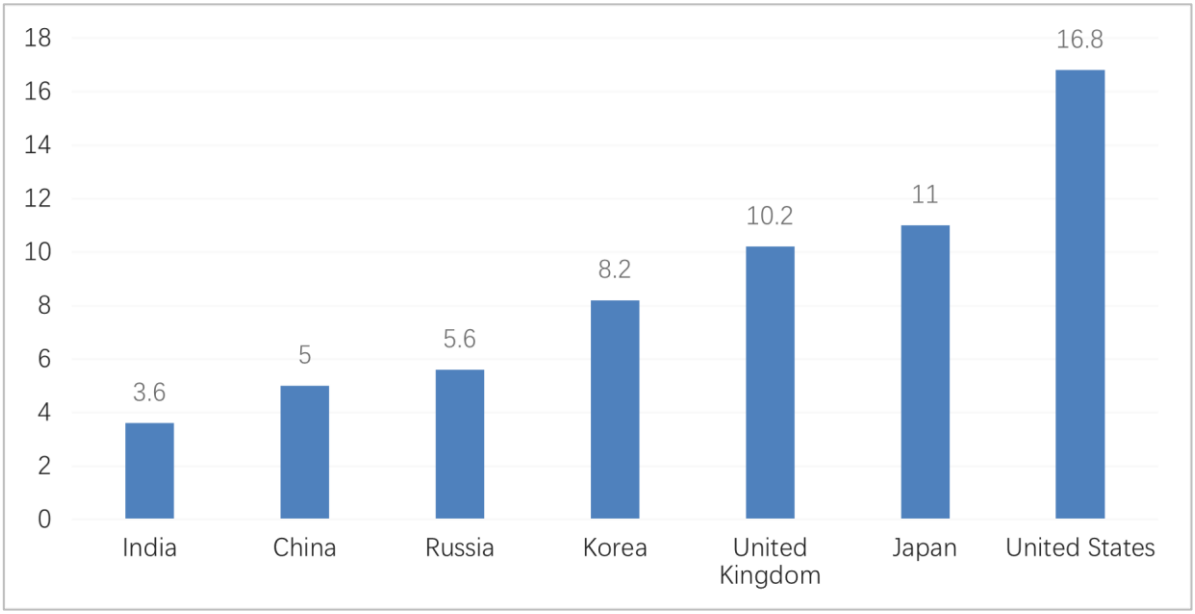

Figure 2.6 The percentage of health expenditure to gross domestic product (GDP) in 2019 (%)

Source: Statista

Link: https://www.statista.com/statistics/268826/health-expenditure-as-gdp-percentage-in-oecd-countries/

[Accessed: 10.11. 2021]

Notes: Health expenditure includes all expenditures for the provision of health services, family planning activities, nutrition activities and emergency aid designated for health, but it excludes the provision of drinking water and sanitation.

2.1.3 Regional Heterogeneity

Due to China's large land area, there are also significant differences in the degree of ageing among different regions in China. From the perspective of Administrative Region, Shanghai's population aged 65 and overreached 7% in 1979. It was the first area in China to enter the ageing process. Ningxia was the latest province to enter the ageing society in 2012, with a time span of 33 years. At present, from the perspective of regional distribution, the eastern provinces represented by Shanghai belong to a high ageing society, the central provinces represented by Beijing are in a medium and high ageing society, and the western cities represented by Gansu are in the transition stage of population ageing (Zhu, 2021). Figure 2.7 shows the elderly dependency ratio in different provinces and municipalities in China in 2021. Chongqing, with the heaviest burden of elderly care is three times that of Xinjiang with the smallest burden of elderly care. This situation is also an important reason for the different implementation status of elderly care policies and the construction progress of pension infrastructure in different provinces and cities in China (see Sections 2.2.2 and 2.2.3 for a detailed discussion of different elderly care policies).

From the perspective of urban and rural areas, China's ageing problem still has the phenomenon of urban-rural inversion for a long time (Zhu, 2021). Under the influence of the rapid development of cities, the migration of labour force leads to the outflow of many young and middle-aged labour force in rural areas, which makes the degree and speed of rural population ageing higher than that in cities. According to China's sixth census data, the population of the elderly aged 65 and over in rural China is 66.67 million, accounting for 10.06% of the total rural population. The number of elderly people aged 65 and over in China's cities and towns is 21.24 million, accounting for 7.98% of China's total urban population. If we make a horizontal regional comparison of the ageing population in rural areas, the scope of China's rural ageing gradually expands from coastal to inland, showing a distribution situation of "high in the East and low in the west", "high in the South and low in the north." In recent years, along with the improvement of rural productivity and the reform of registered residence system, many surplus labour forces have been created in rural areas. At the same time, influenced by educational factors, the upgrading of rural population quality has made large numbers of rural population go to city to work or study. Therefore, we have reason to expect that the gap between urban and rural areas will be further widened.

To sum up, China's ageing population has the characteristics of large base, fast growth rate, unbalanced regional distribution and unstable economic foundation. Followed by an increasingly heavy elderly care burden, which will be discussed in the next section.

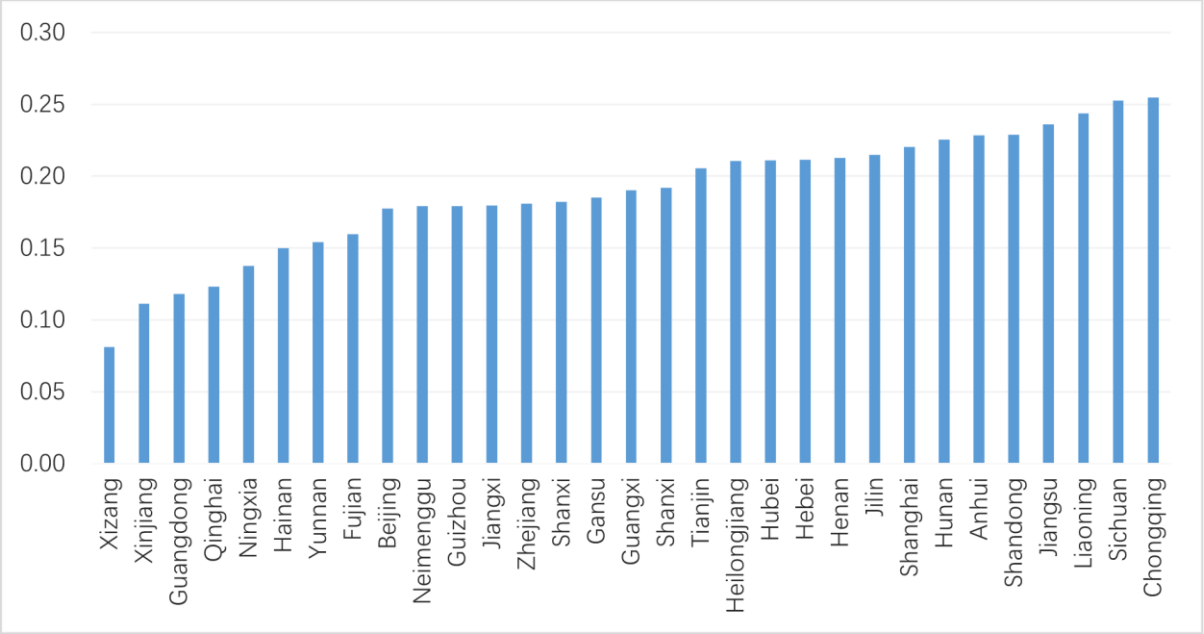

Figure 2.7 Elderly dependency ratio in different provinces and municipalities in China (2021) (%)

Source: China National Bureau of Statistics (Bulletin No. 5 of the seventh census)

Link: http://www.stats.gov.cn/ [Accessed: 03.11. 2021]

2.1.4 Increased Pressure on Elderly Care

As China's population continues to age, significant changes in the population structure are also emerging. Figure 2.8 shows the declining birth rate[7] and natural growth rate[8] in China over the past three decades. Under the dual effects of the declining birth rate and the rising ageing rate for a long time, the elderly care burden of China's society is increasing. Figure 2.9 shows the changes of elderly population ratio in different countries in the past 30 years.[9] Although China's

[7] Birth rate = annual birth population / annual average population * 1000 ‰. In the formula, the number of births refers to live births, that is, when the fetus leaves the mother (regardless of the number of pregnancy months), it has breathed or other life phenomena. The annual average population refers to the average population at the beginning and end of the year.

[8] Natural population growth rate = (annual birth population - annual death population) / annual average population * 1000 ‰ = population birth rate - population mortality

[9] Elderly population ration refers to the population ages 65 and above as a percentage of the total population.

elderly population ratio is still at a low level compared with developed countries. It has grown rapidly in the past decade and has exceeded the world average.

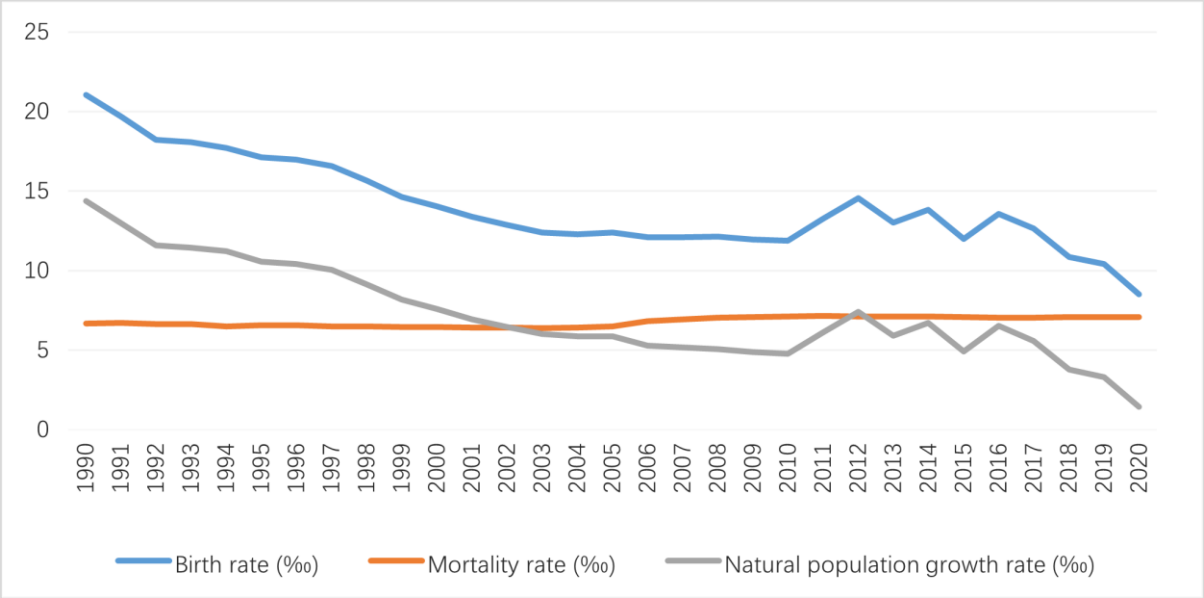

Figure 2.8 Changes in China's birth rate, mortality rate and natural growth rate

Source: China National Bureau of Statistics (Annual data)

Link: http://www.stats.gov.cn/ [Accessed: 03.11. 2021]

Note: Mortality rate = annual death population / annual average population * 1000 ‰

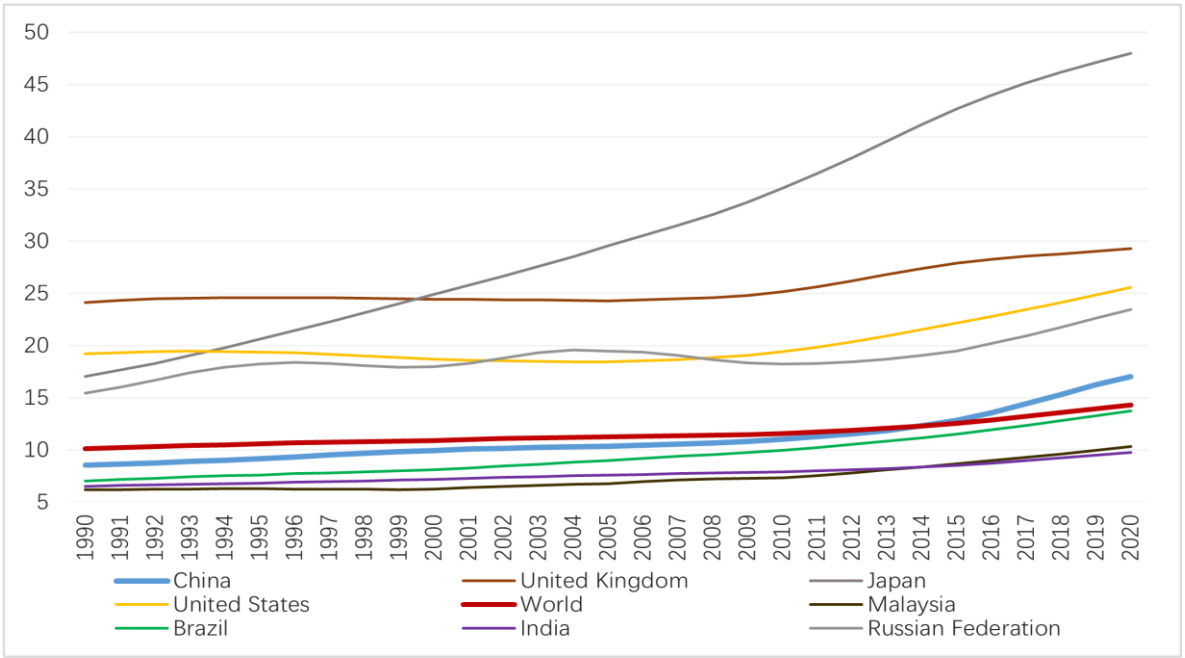

Figure 2.9 Changes in elderly population ratio in different countries (%)

Source: The World Bank Data

Link: https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=CN

[Accessed: 03.11. 2021]

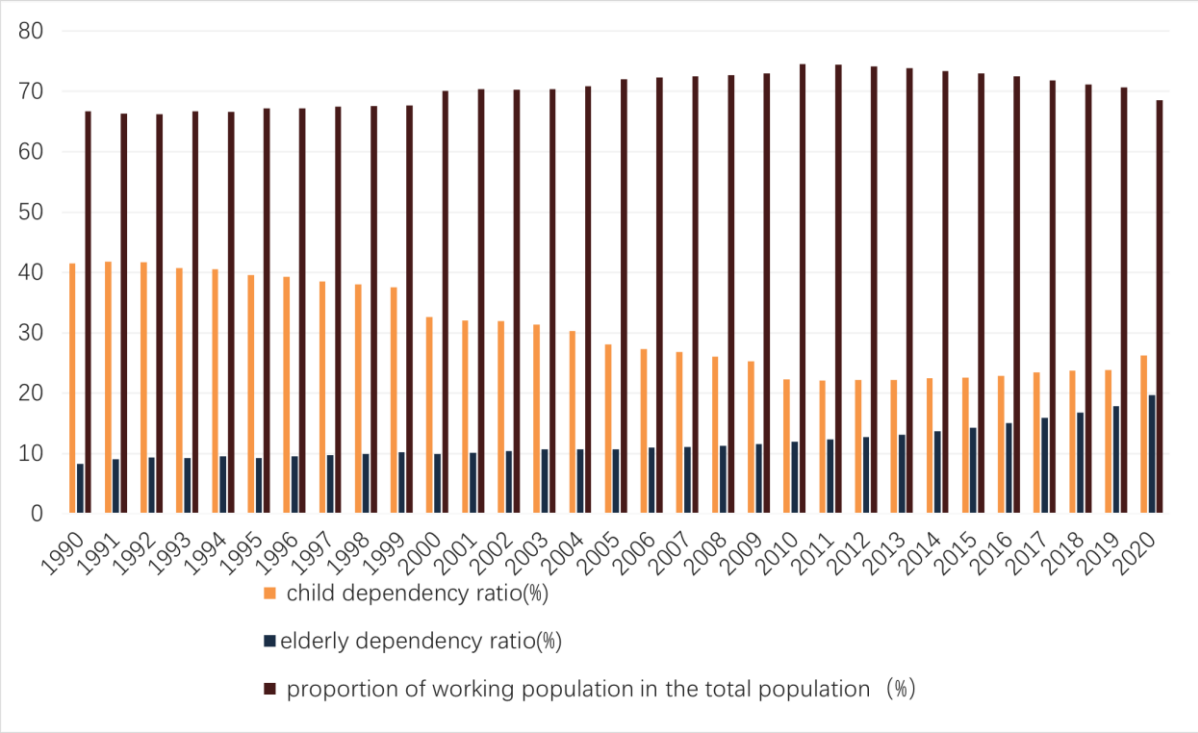

Figure 2.10 Changes in China's child dependency ration, elderly dependency ratio and proportion of working population in the total population (%)

Source: China National Bureau of Statistics (Annual data)

Link: http://www.stats.gov.cn/

[Accessed: 03.11. 2021]

Notes: The child dependency ratio refers to the ratio of the number of children and adolescents (0-14) in a population to the number of people of working age (15-64). It reflects the number of children per 100 people of working age. The elderly dependency ratio indicates the ratio of the elderly population (aged 65 and over) to the working age population (15-64) in a population. It is used to indicate how many elderly people should be borne for every 100 people of working age. The elderly dependency ratio is one of the indicators reflecting the social consequences of population ageing from an economic perspective. The proportion of working population in the total population refers to the number of working population (15-64) at the end of the year divided by the total population at the end of the year.

Figure 2.10 shows the dependency ratio of the elderly, the dependency ratio of children and the proportion of the working population in the total population in China in the past three decades. It shows that the elderly dependency ratio has been rising. The child dependency ratio decreased significantly from 2000 to 2010. Compared with 1990 (the child dependency ratio is close to four times the elderly dependency ratio), the elderly dependency ratio and child dependency ratio in 2020 are getting closer and closer. This shows that the pressure of childcare in China is decreasing, and the pressure of elderly care continues to rise. According to the data

of China's seventh census, the population aged 65 and over accounts for 19.69% of the working age people. This means that on average, every 5.08 working-age people have to raise an elderly person over the age of 65.

In the context of a rapidly aging society, formal and informal elder care represent the two principal mechanisms for addressing the growing demand for caregiving. The section 2.1.5 analyses the current state, interrelation, and challenges of these care modalities in China.

2.1.5. Formal Versus Informal Elderly Care

Having outlined the growing burden of elderly caregiving faced by families, it is important to distinguish between the two primary forms through which this care is provided: formal and informal care. Understanding the differences between these caregiving arrangements is essential, as each has distinct implications for family dynamics, labour supply decisions, and policy design.

Formal care refers to systematic and structured services provided by professional institutions or individuals who have received specialised training (Jiménez-Martín et al., 2012; Hengelaar et al., 2018). This type of care is typically paid and encompasses services such as medical care, rehabilitation, home nursing, and long-term institutional care. Formal care is regulated by legal frameworks and professional standards and is typically delivered by government agencies, healthcare institutions, social service organisations, or private enterprises. In contrast, informal care is provided by non-professionals, often family members, relatives, friends, or neighbors, in informal settings. It is generally unpaid and includes activities such as physical caregiving, emotional support, companionship, and assistance with household tasks. Informal care primarily relies on the personal experience of caregivers and their close relationships with care recipients, rather than professional training or standardised services.

Family care is predominantly characterised by informal care, with relatives or close contacts providing daily living support. Social care, on the other hand, is more closely aligned with formal care, delivered by professionals or institutions offering systematic services. Furthermore, the model that integrates family care as the foundation with supplemental social care often reflects a combination of formal and informal care, aiming to address the comprehensive needs of care recipients in both daily assistance and professional caregiving.

With the China's aging population deepening and despite the weakening of family-based elderly care, the mainly elderly care model in China remains family informal elderly care. Figures 11 and 12 show the elderly care arrangements for individuals aged 60 and over and 65 and over, respectively, based on The China Health and Retirement Longitudinal Study

(CHARLS) 2018 survey data. It is evident from Figures 11 and 12 that elderly individuals in China, particularly those aged 60 and over, are primarily cared for by their adult children. Only 1.73% of those aged 60 and over choose institutional elderly care. Although this proportion increase slightly among those aged 65 and over, it remains relatively very small compared to the share of elderly individuals receiving care from their adult children within the family.

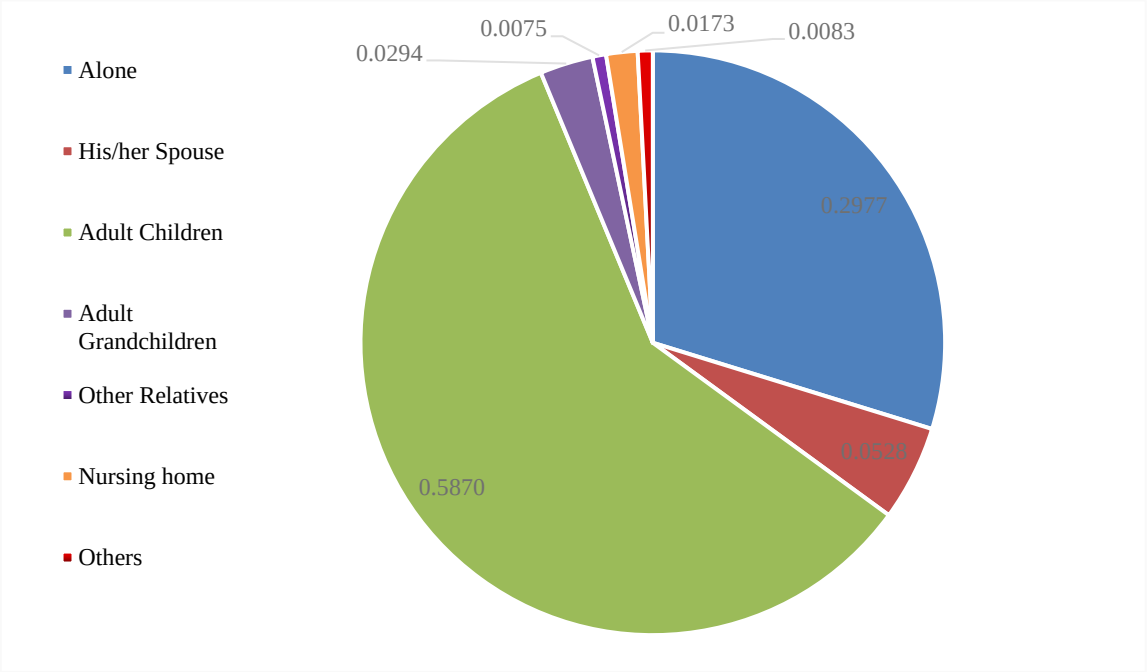

Figure 2. 11 Elderly care mode of the elderly aged 60 and over (2018)

Source: China Health and Retirement Longitudinal Study

Link: http://charls.pku.edu.cn/

[Accessed: 08.11. 2021]

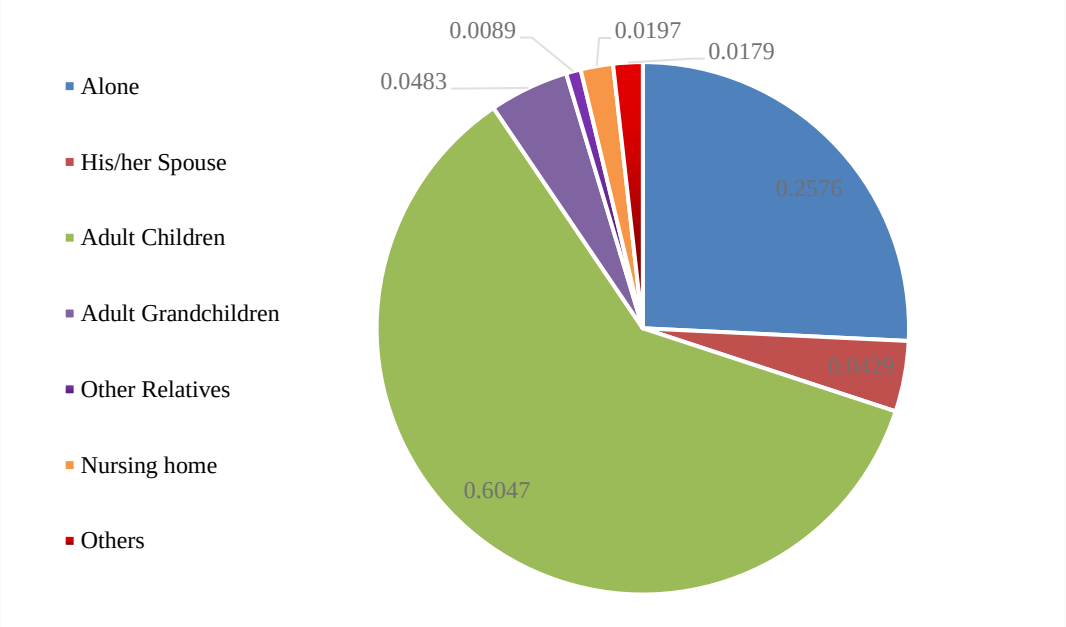

Figure 2. 12 Elderly care mode of the elderly aged 65 and over (2018)

Source: China Health and Retirement Longitudinal Study

Link: http://charls.pku.edu.cn/

[Accessed: 08.11. 2021]

Although the formal elderly care sector in China has been developing rapidly, significant challenges remain, with a persistent mismatch between supply and demand. The scarcity of social elderly care resources in China is primarily manifested in the contradiction between the growing demand for care and the insufficient supply to meet it.

From the demand side, since entering an aging society, China has witnessed a rapid increase in the elderly population, rising life expectancy, and a continuous surge in the prevalence of disability, dementia, and chronic diseases. These factors have driven the total volume and complexity of elderly care demands. The coexistence of escalating "rigid" needs and diverse care requirements has created an increasingly challenging landscape for care provision.

On the supply side, several structural issues exacerbate the problem. First, the availability of family care has declined. Accelerated social mobility and changes in family life cycles have intensified household separation and intergenerational division. This has made co-residence and regular in-person interaction among family members increasingly difficult, undermining the traditional family-based caregiving model. Second, China's public elderly care institutions and related service systems remain in an early stage of development. Public care services are characterised by inadequate overall supply, uneven quality, low levels of professionalisation,

and significant regional disparities. According to statistics from the Ministry of Civil Affairs, by the end of 2020, China had approximately 329,000 elderly care institutions and facilities, including 291,000 at the community level. However, this number remains insufficient to meet the needs of the rapidly growing elderly population.

Third, the marketisation of elderly care services faces notable limitations. Despite substantial growth in market-driven care services under a series of national policy incentives, the quality of these services varies significantly. This has resulted in low levels of trust among elderly individuals and their families. Furthermore, the economic cost of private care services often exceeds the financial capacity of most elderly individuals. According to the Fourth Sample Survey on the Living Conditions of the Elderly in Urban and Rural China, in 2014, the per capita annual income of urban elderly individuals was 23,930 RMB, while that of rural elderly individuals was only 7,621 RMB, leaving many unable to afford high-quality care services.

These challenges in the formal elderly care sector highlight the urgency of exploring more practical and sustainable solutions to address the care gap. In this context, home-based elderly care policies, which emphasise the integration of family care with community support and public services, offer a promising approach to balancing the demand and supply of elderly care resources. Following subsections will introduce the main China's elderly care model and the home-based elderly care policy gradually implemented since 2008 in China.

2.2 Home-Based Elderly Care Policy in China

This section consists of four subsections. The first subsection introduces the main elderly care models in China. The second, third and fourth subsections focus on the development process, contents and characteristics and current development results of home-based elderly care policy in China, respectively.

2.2.1 Family Elderly Care, Social Elderly Care and Home-Based Elderly Care

Although there is no consensus on the classification of the main elderly care models in China, according to source of elderly care resources, three main elderly care modes in China are family elderly care mode, social elderly care mode and home-based elderly care mode (Chen, 2000; Zhu, 2008 and Zhang, 2019).

Firstly, family elderly care mode refers to a way of providing elderly care resources by family members, which is a kind of feedback mode. Parents raise their children when the child is young and children support their parents after children adult. China has always been

dominated by Confucianism and has formed a traditional mode of family elderly care for a long time. Supporting the elderly has become an unshirkable responsibility of Chinese people. Although the function of family elderly care model in China is weakening with the smaller family structure. Many scholars still support that family elderly care model is still the main way of elderly care in China (Zhang, 2008; Wang et al., 2020 and Bao et al., 2022), due to the unique ethical value, life care and spiritual comfort function of family elderly care.

Secondly, it is the social elderly care model. The objective of the social elderly care model is to deliver comprehensive services to the elderly, addressing both their material and spiritual needs through the involvement of societal resources. This model is a systematic framework that integrates organizational, individuals, infrastructural, and technological elements to provide life care, rehabilitation, emotional support, emergency assistance, and opportunities for social engagement to the elderly. It is supported by a series of systems, including implementation standards, operational mechanisms, and monitoring frameworks.

There is a broad consensus among scholars on the necessity and inevitability of adopting a social elderly care model (Luo, 1999 and Liu, 2007). Zhang (2008) highlighted that as the elderly population in need of care continues to grow, while the available resources decrease, the integration of family-based and socialised elderly care will become an inevitable trend in the coming century. Given the weakening of traditional family-based elderly care, it is essential to actively promote the development of the socialised elderly service industry. However, despite these developments, the proportion of elderly individuals opting for the social elderly care model remains relatively low due to certain significant disadvantages, such as the high costs associated with solely social care and the need for elderly individuals to move away from familiar living environments.

Thirdly, it is the home-based elderly care model. The concept of home-based elderly care originated from the community care practices developed abroad, particularly the "community care" approach introduced in Britain in 1963 (Zhang, 2019). This model serves as a middle ground between "family elderly care" and "social elderly care" (Zhang, 2019). In China, home-based elderly care emphasises the family as the core unit, leverageing community resources and professional services to address the daily living needs of elderly individuals residing at home. While the family remains central to this model, it is complemented by community-based support, which provides life care, medical rehabilitation, and emotional comfort through professionally trained service personnel and community day care centers.

Scholars like Ren (2005) argue that this model is particularly well-suited to China's national conditions. Ren (2005) identifies two key aspects of the home-based elderly care model

that align with China's context. First, it corresponds with China's social reality of "getting age before getting rich". China's aging population emerged before the economy had developed sufficiently to provide comprehensive material support. Relying solely on government resources to develop elderly care services is not a practical solution. Compared to institutional elderly care, home-based services offer numerous advantages, including lower costs, broader coverage, and flexible service delivery methods. Secondly, this model aligns with the living habits and psychological preferences of the elderly in China. Influenced by traditional family ethics, many elderly Chinese are reluctant to leave their homes and communities for care in unfamiliar environments. The home-based elderly care model allows them to receive care within the comfort of their own homes and communities, catering to their preferences and psychological needs, and ensuring a peaceful and dignified ageing process. Although precise data is lacking, governments at various levels across China are actively promoting the adoption of the home-based elderly care model (see detailed discussions in Section 2.2.2, 2.2.3 and 2.2.4).

Each of the three main elderly care models discussed above has its own advantages and disadvantages. Given China's current ageing demographics, economic conditions, and cultural background, a hybrid elderly care structure has emerged in many cities. This structure is predominantly based on home-based elderly care, supplemented by institutional care, and supported by social home care services. For example, "9064" or "9073" elderly care structure has gained traction over the past decade since inception of home-based elderly care policy by Chinese government in 2008.[10] As a result, the home-based elderly care model has entered a phase of rapid development, contributing to the further optimisation of China's elderly care system.

2.2.2 Establishment of Home-Based Elderly Care Policy

In 2000, China officially entered the stage of population ageing. The government began to realise the importance of home-based elderly care. The Central Committee of the Communist Party of China and the State Council issued the decision on strengthening ageing work, which greatly promoted the development of China's ageing cause. The word "home-based elderly care" appeared frequently in relevant documents. Scholars' research on home-based elderly care

[10] The elderly care mode of "9064" or "9073" means that 90% of the elderly provide for the elderly through home-based care, 6% ~ 7% of the elderly provide for the elderly through nearby communities, and 3% ~ 4% of the elderly enter institutions for the elderly.

was richer, which greatly promoted the formal introduction of home-based elderly care policy (Wang, 2013). At this stage, although there is no special home-based elderly care policy at the national level, relevant policies and measures have been introduced in some provinces. The concepts and measures of home-based elderly care are becoming more and more common in relevant policy documents at the national level.

In 2008, the National Ageing Office and the Ministry of Civil Affairs jointly issued a policy to promote home-based elderly care services, marking the formal implementation of home-based care policy in China at national level. This policy catalysed rapid development in China's home-based elderly care system, supported by strong governmental policy and financial backing. During this period, community services were increasingly standardised, and institutional elderly care services also saw significant growth. The government's vision for a comprehensive social elderly care system became clearer, with a focus on home-based care, further advancing its development. The main national laws promulgated at this stage are shown in Table 2.2.

Table 2.2 Summary of elderly policies issued by China from 2008 to 2021

Year	Policies	Policy category
2008	Opinions on comprehensively promoting home-based elderly care services (In China's national level policies, there is a policy for "home-based elderly care" for the first time. The policy explains the significance of home-based elderly care, and expounds the basic tasks of home-based elderly care services and eight relevant security measures.)	Home-based care services
2010	Opinions on strengthening and improving the construction of urban community residents' committees (In view of the outstanding problems and actual needs in the work, the opinions put forward policy suggestions on strengthening and improving the construction of urban community residents' committees from eight aspects: clarifying responsibilities, expanding community teams, strengthening community infrastructure construction, etc.)	Community work talent team
2011	The 12th Five Year Plan for the construction of urban and rural community service system (This plan expounds the pension pressure faced by China during the 12th Five Year Plan period, the connotation and positioning of the social elderly care service system, as well as the objectives, tasks and basic security measures of the social elderly care service system.)	Community elderly care service
2011	Notice on printing and distributing four national vocational skill standards for elderly care nurses (To stipulate the national professional skill standards for elderly nursing nurses)	Professional standards for elderly care nurses
2013	Measures for the administration of elderly care institutions (China's first administrative measures for elderly care institutions. The measures are divided into 6 chapters and 36 articles, including general provisions, service contents, internal management, supervision and inspection, legal responsibilities and supplementary provisions, and shall enter into force as of July 1, 2013.)	Management of elderly care institutions
2014	Notice on promoting the construction of urban elderly care service facilities (In order to accelerate the construction of urban elderly care service facilities, the opinions makes provisions and instructions in three aspects: implementation significance, implementation objectives and specific safeguard measures.)	Elderly care service facilities
2014	Notice on government procurement of elderly care services (This notice explains the work content, work objectives, work responsibilities and specific work steps of the government's purchase of elderly care services.)	Government purchase of services
2016	Opinions of the general office of the State Council on comprehensively liberalizing the elderly care service market and improving the quality of elderly care services (In order to promote the better and faster development of the elderly care service industry, with the consent of the State Council, the access threshold will be further reduced and social capital will be guided to enter the elderly care service industry. It also plans the market structure and service objectives of the elderly care service industry.)	Optimize services
2017	Provisions on healthy ageing in the 13th five year plan (This plan expounds the new challenges faced by China's ageing cause during the 13th Five Year Plan period, and makes arrangements in five aspects: guiding ideology, overall	Improve the health level of the elderly

	principles, overall objectives, main tasks and safeguard measures.)	
2019	Notice on clarifying the policy of value added tax exemption for elderly care institutions	Pension institutions
2019	Implementation plan for special action of urban enterprise linkage for inclusive elderly care (Trial) (In order to further promote the cause of elderly care, based on the principle of voluntary participation, various enterprises are encouraged to participate in the development of local elderly care with the support of national funds. It also explains the work content, linkage objectives, responsibility division, capital structure and so on.)	Pension fund support
2020	Notice on printing and distributing training program for directors of nursing homes (for Trial Implementation) and training program for elderly social workers (for Trial Implementation) (In order to ensure the training of 10000 directors of nursing homes and 100000 full-time and part-time elderly social workers by the end of 2022, the Ministry of Civil Affairs printed and distributed the above two notices and defined the training objects, standards, contents, time and assessment requirements.)	Social service provider
2020	Opinions on promoting property service enterprises to develop home-based community elderly care services (Combined with the current development status and shortcomings of home-based elderly care services in China, the policy gives further development direction, objectives and specific measures. It also explains and arranges the smart home-based elderly care.)	Community elderly care service

Source: China National Committee on Ageing and Ministry of Civil Affairs of the People's Republic of China

Link: http://www.cncaprc.gov.cn/ http://www.mca.gov.cn/

[Accessed: 15. 05. 2021]

2.2.3 Contents and Characteristics of Home-Based Elderly Care Policies

China's home-based elderly care policy is a coordinated system rather than a single policy, aiming to provide comprehensive support for the elderly to age in their familiar environment. During the gradual implementation process, China's home-based elderly care policy has gradually developed the following four characteristics.

Firstly, China's home-based elderly care policy is government-led, with active participation from families and social forces. Unlike in some developed countries, such as the UK and Japan, where community elderly care is predominantly government-driven and supported by social forces, China adopts a more collabourative approach. While the central governments play a leading role in decision-making, financial support, market cultivation, and the supervision and management of home-based elderly care policy, the implementation of the policy is not entirely government controlled. There are no specific or unified regulations dictating the development of services, the selection of service models, or the management and operational frameworks across provinces and cities. Instead, these aspects are determined flexibly by local governments, based on their unique circumstances.

Second, the exploration process of China's home-based elderly care policy reflects the characteristics of "bottom-up". In terms of policy content, the central home-based elderly care policy incorporates the insights and outcomes gained from local-level exploration and implementation efforts. In terms of time, the start work of home-based elderly care in developed

provinces and cities such as Liaoning, Beijing, Zhejiang and Guangzhou were earlier than the release time of the national home-based elderly care service policy. Moreover, due to different economic development and different degree of population ageing in various provinces and cities, the time for comprehensively promoting home-based elderly care policy in various provinces and cities in China is different. Based on the current situation of the shortage of elderly care resources, this bottom-up development model of trial before policy is not only conducive to the development and innovation of home-based elderly care services according to local conditions but also improve the utilisation of elderly care resources and funds. It can help China achieve rich development achievements and experience in a short time, providing reference for government decision-making and avoid policy deviation (Luo; Wang; fan; Yu and Chen, 2019).

Third, the focus of China's home-based elderly care policy development has gradually shifted from hardware infrastructure to software services. In the initial stages of home-based elderly care policy development in China, government capital investment was primarily directed towards the construction of elderly care institutions, activity centers, and other facilities, as well as the adaptation of environments to be more age-friendly. However, in recent years, as home-based elderly care services supported by the policy have continued to expand and deepen, the government has introduced a series of service standards, including those for care service requirements, safety management, and service quality evaluation. These standards have created a favorable policy environment for the growth of home-based elderly care services in China. Concurrently, there has been an increasing emphasis on innovating the content and delivery modes of home-based elderly care services and enhancing the scientific management of these services (Zhai, 2019). The government, in collabouration with social forces, has also been actively involved in cultivating service professionals and building a comprehensive service network. These measures are expected to optimise the use of existing hardware facilities and significantly improve the utilisation rate and quality of elderly care resources (Zhang, 2019).

China's family-based elderly care policy has transitioned from offering basic, isolated services to establishing a comprehensive service system. Luo, Wang, Fan, Yu, and Chen (2019) outline this progression through three stages: "single service, comprehensive service, and service system development." Initially, policy-supported home-based elderly care focused on meeting essential needs such as life care and housekeeping. However, after 2010, the approach shifted toward greater integration, with a growing emphasis on improving the quality of life for the elderly rather than merely addressing basic needs. The government has actively worked to build a robust network of home-based elderly care services, piloting innovative models such as "temporary residence services," "time banks," and "elderly care communities" to promote

personalised and comprehensive care solutions. Additionally, the home-based elderly care system has increasingly integrated with the broader social security system, the elderly consumer market, ageing-related legislation, and other aspects of elderly care services.

In terms of the contents, although home-based elderly care policies differ across provinces in China, they typically encompass three broad categories of services:

The first one free or discounted basic care services. These services provide essential support for daily living and aim to improve the quality of life for the elderly. Basic care includes assistance with personal hygiene, dressing, feeding, mobility aids, and help with day-to-day tasks like grocery shopping, meal preparation, house cleaning, and laundry. Additionally, specialized care for individuals with disabilities or cognitive impairments, such as rehabilitation services, cognitive training, and assistance with medication management, is often included. In some regions, meal delivery services or home modifications to improve accessibility for seniors are also offered as part of the basic care package.

The second category is free or discounted health care services. These services focus on promoting and maintaining the physical health of the elderly through preventive, rehabilitative, and therapeutic care. Health management programs may include regular health check-ups, chronic disease monitoring, and personalized rehabilitation training to enhance mobility and well-being. Traditional Chinese medicine also plays a significant role in these services, offering therapies such as acupuncture, cupping, massage, and moxibustion to treat common ailments and improve vitality. In many cases, community health workers provide guidance on manageing chronic illnesses like diabetes and hypertension, ensuring the elderly maintain an active and healthy lifestyle.

The third category includes psychological and emotional support services. Recognising the importance of mental health and emotional well-being, many home-based care policies include psychological support services. These services aim to reduce loneliness, anxiety, and depression among the elderly by offering counseling, emotional support, and fostering social connections. Local governments and communities often establish senior clubs, organise social events, and offer classes on various topics of interest to the elderly, such as arts, crafts, music, or fitness. Moreover, family counseling services are offered to encourage better communication and collabouration within families, strengthening the support system for the elderly.

2.2.4 Development Results of Home-based Elderly Care Policies

With the deepening of China's ageing population, Chinese governments at all levels pay more and more attention to the development of the cause of the elderly. As the function of traditional

family elderly care is becoming weaker and weaker, the home-based elderly care model in China is being increasingly accepted. Table 2.3 shows the results of promoting home-based elderly care policies in some cities.

According to the 2017 statistical bulletin on the development of social services (Ministry of Civil Affairs, 2017), there were 43000 community elderly care institutions and facilities and 83000 community mutual aid elderly care facilities in China. There were 7.448 million old-age beds in total, an increase of 2% over the previous year (30.9 old-age beds per 1000 old people), including 3.385 million community accommodation and daily care beds. By the end of 2017, there were 407000 community service institutions and facilities, including 619 community service guidance centers (including 16 in rural areas), 25000 community service centers (including 10000 in rural areas), 143000 community service stations (including 75000 in rural areas), 113000 other community service facilities and community service centers (stations). The coverage rate is 25.5%, including 78.6% for urban community service centers (stations) and 15.3% for rural community service centers (stations). There are 96000 community voluntary service organisations. Figure 2.11 shows the changes in the number of community service institutions and community services centers in China over the past 13 years. Obviously, the number of that are growing very rapidly. This can also explain the good implementation result of China's home-based elderly care policies.

Table 2.3 The results of promoting home-based elderly care policies

	Year	Result
Beijing	**2000**	Put forward the "9064" new elderly care mode
	2017	259 home-based elderly care stations have been built and operated in Beijing, basically realizing the integrated development of institutions, communities and homes. The standardization system for elderly care services has been basically established, and 8 local standards for elderly care services have been issued, involving service quality of elderly care service institutions, health assessment of service objects, health archives, nosocomial infection control, etc.
Shanghai	**2007**	Put forward the "9073" new elderly care mode
	2013	A total of 533 community catering service points have been built in Shanghai, basically establishing the "9073" elderly care service pattern.
	2017	Shanghai has built 703 elderly care institutions, 127 community care homes for the elderly, 560 day service centers for the elderly, 334 community home service organizations, etc.
Tianjin	**2012**	Tianjin focus on promoting the construction of 20 popular projects and elderly care service projects, adding 4000 beds in elderly care institutions, 100 daily care centers for the elderly, and building one elderly community catering service center in the central urban area. It achieves 75% coverage of catering service community in the central urban area and 80% of the nursing staff in the elderly care service were certified.
Zhejiang	**2014**	Zhejiang Province has basically established a "9643" elderly care service pattern. The province has built 13140 urban and rural community home-based elderly care service centers, 16400 home-based elderly care service stations and 23900 community activity centers (rooms), basically covering urban communities and more than 75% of rural communities. A total of 23600 demonstration home-based elderly care centers with both day care and full care services have been built in the province.
	2018	Zhejiang Province vigorously develops the construction of the old dining hall and the central dining hall, and provides six kinds of meals service, such as the meal service, the neighbourhood help meal, the Internet plus the help meal, etc. By the end of 2018, it has covered 52.6% of the community in Zhejiang.
Jiangsu	**2011**	The province's home-based elderly care service centers (stations) cover 88.22% of urban communities and 42.06% of rural communities

	2015	The total number of home-based elderly care service centers (stations) in the province reached 19818, realizing full coverage of urban communities and 88.42% coverage of rural communities. 90% of counties (cities and districts) have built information community home-based elderly care service platforms such as virtual nursing homes, which basically meet various elderly care needs such as day care, life care and institutional care of the local elderly. In 2015, there were 2122 elderly care service institutions in the province, with 40.17 elderly care beds per 1000 elderly people. 85.5% of the elderly nurses took up their posts with certificates.
Hubei	**2017**	There are 3294 and 11176 home-based elderly care service facilities in urban and rural communities, with coverage rates of 75% and 46% respectively. There are 32 elderly care beds per 1000 elderly people.
Shandong	**2010-2015 (plan)**	There are 250000 new elderly care beds in the province, with maintenance and medical care beds accounting for more than 30% of the total number of various elderly care beds. It is realized that there are 30 elderly care beds per 1000 elderly people, that day care services cover all urban communities and more than half of rural communities, that the elderly care service information platform basically covers urban and rural communities in the province, and that all elderly care nurses work with certificates. The province has basically established a social elderly care service system based on home, supported by communities and supported by institutions.
Heilongjiang	**2013**	The elderly care bed rate of urban elderly care service institutions in the province reached 2.5%. 80% of urban communities carried out home-based elderly care services, and the coverage of daytime care rooms for the elderly in urban communities reached 50%.
	2015	All 3050 urban communities carry out home-based elderly care services, and more than 1 / 3 of rural communities carry out home-based elderly care services. It has comprehensively established a social elderly care service pattern based on home-based elderly care, supported by community services and supported by institutional elderly care. 97% of the elderly in the province rely on community services to realize home-based elderly care, and 3% of the elderly live in elderly care institutions.

Source: Committee on Ageing and Ministry of Civil Affairs of the different provinces and cities

[Accessed: 03. 11. 2021

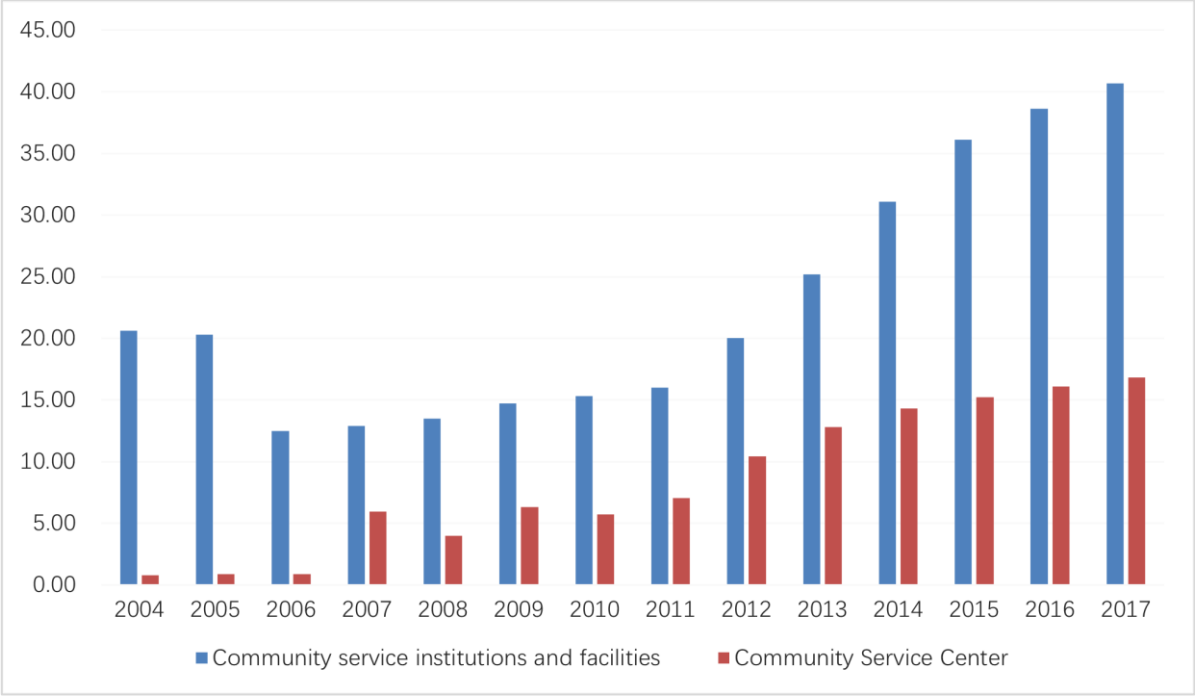

Figure 2.13 The changes in the number of community service institutions and community services centers

Source: Statistical Bulletin on the Development of Social Services

Link: http://www.mca.gov.cn/

[Accessed: 19. 11. 2021]

2.3 The Labour Market in China

This chapter provides a brief introduction to the background of the labour market in China, focusing on the labour force participation patterns and paid working hours of adult children.

2.3.1 Labour Force Participation

Figure 2.12 shows the labour force participation rate for both male and female in over the past 25 years. Even though China's male and female labour force participation rates showed a downward trend, they still maintained the world leading level (Statista Data, 2021) with more than 60% and 75% for female and male, respectively.

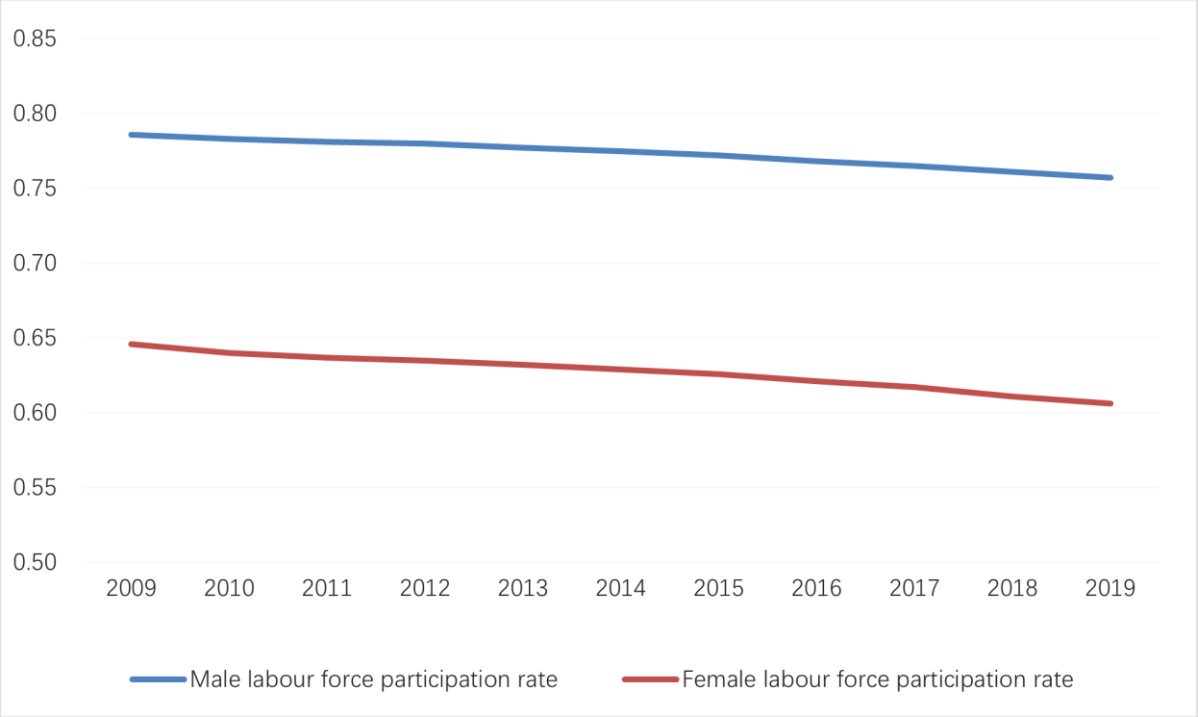

Figure 2.14 Labour force participation rate by gender

Source: Statista Data

Link: https://www.statista.com/statistics/252721/female-labour-force-participation-rate-in-china/

[Accessed: 21.12. 2021]

In terms of the continuous decline in labour force participation rates in China for both male and female, Yao and Tan (2005) argue that the radical reforms of state-owned enterprises, which resulted in the diversion and layoffs of employees, contributed to the drop in labour force participation. Although the state-owned enterprises' reforms concluded in 2005 and the employment situation improved, labour force participation did not return to pre-reform levels. Wu (2015) suggests that as wage levels continue to rise, the income effect outweighs the substitution effect. He argues that the upward shift in wages causes the labour supply curve to bend backward, leading to a decline in labour force participation. Moreover, the labour force participation is further reduced as the working-age population aged 16 to 24 delays entering the labour market due to extended education periods (Wu and Chen, 2021).

From the perspective of gender, the male's labour force participation rate is higher than female's labour force participation rate by 15 percent and over the past 15 years, moreover, the decline of male labour force participation rate in China is 1.1 percent smaller than that of female labour force participation rate (1.4%).

The gender gap in labour force participation is a widespread phenomenon globally. Beyond traditional human capital factors such as education and experience, gender differences in preferences and psychological traits have been widely discussed (Croson and Gnezy, 2009; Bertrand, 2011; Azmat and Petrongolo, 2014). Another significant body of research highlights the role of women as the primary family caregivers, which constrains their participation in the labour market. To balance work and life, women often work shorter or more irregular hours than men, are more likely to interrupt their careers, and tend to focus on different occupations and industries. Moreover, these factors contribute to the gender gap through differences in job-seeking behavior and preferences for job characteristics that are particularly attractive to women, such as shorter or more flexible working hours, non-standard work arrangements, and shorter commuting times. Indeed, childbirth creates significant and lasting earnings disparities between mothers and fathers (Kleven et al., 2019).

Unlike many countries such as the UK, the US, and France, which have seen an increase in female labour force participation and a narrowing gender gap, China is experiencing a widening gender gap in labour force participation. The widening gap in labour force participation between men and women in China can primarily be attributed to two main reseasons: On the one hand, it is attributed to market-oriented reform (Yao and Tan, 2005; Li and Li, 2008; Lu and Ge, 2000; Cai and Wang, 2004; Feng and Feng, 2001; Pan, 2002; Liu et al., 2010). With the accelerating process of industrialisation and urbanisation, the professional division of labour in society is becoming more and more detailed (Guo, 2020). The disadvantage of women's time and energy in work activities gradually appears. Especially after the Chinese government launched the restructuring and reform of the public sector in 1997, female workers leave the government's employment umbrella (Feng and Feng, 2001; Pan, 2002), individuals' social security rights (such as unemployment support, health insurance and pensions) are directly linked to their labour market results. This makes those family members who have to pay more time and energy to take care of their families "punished" by the labour market. In China, women are often the providers of family care, witch lead that the labour force participation of Chinese women showed an obvious downward trend in this period (Liu, 2010). At the same time, this period is also a period of rapid improvement of Chinese women's social status. Women's awareness of independence has been strengthened, and their education level

has also been significantly improved. With the improvement of women's educational level and social status, the bargaining power of Chinese women in the labour market has also improved rapidly, but in the face of unequal treatment of women in the employment market, some women choose to give up employment (Yao and Tan, 2005; Li and Li, 2008).

On the other hand, it is the influence of family structure and division of labour within the family on women's employment. Since the reform and opening, China's family structure has gradually changed from big family to small family (Shen, Zhang and Yan, 2012). Family members in small families face increasing pressure and responsibility to take care of the family, which will affect the labour supply of family members. Influenced by Chinese traditional culture, women are often the main undertakers of family care. If women choose to have children, they will have to face the work pressure and even career dilemma caused by work interruption or less time and energy invested in work to give birth and care for children. Women over the age of 45 are usually also suffer from the dilemma of taking care of their elderly parents or parents in law and being unable to take care of their work. To take better care of their families, some women have to sacrifice all or part of their labour supply.

Li (1995) argues that after marriage, family caregiving responsibilities further widen the gap in labour force participation rates between men and women. According to the data of China Family Panel Studies (CFPS) in 2018, author sorted out the labour force participation of men and women aged 16-64 in unmarried and married (with spouse) in Table 2.4. The labour force participation rate of women decreased significantly after marriage, while the labour force participation rate of men increased slightly. In unmarried status, the labour force participation rates of men and women are 90.76% and 90.03% respectively, and the gap is only 0.73%. However, in married (with spouse) status, the labour force participation rates of men and women are 91.34% and 81.37% respectively, and the gap is widened to 9.97%. After marriage, women's family roles become more complex, and they need to bear more and more family responsibilities. We have reason to believe that this has led to a decline in the probability of employment of women. However, the level of male labour force participation is little affected by family responsibility.

Although women's social status has been continuously improving now, the influence of social roles on gender differences remains significant. According to the report on the current situation of women's workplace in China (2018), in job selection, the primary consideration of working women is "convenience to work", while the primary consideration of working men is "growth and development". Figure 2.13 shows the factors considered by men and women in choosing jobs under different marital states. From the perspective of women's marital status,

the proportion of unmarried women considering growth and convenience to work is basically close, while married women have a stronger demand for convenience to work. For married women, maybe because the time they need to invest in the family increases, they may more likely giving more consideration to the convenience of taking care of the family compared with unmarried women. Because of this, the primary consideration is the convenience of commuting to and from work, which virtually reduces the opportunities of women in choosing job and may lead women to lose more potential excellent opportunities.

Table 2.4 Labour force participation rate (by gender and marital status)

	Male	Female
Unmarried	90.76%	90.03%
Married（with spouses）	91.34%	81.37%

Source: China Family Panel Studies

Link: http://isss.pku.edu.cn/cfps/index.htm

[Accessed: 15.12. 2021]

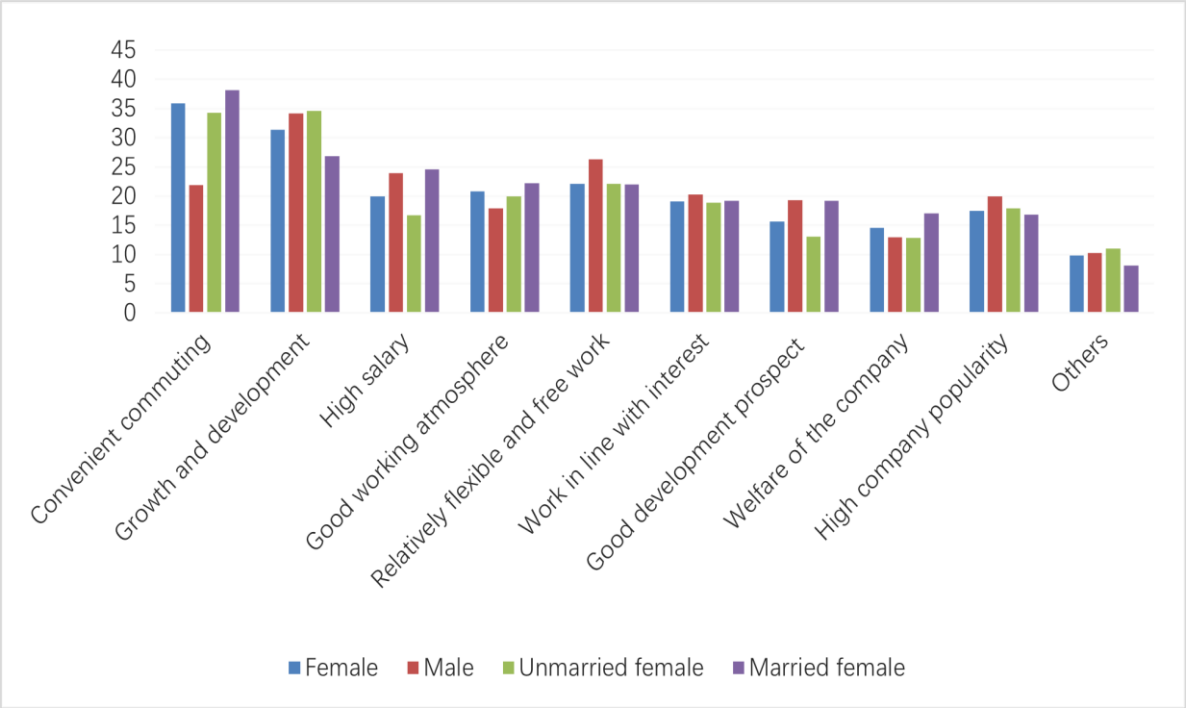

Figure 2.15 Factors to consider when choosing a job (by gender and marital status)

Source: Since China

Link: http://science.china.com.cn/2018-03/07/content_40243603.htm

[Accessed: 13.11. 2021]

2.3.2. Unemployment

According to the Seventh National Census of China, the female unemployment rate reached 7.26% in 2020, which was 1.5 percentage points higher than the male unemployment rate of 5.76%. Figure 2.14 presents the unemployment rate by age groups and gender. For women aged 20 to 49, the unemployment rate in each age group is higher than that of men. Particularly, in the prime working age groups of 25-29, 30-34, and 35-39, the unemployment gap between women and men is at its widest. However, after the age of 50, the female unemployment rate decreases and falls below that of men.

Existing literature offers several explanations for the gender disparities in unemployment, which complement the discussion in Section 2.3.1 regarding the reasons for the low female labour force participation rate. These explanations are as follows: First, the relatively tight labour market and the lack of an equitable and lagging labour protection legal system may lead to gender-based employment discrimination. Myatt and Murell (1990), in their study of Canada, found that key determinants of gender differences in unemployment include the minimum wage level and the bottlenecks in the economy's capacity to absorb new labour force entrants. Gender biases may stem from information asymmetry, where employers assume that women, on average, possess lower labour skills and qualifications than men (Webster, 2012), leading to discriminatory treatment between genders (Ham et al., 1999). Under equal skill and qualification conditions, men are more likely to receive preferential treatment, and discrimination against women is present in the hiring process (Chen and Hamori, 2008).

Second, as women tend to bear more household responsibilities than men, the labour market reacts differently to workers of different genders with similar human capital characteristics, particularly in terms of marital status (Masague and Carolina, 2008). Due to these family responsibilities, women may also exhibit lower job search intensity, less human capital accumulation, more frequent entries and exits from the labour market and as a result slower human capital accumulation and higher reservation wage levels. These factors, interacting with market mechanisms, can also contribute to the gender differences in unemployment (Azmat et al., 2006).

Finally, considering China’s specific context, the mid-1990s state-owned enterprise reforms resulted in a large number of laid-off workers. Empirical studies have confirmed that the layoff rate for female workers was significantly higher than for men, and women also faced greater difficulty in re-entering the labour market (Appleton et al., 2002; Giles et al., 2006).

These structural shocks disproportionately affected women and had long-lasting implications for their labour market participation. As a result, the gendered impact of economic reforms remains a critical factor in understanding the decline in female unemployment in China.

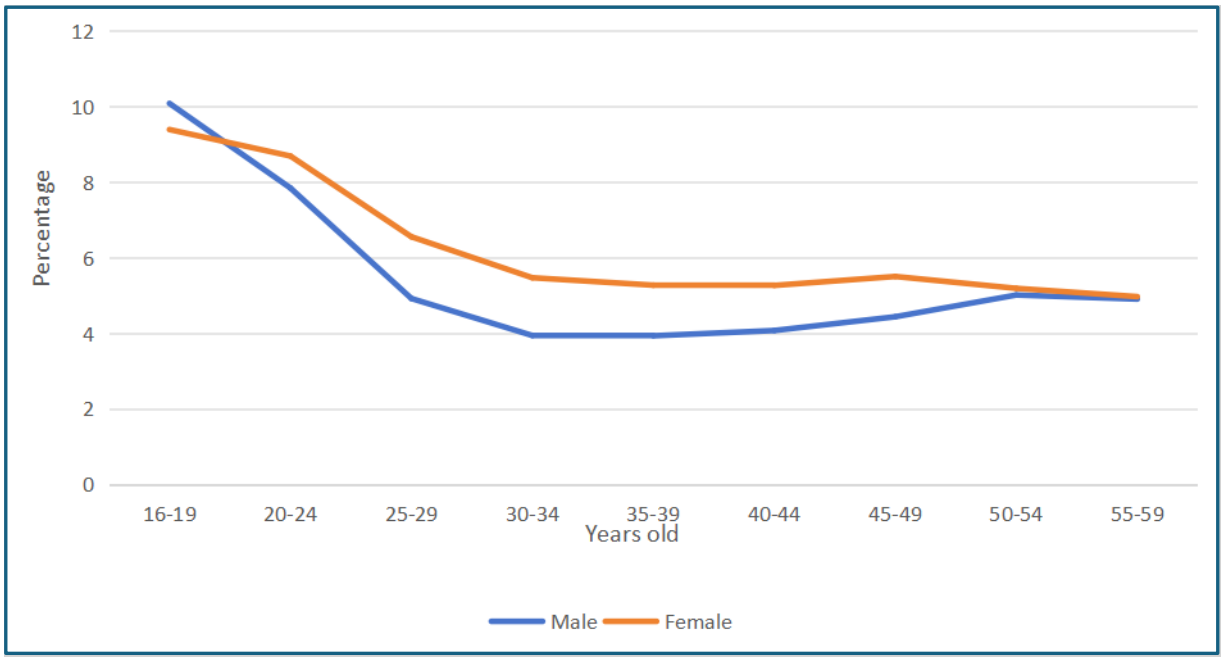

Figure 2.16 Unemployment Rate by Gender

Source: National Bureau of Statistics of China

Link: https://data.stats.gov.cn/easyquery.htm?cn=C01

[Accessed: 13.01. 2025]

2.3.3 Hours of Paid Work and Hours of Household Work

As mentioned above, the reason why women's labour force participation, especially those who enter marriage, has decreased significantly is that they have to allocate more time to take care of family. In comparison, the labour force participation of men is less affected. Similarly, in terms of hours of paid work and hours of household work, men and women, especially married men and women, also show different trends.

According to the survey report on the current situation of Chinese women's workplace in 2018, Table 2.5 shows the time changes of men and women in work and family by different marital status. Married women work in the labour market 1.5 hours less than unmarried women every week and the time women spend at home are increase 0.9 hours per day. Women spend more time in the family than men when they are not married, while after marriage, this gap is further widened (from 8% to 22%).

Table 2.5 Time changes of men and women in work and family by different marital status

	Women	Men	Gap
Weekly working hours	47	51.3	9%
Time spent in the family every day(hours)	2	1.7	-15%
	Unmarried women	**Unmarried men**	**Gap**
Weekly working hours	47.6	52	9%
Time spent in the family every day(hours)	1.7	1.5	-8%
	Married women	**Married men**	**Gap**
Weekly working hours	46.1	50.4	9%
Time spent in the family every day(hours)	2.6	2	-22%

Source: Science China

Link: http://science.china.com.cn/2018-03/07/content_40243603.htm

[Accessed: 11.11. 2021]

Similar results are also reflected in the empirical research results in China. Zhou (2013) investigated the impact of childcare and elderly care on rural married women's non-agricultural employment by using the data of four Jiangsu field surveys in 2008, 2009, 2010 and 2012. He finds that raising children and supporting the elderly reduced the possibility of non-agricultural employment and working hours. Chen et al. (2016) based on the data of "China Health and Nutrition Survey (CHNS)" from 1991 to 2011 empirically tests the impact of providing family care on women's employment by using panel data and instrumental variable methods. It shows that it is difficult for women to balance care and work when they spend more than 20 hours a week in high-intensity care. Care responsibility can reduce the working hours by 2.8-4.8 hours per week.

Another interesting phenomenon is that according to the data of China Family Panel Studies (CFPS) in 2018, male elderly caregivers (care elderly parents or parents-in-law) under the age of 38[11] accounted for 30.6% of all male caregivers, while female caregivers under the age of 38 accounted for 60.5% of all female caregivers. In other words, today's younger female caregivers have a heavy burden of elderly care, and with the growth of the age of caregivers, men have become the main force in providing elderly care. If gender differences are ignored, the caregivers under the age of 38 account for 46.01% of all caregivers providing elderly care. These elderly care providers who under the age of 38 were born in China after the implementation of the one-child policy, which means that most of them have no brothers and sisters and need to undertake elderly care alone. This also shows that the only child has become

[11] The Chinese government has implemented the one child policy since January 1, 1980, that is, a couple can only have one child. People born in 1980 were 38 years old when they were surveyed by CFPS in 2018.

an elderly caregiver that cannot be ignored. With the passage of time and the continuous improvement of medical level, more and more one-child families (both husband and wife are only children) will face greater and greater pension pressure. This is because it is likely that they need to take care of their parents and parents in law, but also their grandparents.

In conclusion, women's family care work will affect their paid working hours. This has also become a disadvantage in the competition of female employees in the workplace. When female employees face the dual pressure of work and life responsibilities, they have to choose between family and work with limit time and energy.

2.3.4. The Effect of Formal Care on Informal Care and the Labour Market

As discussed in Sections 2.1 and 2.2, the rapidly increasing demand for elderly care in China, coupled with the declining availability of family caregiving resources, has become a critical factor influencing the labour supply of adult children, especially married women. In the face of this "work-family" conflict, the role of formal elderly care has gained increasing attention in Chinese society. As China’s home-based elderly care policies enter the initial stages of development and implementation, it is essential to clarify whether, and how, the responsibilities of families and the state in elderly care can be balanced. This issue has become crucial in the current policy and research landscape.

Existing literature has examined four key relationships between formal and informal care and their significant impact on the labour market. First, the compensatory model posits that one caregiving system is substituted by another, but according to a hierarchical sequence. Formal care (such as social services or specialised private caregivers) is only sought when all informal caregiving resources have been exhausted. Some empirical studies have supported this theory, suggesting that when informal caregiving resources are insufficient, families turn to formal care (Myatt and Murell, 1990).

Second, the substitution model argues that as individuals receive formal care, the level of informal care provided by the family decreases. This model was used by economists advocating for the rationing of formal care to control public health expenditures. However, empirical evidence indicates that, in most cases, families do not completely cease providing informal care when formal care is available (Viitanen, 2006). For example, Viitanen (2006) analysed the relationship between formal and informal care in 12 European countries and concluded that while formal care can replace informal care provided outside the household, it cannot entirely replace the care provided by cohabiting family members.

Additionally, the task-specific model proposed by Litwak (1985) argues that formal and informal care are distinct but complementary. According to this model, informal caregivers (typically women) are better suited for daily caregiving tasks, such as bathing, dressing, eating, and drinking, while formal care is more appropriate for tasks that require higher levels of skill. In contrast to the compensatory model, the nature of the task, rather than the preferences of the care recipient, determines who is best suited to provide care (family members or trained professionals). This view is supported by research by Penning and Chappell (2008) and Fischer and Eustis (2010).

Finally, the supplementary model proposed by Chappell and Blandford (1999) combines elements of the compensatory and substitution models, suggesting that when the needs of the care recipient exceed the capacity of informal caregiving, formal care can provide necessary support. This is particularly the case when informal caregivers need respite care or when the family faces an emergency. According to this model, when informal caregivers recognise that they can no longer manage on their own, they begin to seek formal caregiving services.

In summary, formal and informal caregiving have complementary roles in meeting the needs of elderly care. Effective policy design should encourage the integration of both formal and informal care to alleviate the caregiving burden on family members, particularly the labor supply pressures on married women. For China's current home-based elderly care policies, addressing how to balance formal and informal care systems through appropriate policy interventions is crucial to optimising labor market participation and family caregiving resources. Regardless of the relationship outlined above, formal elderly care has been shown to significantly impact the labour supply of adult caregivers, both in terms of its scope and its depth.

Indeed, an increasing body of empirical evidence shows that when the government employs social policies to serve as a substitute for familial informal care, typically by offering affordable and high-quality care services, it tends to promote elderly caregiver's engagement in the labour market (Loken, Lundberg and Riise, 2017; Hollingsworth et al., 2022)(see detailed discussion in Section 7.3.2).

Chapter 3 Literature Review

3.1 Theoretical Framework

The two main subjects involved in this research are the elderly care provision and adult children's labour supply at both intensive and extensive margins. It wants to use econometric methods to explore the impact of elderly care on adult children's labour supply (probability of employment and paid working hours). Before reviewing the empirical literature, it is necessary for us to answer the following three questions with the help of economic theory as the theoretical basis. First, why should elderly care be carried out (the necessity of elderly care). Second, why and how does elderly care affect caregivers' labour supply. Third, why is there a significant gender distinction in the impact of elderly care on labour supply. Next, subsections 3.1.1, 3.1.2 and 3.1.3 will answer these three questions respectively.

3.1.1 Provision of Elderly Care

Throughout a person's life cycle, they depend on others for care in childhood and old age, while in adulthood, they take on caregiving roles for both children and the elderly. In this process, wealth, emotions, and social resources are exchanged and transmitted between generations.

With the growing demand for elderly care, adult children play an increasingly important role in supporting their parents and in-laws. Though no model can fully explain all eldercare behavior, theoretical research suggests three primary motivations: reciprocity, altruism, and social responsibility (Wu, 2009; Liao, 2020).

The exchange model challenges the cooperative hypothesis within families, positing that family members pursue their own utility maximization based on individual preferences. In this framework, parents may exchange resources for future care, where elderly care provided by adult children is viewed as a return for the parents' earlier support. Resource transfers between generations need not be simultaneous and can occur before or after expected reciprocity. These transfers take various forms—not solely monetary—and may include promises of inheritance or assistance with grandchildren, reflecting an implicit exchange relationship. In the exchange model, caregiving is seen as the result of a comparative advantage among family members, with adult children's care for their parents influenced by the opportunity cost of their time. Higher-income children face a greater opportunity cost, making it more likely that lower-income children will provide caregiving. The theory frames elderly care as a reciprocal exchange for earlier parental support, involving transfers of economic resources, labour, and emotional comfort. Intergenerational support, therefore, functions as a two-way exchange of valuable

resources, such as money, time, and affection.

Another key motivation for caregiving is altruism. According to Becker (1976, 1981), family members are driven by mutual concern for each other's well-being, fostering selfless behaviors. Parents, for instance, may invest in their children's education without expecting a direct return, while adult children may care for frail parents or in-laws without the prospect of inheritance. This altruism can lead to significant personal sacrifices, such as reduced labour supply, especially when individuals return home to care for parents despite no tangible reward. However, the strength of altruistic bonds varies across cultures. For instance, intergenerational caregiving in Asian countries, particularly China, follows a feedback model, where each generation supports both the previous and next generations. In contrast, Western countries typically follow a relay model, where caregiving flows only from one generation to the next (Ji, 2025).

Family norms, defined as the explicit and implicit cultural rules that guide behavior, impose obligations and responsibilities within families. In patriarchal societies, norms often dictate that women, particularly married women, bear the burden of care (Wu, 2009). Family norms also explain why adult children’s obligations to parents are stronger than those to extended family members (Liao, 2020) as norms often expected adult children to support their parents. These norms vary by region. For instance, in many Asian cultures, sons—especially the eldest—are expected to care for ageing parents, a duty less emphasised in Western countries. In the U.S., the parent-child relationship is generally not influenced by the child's gender (Bian and Johnson, 2001), while in China, sons and daughters-in-law are often preferred for co-residence and caregiving responsibilities (Martin, 1989; Casterline et al., 1991; Hermalin et al., 1992). Failure to fulfill these expectations can result in moral condemnation, particularly for sons and their spouses.

In addition to these three primary motivations, other theories help explain eldercare behavior. The demonstration effect model (Cox and Stark, 2005) suggests that adult children may care for their parents to set an example for their own children, thereby increasing the likelihood of receiving care in the future. However, this model cannot explain the care provided by childless adults. The warm-glow model (Andreoni, 1989) offers a complementary perspective, proposing that individuals provide care not only out of altruism but also for the intrinsic satisfaction or external praise they receive from giving. This aligns with broader family norms and societal values, further shaping caregiving behavior.

3.1.2 Elderly Care and Caregivers' Labour Supply

Building on the discussion in Section 3.1, adult children's support for their parents is a critical component of intergenerational social relations. However, elderly care is highly time-intensive, requiring caregivers to allocate significant time and effort. Given the constraints of limited working hours, providing care necessitates sacrificing either paid work or leisure time. In this subsection, we apply labour supply theory to examine the impact of elderly care on caregivers' labour supply, addressing both individual and family-level dimensions.

3.1.2.1 Labour-Leisure Model

The first model to be discussed is the simple labour-leisure model. This economic framework explains how individuals, when constrained by both time and income, choose between labour and leisure to maximise their overall utility from the consumption of goods and leisure (Becker, 1965). The model posits that individual utility is derived from the satisfaction gained through the consumption of material goods and leisure. While labour does not generate direct positive utility—due to the fatigue and disutility associated with work—it increases income, enabling individuals to consume more goods and enjoy more leisure, thereby enhancing their overall utility. Since time is fixed, allocating more hours to labour reduces the time available for leisure. Given a predetermined level of wealth, consumption preferences, and the opportunity cost of leisure, individuals optimise their utility by balancing their time between labour and leisure.

If intergenerational wealth transmission is not considered, individual wealth is closely tied to potential income, which depends on paid working hours and the wage rate per unit of labour. The wage rate, in turn, is influenced by the value of human capital, which is accumulated through health, education, and training, and tends to remain constant in the short term (Liao, 2020). As a result, income is primarily determined by the amount of paid working hours. Consumption preferences reflect an individual's relative preference for different goods. In the labour-leisure model, material and leisure goods are considered substitutes. The substitute between these goods reflects the trade-off between labour and leisure. When labour income is low, material consumption is constrained, and the marginal utility of material goods exceeds that of leisure. To increase material consumption (which requires higher labour income), individuals reduce leisure and increase labour supply. Conversely, when income is high, the marginal utility of leisure exceeds that of material goods, leading individuals to increase leisure consumption and reduce labour hours.

Following the above discussion, since labour and leisure are substitutes, leisure has an opportunity cost: each additional hour of leisure implies foregoing one hour of work. The

opportunity cost of leisure varies with the wage rate. If the opportunity cost of leisure is $X per hour, individuals will only work if the market wage exceeds $X. When the wage rate falls below this threshold, individuals "reserve" their labour supply. This threshold is referred to as the "reservation wage," which reflects the minimum market wage required for an individual to choose labour over leisure.

For those already in the labour force, decisions regarding working hours are influenced by wage changes. An increase in the market wage initially boosts both labour force participation and working hours. However, empirical studies show that beyond a certain point, further increases in the wage rate led to a reduction in hours worked. Labour economists explain this phenomenon through the substitution and income effects. As wages rise, the opportunity cost of leisure increases, prompting individuals to substitute labour for leisure (substitution effect). Simultaneously, higher wages increase income, which raises the consumption of leisure and reduces working hours (income effect). When the market wage is low, the substitution effect dominates, leading to an increase in labour supply. At higher wage levels, the income effect outweighs the substitution effect, resulting in a decline in working hours.

3.1.2.2 Extended Labour-Leisure Model

Scholars have further extended the simple labour-leisure model into what is known as the Extended Labour-Leisure model or Time Allocation model (Gronau, 1977; Becker, 1965). This model divides an individual's time into three categories: market labour, household labour, and leisure. Unlike market labour and leisure, household labour is different. Market labour generates income, which allows for greater consumption of goods, thereby indirectly enhancing utility. In contrast, leisure time directly increases satisfaction, providing immediate utility. Household labour, while not generating income or providing immediate satisfaction, must still be performed. If an individual opts not to engage in household labour, they need hire market workers to replace their effort, incurring a cost. Therefore, there is an opportunity cost in family work that affects the reservation wage.

For those not engaged in labour market work, an increase in wages may incentivise entry into the labour market, as home production becomes relatively more costly. For individuals already participating in the labour market, higher wages render home production less favorable, leading them to reduce time spent on home production until the marginal productivity of home production aligns with the market wage. Wage increases also raise the opportunity cost of leisure. This results in two potential effects: a substitution effect, where individuals reduce leisure time in response to higher wages, and an income effect, where higher wages enable

individuals to increase their leisure time. Overall, the net effect remains ambiguous.

3.1.2.3 Family Labour Supply Theory

The classic labour-leisure model primarily focuses on individual leisure and labour supply decisions, but these decisions are also influenced by the labour supply choices of other family members, such as between spouses or across generations. Becker (1973) pioneered the study of decision-making behavior within family environments, extending the analysis of labour supply decisions from individuals to households. There are four main types of leisure-labour supply models which consider family members. These are the single decision-making model, male/female chauvinist model, the family utility/family budget constraint model and the individual utility/family budget constraint model (see detail discussion in Section 6.2.1.2).

Although game-theoretic processes between family members differ across these four models, the family decision-making frameworks differ from the individual model in several keyways. First, the family functions not only as a consumption unit but also as a production unit. For instance, when making food consumption decisions, the household may choose between dining out (a consumption activity) or cooking at home (a production activity). Second, time allocation among family members is interdependent. While some activities can be completed independently, others require joint participation, leading to overlaps in time allocation rather than a simple summation of individual efforts. Third, household budget constraints are influenced not only by individual income but also by total household income. In the family setting, caregiving responsibilities, particularly for elderly parents, are often distributed among family members, leading to interdependence in labour supply decisions. For instance, one spouse may reduce their labour supply to provide elderly care, while the other compensates by increasing labour supply. This division of labour reflects the dual role of the family as both a consumption and production unit, where caregiving itself becomes a form of household production.

3.1.2.4 Gender-Based Heterogeneities

The gender gap in labour supply has been widely studied, with explanations spanning economics and sociology. The differential impact of elderly care on labour supply between men and women can be traced to traditional social divisions of labour and gender roles. Historically, women were assigned family-related tasks such as childbirth and caregiving, while men undertook survival-related work like hunting and farming. Patriarchal ideologies reinforced this division, placing men in dominant roles and relegating women to subordinate, supportive

positions, thereby creating a hierarchical gender division of labour.

Even after the Industrial Revolution, when more women entered the labour market, these patriarchal ideologies persisted, continuing to marginalise women in the public sphere. The Dual Systems Theory (Hartmann, 1979) posited that the interaction between capitalism and patriarchy perpetuates women's subordinate status in both the household and labour market. Building on this, Becker (1991) introduced the theory of comparative advantage to explain family decision-making. According to this theory, individuals weigh the costs and benefits of their decisions based on their comparative advantages, following the principle of maximizing gains and minimizing losses. Traditional gender norms, which cast women as having a "caring tendency" and men as having a "work tendency," shape distinct developmental paths and comparative advantages for each gender. Consequently, when faced with caregiving responsibilities, women are more likely to reduce their labour force participation to provide care for the elderly, sacrificing work hours and career opportunities.

Women's participation in the labour market is further influenced by societal norms and career interruptions due to biological and caregiving responsibilities. These factors diminish women's competitiveness in the labour market. Human Capital Theory provides a framework for understanding gender disparities in labour market outcomes, viewing education and training as key investments in human capital (Becker, 1964). The theory posits that the longer one invests in a specific activity, the higher the returns, explaining the income gap between married men and women, as women tend to work fewer hours and have shorter labour force participation compared to men.

Becker (1981) also emphasised that returns to professional human capital grow over time, encourageing labour specialization within households. In this framework, women, due to their comparative advantage in childbirth and caregiving, are often assigned these roles, reinforcing gendered divisions of labour and human capital accumulation differences. The time and energy women devote to caregiving limit their participation in time- and experience-intensive market activities, which often leads to occupational segregation and gender discrimination.

In summary, elderly caregiving exacerbates the gender gap in labour supply, creating a reinforcing cycle. Traditional norms position women as primary caregivers, and once they assume this role, both the theory of comparative advantage and the family division of labour discourage their return to the labour market. This weakens women's human capital accumulation, further reducing their labour market competitiveness relative to men, and deepening occupational segregation and gender discrimination. As a result, women face lower costs of exiting the labour market compared to men, which reinforces their caregiving role and

strengthens societal perceptions of women as caregivers.

3.2 Empirical Literature Review

3.2.1 Determinants of Adult Children's Support for Elderly People

Whether and how the elderly receive care is shaped by multiple factors. This section examines the determinants of caregiving behavior among adult children, primarily from the perspectives of both the elderly and their adult children. Understanding these factors—widely considered in the international literature—facilitates the selection of appropriate control variables and helps identify potential endogeneity issues in the analysis.

The first factor to consider is the financial situation both for the elderly and their adult children. The impact of financial situation (for both the elderly and their adult children) on elderly care behavior can be analysed from two perspectives. On the one hand, different care arrangements come with varying economic costs. Family-provided care is typically less expensive compared to institutional care or hiring professional caregivers. Therefore, both the financial status of the elderly and that of their adult children influence the latter's ability and willingness to provide care. On the other hand, according to the Labour-Leisure Theory, when adult children allocate more time to the labour market to increase their labour income, the time available for family caregiving and leisure is reduced. Empirical studies also support this theoretical framework, although the magnitude of impact varies across contexts.

Some scholars argue that wealthier children are more likely to exchange financial support for time when caring for their parents, meaning they contribute more money but provide less direct daily care compared to those less affluent adult children (Sloan et al., 2002). However, Xie (2009), using data from the 2006 National Comprehensive Social Survey, finds that wealthier children tend to offer more financial support to their parents but did not observe a corresponding reduction in daily caregiving. Di et al. (2014) also finds no evidence of children exchanging money for time in caregiving. This may be due to limited care needs of parents or the presence of multiple siblings who share caregiving responsibilities, preventing any direct conflict between time spent caregiving and time in the labour market.

From the perspective of elderly people who receive elderly care, Kaida, Moyser and Park (2009) state that the growing demand for "privacy" of the elderly has led to the increasing prevalence of independent life of the elderly. However, the inability to pay the costs of housing and living expenses may prevent some seniors from living independently despite their preference to do so (Boyd, 1986). Co-residence with children or other relatives may alleviate, at least in part, the economic constraints faced by such elderly people (Burr and Mutchler, 1999).

However, there is no linear relationship between the economic income of the elderly and their access to childcare in Asian countries, but a "U" type (Mi, 2014). Specifically, low-income people tend to receive home-based elderly care services from their children. As their income increases, their dependence on child-provision-care will gradually decline. However, those with higher incomes will be more willing to spend high elderly care expenses for formal care and enjoy time with their children based on not adding a burden to their children. Despite differing influence, the wealth of both adult children and their elderly parents or parents-in-law significantly affects the caregiving behavior of adult children toward their elderly parents and parents-in-law.

Secondly, the number of siblings of the adult children is a critical factor in determining the care provided by adult children to elderly parents and in-laws. Before examining this relationship, it is important to distinguish two concepts: the total amount of care received by parents and in-laws from all their adult children (from the parents' perspective) and the care provided by a single adult child (from the child's perspective). In one-child families, these two measures are equal. However, in families with multiple children, the total care received by the elderly is the sum of care provided by each child.

Luo and Bian (2003) suggest that children's caregiving reflects their sense of obligation toward their parents, and thus, there is a positive correlation between the number of children and the probability of parents receiving care—the more children, the higher the probability of elderly support. However, the total amount of care does not increase linearly with the number of children. Xie (2009), using data from the 2006 National Comprehensive Social Survey, finds a nonlinear relationship: beyond a certain number of children, the probability of receiving daily care from adult children remains static (Zimmer and Kwong, 2003).

While parents may receive more total care with more children, the care provided by each individual child tends to diminish as the caregiving responsibility is shared with more siblings. Several studies show that the larger the number of siblings, the lower the likelihood that each child will provide care (Zimmer and Kwong, 2003). For instance, Di et al (2014), using logistic regression and data from the China General Social Survey (CGSS in 2006), find that for each additional sibling, the likelihood of an individual providing elderly care decreased by 4.5 percentage points.

However, Xie (2009) observed no significant effect of sibling number on the caregiving behavior of individual children. He concludes that children do not avoid caregiving responsibilities or increase support based on the presence or absence of siblings. Xie's findings, supported by Di et al. (2014), suggest that sibling caregiving behavior may be influenced by a

form of mutual role modeling rather than the number of siblings, where one sibling's actions set an example for others.

Thirdly, changes in family structure (discussed in detail in Chapter 1) have influenced the living preferences of the elderly, which significantly affect the caregiving provided by adult children. Proximity plays a crucial role, as shorter distances between adult children and their elderly parents reduce the time and effort required for caregiving. Empirical studies using Chinese data further support this phenomenon, showing that living arrangements directly impact the frequency and intensity of care. Children who co-reside with their parents provide the most frequent daily care, followed by those with parents in "empty nest" households. In contrast, parents living with other children receive less care from respondents, as their needs are presumably met by co-residing siblings (Wang, 2016). Di, Wei, and Zhong (2014), using data from the China General Social Survey (CGSS 2006) and logistic regression analysis, find that when children lived within a 15-minute walking distance, the likelihood of daily caregiving increased significantly. However, as the walking distance increased to one hour, the probability of caregiving sharply declined, with a negative effect coefficient of 1.09.

Fourthly, the impact of adult children's age on caregiving for elderly parents has attracted attention in recent studies, but conclusions remain mixed. Some scholars argue that as adult children grow older, their sense of responsibility changes (Hermalin and Yang, 2014 and Cheung, 2019). For example, individuals who are themselves entering old age may become more aware of the importance of caregiving and may be more willing to care for their aging parents. At the same time, younger generations may prefer modern eldercare options, such as relying on government services or encouraging parental self-reliance, while older generations may continue to follow traditional ideas of filial piety.

However, this generational pattern is not always consistent. Some findings suggest that older people may increasingly support formal or government-based care to reduce the burden on their children. This has been described as a kind of "responsibility ethics," where elderly parents try to avoid over-relying on their children, especially when they are aware of financial or work-related pressures their children face (Hermalin and Yang, 2014).

From the perspective of elderly parents, age plays an important role in how much care they need and how it is provided. Before the age of 75 or 80, parents may rely more on their children or even provide help within the household. But as they become older and less healthy, they often turn to formal or community-based care services instead of depending entirely on their families (Boeckxstaens and De Graaf, 2011; Wiles and Jayasinha, 2013).

Overall, the relationship between age and caregiving is complex and influenced by many

factors, including changing family values, economic conditions, and availability of external care resources.

Fifth, as adult children age, most enter marriage, form their own families, and have children. The demands of their own households, including raising children, require time and energy, which may reduce the frequency and time they dedicate to caring for their parents. In terms of marriage, the literature consistently finds that unmarried children have fewer familial obligations compared to their married counterparts, allowing them more freedom and time to provide care for their parents (Huang, Du, and Chen, 2018; Zhang, 2019). Zhang (2019) also found that marital status negatively affects the provision of life care for parents (10.7 percentage points). After marriage, the focus of adult children tends to shift toward their own nuclear families. Similarly, after having children, their time, energy, and financial resources are increasingly consumed by their immediate household, often resulting in reduced caregiving for their parents. In some cases, married children may even rely on their parents for financial support to cover the costs of raising the next generation.

Sixth, in China, wives increasingly take on the primary role in providing care for their own parents as well as their parents-in-law, often surpassing the contributions of sons. Traditionally, China's patrilineal family system placed the primary responsibility for elderly care on sons, who were expected to live with and support their parents financially and physically after marriage. Daughters, once married, were viewed as part of their husband's family and were not expected to care for their biological parents (Greenhalgh, 1985). However, with the evolution of family dynamics, the role of daughters—and specifically wives—has changed. Wives now often serve as the key caregivers for both their own parents and in-laws, balancing dual obligations. This shift is particularly evident in families where sons rely on their wives to fulfill caregiving responsibilities. While sons may continue to provide financial support, it is increasingly their wives who perform the daily caregiving tasks. Di, Wei, and Zhong (2014) highlight that while the gender division in caregiving persists, daughters-in-law, rather than sons, are frequently the ones providing fundamental elderly care. Xu (2015) finds that although sons may still contribute more financial resources, the direct caregiving responsibilities, such as daily care, have increasingly shifted to wives. Once co-residence is accounted for, it is the wives of sons who take on most caregiving duties.

Finally, compared to the direct care that adult children provide to elderly parents and parents-in-law, their educational level is more closely linked to the emotional support they offer. In general, the higher the educational attainment of adult children, the more emotional care they tend to provide. However, there is no clear linear relationship between education and the care

provided to elderly parents. Up to a certain educational threshold, higher education positively influences caregiving behavior. Beyond that threshold, however, this positive effect diminishes or disappears altogether. For example, Huang, Du, and Chen (2018) find that children with education levels above junior middle school, high school, and college were more likely to provide care than those with lower levels of education, with coefficients of 1.28, 1.34, and 1.23, respectively. However, children with college degrees or higher showed reduced care intensity. Xie (2009) finds similar results, noting that those with high school education were more likely to provide daily care compared to those with only primary education or less.

Overall, the discussion above highlights several key factors influencing caregiving behaviour, such as financial status, the number of siblings, family structure, the age of adult children, marital status, and gender. Therefore, in the empirical analyses presented in Chapters 5, 6, and 7, of this thesis focuses on the labour supply of married men and women to abstract from the variations in marital status and its interaction with gender. Furthermore, we conduct heterogeneity and sensitivity analyses on age and financial status to assess the potential endogeneity arising from their influence on independent variables. The literature discussed above also informs the choice of the instrumental variable employed in Chapters 5 and 6, that is the number of siblings as is identified as a determinant of elderly care. In addition to the factors discussed above, elderly parents' perspectives on aging (Kaida, Moyser, and Park, 2009; Johnson, 2013; Cain et al., 2018), marital status (Kaida, Moyser, and Park, 2009), and education (Zhang and Wang, 2016) have been shown to influence caregiving demand, which in turn affects the supply and intensity of care provided by adult children. However, due to the unavailability of individual-level data on elderly parents and in-laws in this study, the impact of these factors on adult children's caregiving provision will not be discussed in detail. In Chapters 5, 6, and 7, a province- and time-fixed effects model will be employed to address potential issues of omitted variable bias. The following section focuses on the determinants of adult children's laboor supply, which informs the decisions regarding the control variables included in the empirical analyses of this thesis that follow.

3.2.2 Determinants of Adult Children's Labour Supply

There are many factors affecting the adult children's labour supply at both extensive and intensive margins. As discussed in Section 2.1, individual labour supply decisions related to their preferences for work and leisure. If we consider the labour supply of adult children's spouse and other family members, this preference is not only affected by the human capital endowment and demographic variables related to adult children themselves, but family

characteristics are also considered to affect the adult children's labour supply. This chapter presents a review of the empirical literature on the labour supply of adult children. It examines how adult children's decisions regarding labour force participation and the number of hours to work are influenced by financial variables (Section 3.2.2.1); demographic characteristics (Section 3.2.2.2.) and family characteristics (Section 3.2.2.3.). Based on the factors emphasised in international literature, we will identify the control variables for the empirical analysis in Chapters 5, 6 and 7.

3.2.2.1 Financial Characteristics

The first factor that needs to be discussed is adult children's own wage. An increase in the individual's wage will affect their labour supply through income effects and substitution effects. For an individual who does not work, there is no income effect associated with increasingly the wage rate. Hence, increases in the market wage rate are expected to be associated with a higher probability of participating in the paid labour market and working more hours. However, for an individual who works, as discussed in Section 2.1, the income and substitution effects of an increase in the wage rate offset each other. When the wage rate rises, leisure becomes more expensive. If the income effect is more significant, adult children are more likely to buy more expensive leisure time, thus reducing the labour supply in the labour market. When the substitution effect exceeds the income effect, adult children will invest more in paid work (Addison and Siebert, 1979; Ashenfelter and Heckman, 1974 and Killingsworth, 1983). However, empirical research shows that when adult children's own wage rate rises, the strength of the above two effects is significantly different in different economic and welfare environments.

Most studies have reported the domination of the substitution effect of own wages on adult children' s labour supply for labour force participation (Blundell and MaCurdy, 1999; Devereux, 2004; Blau and Kahn, 2007; Kaya, 2014; Merz, 2008; Dostie and Kromann, 2013 and Cai, 2018). While, in terms of paid working hours, although some studies have confirmed the negative effect of wages on paid working hours (Burauel et al., 2020), while it is not all significant in people with different characteristics.

Moreover, according Liu and Bruin (2015), women experience stronger wage incentives, whereas male paid working hours tends to be more stable, showing lower wage elasticity. This suggests that increases in women's wages are more likely to lead to greater work-hour commitments, potentially due to their generally lower income levels compared to men, making wage incentives more impactful for women.

Secondly, the non-labour income also influences the adult children's labour supply. There is a presumption that the income effect of an increase in non-labour income on the work effort of the family members is likely to be negative (Ashenfelter and Heckman,1974). This is because the individual does not have to work the same number of hours as they did before to purchase the desired level of consumer goods. Although many literature shows that adult children's labour supply is negatively correlated with their non-labour income (Saha and Kalita, 2015; Mansor, Hong, Abu, and Shaari, 2015), there are also many literatures supporting that in recent years, the impact of adult children's non-labour income on their probability of employment and working hours is becoming smaller and smaller, or even insignificant (Kidd and Ferko, 2001). Merz (2018) employs micro data from the German Social Economic Panel (SOEP) 1985-2005 and finds that before 1994 there was a clear negative link between the husband' s wage and the wife' s probability of being employed and weekly working hours. By 2000, the connection between wives' employment probability and the husbands' wage decile had generally decreased. Specifically, in 1985-1994, for every Euro increase in the husband's income, the wife's employment probability decreased 12.6 percentage points. During 1995-2005. This ratio is only 4.4 percentage points. In 1985-1987, the wife's paid working hours fell by 27%. In the period 2003-2005, this ratio is 20.7% for every Euro increase in the husband's income.

However, Kidd and Ferko (2001) find that the level of non-labour income was insignificant in determining the probability of employment for both male and female. They explained that one factor leads the inconsistency between the empirical relationship of income and adult children's labour supply in some studies and theoretical expectations is the spouse selection process. For example, career orientated men, earning large incomes, seek out and marry career-orientated women, who also earn large incomes. Therefore, in some cases, husbands' income can be positively associated with their wives' labour force participation. Pencavel (1998) also finds that husband's wages have a minor role in explaining a married woman's work decisions in Australia.

Based on the above discussion, the empirical analyses of this thesis account for the impact of financial factors on the labour supply of married children, both at the intensive and extensive margins. Chapters 5, 6, and 7 incorporate variables measuring the hosuehold's financial resources as determinants of labour supply.

According to Section 3.1.2, the financial characteristics of adult children, particularly wage income, influence their labour supply decisions by affecting the comparison with their reservation wage. The reservation wage of adult children is shaped by individual and family characteristics, which will be discussed in Sections 3.2.2.2 and 3.2.2.3, respectively.

3.2.2.2 Demographic Characteristics

In international literature, adult children's age, educational background and household registration are also generally considered to be important factors affecting adult children's labour supply. These factors help to characterise a person's preference for leisure and work. This explains why people with the same wage level and non-labour income will supply different labour levels. Next, we will summarise the impact of demographic characteristics on adult children's labour supply at intensive and extensive margins.

The first factor that will be discussed is age. International literature consistently finds that as age increases, the employment probability tends to decline, with this effect often being nonlinear for both male and female (Eckstein and Lifshitz, 2011). However, the trends for men and women differ significantly across various life stages. Most studies confirm an inverted U-shaped pattern in male employment probability, where participation peaks in midlife and declines as men approach retirement age. For women, the employment pattern follows an "M-shape": they are employed before marriage, exit the labour market after marriage or childbirth, and then re-enter as their children grow older, eventually reducing labour participation again near retirement age (Chapman et al., 2001).

However, in less-developed regions, this gender-based divergence is less pronounced. For instance, in Pakistan, Zahir et al. (2009) used data from a 2007-2008 survey of urban and rural women aged 15-64. Dividing the women into five age groups, their Logit model analysis revealed that female labour force participation increased with age, even for those aged 55-64. The strongest increase in labour participation (19.2%) was seen in the 45-55 age group, likely because these women had grown children, most attending college, freeing up time for market work. In China, Tan (2005) used Probit models on data from the National Bureau of Statistics' 2002 Urban Socio-Economic Survey to examine the age-related labour supply patterns of married women. The study found that labour force participation followed an inverted U-shape, peaking between the ages of 30 and 40. Beyond this age range, participation rates declined as women aged, reflecting increasing responsibilities such as elderly care (Stone and Short, 1990).

Although in different social backgrounds, age has different performance on adult children's labour force participation. When considering working hours, international literature agrees that age negatively affects paid work hours, particularly beyond certain age thresholds (Birch, 2005; Taylor, Earl, and McLoughlin, 2016). For example, Taylor, Earl, and McLoughlin (2016), based on a 2010 survey of Queensland employers, similarly found that for every 1% increase in workers over age 50, the likelihood of reduced working hours rose by 2% for both men and women.

Education is also a very important factor that affects adult children's labour supply. Different from the influence of age on adult children' labour supply, education is the result of long-term human capital accumulation. Human capital theory holds that the difference of personal income comes from the difference of human capital investment and accumulation (Mincer, 1958). Birch (2005) also states that education may affect labour supply directly by altering the preference and attitudes for work and leisure, and indirectly by influencing the wage rate.

There is rich literature established on the impact of education on labour supply and argued that the impact of education on labour force participation is not uniform across years of education. The relationship may be U-shaped (Haghighat, 2002; Lincove, 2008; Tam, 2011). The probability of employment was found to be high for illiterate people, lower for individual educated at primary and (perhaps) at the secondary school level, and higher yet for individual college graduates. This relationship has been explained by the correlation between education and income. At the low end of the scale, where education and income are low, this high probability of employment can be explained by the pressing need to earn some income, no matter how meager to survive (Sharif, 2003).

However, the assumption established in developed countries that a family utility function can represent the household reference may not be established in developing countries, especially in those Asian countries. This is because women often have less say about family decisions than do their husbands in developing countries. One of the beneficial roles of women's education in developing countries is to empower them to assert their preferences more effectively in household decision making (Schultz, 1990). Cameron, Dowling and Worswick (2001) first consider the possible impacts of increasing the wife's education on the household decision-making model. The data came from the empirical analysis are the 1975–1976 World Fertility Surveys (WFS) for Indonesia, Korea, the Philippines, Sri Lanka, and Thailand. In their result, only Sri Lanka show a U-shaped relationship between education and labour force participation rate. They found that in every other country, women' s tertiary education is positively related to the labour force participation rate. In all countries other than Korea, the magnitudes of the effects are significant. A woman with tertiary education is 49%, 23%, 17% 16% and 3% more likely to be employed in the labour market than a woman with no education in Tailand, Philippines, Sri Lanka, Indonesia and Korea respectively. The results clearly point to the importance of tertiary education over lower levels of education in promoting labour force participation. Primary school education has either no effect or a negative effect on the labour force participation of women. As was argued above, women with low levels of education may

prefer to stay at home and care for young or elderly family members whereas their husbands may prefer that they work in the labour market.

Lu (2015) studied the impact of education on paid working hours in China from 1988 to 2019 in four stages. The higher the level of education, the fewer working hours per month. Married individuals with low education level are more engaged in informal employment, which will increase their working hours. However, she found that compare with male, in the decision-making of married women's labour force participation, the role of education "threshold" is weakening, that is, the positive effect of education on women's labour force participation is declining. This also explains, to some extent, why women's education level has increased significantly while their labour force participation rate has decreased significantly.

Finally, in China, more and more studies focus on whether the samples are from urban or rural areas. In China, a man-made separation between urban and rural areas exists due to the unique household registration system implemented by the government. Labour mobility is restricted, particularly for rural residents seeking to migrate to urban areas. As Zhu (2015) argued, even when rural migrants move to cities, they are not treated equally to local urban residents in terms of employment, work benefits, social services, and children's education. Urban employers often hold biases against rural workers, perceiving them as undereducated and prone to crime, despite recognizing some desirable traits—being cheap, hardworking, and compliant (Chen and Hoy, 2011; Guo et al., 2017). Such prejudices contribute to a deep social divide between urban residents and rural migrants, as local residents are reluctant to engage with migrant populations (Kuang and Liu, 2012).

Additionally, employers set lower wage rates for rural migrants compared to local urban workers with similar productivity (Chen and Hoy, 2011; Song and Smith, 2019). For example, Li (2012) revealed a wage gap between rural migrants and local urban workers, noting that rural migrants worked an average of 58 hours per week compared to 43 hours for urban workers, yet earned only 45% of the hourly wage of their urban counterparts. Worse still, urban workers received more in-kind benefits, such as employer-provided insurance. When these in-kind benefits are factored in, rural migrants earned just 37% of the hourly wage of urban workers.

The disparities faced by urban and rural workers may influence their labour supply decisions. Research shows that holding urban household registration reduces the probability of employment and paid working hours for both men and women (Chai et al., 2021 and Liao and Paweenawat, 2021). This might be because income is higher for worker in urban areas than in rural areas, the substitution effect is higher in urban areas.

Consistent with the existing literature, the empirical analyses in Chapters 5, 6, and 7 include age, education, and household registration status. Additionally, recognising that both elderly care and paid labour work require physical well-being, we incorporate health status following Meng (2013).

3.2.2.3 Family Characteristics

According to Family Utility Constraint Model and Extend leisure-Labour Model, adult children's labour supply decisions are more vulnerable to the characteristics of families and other family members. This subsection mainly discusses marital status, childcare and elderly care.

The first factor to discuss is marriage. Compared to men, women's labour supply is more significantly influenced by marital status. As outlined in Chapter 1, the probability of employment and the number of paid working hours are considerably lower for married women than for unmarried women. After marriage, women often assume caregiving responsibilities for both their own parents and their in-laws. This increases the implicit cost of their paid labour, weakening the substitution effect and thereby influencing their labour supply decisions. Moreover, marriage alters the income structure for both men and women. As highlighted in Section 3.1.2, in economic models, a spouse's income, household assets, and contributions from other family members form part of the household's non-labour income. This change in non-labour income affects the income effect on married adults' labour supply, further shaping their labour supply decisions. Most studies on married adults' labour supply report positive own-wage elasticities and negative spousal-wage elasticities across various estimation methods (Blundell and MaCurdy, 1999; Devereux, 2004; Blau and Kahn, 2007; Kaya, 2014; Merz, 2008; Dostie and Kromann, 2013; Cai, 2018). However, several studies have found an inverse relationship between married adults' labour supply and their spouse's wages (Licona, 2000; Tumsarp and Pholphirul, 2020).

From the perspective of marital relationships and household division of labour, Chen (2019) argued that under traditional family labour division, many households follow a model where men participate in paid employment while women withdraw from the labour market to focus on caregiving. A stable marriage tends to alleviate men's domestic responsibilities, thereby positively influencing their labour market participation. In contrast, women who have withdrawn from the labour market for extended periods to engage in household duties face weaker bargaining power in household decision-making (lower threat points in bargaining). Re-entering the labour market not only increases women's earnings but also enhances their

bargaining position in household utility distribution. Women in less stable marriages, being more aware of potential divorce, are more likely to choose employment as a labour supply strategy. Using data from the China Family Panel Studies (CFPS), Chen (2019) applied a discrete variable analysis and finds that marital stability increases men's employment rates but reduces women's. Specifically, women in stable marriages exhibited a 5% lower employment probability compared to those in unstable marriages.

Secondly, childcare is also an important factors effect on adult children's labour supply at both intensive, extensive margins. Given that married men have traditionally played a minimal role in childcare, most research has focused on women's labour supply. The limited studies on fathers' labour supply support the view that, under the male breadwinner model, fathers are primarily responsible for providing economic support to the family. Consequently, fathers are expected to increase their labour supply after having children to enhance the household's standard of living (Lundberg and Rose, 2002). Lundberg and Rose (2002) estimate the effect of children on men's labour supply and hourly wages using data from the Panel Study of Income Dynamics (PSID). Their fixed-effects estimates indicate that, on average, a child increases a man's wage rate by 4.2% and his annual hours of work by 38 hours per year. However, the effects of children are highly nonlinear and nonmonotonic, with significant positive incremental effects limited to the first two children. For mother, most studies on female labour supply recognise the importance of children. Generally, having children reduces women's likelihood of participating in the labour market and working hours (Apps, et al., 2016; Luo and Miao, 2018). This is because children have increased demand for non-work activities, such as family production.

The age of children can also affect women's labour supply. Young children, such as newborns, are more nervous in their mother's time than older children. As a result, women with young children usually provide less labour than women with older children. For example, Luo and Miao (2018) used the Dynamic Monitoring Data of China's floating population in 2014 and took the gender of the first child as the instrumental variable to empirically analyse the impact of the number of children born on women's labour participation rate, eliminating the endogenous problem between the number of children and employment. The results show that the number of children has a negative impact on the female labour force participation rate. Compared with women without preschool childcare, children aged 2-6 and under 2 are more likely to consume their mothers' energy, causing them to give up full-time jobs and even withdraw from the labour market.

Finally, the effect of elderly care on adult children's labour supply at intensive and extensive margins will be introduced. Most studies of female labour supply (labour force participation rate, paid working hours and early retirement decisions) recognise the importance of elderly care (Stone and Short, 1990; Boaz and Mueller, 1992; Wolf and Soldo, 1994; Ettner, 1995, 1996; Carmichael and Charles, 1998; Casado-Marin et al, 2011; Jacobs, 2015; Kolodziej, Reichert and Schmitz, 2018). Women's elderly care for parents and parents in law, especially high-intensity elderly care, usually harms their labour force participation (Berecki-Gisolf et al., 2008; Huang, 2012; Crespo and Mira 2014; Heger 2014; Fan and Chen, 2015; Kolodziej, Reichert and Schmitz, 2018). This is because elderly care providers need to increase the supply of non-labour activities. However, some studies find no significant impact or a significant positive effect of elderly care on women's probability of employment (see, for example, Wolf and Soldo, 1994 for the US; Casado- Marin et al., 2011 for Spain; Jacobs, 2015 for Canada). The research on the relationship between elderly care and working hours is not consistent: some scholars find that elderly care can significantly reduce the working hours of adult children (Ettner, 1996; Fahle et al., 2017 and Heger et al., 2020), but other studies have found positive and non-significant result (Wolf et al., 1994; Boli et al., 2008; Casado-Marin et al., 2011 and Jacoba ey al., 2015). This may be because for women who already have a job and do not show a significant decline in working hours, their care intensity does not reach the level of crowding out paid working hours. According to the Leisure-Labour Model, the elderly care provision may occupy their leisure time, thus protecting paid working hours from being affected.

According to Comparative Theory and Human Capital Theory, when the demand for family care increases, more women will sacrifice career development and allocate more time to complete non-labour work than men. Therefore, compared with men, women's labour supply is more negatively affected by family affairs (Carmichael and Charles, 2003; Heitmueller, 2007; Leigh, 2010; King and Pickard, 2013; Nguyen and Connelly, 2014). Among those who do provide care, the impact on male labour supply is varied. While caregiving reduces labour force participation for both men and women, the decline is more pronounced for women (Carmichael and Charles, 2003; Nguyen and Connelly, 2014; Kolodziej et al., 2018). However, some studies suggest caregiving may lead to early retirement for men more than for women (Heger and Korfhage, 2020). In terms of working hours, most research shows that elderly care has a smaller effect on men's hours compared to women's, likely because men are more likely to work full-time and have less flexibility to reduce their hours (Latif, 2006; Heger and Korfhage, 2020).

As discussed above, the marital status of adult children significantly influences their labour supply, including employment probability and paid working hours. Therefore, this thesis

focuses exclusively on married adult men and women rather than individuals of all marital statuses. Additionally, to account for the impact of childcare on the labour supply of adult men and women, we account for presence of childcare responsibilities in Chapters 5, 6, and 7 consistent with the existing evidence.

To sum up，the above financial factors, family factors and demographic factors have a significant impact on individual labour supply at intensive and extensive margins. Although the effects are inconsistent across gender and social backgrounds the labour supply level of adult children who are married, are older and have the burden of child and elderly care is low at intensive and extensive margins.

3.2.3 Identification of the Causal Effect of Elderly Care on Labour Supply

With the help of rigorous measurement methods, measuring the causal effect between elderly care and adult children's labour supply and analyzing whether the research results are consistent is the key to translating the research conclusions into social productivity. Section 3.2.1. and section 3.2.2 introduced the determinants that affect adult children's support behaviour for elderly care and adult children's labour supply at intensive and extensive margins. Next, the challenge of causal effect identification, the methods of identifying causality effects, and the empirical research of policy evaluation tools will be reviewed in this section. Building on these accumulated research insights, we progressively develop the empirical methodologies employed in Chapters 5, 6, and 7.

3.2.3.1 Empirical Challenges

A core content of the first two empirical studies in this thesis is to establish and test the causal relationship between elderly care and adult children's labour supply at intensive, extensive margins. The challenge of identifying causal effects comes from endogenity problems. Endogenity problem specifically refers to the correlation between explanatory variables and error terms in regression analysis (Wooldridge, 2006). Wang and Li (2017) combined the sources of endogeneity problems into five categories: missing variable deviation, selection deviation, two-way causality, dynamic panel and measurement error. Since the data used in this study are from the national China Health and Nutrition Survey (CHNS), we regard the selection deviation is not a big issue. Because the variables selected in this study are from the questionnaire survey results based on objective facts, the possibility of measurement error is small. Although the data type used in this study is panel data, the lag term including the

explained variables is not considered in the regression equation, so there is no impact of Dynamic Panel on endogeneity. In summary, the endogeneity problem mainly comes from two aspects in the research in this thesis. One is that adult children's labour force outcomes (labour force participation rate and paid working hours) and family elderly care may interact. Another is that there will be omitted missing variables in the empirical equations.

In detail, firstly, as described in the theoretical framework, when people in paid work faced the responsibility of elderly care, their care time and paid working time will compete. It means that the opportunity cost of caring for the elderly is usually related to paid employment (Becker, 1965). Because elderly care is a time intensive activity, when caregivers face responsibility of care, they have to reduce the time of paid work to meet the needs of care. On the other hand, because unemployed or part-time workers have more time, they are more likely to be caregivers in the family. According to Michaud et al (2010), these two causal relationships are not only both reasonable, but also not mutually exclusive, and can even occur at the same time. In most provious studies, researchers chose to ignore the causality between elderly care and labour force outcomes. Informal elderly care has been treated as an exogenous variable (Carmichael and Charles, 1998 and Lilly et al., 2010). However, as several authors (Doty, Jackson, and Crown 1998; Ettner 1995; Heitmueller 2007) noted, the failure to test and account for endogeneity caused by interaction between labour force outcomes and elderly care can lead to biased and inaccurate results.

Ettner (1996) stated that if family care is treated as an exogenous variable, the following three assumptions need to be met. First, the family's allocation of elderly care tasks does not depend on the children's characteristics, such as employment status. Second, families do not allow informal elderly care to be unsatisfied. Third, home caregivers cannot replace informal care by purchasing formal care. However, it is clear that these assumptions may fail for some reason. The allocation of the elderly care burden within the family may undoubtedly depend on the endogenous characteristics of the children. Unemployed children, for instance, face lower time costs and may be expected to provide a more significant share of the total amount of informal care than their employed counterparts. Similarly, children with a time cost that exceeds the price of professional homecare may decide to pay for formal care instead of providing informal care. Ettner (1996) shows that the effect of informal caregiving on labour supply based on simple OLS regression is potentially biased towards overstating the effect. This conclusion has received more and more support in subsequent studies. Using an instrumental variable approach and panel data techniques and employing data from the British Household Panel Study from 1991 to 2002, Heitmueller (2007) shows that not accommodating for endogeneity

in the labour market participation equation may significantly overestimate the impact care exhibits on the employment decision of informal carers. Similarly, Bolin et al. (2008) use the data from The Survey of Health, Ageing and Retirement in Europe (SHARE) in 2004 to analyses the impact of informal elderly care for parents (in law) on the caregiver labour market in more than 50 European countries. When they treat informal care as exogenous, informal elderly care was associated with a -0.037 negative and significant effect on the employment probability. When they present the results from the instrumental variables regressions, treating informal care as endogenous. The significant negative effect is -0.224. It is larger than they obtained when treating informal care as exogenous.

Secondly, the endogenity problem can also arise due to omitted missing variables. The labour supply of adult children may be affected by unobservable characteristics such as personal family concept and work preference. For example, women with a strong sense of filial piety and low willingness to work may reduce working hours or even withdraw from the labour market to take care of their elderly parents. Leigh (2010) emphasises that unobserved characteristics can change the estimates significantly. Using panel data from Australia, he finds that accounting for individual fixed effects reduces the strong negative coefficients for the link between caregiving and labour force participation from - 28 percent to - 6 percent. Viitanen's (2010) analysis of the European Community Household Panel (ECHP) initially identifies Germany as the only country among 13 European nations with a significant relationship between caregiving and labor force participation. However, after controlling state dependence in labor force participation and individual fixed effects, this negative impact diminishes from 0.7 to 0.3 percentage points.

The endogeneity problem between elderly care and the adult children labour supply outcomes (labour force participation and paid working hours) will affect the effectiveness and significance of the regression results. Therefore, addressing potential endogeneity issues in these two aspects is a crucial component when examining the three empirical relationships.

3.2.3.2 Approaches to Identify the Causal Effects

To address the endogeneity problem caused by two-way causality, the instrumental variable (IV) method and fixed effects model are commonly employed in the literature. The IV method aims to separate endogenous explanatory variables into exogenous and endogenous components by utilizing instrumental variables (Wooldridge, 2006; Larcker and Rusticus, 2010). This process involves a two-stage estimation procedure: in the first stage, the endogenous explanatory variable is regressed on the instrumental variable to obtain predicted values; in the second stage,

these predicted values are used in place of the endogenous variable in the main regression, effectively mitigating endogeneity bias.

Among the IV estimation techniques, Two-Stage Least Squares (IV-2SLS) is the most widely used in studies examining the relationship between elder care and labour supply (Jiang and Zhao, 2009; Liu, Qi and Dong, 2016). Other common IV approaches include Three-Stage Least Squares (IV-3SLS) and the Generalized Method of Moments (IV-GMM) (Meng, 2011). Additionally, when the dependent variable is binary, methods such as IV-Probit (Liao, 2020; Huang et al., 2021) and IV-Logit (Ma and Li, 2014) are more appropriate.

Each of these methods has its own advantages and limitations. IV-2SLS is most effective under the assumption of homoskedastic and uncorrelated error terms (Hahn et al., 2004). In the presence of heteroskedasticity or autocorrelation, IV-GMM provides more efficient and robust estimates by incorporating heteroskedasticity-consistent weighting matrices (Bascle, 2008). While its advantages come at the cost of increased complexity and sensitivity to instrument validity. IV-GMM requires a strong set of overidentifying restrictions, and if the instruments are weak, it may lead to even greater bias than IV-2SLS. IV-3SLS extends the 2SLS framework by considering the correlation of error terms across simultaneous equations, making it suitable for systems of interdependent equations where endogeneity arises from feedback effects.

On the other hand, IV-Logit and IV-Probit are designed specifically for models with binary dependent variables. However, Timoneda (2021) points out that in fixed effects models, using IV-Logit and IV-Probit can result in significant sample loss, as observations with no variation in the dependent variable are excluded. Furthermore, as more covariates are added, the coefficient estimates become less reliable. In cases where the dependent variable is binary, the Linear Probability Model with Fixed Effects provides more accurate estimates and predicted probabilities than non-linear models, especially when the proportion of ones in the dependent variable is less than 25%.

The validity of IV estimation relies heavily on the choice of strong and relevant instruments. Instrumental variables must satisfy two key conditions: (1) they must be strongly correlated with the endogenous explanatory variable (instrument relevance), and (2) they must be uncorrelated with the error term in the main equation (instrument exogeneity). In the context of elder care and labour supply, common IVs used in the literature include the number of siblings (Huang, 2021; Wu et al., 2017; Chen et al., 2016), parents' (or in-laws') age and health status (Chen et al., 2016), whether both parents (or in-laws) are alive (Bolin et al., 2008), the husband's parental health condition, and the availability of community-based elder care institutions (Chai et al., 2021).

Another approach employed in the literature is the inclusion of individual fixed effects. The fixed effects model involves transforming the equation to account for fixed effects and then estimating it (Wooldridge, 2006). This approach is designed to control unobservable factors that unvaried over time. However, the fixed effects model only partially addresses endogeneity, as it does not account for unobservable factors that vary with time, which may also be correlated with the explanatory variables, thus leading to potential omitted variable bias. As a result, the fixed effects model is often employed as an auxiliary method in conjunction with other techniques to correct for endogeneity, rather than serving as the primary correction mechanism. To address the endogeneity issue arising from unobservable variables, many scholars adopt the panel data approach and use fixed effects for regression estimation (Heitmueller, 2007; Van Houtven et al., 2013; Wang and Zhang, 2018; Chai et al., 2021).

In addition to the instrumental variable and fixed effects models discussed above for addressing potential endogeneity issues, a range of robustness checks can be employed to mitigate concerns about potential measurement error and sample selection. Informed by the existing literature, the empirical analyses in this thesis address the potential endogeneity between elderly care and labour supply by employing a 2SLS strategy and using the number of siblings as an instrument (see discussion in Sections 5.4 and 6.4).

3.2.3.3 Policy Evaluation Tools

Sections 3.2.3.1 and 3.2.3.2 have discussed the identification of causal effects between elderly care and caregivers' labour supply. The ultimate goal of this thesis is to find effective intervention measures that ensure a work-life balance for adult caregivers while providing a supportive elderly care environment. Social policy plays a crucial role in addressing this issue. From a causal effect perspective, elderly care policies can mitigate some of the negative impacts of caregiving on labour supply at both intensive and extensive margins by easing the caregiving burden on adult children. This also further confirms the causal relationship between elderly care and labor supply. The next paragraph will review empirical research on policy tools.

Family policy originated in Europe. It is mainly used as a basic policy tool to deal with the problem of low birth rate and poverty (Su, 2013). Given the cultural context of European countries, the basic needs and personal circumstances of the elderly are generally considered independent of family members. As a result, elderly care policies are typically addressed separately from family policies. Until the end of the 20th century, due to the aggravation of the problem of population ageing, the heavy burden of social pension, the elderly policy was gradually listed as a part of family policy. Most of the research on family elderly care in China

appeared in the period from the end of the 20th century to the beginning of the 21st century, and then there was the concern and research on family policy.

Since the development of elderly care policies abroad, many scholars generally suggested that elderly care policies play a positive role in the development of families and the lives of family members (Bogenschneider, 2006; Anderson and Wilder, 2008; Dong, 2018). However, the research on the elderly care policy on the labour supply of adult children is not rich and the conclusions of these studies are not consistent. For example, Løken, Lundberg and Riise (2016) focus on the 1998 federal grant program in Norway founding that there was no significant effect on the probability of employment of caregivers. However, a slight impact on the labour force participation of care providers with economic transfer was found by Yamada and Shimizutani (2015). They used the data of Japan's 2010 Comprehensive Survey of Living Conditions (CSlC) and employ logit, OLS and IV methods were employed to study the impact of family elderly care on employment since Japan launched the nursing insurance policy. The study finds that if elderly parents do not have nursing insurance, women engaged in family elderly care would reduce their labour participation by 27.2 percentage points, while the elderly receiving nursing insurance, Women engaged in family elderly care will reduce their labour participation by 24.7 percentage points.

Compared with economic support, care support seems to have a more direct and positive impact on the labour supply of care providers. For example, Hollingsworth et al (2021) rely on the Scottish Community Care and Health Act (CCHA) of 2002 and difference-in-differences strategy to explores the impact of the free formal elderly care policy implemented in Scotland in 2002 on the caregivers' labour supply. They find that after implementing the policy in 2002, the working hours of the caregivers have increased compared with England and Wales. Specifically, working hours per week increased significantly by 4.3% (1.4 hours) in Scotland and only 0.69 hours in England and Wales. Similarly, the Scotland's caregivers' employment probability increased significantly by 4 percentage points, while the probability of employment of caregivers in England increased by 2.5 percentage points. At the same time, they find that male caregivers were more sensitive to the measure than female caregivers. In China, there is no research on the impact of elderly care policy on caregiver labour supply.

To sum up, when exploring the impact of elderly care on the labour supply of adult children elderly care providers, the endogenity problem cannot be ignored. In the existing empirical literature, instrumental variables and fixed effect models are widely used to deal with potential endogenity problems.

Chapter 4 Dataset Selection

The first two research questions of this study mainly explore the impact of elderly care on the adult children's labour supply at both intensive and extensive margins. The third research question of this study intends to explore the impact of the home-based elderly care policy on the adult children's labour supply at both intensive and extensive margins. Therefore, the survey data needed in this study should not only be limited to the adult children's care (at both intensive and extensive) for elderly parents and parents in law but also needs adult children's labour supply data (at both intensive and extensive margins). The survey data should also include the demographic characteristics, financial characteristics and family characteristics of the respondents as control variables. After screening, four databases in China can simultaneously provide individual level microdata on the adult children's labour supply (at both intensive and extensive margins) and the elderly care they provided (at both intensive and extensive margins). They are China Health and Retirement Longitudinal Study (CHARLS), Chinese General Social Survey (CGSS), China Health and Nutrition (CHNS) and China Family Panel Studies (CFPS). This chapter explains each of them in detail (See Table 4.1 for an overview of these four datasets).

4.1 China Health and Retirement Longitudinal Study (CHARLS)

CHARLS national baseline survey was carried out in 2011, covering 150 county-level units, 450 village level units and 17000 individuals in about 10000 households. These samples were followed every two to three years. The purpose of China Health and Retirement Longitudinal Study (CHARLS) is to collect high-quality micro data representing families and individuals of middle-aged and elderly people aged 45 and over in China, so as to analyse China's population ageing problem and promote interdisciplinary research on ageing problem. Compared with the other three micro databases to be introduced, CHARLS is a tracking data survey focusing on the family and social life of the middle-aged and the elderly in China. This database not only includes the basic demographic information of the surveyed middle-aged and elderly people over 45 years old, but also includes information in terms of their relationship with parents and children, physical and mental health, work and retirement, asset composition, insurance, family income and expenditure, and so on. The retirement time, retirement type, retirement reason, retirement salary and other retirement related information contained in CHARLS are not available in the other three data surveys.

Table 4.1 Comparison of available databases

				China Health and Retirement Longitudinal Study (CHARLS)		Chinese General Social Survey (CGSS)	China Health and Nutrition (CHNS)	China Family Panel Studies (CFPS)
Organization (design and organise to collect data)				National Development Research Institute of Peking University		Renmin University of China	Carolina Population Center at the University of North Carolina and the National Institute for Nutrition and Health at the Chinese Center for Disease Control and Prevention	China Social Science Investigation Center, Peking University
Data type				Panel data		Cross-section data	Panel data	Panel data
Whether public available or not				Yes		Yes	Yes	Yes
Years of data				2018/2015/2013/2011		2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991/1989	2018/2016/2014/2010/2009 /2008
Relevant variables and available years	Elderly caregivers' Characteristics	Demographic characteristics	Gender	Relationship A	Relationship B	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
				2018/2015/2013/2011	2018/2015/2013/2011			
			Age	2018/2015/2013/2011	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Urban and rural registered residence	2018/2015/2013/2011	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Region	2018/2015/2013/2011	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Education	2018/2015/2013/2011	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Marital status	2018/2015/2013/2011	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
		Characteristic Family	Number of brothers and sisters	2018/2015/2013/2011	2018/2015/2013/2011	-	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Number of brothers and sisters of spouse	2018/2015/2013/2011	2018/2015/2013/2011	-	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Living arrangement	-	2018/2015/2013/2011	-	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016
		Labour work and non-labour work	Industry	2018/2015/2013/2011	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Employed or not*	2018/2015/2013/2011	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Labour working hours (per day)*	-	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Occupation	2018/2015/2013/2011	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Sector	2018/2015/2013/2011	2018/2015/2013/2011	-	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Early retirement decision*	-	2018/2015/2013/2011	-	2015/2011/2009/2006/2004/2000/1997/1993/1991	-
			Reasons for early retirement	-	2018/2015/2013/2011	-	-	-
			Weekly labour working hours of partner	-	-	-	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Provide elderly care or not*	-	2018/2015/2013/2011	2017	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016
			Hours that caregiver care for the elderly every week*	-	2018/2015/2013/2011	2017	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016
			Hours of spouse that caregiver care for the elderly every week	-	-	-	-	2018/2016
			Care mode (economic support, life care, spiritual support)	-	-	2017	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016
		Financial characteristics	Labour income (per week)	2018/2015/2013/2011	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Labour income of partner (per week)	2018/2015/2013/2011	-	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
			Non-labour income (per week)	-	2018/2015/2013/2011	2017/2015/2013/2012/2011/2010/2008/2006/2006/2004/2003	2015/2011/2009/2006/2004/2000/1997/1993/1991	2018/2016/2014/2010
	Elderly parents and parents in laws' characteristics		Age	2018/2015/2013/2011	-	-	-	2018/2016
			Income	2018/2015/2013/2011	-	-	-	-
			Housing property rights		-	-	-	-
			health		-	-	-	-
			Marital status	2018/2015/2013/2011	-	-	-	-
			Education	2018/2015/2013/2011	-	-	-	-
			Number of parents and parents in laws alive	-	-	-	2015/2011/2009/2006/2004/2000/1997/1993/1991	-
			Medical insurance	2018/2015/2013/2011	-	-	-	-
			Pension insurance	2018/2015/2013/2011	-	-	-	-

Source: Official website of CHARLS, CGSS, CHNS and CFPS

Link: http://charls.pku.edu.cn/ http://cgss.ruc.edu.cn/ https://www.cpc.unc.edu/projects/china/ http://www.isss.pku.edu.cn/cfps/

*[Accessed: 01. 08. 2021 Note:__ and * indicates the key variables required for the study*

Moreover, since CHARLS includes the relationship between the respondent and their parents and children respectively and the information is comprehensive, the relationship between two pairs of adult children and their parents can be extracted from CHARLS. That is, the relationship between the respondent and his/her children and the relationship between the respondent and his / her parents (relationship A and relationship B are used to represent the above two relationships respectively in Table 4.1). Based on this, CHARLS data have been widely used to explore the effect of elderly care on adult children's labour supply at intensive and extensive (see, for example, Chai, 2021; Wang, et al, 2019).

Compared to the other three national datasets, labour supply behavior is more comprehensively recorded in the CHARLS. This enables not only the investigation of how elderly care impacts the labour supply of adult children but also the exploration of dynamic changes in the labour supply of married adult children in China under the influence of other social factors. For instance, by analysing how health conditions and disabilities influence individuals' decisions to remain in or exit the labour market, researchers can gain deeper insights into the effects of aging and health constraints on labour force participation. Additionally, CHARLS provides detailed information on retirement plans, pensions, and other social security mechanisms, allowing for the examination of how economic security and public policies shape individuals' willingness or need to work beyond the traditional retirement age. CHARLS also offers rich data on household dynamics, enabling researchers to study the role of family support in shaping labour supply behavior. Beyond labour supply, CHARLS could provide valuable insights into broader socio-economic factors. Its longitudinal nature enables the analysis of long-term trends in income inequality, wealth accumulation, and access to healthcare services. These factors are crucial for understanding how economic disparities influence labour supply decisions, particularly for older workers. Furthermore, by examining disparities in employment and income levels between urban and rural areas, researchers can explore the spatial dimensions of labour supply behavior and socio-economic inequality in China. Finally, the extensive health data in CHARLS, including information on chronic illnesses, disabilities, and mental health, serves as a critical resource for evaluating how health conditions impact labour supply, as well as broader social participation and economic well-being. For example, understanding the relationship between health shocks and early retirement, or the effects of chronic illnesses on labor productivity, can provide valuable insights for policymakers in designing measures to support older workers effectively.

However, a key disadvantage of CHARLS is that these are from the middle-aged and

elderly people aged 45 and above, which greatly limits the sample size. We want to observe not only the impact of elderly care on the labour supply of adult children over the age of 45, but also the impact on the labour supply of middle-aged and young people under the age of 45. Obviously, it cannot be achieved in the relationship between the respondents and his/her parents. In CHARLS relationship A (the relationship between the respondent and their children), this age limit has been broken, but the lack of elderly care data (i.e. the care of the respondent's children for the respondent) cannot meet our needs. On the other hand. CHARLS does not cover the care for parents in law, while in China, married adult children are usually the care for their parents in law. This once again limits the scope of the study.

4.2 Chinese General Social Survey (CGSS)

The Chinese General Social Survey (CGSS), which began in 2003, is the earliest national, comprehensive and continuous academic survey project in China. The CGSS sample covers 31 provinces[12] / cities[13] / autonomous regions[14], the sample size in 2017 is 12582 households, and the respondents include all family members in the sample households. CGSS systematically and comprehensively collects data at multiple levels of society, community, family and individual. Compared with the other three micro databases, CGSS has the widest survey scope and the most frequent data updates. CGSS has no age limit on the respondents. In addition to providing information in terms of basic demographic characteristics, employment, family income and expenditure, social life, entertainment arrangements and other information, CGSS pay more attention on the subjective feelings of the surveyed population. Such as whether you feel pressure, attitude towards religion, etc. However, the variables of whether to provide elderly care and hours of elderly care provided by adult children only appeared in the latest survey (2017). Therefore, empirical research based on CGSS rarely covers the subject of elderly care. The only known empirical study related to the elderly is the analysis of determinants that affect the quality of life of urban elderly conducted by Zhou and Xu in 2013.

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[12] Province(CGSS): Yunnan, Jilin, Sichuan, Anhui, Shandong, Shanxi, Guangdong, Jiangsu, Jiangxi, Hebei, Henan, Zhejiang, Hainan, Hubei, Hunan, Gansu, Fujian, Guizhou, Liaoning, Shanxi, Qinghai, Heilongjiang

[13] City (CGSS): Shanghai, Beijing, Tianjin, Chongqing

[14] Autonomous regions (CGSS): Neimenggu, Ningxia, Guangxi, Xinjiang, Xizang

4.3 China Health and Nutrition Survey (CHNS)

China Health and Nutrition Survey (CHNS) is conducted by an international research team with backgrounds in nutrition, public health, economics, sociology, Chinese research and demography. It aims to understand how China's economic and social transformation affects the health and nutritional status of its people. The CHNS sample covers 25 provinces[15] / cities[16], the sample size in 1997 is 4,400 households and 19,000 individuals. In each survey after 1997, new families and their family members will be added to the sample. The advantage of CHNS is that it is a long panel data and can provide all the key variables required for research. CHNS began to carry out national surveys in 1989 and conducted a follow-up survey every two to three years. In the 26 years from 1989 to 2015, CHNS conducted 10 data tracking surveys. This is the longest spanning data survey among the four micro data surveys discussed in this chapter. Since 1991, CHNS began to provide information on the relationship with parents (elderly care at both intensive and extensive margins), but the age of the respondents was limited to less than 52 years old. Although there is also an age limit, this study mainly focuses on the labour supply (the earliest legal retirement age for women is 50, and the latest is 55 in China. The legal retirement age for men is 60), the sample loss due to age limit in CHNS is acceptable. CHNS also provides basic information in terms of demographic characteristics, family income and expenditure, work and retirement, which can meet the research needs. In addition, it is worth mentioning that CHNS not only provides the respondent's labour supply information, elderly care information and necessary control variable information required for the study but also involves the health of parents and parents in law. This information can be used to measure the physical health of the elderly being cared for. Compared with the other three micro data surveys, CHNS is the only data survey that can provide information about elderly care in the long panel meeting research needs.

CHNS data have been widely used to explore the effect of elderly care on adult children's labour supply at intensive and extensive margins (see, for example, Wu, et al, 2017; Chen, et al, 2016; Fan and Chen, 2016; Huang, 2012; Liu, et al, 2010) in China. One limitation of the analysis is that the database has not yet released survey data for 2018. In 2016, China fully implemented the two-child policy and extended the duration of legal maternity leave for women,

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[15] Province (CHNS): Liaoning, Heilongjiang, Yunnan, Jiangsu, Shandong, Henan, Hubei, Zhejiang, Hunan, Guangxi, Guizhou, Shanxi

[16] City (CHNS):Beijing,Shanghai, Chongqing

but the existing data do not capture the potential impact of these policies on adult children's labour supply.

4.4 China Family Panel Studies (CFPS)

Finally, China Family Panel Studies (CFPS) is a national, large-scale and multidisciplinary social follow-up survey project. It focuses on the economic and non-economic welfare of Chinese residents, as well as many research topics including economic activities, educational achievements, family relations and family dynamics, population migration, health, etc. The CFPS sample covers 25 provinces[17] / cities [18]/ autonomous regions[19], the target sample size is 16000 households, and the respondents include all family members in the sample households. The advantage of CFPS lies in the rich information of fields and variables involved. It is not limited to the elderly group and social life, which provides more possibilities for heterogeneity research and variable selection. Relevant to this study, CFPS data have been widely used to explore the impact of living with parents (in law) on adult children's labour supply (see, for example, Gu, 2021; Ren and Treiman, 2015), research on gender differences in labour market (see, for example, Chen and Zhou 2014; Yu, 2014), Family decision making (see, for example, Yu, 2014; Chen and Zhou, 2014) and the impact of child care on parents' labour supply (see, for example, Chen, 2016). Despite the advantage of CFPS lies in its large scale and large number of samples. However, the information about elderly care in CFPS was only investigated in 2016. Since China's family elderly care policy began to flourish after 2008, CFPS cannot meet the data requirements of addressing the research question of the third empirical chapter.

To sum up, this study intends to use the tracking data of CHNS from 1991 to 2015 for all three research questions due to the large period span and the rich available variables.

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[17] Province(CFPS): Sichuan, Anhui, Shandong, Guangdong, Jiangsu, Jiangxi, Hebei, Henan, Zhejiang, Hainan, Hubei,Hunan, Gansu, Fujian, Guizhou, Liaoning, Shanxi, Qinghai, Heilongjiang

[18] City (CFPS): Shanghai, Beijing, Tianjin, Chongqing

[19] Autonomous regions (CFPS): Ningxia, Guangxi

Chapter 5 The Impact of Elderly Care on Married Women's Labour Supply

5.1. Introduction

In the past 20 years, China's population structure has undergone significant changes. The deepening of China's ageing population has attracted international scholars' wide attention in recent years. With the acceleration of China's ageing process, the care demand of the elderly poses a significant challenge to society (Zeng and Hesketh, 2016). As the formal social care industry for the elderly is still underdeveloped, informal family care continues to be the main form of care provision for the elderly (Zhu and Österle, 2019). This is reinforced by Chinese law and the Confucian culture of filial piety, which requires adults to support their elderly parents and parents in law (Yan, 2003, Standing Committee of National People Congress Standing Committee of National People's Congress, 2012). Moreover, influenced by Chinese traditional culture, women are often the primary caregivers for their families rather than men. Especially after women get married, they are more likely to take on unpaid elderly care work than unmarried women (Dostie and Kromann, 2013 and Cai, 2018).

Although there is a rich of international literature that explores the impact of elderly care on the labour supply of female caregivers both at the intensive and extensive margins (see, for example, Skira, 2015 for the US; King and Pickard, 2015 for the UK; Heger and Korfhage, 2020 for fifteen European countries and Chai, Fu and Coyte, 2021 for China), the empirical evidence is mixed both in terms of the sign and the magnitude of the impact of the elderly care. Many empirical studies also find that the net effect of elderly care on female caregivers varies by region, time period and caregiver characteristics. Despite the distinctive features of the China's concept and mode of elderly care, possibly influenced by the far-reaching traditional culture, however, there is limited research based on Chinese data. This paper aims to fill this evidence gap by exploring the impact of elderly care on married female caregivers' labour supply at both extensive margin (employment status) and the intensive margin (paid working hours conditional employment) in China.

The analysis employs data from the China Health and Nutrition Survey (CHNS) in 2004, 2006, 2009, 2011 and 2015, which in contrast to other national surveys (for example, China Health and Retirement Longitudinal Study (CHARLS), Chinese General Social Survey (CGSS) and China Family Panel Studies (CFPS)), covers both urban and rural areas in China and has a

rich set of individual, family, and financial characteristics that are well-established determinants of married women's labour supply (Ashenfelter and Heckman, 1974; Saha and Kalita, 2015; Chai, Cai and Li, 2021). By employing Two-stage least squares (2SLS) and exploring the exogenous variation in need care (whether elderly parents or parents in law have elderly care demand) and the sum of the number of siblings of both spouses, which are used as instruments for elderly care, the analysis addresses potential endogeneity bias between elderly care and married women' labour supply. Considering the features of family structure in China, core families that conform to economic development collide with multi-generational families that are influenced by traditional cultural and the increasing informal family elderly care demand, the analysis considers the potential heterogeneous effects of living arrangements, care intensity, childcare and caregivers' age.

The analysis shows that elderly care has positive significant impact on married women' probability of employment by 8.6 percentage points. In contrast, conditions on employment, elderly care significantly reduces their paid working hours (-4.50 hours). These results are robust to different estimate methods, different instrumental variables, model specification and levels of clustered standard errors. Further analysis reveals that the impact of elderly care is not uniform and varies by living arrangements, childcare and age. Specifically, providing elderly care reduces the employment probability of married women co-residing with their elderly parents or parents-in-law by 17.3 percentage points. In contrast, it increases the employment probability of women caregivers who do not live with their elderly parents or parents-in-law by 20.3 percentage points. Additionally, elderly care decreases the paid working hours of non-co-resident female caregivers by 5.98 hours per week, while it has no significant effect on the paid working hours of co-resident married women. The differences arising from these living arrangements may be driven by the fact that co-residing married women are more likely to assume the role of primary caregivers, while non-co-residing married women tend to provide care for elderly parents through financial support. In terms of age, while elderly care reduces the paid working hours of married women aged 35 and over, it significantly increases the probability of employment for those older women. In contrast, for younger married women, elderly care negatively impacts their labour supply at both extensive and intensive margins by 34.4 percentage points and 11.58 hours per week. The heterogeneity related to childcare reveals the competing demands of childcare and elderly care on the limited time and energy of married women. The regression results show that married women without childcare responsibilities, when facing elderly care obligations, not only do not experience a negative impact on their

labour supply but are more likely to increase their probability of employment to earn additional income for caregiving expenses. In contrast, married women who are simultaneously responsible for both childcare and elderly care face significant caregiving pressures, leaving them with insufficient time and energy to participate in the labour market. Moreover, for those already employed, their paid working hours are negatively affected by 28.47 hours per week. However, the intensity of elderly care has no significant impact on both intensive and extensive margins of female caregiver's labour supply. In terms of Hukou, we did not find heterogeneity in employment probability based on household registration type. The heterogeneous effect of elderly caregiving on wife' labour supply is only observed in the paid working hours of urban married women (-12.98 hours per week). This may be due to the relative inflexibility of the rural labor market, which limits rural women's ability to adjust their paid working hours through social or government support. In contrast, in urban areas, caregiving responsibilities result in a significant reduction in women paid working hours, highlighting the broader range of job opportunities available. Urban women are more likely to reduce their working hours rather than leave the labor market entirely, allowing them to balance work and caregiving responsibilities more flexibly.

The structure of this paper is as follows: Section 2 reviews the previous literature that includes theoretical framework and empirical evidence. Sections 3 and 4 discuss the data and method. Section 5 presents the estimation results and presents results from the heterogeneity analysis by living arrangement, care intensity, childcare and age. And finally, Section 6 concludes.

5.2. Literature Review

In the labour market, individual factors play an essential role in their own labour supply decisions. It involves whether to work and how long to work every day if they were employed. It is supported that the employment decision is ultimately a decision about how to use time. One way to use time is for leisure activities, and the other is to use it for work (paid work or unpaid family work) (Ehrenberg, Smith and Hallock, 2021). In this section, we want to review the empirical experience that explores how married women's labour supply will be affected when they face the responsibility of elderly care, including whether they work and the paid working hours they can provide. Before reviewing empirical experience, this section also answers the above questions from the perspective of the theoretical model.

5.2.1. Theoretical Framework

The cost of formal elderly care services is directly expressed in the form of money, while the cost of informal elderly care is usually expressed as an "implicit cost" that family elderly care affects caregivers' labour market decisions, both along intensive margin and extensive margins (Heitmueller, 2007). Carmichael and Charles (1998) emphasise the role of economic incentives in this decision-making process and suggest that an increase in the responsibility of caring for elderly parents and parents in law might affect caregivers' labour supply outcomes in two ways with opposite effects, through "income effect" and "substitution effect". In this context, substitution effect could arise from that elderly care is a labour-intensive and time-intensive activity leading to increased time scarcity of caregivers, making them unable to balance the burden of work and elderly care under time constraints. As a result, individuals who provide elderly care would reduce their paid working hours and may even withdraw from the labour market. On the other hand, the income effect would arise as care for the elderly requires additional money. In order to make up for this additional expense, caregivers may need to work actively to obtain more labour income leading to an increase in their labour supply. In theory, both effects could be present simultaneously and hence the interaction of these two effects would determine the net impact of the informal care on married women's labour supply.

However, according to the Extended Leisure-Labour model, which has been detailed discussed in Chapter two, for the research objects of this empirical chapter (married women), the reservation wage of married women is significantly influenced by the labour supply decisions and earnings of other household members, particularly their husbands. The reservation wage, in turn, affects the threshold and intensity of income and substitution effects (Cherchye, Derock and Vermeulen, 2012; Aizer, 2010). In other words, the income effect and substitution effect of married women under the pressure of elderly care are not only affected by their personal preferences, for example wage rate and care willingness, but also affected by the work-life arrangements of other family members. Moreover, due to the differences in the necessity of women in the family at different stages and under different conditions, researchers often find that changes in caregiver's age, family income and husband's work status will also affect married women's labour supply decisions (see Section 2.2.2 for detailed discussion for empirical research results).

5.2.2. Empirical Literature

The international research on the relationship between family elderly care and caregivers'

labour supply began in the 1980s (Soldo and Myllyluoma, 1983; Brody and Schoonover, 1986). However, there are no consistent empirical results on the causal effect between family elderly care and female caregivers' labour supply. From the perspective of empirical evidence at extensive margin, some studies find no significant impact or a significant positive effect of elderly care on women's probability of employment (see, for example, Wolf and Soldo, 1994 for the US; Casado- Marin et al., 2011 for Spain; Jacobs, 2015 for Canada). There is also a body of literature that supports the negative impact of elderly care on women's probability of employment (Berecki-Gisolf et al., 2008 for Australia; Huang, 2012 for China; Crespo and Mira, 2014 for Europe; Skira, 2015 for the US; Fan and Chen, 2015 for China; Kolodziej, Reichert and Schmitz, 2018 for Europe; Chai, Cai, Li and Zeng, 2021 for China).

Regarding paid working hours, although Wolf and Soldo (1994) find that elderly care had no significant relationship to women's paid work hours in the US, most recent literature support that elderly care may reduce paid work hours for female caregivers (Berecki-Gisolf et al. 2008 for Australia; Bolin et al. 2008 for Europe; Kotsadam 2011 for Europe; Meng, 2013 for China; Van Houtven et al. 2013 for the US and Heger and Korfhage, 2020 for Europe). It may be influenced by factors such as samples and methods. The magnitude of this negative impact varies in international literature. For example, in Europe, Meng (2011) uses data from the German Socio-Economic Panel (2001-2007) and employs a linear probability model (LPM) with efficient Generalized Method of Moments (GMM) estimation and fixed effects to address endogeneity. He finds that caregiving reduces women's working hours by 35 minutes per week. Heger and Korphage (2020), analysing panel data from 15 European countries (2004-2015), report that providing elderly care reduces women's paid working hours by 8.2 percentage points. In the United States, using panel data from the American Health and Retirement Survey (HRS), Johnson and Lo Sasso (2000) find that family caregivers aged 53-63 work 23%-28% fewer hours annually compared to non-caregivers, for both men and women.

The study on the impact of elderly care on caregiver labour supply in China began around 2010 and there are few empirical results compared with the international literature. Many studies in China have used the cross-sectional data and/or panel data of the "China Health and Nutrition Survey (CHNS)". In addition, CFPS, CGSS, CHARS and some province level databases are also selected. Table B.1 in the appendix is a summary of literature based on Chinese data. Most of these studies employed un-update data that before 2012, and nearly half of them employed cross-sectional data.

The empirical research closest to the content of this study comes from Chen, et al (2016). Using the data of China Health and Nutrition Survey (CHNS) from 1991 to 2011, Chen et al. (2016) controlled both the time fixed effects and individual fixed effects. They find that providing elderly care has no significant effect on the possibility of women being employed while significantly reducing the working hours by 2.8 hours per week. Based on the benchmark study, they conducted heterogeneity analyses on care intensity and living arrangements, respectively. They set three care intensity dummy variables of 10, 15, and 20 hours of weekly care for parents and parents in law. They find that providing more than 20 hours of high-intensity care per week makes it difficult for women to balance care and work, resulting in a "threshold effect" and a significant decrease the probability of employment by 7.31 percentage points. For women who are still working, this threshold appears within 10 hours. The responsibility of elderly care will result in a reduction of 4.8 paid working hours per week. In terms of living arrangement, they divided the whole sample into two subgroups (co-residence subgroup and non-co-residence subgroup) for regression based on whether female caregivers live together with the elderly parents and parents-in-law. They find that who lived with the elderly had a significant decrease in their probability of employment by 21.6 percentage points and reduced weekly working hours by 2.67 hours.

However, Chen, Fan, Zhao and Chu (2016)'s research sample includes information from 9 years before China entered an ageing society in 2000. In that period, the elderly dependence ratio was relatively low, which may lead to caregivers facing fewer work-life conflicts and a different impact of elderly care on paid working hours for female caregivers. Although the study is based on individual-level data, the causal impact of elderly care responsibilities on labour supply in the 1990s offers limited guidance for contemporary economic policymaking. The sample period of this thesis began in 2004, and compared to Chen, Fan, Zhao and Chu (2016), a shortened study period is more likely to reduce biased effects caused by macroscopic factors such as social services that change over time and are unobservable. Secondly, the elderly care information of CHNS is persistent (see Tables C.1-C.4 in Appendix C for details). Therefore, individual fixed effects may lead to biased regression results in this situation. Thirdly, they did not consider the impact of total family income and husband's work status on the labour supply of married women, which affect married women's labour supply significantly at both intensive and extensive margins (Merz, 2018). Finally, in terms of research subjects, we consider that married and unmarried women are not only differ in the supply of elderly care, but also in their

labour supply researches (Merz, 2008; Dostie and Kromann, 2013 and Tumsarp and Pholphirul; 2020). Therefore, this study only focuses on those women who are married and have spouses.

Two articles using the latest data are from Wang et al. (2020) and Huang et al. (2021). They use panel data from the CHNS and study the role of elderly care on the female caregivers' labour supply. However, Wang et al. (2022) based on data from CHNS from 1993 to 2015, exploring the urban-rural differences on the informal care intensity of female caregivers in China. In their study, employment status is taken as an independent variable, and the intensity of elderly care is the dependent variable. Although this study shows the being employed significantly increases the probability to take low-intensity elderly care (smaller than 10 hours per week), the study does not identify the causal effect of the impact of elderly care on the labour supply. Huang et al (2021) use the data from CHNS 1991-2015 and Generalized Space Least Square (GS2SLS), they find that elderly care significantly reduces the employment probability of female caregivers by 8.1 percentage points. However, they do not control caregivers' family characteristics and husband characteristics, which affect married women's labour supply significantly at both intensive and extensive margins (Merz, 2018). Moreover, they only report the impact of elderly care on female caregivers' labour supply at extensive margin and do not consider its potential impact along the intensive margin providing an incomplete picture.

In summary, the literature on the impact of elderly care on the labour supply of married women in China is relatively scarce and still at early stages. Compared to existing international studies, there are notable differences in both the significance and magnitude of the effects.

5.3. Data

5.3.1. Data and Sample Restrictions

As discussed in Chapter 4, the data for this empirical analysis are sourced from the CHNS, which provides a long panel dataset containing all key variables necessary for the regression analysis. The variables related to informal family elderly care are derived from the CHNS individual questionnaire, titled 'The Supplementary Survey on the Relationship between Children and Their Parents (in-law).' Information on elderly care (e.g., whether elderly care is provided, hours of elderly care per week) has been collected since 1993. Data on the number of siblings for both spouses, one of the instrumental variables intended for use in the regression, has been available since 2000. However, despite the CHNS 2000 survey including information for all the variables needed in this empirical research, there was a large number of missing

observations. After eliminating missing data, there are only four observations in 2000. To avoid bias due to the limited sample size, this study excludes the 2000 data and instead utilizes CHNS data from five surveys conducted in 2004, 2006, 2009, 2011, and 2015, covering an 11-year span.

The main variables of this study are elderly care (independent variable in both extensive and intensive margins), employment status (dependent variable in extensive margin) and weekly paid working hours (dependent variable in intensive margin). Therefore, the sample needs to collect information on elderly care and employment status for extensive margin estimation as well as to collect information on elderly care and weekly paid working hours for intensive margin estimation. In addition, the study also put some restrictions on the data.

Firstly, the sample is restricted only for women aged between 18-51 years old. This is because the questions in "The Supplementary Survey on the Relationship between Children and Their Parents (in law)" are only asked to ever be married women under the age of 52. Moreover, CHNS only aims at the respondents aged 18 and above to ask about their spouses' information and marital status, which are included in the regression. Therefore, the minimum age limit for this study is 18 years old, maximum age limit to 51 years old.

Secondly, the sample is restricted only to married women. This is because, firstly, "The Supplementary Survey on the Relationship between Children and Their Parents (in law)" is only asked to ever be married women (including women who are divorced or widowed). Secondly, according to the discussion in Sections 2.3.1 and 2.3.2 and rich international research (Dostie and Kromann, 2013 and Cai, 2018), the elderly care decisions and the intensity of elderly care have more significant effects on married women than unmarried women. Moreover, numerous studies have found that the labour supply of married women is different from that of unmarried women (Licona, 2000; Bick et al. 2018; Tumsarp and Pholphirul; 2020). This means that it is not just married women, and unmarried women are differing in the supply of elderly care, married women and unmarried women also differ in their labour supply. Based on the above two reasons, this study only focuses on married women who and have spouses.

Overall, there are 143564 initial observations obtained in the present study. Among 143564 initial observations, there are 12346 observations that include elderly care information. There are 12341 observations including elderly care (independent variable in extensive margin regression) and employment status (dependent variable in intensive margin) information. There are 8020 observations including elderly care (independent variable in intensive margin regression) and weekly paid working hours (dependent variable in intensive margin regression)

information. In addition, Table 5.1 helps to summarise the number of observations and individuals lost due to each control variable added to the regression equation in both extensive and intensive margin estimations.

It is not difficult to find that when the variables of the husband's second occupation and husband's monthly income are added, there is an apparent loss in the number of observations and individuals (the observation size lost 11.64% and 11.16% after joining the husband's second occupation variable at extensive and intensive margins estimation respectively, the observation size lost 45.70% and 50.18% after joining the husband's monthly income variable at extensive and intensive margins estimation respectively). This is because the spouse's information needs to be identified and matched by the individual line number and the spouse's line number. However, in each survey, not every respondent's spouse will also be surveyed. In other words, in the data collection process of CHNS, it is not guaranteed that the information of husband and wife can always be collected simultaneously. When there is only information about the wife but no information about the husband in CHNS, the information about the husband is missing. In addition, even if the husband's number can be recognized and matched, it cannot guarantee the relative information effectively collected, which may result in observation loss. However, even in the face of a significant degree of data loss, this study remains variables about husband (husband's monthly income and husband's second occupation). This is because that rich empirical analysis supports that husband's wage, bonuses and working conditions can significantly affect the wife's probability of employment (Yao and Tan, 2005; Saha and Kalita, 2015; Mansor, Hong, Abu, and Shaari, 2015).

Another variable that causes profound observations loss is childcare[20] (24.81% and 14.46% observations lost in extensive and intensive margins estimation, respectively). Although we have not found the exact reason why the observations decrease after adding this variable, it is necessary to include childcare in the regression. This is because both childcare and elderly care

[20] Childe care dummy variable are set according to the questions " Did you take care of your children under 6 at home last week " and "Did you help take care of children under 6 from other families last week?" in CHNS survey. If the respondent's answer is "Yes" for any of these two questions, then Child care equals to 1 (the respondent provide child care). If the answers for both of these two questions are both "No", then Child care equals to 0 (the respondent didn't provide child care). In CHNS, there is no information indicating whether a woman has children or not.

are time intensive activities. Childcare will affect the decision-making and intensity of elderly care for women who also need care for children or elderly parents (parents in law) (Gelbach, 2002). Therefore, this research cannot ignore the influence of childcare on the relationship between elderly care and the probability of employment as well as paid working hours.[21] Overall, according to Table 5.1, After restricting the sample to observations with non-missing values in all the variables included in the analysis the sample size is 4296 (extensive margin estimation sample) and conditional employment 2881 (intensive margin estimation sample).

Table 5.1 Sample restrictions

		Extensive Margine				Intensive Margine			
Variable		**Number of observations**	**% lost**	**Number of individuals**	**% lost**	**Number of observations**	**% lost**	**Number of individuals**	**% lost**
Initial sample size		143564	-	38536	-	143564	-	38536	-
Restrict the sample to women		72332	49.62	20134	47.75	72332	49.62	20134	47.75
Restrict the sample to 18-52 years old		36883	49.01	12474	38.05	36883	49.01	12474	38.05
Restrict sample to be Interviewed in 2004, 2006, 2009, 2011, 2015		19,612	46.83	7833	37.21	19612	46.83	7833	37.21
Restrict sample to married individuals		14585	25.63	6461	17.52	14585	25.63	6461	17.52
Independent variable	**Elderly care**	12,346	15.35	5678	12.12	12346	15.35	5678	12.12
Dependent variable	**Employed**	12,341	0.04	5676	0.04	-	-	-	-
	Weekly working hours	-	-	-	-	8020	35.04	4232	25.47
Control variables	**Age**	12,341	0.00	5676	0.00	8020	0.00	4232	0.00
	Hukou	12,341	0.00	5676	0.00	8020	0.00	4232	0.00
	Education	12323	0.15	5672	0.07	8010	0.12	4229	0.07
	Health	12306	0.14	5670	0.04	8002	0.10	4227	0.05
	Husband's second occupation	10874	11.64	5270	7.05	7109	11.16	3922	7.22
	Husband monthly income	5905	45.70	3780	28.27	3542	50.18	2653	32.36
	Caring for children under 6 years old	4440	24.81	3023	20.03	3030	14.46	2124	19.94
	Household size	4366	1.67	2985	1.26	3030	0.00	2124	0.00
	Household total gross income	4352	0.32	2975	0.34	3030	0.00	2124	0.00
	Higher skill worker	-	-	-	-	3029	0.03	2124	0.00
	Permanent contract	-	-	-	-	3020	0.30	2116	0.38
	State-owned company	-	-	-	-	2913	3.54	2059	2.69
Instrumental Variables	**Need care**	4322	0.69	2956	0.64	2893	0.69	2046	0.63
	Number siblings	4296	0.60	2946	0.34	2881	0.41	2041	0.24
Province fixed effects		4296	0.00	2946	0.00	2881	0.00	2041	0.00
Wave fixed effects		4296	0.00	2946	0.00	2881	0.00	2041	0.00

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015.

[21] The discussion on potential endogeneity arising from child care is presented in Section 5.5.2.4.

5.3.2. Variable Definitions

Dependent Variables

The dependent variable in this study is labour supply measured as employment status and working hours. In this study, employment status refers to whether the respondent has a labour paid job/ work at present or not. Dummy variable will be set according to the question "Are you presently working?" in CHNS survey. If the respondent's answer is "Yes" then Employment equals to 1 (the respondent is employed). If the answer is "No", then Employment equals to 0 (the respondent is non-employed). Specifically, employment status=1 means respondents had at least one paid job/work at the time of the survey. For those respondents outside the labour market and/or those in the labour market but without at least one paid job at the time of the survey, employed = 0. Therefore, H_{it} has only two values of 0 and 1, which is a binary variable.

Working hours indicates women's weekly paid working hours[22]. The value of this variable comes from respondent's answers to "How many hours do you work on average per day" and "How many days do you work on average per week". The relationship between Employment and Working hours is: if Employment=1, then Working hours > 0; if Employment =0, then Working hours = 0.

Main independent variable

Elderly care

The elderly care mentioned in this chapter refers to the family elderly care provided to any one or more of the married women's own parents and/or the women husband's parents (parents in law). Independent variable EC_{it} in extensive and intensive margins regression indicates whether women provide elderly care in the last week. This empirical research set dummy variable according to the question "Did you take care of his / her daily life (any one or more of the woman's parents or parents in laws) last week?" If the respondent's answer is "Yes" then EC_{it} equals to 1. If the answer is "No", then EC_{it} equals to 0. It is worth noting that in this empirical chapter, those observations that elderly care is not provided to one or more of the parents (parents in law) because they are not alive are also considered as not providing elderly care. EC_{it} also has only two values of 0 and 1, which is a binary variable. Table 5.2 summaries the detailed definition and description for all variables in extensive and intensive regressions.

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[22] Weekly paid working hours in this chapter does not include the hours for free housework or public welfare work.

Other control variables

Control variables are defined based on literature and previous empirical studies. The present study also considers that those variables must be present in data sets in 2004, 2006, 2009, 2011 and 2015 surveys. The study then categories the control variables into three groups for equation (1): personal characteristics (P_{it}), family characteristics (M_{it}) and financial characteristics (F_{it}).

Personal characteristics (P_{it}) consists of Age, Age square following Huang (2010), Hukou dummy (0= rural, 1= urban) following Kolodziej, Reichert and Schmitz (2018), Education dummies (1= primary school and below, 2= Lower middle school degree, 3= Upper middle school degree, 4= technical or vocational degree, 5= university or college degree or higher) following Kolodziej, Reichert and Schmitz (2018) and Caregivers' health dummy (0 = during the past 4 weeks, have been sick or injured, 1=during the past 4 weeks, have not been sick or injured) following Meng (2013). According to section 3.2, the above demography characteristics have a significant impact on women's labour supply at both extensive and intensive margins. Considering the possible nonlinear relationship between age and labour supply at both extensive and intensive margin, the square of age is set in this study.

Secondly, it is family characteristics (M_{it}), which usually be ignored in international empirical research. Due to the fact that the samples in this study are from married women and are influenced by the joint utility decision-making model, the time allocation decisions of married women are no longer solely influenced by their own factors. Family structure and family members' time allocation decisions also have a significant impact (see detailed discussion in section 3.2). This study takes into account the husband's work situation more comprehensively based on the family characteristics selected in most empirical studies. It consists Childcare dummy (0= didn't provide child care in the last week, 1= provide child care in the last week) following Kolodziej, Reichert and Schmitz (2018), household size[23] following Huang, Xu, Liu, Yu and Yu (2021) and whether the husband has a second job dummy (0=husband hasn't a second job, 1=husband has a second job).

Finally, it is financial characteristics (Fit). Most existing literature focuses more on the income situation of husbands. But what cannot be ignored is also the total household income. The total family income can better reflect the income status of the cohabiting parents and siblings, and this variable can more comprehensively reflect the living standard of the married

[23] Household size refers to the number of people in family.

women's families and their non labour income. This variable also helps to characterize the time allocation and elderly care concept of other family members. The financial characteristic in this section consists of logarithm of husband's monthly income in real term (2015=100)[24] following Huang, Xu, Liu, Yu and Yu (2021) and logarithm of household yearly total gross income in real term (2015=100) following Meng (2013). It worth to note that in working hours specification, I additionally control for Higher skill dummy (0=General Workers, 1=Senior technician or manager), State-owned dummy (0=nonstate-owned unit, 1=state-owned unit) and Permanent contract dummy (0=Sign short-term contract with the work unit or temporary work, 1=Sign Permanent contract with the work unit) following Chen. et al. (2016) and Zhou, Kan and He (2022). Table 5.2 summaries the detailed definition and description of variables

Table 5.2 Variable summary

Variable Name	CHNS Question	Definition	Variable Type
Employment status	Are you presently working? * If retired but rehired, record 1. 0 No 1 Yes	The employment status of the respondents: 1- Employed 0- Non-employed (unemployed + out of labour force)	Dummy variable
Weekly working hours	During the past week, how many days on average did you work? During the past week, how many hours on average did you work per day?	Weekly working hours of the respondents.	Continues variable
Elderly care	Is s/he still alive? 0. No (skip to next relative) 1. Yes During the past week, did you help your mother/father/mother-in-law and father in law with her/him daily life and shopping? 0. No 1. Yes	Whether the respondent provides elderly care: 1- Yes 0- No	Dummy variable
Age	Age (years): ___ * Record 018 if 18.00-18.99 years, 019 if 19.00-19.99 years, etc.	Age of the respondents	Continuous variable
Age squared	Age (years): ___ * Record 018 if 18.00-18.99 years, 019 if 19.00-19.99 years, etc.	Age squared = Age ^{2}	Continuous variable
Education	What is the highest level of education you have attained? 1 primary school or below 2 lower middle school degree 3 upper middle school degree 4 technical or vocational degree 5 university or college degree or higher	Highest education level of the respondent	Categorical variable (included in the regression as 4 dummies leaving category primary school or below as the reference category)
Hukou	To which type of household registration do you belong? 1 urban 2 rural	Respondents household registration statues: 0= rural 1 = urban	Dummy variable
Health	During the past 4 weeks, have you been sick or injured? Have you suffered from a chronic or acute disease? 0 no 1 yes	Respondents health registration statues: 0- unhealthy (answer "yes") 1- healthy (answer "no")	Dummy variable
Senior technician or manager	What is your primary occupation? 1 Senior professional/technical worker (doctor, professor, lawyer, architect, engineer) 2 Junior professional/technical worker (midwife, nurse, teacher, editor, photographer) 3 Administrator/executive/manager (working proprietor, government official, section chief, department or bureau director, administrative cadre, village leader) 4 Office staff (secretary, office helper) 5 Farmer, fisherman, hunter 6 Skilled worker (foreman, group leader, craftsman) 7 Non-skilled worker (ordinary labourer, logger) 8 Army officer, police officer 9 Ordinary soldier, policeman 10 Driver 11 Service worker (housekeeper, cook, waiter, doorkeeper, hairdresser, counter salesperson, launderer, child care worker) 12 Athlete, actor, musician	Primary occupation of the respondents. 0 General Workers (The answer is 2,4, 5, 6, 7, 8,9,10,11 and 12) 1 Senior technician or manager (The answer is 1 and 3)	Dummy variable
Sign l Permanent contract with the work unit	What is your employment position in this occupation? 1 self-employed, owner-manager with employees 2 self-employed, independent operator with no employees (includes farmer) 3 works for another person or enterprise (includes small-, medium-, and large-scale	Primary position of the respondents. 0 Sign short-term contract with the work unit or temporary work (The answer is 1, 2, 4, 5 and 6)	Dummy variable

[24] Husband's monthly income = Logarithm (husband's monthly wage inflated to 2015 + husband's
annual bonus inflated to 2015/12) (Chai, Cai and Li, 2021).

	collective enterprise, farm, and private enterprise) as a permanent employee 4 contractor with other people or enterprise 5 temporary worker 6 paid family worker	1 Sign long-term contract with the work unit (The answer is 3)	
State-owned company	What type of work unit is this? 1 government department 2 state service/institute 3 state-owned enterprise 4 small collective enterprise (such as township-owned) 5 large collective enterprise (such as owned by county, city, province) 6 family contract farming 7 private, individual enterprise 8 three-capital enterprise (owned by foreigners, overseas Chinese and joint venture)	Work unit type of the respondents. 0 Not government departments or state-owned (The answer is 4, 5, 6, 7 and 8) 1 Government departments or state-owned (The answer is 1, 2 and 3)	Dummy variable
Childcare	During the past week, did you take care of children under 6 in your household? 0 no 1 yes	Whether the respondent provides childcare: 1-Yes 0-No	Dummy variable
Husband's secondary occupation	Do you have a secondary occupation? 0 no 1 yes	Whether the respondent's husband have secondary occupation: 1-Yes 0-No	Dummy variable
Husband's monthly income	On the average, what was your monthly retirement wage/salary in the past year, including subsidies and bonuses? (yuan) What was the total value of all bonuses for the last entire year? (yuan)	Logarithm of the sum of husband's monthly wage inflated to 2015 and husband's annual bonus inflated to 2015/12	Continuous variable
Household yearly total gross income	CHNS official website supplementary information	Logarithm respondents' total gross household income inflated to 2015	Continuous variable
Household size	CHNS official website supplementary information	Number of respondents' family members	Continuous variable
Need care	Is s/he still alive? 0. No(skip to next relative) 1. Yes Does s/he need to be taken care of (refers to the need for other people's help in daily life and shopping)? 0. No 1. Yes	Whether the respondents' parents (in law) need to be taken care of. 0. No 1. Yes	Dummy variable
Number of siblings	How many brothers do you have? How many sisters do you have? How many brothers does your husband have? How many sisters does your husband have?	Number of siblings for both respondent and her husband.	Continuous variable
Province	City code 11= Beijing* 21 = Liaoning 23 = Heilongjiang 31 = Shanghai 32 = Jiangsu 37 = Shandong 41 = Henan 42 = Hubei 43 = Hunan 45 = Guangxi 52 = Guizhou 55 = Chongqing	Current residence of the respondents	Categorical variable (included in the regression as 11 dummies leaving category Beijing as the reference category)

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015

5.3.3. Summary Statistics

Table 5.3 reports the descriptive statistics of the main variables, control variables and instrumental variables for extensive and intensive margin estimations, respectively. In Table 5.3, there are total of 4296 observations in the sample. Among them, 3577 observations have not provided elderly care in the past four weeks, accounting for 83.26% of the sample. The average probability of being employed is 72% for all observations. For non-caregiver subgroup, the probability of employment is 71%, while for caregiver subgroup, it increases to 75%. This different is inconsistent with the descriptive statistical results of the existing literature that the employment probability of caregivers is lower than that of non-caregivers (Skira, 2015; Fan and Chen, 2016; Heger and Korfhage, 2020 and Chai, Cai and Li, 2021). The average weekly working hours are 43.02 hours for caregivers sub-sample group, which is 0.07 hours lower than non-caregiver sub-sample group. In order to have a more detailed understanding of the data distribution of each category of categorical variables and dummy variables, Table 5.4 further reports the data distribution of categorical variables in the whole sample, with and without elderly care respectively in both extensive and extensive margins.

From the perspective of personal characteristics, the average age of the non-caregivers is lower than that of caregivers in both extensive and intensive margins. This might be because as

the age of adult children increases, the age of their elderly parents and parents-in-law also increases. Then, with the increase in age, the elderly care demand for elderly parents will also increase. In this case, the possibility and proportion of adult children providing elderly care will also increase. In terms of HuKou, according to Table 5.4, a higher proportion of women who provide elderly care hold urban HuKou. This difference consistency with the higher dependency ratio of the elderly in rural areas. Under the influence of the rapid development of cities, the migration of labour force leads to the outflow of a large number of the young and middle-aged labour force in rural areas, which makes the degree and speed of rural population ageing higher than that in cities (China National Bureau of Statistics, 2022). As the results, compared with the adult children whose Hukou is urban, most of the adult children in rural areas leave their elderly parents and parents-in-law to work in cities. Geographical separation makes them less likely to provide elderly care. In terms of the highest education level, there is an apparent education threshold. The proportion of non-caregivers with a lower middle school degree or below is higher than that of caregivers in both extensive and intensive margins. While observations with upper middle school degree or above account for a large proportion of caregivers. One possible explanation is the rapidly increasing enrollment scale of higher education and the increasing depreciation of academic qualifications in China in recent years. According to the annual data of the National Bureau of Statistics of the People's Republic of China, the number of graduates with bachelor's degree in China was 404700 in 1998, 2.5905 million in 2010, 3.5859 million in 2015, and 4.281 million in 2021. In the past 20 years, the number of graduates with bachelor's degrees increased by 957.82%. With the popularisation of higher education, the bargaining power of higher education in the labour market is becoming lower and lower (Acemoglu, 2012). According to the Ma, Ji and Xu (2017), compared with 2002, the education premium of undergraduate education in the 18–30-year-old population decreased by 42% in 2009, and it is predicted that this declining trend will spread to the labour aged 45 and below in 2015. Therefore, when the paid income of the labour force with a bachelor's degree is less and less, the possibility of giving up the elderly care due to the paid work being higher than the reservation wage will also be reduced. In terms of health, the health level of people who provide elderly care is slightly better than non-caregivers in both extensive and intensive margins.

From the perspective of family characteristics, among those who provide elderly care, there is a relatively low proportion of people who provide childcare simultaneously in both extensive margin and intensive margins. This is because childcare and elderly care are all time

intensive activities. When a person's energy is limited and faces the dual pressure of childcare and elderly care, they have to make a choice. According to Table 5.4, the proportion female caregivers' husbands who have a second occupation is lower than that of non-caregivers in both extensive and intensive margins, which can be explained by the income effect. The husband's second occupation means that the wife's non-labour income increases. When women's non-labour income increases, they might be more likely to buy formal care rather than take care of elderly parents or parents in law by themself. Regarding family size, the family size of women who provide elderly care is smaller. This is consistent with the existing empirical experience, that is, people in large families may bear less responsibility for elderly care (Huang, 2021 for China; Wu. et al., 2017 for China; Chen. et al., 2016 for China; Bolin, Lindgren and Lundbor, 2008 for European; Heitmueller, 2007 for American).

Financial characteristics include monthly labour income of husband and the annual gross income of family which can directly reflect the non-labour income of married women. According to Table 5.3, the caregivers' subgroup has a higher household total gross income, but the husband's annual income is lower for both extensive and intensive margins. This may stem from the wife's different choices when their non-labour income increases. On the one hand, wives can use their non labour income to purchase leisure time, leading to a decrease in the probability of employment or paid working hours. On the other hand, they can also purchase formal elderly care with their increased non-labour income. Wives can exchange more time in the labour market.

The research observations of this study are from 12 provinces including Beijing, Liaoling, Heilongjiang, Shanghai, Jiangsu, Shandong, Henan, Hubei, Hunan, Guangxi, Guizhou and Chongqing. They cover cities in the east, middle and west of China. According to Table 5.4, the provinces that provide the most elderly care are Liaoning, Heilongjiang, Henan and Jiangsu in both extensive and intensive margins.

Table 5.3 Summary statistics

	Extensive Estimation						Intensive Estimation					
	Total		Noncaregivers		Caregivers		Total		Non-caregivers		Caregivers	
Variable	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
Elderly care	0.17	0.37	0	0	1	0	0.17	0.38	0	0	1	0
Employed	0.72	0.45	0.71	0.45	0.75	0.43	-	-	-	-	-	-
Weekly working hours	-	-	-	-	-	-	43.07	15.07	43.09	15.22	43.02	14.36
Age	40.08	7.5	40.06	7.47	40.21	7.63	39.06	7.15	39.01	7.11	39.29	7.34
Hukou	0.57	0.5	0.55	0.5	0.64	0.48	0.63	0.48	0.61	0.49	0.71	0.46
Education	2.59	1.3	2.54	1.29	2.85	1.33	2.84	1.38	2.8	1.37	3.08	1.38
Health	0.89	0.31	0.89	0.31	0.87	0.33	0.9	0.31	0.9	0.3	0.88	0.32
Husband's monthly income	2473.08	3683.945	2487.772	3730.497	2404.825	3461.88	2566.973	3870.182	2567.144	3890.028	2566.176	3780.742
Husband's second occupation	0.06	0.24	0.07	0.25	0.05	0.21	0.08	0.27	0.08	0.28	0.06	0.23
Caring for children under 6 years old	0.25	0.43	0.25	0.43	0.24	0.43	0.24	0.43	0.24	0.43	0.23	0.42
Household size	3.84	1.35	3.85	1.35	3.78	1.33	3.81	1.31	3.83	1.34	3.71	1.21
Household total gross income	61053.67	67200.84	60605.29	66103.79	63284.36	72419.71	68463.47	68597.55	68227	69185.27	69581.43	65803.06
Occupation	-	-	-	-	-	-	0.13	0.34	0.13	0.33	0.15	0.36
Position	-	-	-	-	-	-	0.58	0.49	0.58	0.49	0.54	0.5
Work unit type	-	-	-	-	-	-	0.37	0.48	0.35	0.48	0.43	0.5
Need care	0.18	0.38	0.12	0.33	0.45	0.5	0.17	0.38	0.12	0.32	0.42	0.49
Number siblings	5.8	3.14	5.83	3.14	5.65	3.15	5.5	3.13	5.52	3.09	5.39	3.31
Province	36.03	11.01	36.58	10.73	33.27	11.92	34.93	11.35	35.47	11.18	32.36	11.8
wave	2008.7	3.4	2008.59	3.4	2009.21	3.34	2008.83	3.25	2008.74	3.26	2009.26	3.17
Sample Size	4296		3577		719		2881		2378		503	

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015.

Table 5.4 Summary statistics for dummy variables

	Extensive Estimation						Intensive Estimation					
	Total		Noncaregivers		Caregivers		Total		Noncaregivers		Caregivers	
	Freq.	Per cent	Freq.	Per cent	Freq.	Per cent	Freq.	Per cent	Freq.	Per cent	Freq.	Per cent
Elderly Care												
Don't provide elderly care	3,577	83.26	-	-	-	-	2,378	82.54	-	-	-	-
Provide elderly care	719	16.74	-	-	-	-	503	17.46	-	-	-	-
Employed												
Didn't been employed	1,202	27.98	1,021	28.54	181	25.17	-	-	-	-	-	-
Have been employed	3,094	72.02	2,556	71.46	538	74.83	-	-	-	-	-	-
HuKou												
Rural	1,848	43.02	1,592	44.51	256	35.61	1,076	37.35	928	39.02	148	29.42
Urban	2,448	56.98	1,985	55.49	463	64.39	1,805	62.65	1,450	60.98	355	70.58
Education												
Primary school and below	911	21.21	804	22.48	107	14.88	506	17.56	442	18.59	64	12.72
Lower middle school degree	1,579	36.76	1,333	37.27	246	34.21	940	32.63	790	33.22	150	29.82
Upper middle school degree	747	17.39	603	16.86	144	20.03	472	16.38	382	16.06	90	17.89
Technical or vocational degree	480	11.17	386	10.79	94	13.07	422	14.65	341	14.34	81	16.10
University or college degree or higher	579	13.48	451	12.61	128	17.80	541	18.78	423	17.79	118	23.46
Health												
Didn't have sick or injured or have acute disease or chronic disease in the past four weeks	467	10.87	376	10.51	91	12.66	300	10.41	241	10.13	59	11.73
Have been sick or injured or have acute disease or chronic disease in the past four weeks	3,829	89.13	3,201	89.49	628	87.34	2,581	89.59	2,137	89.87	444	88.27
Husband's second occupation												

Husband dosen't have a second occupation	4,029	93.78	3,343	93.46	686	95.41	2,657	92.22	2,182	91.76	475	94.43
Husband has a second occupation	267	6.22	234	6.54	33	4.59	224	7.78	196	8.24	28	5.57
Child care												
Didn't take care Children under 6 years old	3,228	75.14	2,685	75.06	543	75.52	2,187	75.91	1,798	75.61	389	77.34
Have take care Children under 6 years old	1,068	24.86	892	24.94	176	24.48	694	24.09	580	24.39	114	22.66
High-skilled occupation												
Senior technician or manager	-	-	-	-	-	-	2,503	86.88	2,076	87.30	427	84.89
General Workers	-	-	-	-	-	-	378	13.12	302	12.70	76	15.11
Permanent contract												
Have Bianzhi	-	-	-	-	-	-	1,223	42.45	994	41.80	229	45.53
Don't have Bianzhi	-	-	-	-	-	-	1,658	57.55	1,384	58.20	274	54.47
State-owned company												
Government departments or state-owned units	-	-	-	-	-	-	1,821	63.21	1,535	64.55	286	56.86
Not government departments or state-owned units	-	-	-	-	-	-	1,060	36.79	843	35.45	217	43.14
Need care												
Parents or parents in law need to be cared	3,526	82.08	3,130	87.50	396	55.08	2,384	82.75	2,094	88.06	290	57.65
Parents or parents in law dosen't need to be cared	770	17.92	447	12.50	323	44.92	497	17.25	284	11.94	213	42.35
Province												
Beijing	209	4.86	143	4.00	66	9.18	175	6.07	125	5.26	50	9.94
Liaoling	439	10.22	322	9.00	117	16.27	293	10.17	213	8.96	80	15.90
Heilongjiang	383	8.92	328	9.17	55	7.65	314	10.90	266	11.19	48	9.54
Shanghai	188	4.38	144	4.03	44	6.12	159	5.52	124	5.21	35	6.96
Jiangsu	467	10.87	408	11.41	59	8.21	385	13.36	333	14.00	52	10.34
Shandong	468	10.89	375	10.48	93	12.93	299	10.38	238	10.01	61	12.13
Henan	396	9.22	319	8.92	77	10.71	186	6.46	145	6.10	41	8.15
Hubei	404	9.40	357	9.98	47	6.54	245	8.50	212	8.92	33	6.56
Hunan	414	9.64	362	10.12	52	7.23	212	7.36	180	7.57	32	6.36
Guangxi	471	10.96	425	11.88	46	6.40	302	10.48	268	11.27	34	6.76
Guizhou	328	7.64	287	8.02	41	5.70	236	8.19	213	8.96	23	4.57
Chongqing	129	3.00	107	2.99	22	3.06	75	2.60	61	2.57	14	2.78
Wave												
2004	825	19.20	714	19.96	111	15.44	486	16.87	419	17.62	67	13.32
2006	833	19.39	717	20.04	116	16.13	532	18.47	451	18.97	81	16.10
2009	912	21.23	768	21.47	144	20.03	635	22.04	530	22.29	105	20.87
2011	1,260	29.33	1,001	27.98	259	36.02	958	33.25	760	31.96	198	39.36
2015	466	10.85	377	10.54	89	12.38	270	9.37	218	9.17	52	10.34
Total	4,296	100.00	3,577	100.00	719	100.00	2,881	100.00	2,378	100.00	503	100.00

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015.

5.4. Method

To explore how elderly care affects married women's labour supply, this chapter estimates an empirical specification as follows:

$$H_{ipt} = \lambda_0 + \lambda_1 EC_{ipt} + \lambda_2 P_{ipt} + \lambda_3 M_{ipt} + \lambda_4 F_{ipt} + T_t + C_p + \mu_{ipt} \quad (5.1)$$

In this equation, H_{ipt} is the labour supply (employment or conditional on employment working hours) of women i in province p at time t. i is individual (i=1,...,N). t is survey year (t = 2004, 2006, 2009, 2011 and 2015). p is province[25]. EC_{ipt} is elderly care of women i in province p at time t. It is also regressed on personal characteristics (P_{ipt}), family characteristics (M_{ipt}) and financial characteristics (F_{ipt}). T_t represents the unobservable quantity varying with time, that is, time fixed effects. C_p represents the unobservable quantity varying with province, that is, province fixed effects. μ_{ipt} represents the random error term varying with individual and time.

However, in equation (5.1), λ_1 may still not reflect causal effect between elderly care and labour supply in both extensive and intensive margins due to reverse causality and missing variable which would make the elderly care endogenous. The potential endogeneity problem comes from two aspects in this research. Firstly, women's labour supply (at both intensive and extensive margins) and family elderly care may interact. On the one hand, family elderly care may affect women's labour supply (at both intensive and extensive). When there is a conflict between paid work and family elderly care, caregivers might have to give up some paid working hours or even withdraw from the labour market to meet the care needs of the elderly or might increase their labour supply if the income effect dominates. On the other hand, women who do not work or work for a short time may be more inclined to provide family elderly care because they have more time and energy. Secondly, the endogeneity problem can arise due to omitted missing variables. Female's labour supply decision and paid working hours per week may be affected by unobservable characteristics such as personal family concepts and work preferences. For example, women with a strong sense of filial piety and low willingness to work may reduce working hours or even withdraw from the labour market to take care of their elderly parents (Yang, 2020). However, the CHNS does not capture that information leading omitted variable issues.

[25] Province in this research include Beijing, Liaoning, Heilongjiang, Shanghai, Jiangsu, Shandong, Henan, Hubei, Hunan, Guangxi, Guizhou and Chongqing

This analysis uses 2SLS method to address the potential endogeneity bias from interact between elderly care and married women's labour supply following Huang (2021), Chen. et al (2016) and Bolin, Lindgren and Lundbor (2008). A valid and relevant instrumental variable in 2SLS needs to be correlated with the endogenous independent variable but not related to error terms. Meeting this condition, the instrumental variables adopted in the existing literature are: the number of wife and husband's brothers and sisters (Huang, 2021; Wu et al, 2017; Chen et al, 2016; Bolin et al., 2008; Heitmueller, 2007; Wolf and Soldo, 1994), the age of parents (in law), the physical condition of parents (in law) (Chen et al, 2016), whether parents (in law) are both alive (Bolin. et al, 2008), care demand of parents (in law) (Bolin et al, 2008; Heitmueller, 2007), whether one of husband's parents was in poor health, and the number of community elderly care institutions (Chai et al, 2021).

Unfortunately, there are not enough observations in CHNS household data and individual data to reflect the age and physical condition of parents and parents-in-law. CHNS household data and individual data also do not provide information on the number of community elderly care institutions. Therefore, the age of parents (in law), the physical condition of parents (in law) and the number of community elderly care institutions are infeasible to be instrumental variable in this empirical chapter.

This analysis selects need care (whether elderly parents or parents in law have elderly care demand) and the sum of the number of siblings of both spouses as instrumental variables. This is because, firstly, elderly care decisions depend on elderly care needs. It has reason to believe that compared with the elderly who do not need to be taken care by the daughters or daughters-in-law, the elderly who need to be taken care of are more likely to provide elderly care. Moreover, care demand of the elderly people does not directly affect women's employment probability and paid working hours, meeting the instrumental variables selection criteria. Second, many literatures have shown that having more brothers and sisters is convenient for sharing the responsibility of family care (Huang, 2021; Wu. et al., 2017; Chen. et al., 2016; Bolin, Lindgren and Lundbor, 2008; Heitmueller, 2007). However, most of this literature only focused on the number of female's brothers and sisters. It cannot be ignored that the family structure of female's husbands will also affect women's elderly care decisions, especially the care decisions of parents in law. The more siblings a husband has, the more likely it is that a married woman's responsibility for caring for her in-laws will be shared. Therefore, this study tried to employ the instrumental variable that the sum of the number of siblings of wife and husband. At the same time, the number of siblings of wife and husband does not directly affect

women's employment probability and paid working hours, meeting the instrumental variables selection criteria.

In order to test the selected instrumental variables, this study conducted an over identification test (it is a joint test of the null hypothesis: the instruments are independently distributed of the error process and that they are properly excluded from the model; alternative hypothesis: at least one instrumental variables used were related the error process), and a weak instrumental variable test (it is a joint test of the null hypothesis: instrumental variables were related to endogenous explanatory variables; alternative hypothesis: instrumental variables were not related to endogenous explanatory variables) for the above two instrumental variables in both extensive and intensive margins. The results of the over identification test and the weak instrumental variable test are shown in Tables D.1 -D.4 in Appendix D, respectively. According to Table D.1 and Table D.3, the P values are all bigger than 0.1, so it cannot reject that overidentifying restrictions are valid for jointly two instrumental variables (care demand of parents and parents in law and the number of siblings of wife and husband). According to Table D.2. and Table D.4, F statistics are all greater than 10, and the p value of F statistic are all 0.000. Therefore, it has reason to reject the null hypothesis that the coefficients of all instrumental variables are 0 in the first stage regression. In the last part of Table D.2. and Table D.4, it conducted the Wald test with a nominal size level of 5% for endogenous variables. Since the minimum eigenvalue statistics are 235.381 and 148.06 respectively for extensive and intensive margins, it is greater than the corresponding critical value. The null hypothesis of weak instrumental variables can be rejected. Therefore, the care requirement of elderly parents and parents-in-law and the number of siblings can be included in the regression to address potential endogeneity bias.

In order to solve the potential endogeneity bias from omitted variables, this study employed panel time fixed effects and panel province effects. It set robust standard errors clustered at the province level. It is worth mentioning that in some research on the impact of elderly care on the labour supply in both intensive and extensive margins of female caregivers, in addition to the time fixed effects and provincial fixed effects mentioned above, the individual fixed effects will also be employed (Chen, Fan, Zhao and Chu, 2016; Huang, Xu, Liu, Yu and Yu, 2021). This is because there are usually unobservable individual characteristics that do not change over time affect caregivers' labour supply at both extensive and intensive margins, such as labour preference and altruistic motivation. Adding individual fixed effects to the regression system can effectively control these unobservable variables to make the regression more robust.

To examine the appropriateness of including fixed effects in terms of data structure, Table 5.5 summarises the number of individuals appeared in the different surveys. Table 5.5 illustrates that there are only 52% and 50% of the observations in all five surveys occurred in two or more surveys at extensive margin and intensive margin, respectively. Tables C.1-C.4 in appendix show the panel data statistics in terms of employment status, paid working hours and elderly care. From Tables C.1-C.4, the independent variable (elderly care) and dependent variables (employment status and paid working hours) are persistent within an individual. Specifically, for example, in extensive margin regression, 95.35% of the people who have found jobs have been employed in all five surveys from 2004 to 2015 (2004, 2006, 2009, 2011 and 2015). For those without paid jobs, 88.67% have never been employed. On average, 93.26% of the people in the surveys from 2004 to 2015 (2004, 2006, 2009, 2011 and 2015) maintained the same employment status (employed or not employed). Similarly, in the five surveys from 2004 to 2015 (2004, 2006, 2009, 2011 and 2015), 77.67% of those who have taken care of the elderly have always taken care of the elderly. In other words, in these five surveys, the state of providing elderly care for these people has not changed. Among those who did not provide elderly care, 95.41% had never provided elderly care between 2004 and 2015 (2004, 2006, 2009, 2011 and 2015). On average, 91.75% of the respondents in the sample of this study have no change their elderly care status (providing or not providing elderly care). In this case, according to Nguyen and Connelly (2014) and Kolodziej, Reichert and Schmitz (2018), if the individual fixed effects is also used, it is equivalent to only using the information of 8.25%[26] of the changed individuals to estimate the coefficient (λ_1 in equation (1)) between the elderly care and the probability of employment of married female caregivers, and the default this coefficient (only generated from 8.25% of the individuals) represents 100% of the individual situation. The estimates in this case are biased. Therefore, individual fixed effects aren't be included in benchmark following Chen, Zhao and Fan (2017) and Wang, Li, Zhang, Ding, Feng, Tang, Sun and Zhou (2020) for both extensive and intensive margins.

In summary, the empirical research in this section will explore the impact of elderly care on married women's labour supply at both extensive and intensive margins with the help of two-stage least squares method, time fixed effects and province fixed effects. The test results of other methods, such as POLS (Kolodziei, Reichert and Schmitz, 2018), Logit (King and Pickard, 2015), Probit (Ugrenionov, 2013; Chai, Fu and Coyte, 2021), FE (Crespo and Mira,

[26] 8.25%=100%-91.75%

2014), IV FE (Ciani, 2012; Crespo and Mira, 2014), will be used as robustness test for comparison and analysis.

Table 5.5 Number of appearances in the survey

	Emplomen t status				Working hours			
Number of appearances in the survey	Observatio ns	Perce nt	Individua ls	Perce nt	Observatio ns	Perce nt	Individua ls	Perce nt
1	2031	0.473	2031	0.689	1460	0.507	1460	0.715
2	1170	0.272	585	0.199	768	0.267	384	0.188
3	687	0.160	229	0.078	411	0.143	137	0.067
4	388	0.090	97	0.033	232	0.081	58	0.028
5	20	0.005	4	0.001	10	0.003	2	0.001
Total	4296	100	2946	100	2881	100	2041	100

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015.

5.5. Results

This section firstly presents the estimation results of the impact of elderly care on the probability of employment and paid working hours for married women in 2004, 2006, 2009, 2011 and 2015 in China in Section 5.5.1. It also completes robustness checks to different estimate methods, different cluster standard errors, a single instrumental variable (need care) and excluding husband's variable in Section 5.5.2. Then, this section explores heterogeneity in the impact of elderly care on married women' labour supply by living arrangement, age group, care intensity and childcare in Section 5.5.3.

5.5.1. Benchmark Model

In the benchmark model, elderly care is considered an exogenous variable firstly. When we do not consider the interaction between elderly care and the married women's probability of employment and paid working hours, this analysis uses POLS, year fixed effects, and provincial fixed effects to explore the causal effect between elderly care and married women's labour supply at both extensive and intensive margins. Moreover, in order to address the endogeneity problem between elderly care and married women's possibility of employment and paid working hours (has been discussed in Section 5.4), elderly care is instrument by need care (whether elderly parents or parents in law have elderly care demand) and the sum of number of siblings of spouses. Table 5.6 reports the POLS and 2SLS estimates results of married women's probability of employment and weekly working hours respectively.[27] According to the first and

[27] Tables E.1. to E.4. in the Appendix E report the estimated results of the POLS and 2SLS in both extensive and intensive margins by control variables, respectively. First stage results are

fourth columns of Table 5.6, when elderly care is considered to be an exogenous variable, there is no significant impact of elderly care on the married women's labour supply at both extensive and intensive margins. Column 3 and column 6 of the Table 5.6 consider the potential

Table 5.6 POLS and 2SLS estimates of wives' probability of employment and weekly working hours

	Probability of employment			Paid working hours		
	POLS	2SLS		POLS	2SLS	
		First Stage	Second Stage		First Stage	Second Stage
	(1)	(2)	(3)	(4)	(5)	(6)
Elderly Care	0.008		0.086***	-0.339		-4.964***
	(0.017)		(0.022)	(0.551)		(1.800)
Age	0.068***	-0.016	0.069***	-0.321	-0.025*	-0.414
	(0.010)	(0.011)	(0.010)	(0.434)	(0.013)	(0.436)
Age square	-0.001***	0.000	-0.001***	0.001	0.000*	0.002
	(0.000)	(0.000)	(0.000)	(0.006)	(0.000)	(0.006)
Hukou	0.045**	0.023	0.043***	3.105**	0.035	3.284**
	(0.016)	(0.019)	(0.014)	(1.394)	(0.026)	(1.395)
Lower middle school degree	0.002	0.031*	-0.000	3.728***	0.023	3.834***
	(0.021)	(0.015)	(0.020)	(0.822)	(0.017)	(0.719)
Upper middle school degree	0.044***	0.057**	0.039***	3.951**	0.037	4.113***
	(0.012)	(0.020)	(0.012)	(1.494)	(0.027)	(1.343)
Technical or vocational degree	0.167***	0.058**	0.162***	1.707	0.042	1.885*
	(0.026)	(0.024)	(0.026)	(1.121)	(0.031)	(0.969)
University or college degree or higher	0.148***	0.057**	0.144***	1.240	0.046	1.407
	(0.025)	(0.025)	(0.024)	(1.370)	(0.030)	(1.229)
Health	-0.001	-0.023	0.002	-0.596	-0.006	-0.711
	(0.027)	(0.018)	(0.026)	(0.845)	(0.025)	(0.861)
Husband monthly income	0.051***	0.002	0.051***	-0.229	0.001	-0.229*
	(0.004)	(0.002)	(0.004)	(0.139)	(0.003)	(0.131)
Husband's second occupation	0.143***	0.005	0.143***	-5.589***	0.006	-5.587***
	(0.019)	(0.021)	(0.019)	(1.185)	(0.026)	(1.107)
Child Care	-0.025	-0.011	-0.024	-3.288***	-0.020	-3.377***
	(0.020)	(0.019)	(0.020)	(1.054)	(0.020)	(0.979)
Household size	0.001	0.007	0.000	-0.598**	0.004	-0.588**
	(0.007)	(0.004)	(0.007)	(0.240)	(0.007)	(0.242)
Household total gross income	0.012	-0.002	0.012*	0.705	-0.001	0.675
	(0.007)	(0.006)	(0.006)	(0.526)	(0.007)	(0.493)
High-skilled occupation				-0.098	-0.000	-0.106
				(0.757)	(0.027)	(0.732)
Permanent contract				-0.856	0.013	-0.801
				(0.543)	(0.016)	(0.506)
State-owned firm				-5.701***	0.019	-5.602***
				(0.999)	(0.024)	(0.980)
Need_care		0.306***			0.310***	
		(0.026)			(0.034)	
Number of siblings		0.000			-0.000	
		(0.002)			(0.002)	
Constant	-0.888***	0.460**	-0.921***	48.112***	0.569*	50.862***
	(0.153)	(0.204)	(0.150)	(8.385)	(0.280)	(8.292)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Weak instrument test with Stock-Yogo critical value						
F statistic		135.315***			87.436***	
p-value		0.000			0.000	
Sargan-Hanson over-identification test						
Chi2(1) statistic		0.355			0.020	
p-value		0.551			0.888	
Number of observations	4296	4296	4296	2881	2881	2881
Adjusted R^2	0.354	0.134	0.350	0.093	0.125	0.080

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level.

presented in Tables F.1 and F.2 in Appendix for extensive and intensive margins, respectively.

endogeneity problem employing 2SLS with year fixed effects and province fixed effects. Elderly care has a significant impact on both the employment possibility and paid working hours of married women.

Specifically, compared to married women who do not provide elderly care, those who do experience an 8.6 percentage points increase in employment probability. This positive result aligns with the findings of Chen et al. (2016), who used 1991-2011 CHNS data to examine the impact of elderly care on women's probability of employment. It also supports the income effect proposed by Carmichael and Charles (1998, 2003), which suggests that the financial burden of elderly care may lead women to remain in the labour market to avoid income loss. In other words, when married women face elderly care burden in the family, even if reduce their leisure time, they may choose to actively participate in the labour market to offset the additional costs of providing elderly care. Pecchenino and Pollard (2002) and Kydland and Pretnar (2018)'s research indirectly confirms the impact of financial pressure from elderly care on the labour supply of caregivers. They find that the financial burden of elderly care alters household consumption patterns, such as reducing investment. Additionally, driven by rational concerns for securing cargivers' own basic needs in old age, individuals tend to have an increasing demand for pension security (Pecchenino and Pollard, 2002). This may encourage working-age individuals, particularly those providing elderly care, to remain in the labour market to earn additional income, rather than withdraw, in order to build retirement savings and offset the extra costs associated with elderly care.

In terms of the intensive margin (column 6 of Table 5.6), there is a significant negative impact of elderly care on married women's paid working hours. Compared to women who do not provide elderly care, the weekly paid working hours of female caregivers is 4.964 hours lower. This result is consistent with the most of international empirical research that elderly care has a negative effect on female caregivers' paid working hours (Meng, 2013 for Canada; Van Houtven et al., 2013 for the US and Heger and Korfhage, 2020 for Europe). In terms of impact magnitude (-4.964 hours), our findings also provide evidence in international literature and in range of the magnitude of Chinese empirical research.[28] The results confirm that among the effects of elderly care status on paid working hours, the substitution effect is stronger than

[28] Research results based on Chinese data show that the impact of elderly care on paid working hours of Chinese women is in the range from 1-5 hours per week (see detail information in Table A.1 in Appendix).

the income effect. Combined with the results in column 3 in Table 5.6, the provision of elderly care may not lead married women withdrawal from the labour market directly, perhaps due to the fact that they also need labour income to compensate for the additional costs of elderly care. However, for those women who are already employed, the provision of elderly care significantly reduces their paid working hours. The substitution effect of elderly care is reflected in the intensive margin of married female labour supply.

The control variables used in the benchmark model are in line with the discussion in the Section 5.3, including individual demographic characteristics, family characteristics and financial characteristics.

In this study, individual demographic characteristics, according to the third column in Table 5.6, the probability of employment of caregivers will increase by 6.9% for each year of age increase. Moreover, because the age square is significantly less than zero (-0.001), which indicates that the relationship between caregiver age and the possibility of employment is nonlinear and presents an inverted "U" shape, which is consistent with the employment trend of Chinese women's life cycle (Stone and short, 1990; Zahir et al., 2009; Tan, 2015 and Liu, 2014). However, the final column in Table 5.6 reports that age and the age square have no significant impact on the paid working hours of female caregivers. In other words, although with age growth, the possibility of women's employment would increase, the increase in age will not affect their paid working hours for those women who have been employed. In order to further understand the female caregivers' labour supply (at both intensive and extensive margins) response to elderly care at different ages, we explore the estimation results by age group in the Section 5.5.3.3.

In terms of Hukou, owning urban Hukou will significantly increase wives' labour supply at both extensive and intensive margins by 4.3 percentage points and 3.284 hours per week, respectively. In terms of education, our estimation results are consistent with the findings of Cameron, Dowling, and Worswick (2001) regarding the impact of education on women's employment probability in developing countries. Specifically, compared to women with a primary education or less, the probability of employment is 3.9 percentage points, 16.2 percentage points, and 14.4 percentage points higher for women with an upper middle school education, technical or vocational school education, and a university degree or higher education, respectively. On the intensive margin, women with a lower middle school education work 3.834 additional paid hours per week compared to those with primary education or less. As educational attainment increases, the additional paid work hours rise to 4.113 for upper middel

school graduates and 1.885 for those with a technical or vocational degree. Notably, for married women with a university degree or higher, education does not contribute to an increase in paid work hours. One explanatory reason is the devaluation of academic qualifications caused by the enrollment expansion of higher education in China since 1998. It might lead the Chinese academic qualifications threshold move backward (Acemoglu, 2012 and Ma, Ji and Xu, 2017), which has been detailed discussed in descriptive statistics section.

According to Table 5.6, among the three variables describing women's working status, women's occupation and contract type have no significant impact on their paid working hours. The women who work in state-owned enterprises provide less paid working hours (-5.602 hours per week) than those who work in non-state enterprises. This may be because the work in China's state-owned enterprises is relatively stable, the work intensity is moderate, and the risk of being punished for work performance is small.

The family factors also significantly impact on the married women's labour supply. In terms of the childcare, it is significantly decreasing the married women's paid working hours by 3.377 hours per week, which is consistent with the empirical results of Gelbach (2002) and Luo and Miao (2018). However, there is no statistically significant effect on the probability of employment.

Regarding household size, there is no statistically significant effect of the number of family members on the married women's probability of employment. While, for every increase in the number of people in the family, their paid working hours will be significantly reduced by 0.588 hours per week. The reason for this result comes from multiple factors. One reason may be that more elderly parents and parents-in-law or children in the family who need to take care of might lead to married women have less time to devote to paid work. Another possible reason is that there is more labour force in the family and married women have higher non-labour income. They can use these non-labour income to buy more leisure time and reduce the supply of paid working hours. The observed negative effect results might from the interaction of two opposing forces, both of which may be present simultaneously.

In terms of the second occupation of the husband, according to Table 5.6, compared with the female whose husband don't have a second job, those husbands have second occupation have a higher probability of employment by 14.3 percentage points significantly. The paid working hours of those wife decreased significantly by 5.587 hours. The husband's monthly income and total family income play a similar role with husband's second occupation on the women's labour supply at both extensive and intensive margins. Whether it is the husband's

second occupation, the husband's monthly income or the total family income will affect non-labour income for married women in the family (the husband's second occupation means that the family has an extra income). In the family decision-making model, the time of both husband and wife is divided into three parts: paid labour work, leisure and unpaid family care work. When the non-labour income of married women increases and the wage rate remains unchanged, the changes of their paid working hours is affected by women's purchase of leisure or formal care. If women buy leisure, their paid working hours may reduce. If a woman buys the formal care to reduce family care work, her paid working hours may increase. According to Table 5.6, both the husband's income and the family's gross income have a significant positive impact on the probability of caregivers being employed. Specifically, every 1% increase in the monthly income of the husband will increase 5.1 percentage poits the possibility of the married women being employed. For every 1% increase in the household gross income, the probability of the married women being employed increases by 1.2 percentage points. While, in terms of the intensive margin, husband's monthly income reduced wife's paid working hours by 0.229 hours per week, while household total gross income has no significant effect on female caregivers' paid working hours.

5.5.2. Robustness Checks

Our benchmark results presented in the previous section show that elderly care significantly increase the probability of employment of married women by 8.6 percentage points while conditional on employment, elderly care significantly decrease the weekly working hours of married women by 4.964 hours. In this section, we explore the robustness of these findings (i) to the different estimate methods; (ii) to the different cluster standard level; (iii) to the different instrumental variable selection (only need care) and (V) to exclude husbands' variables.

5.5.2.1. Different Methods

The first robustness test is conducted by comparing the regression results with different models in extensive and intensive margins respectively. Because the dependent variable is binary in extensive estimation, Logit and Probit models might be more suitable than linear probability model. At the same time, in order to capture individual characteristics that are often cannot be observed in both extensive and intensive margins regression, individual fixed effects are expected to be employed.

Table 5.7 reports the regression results of five additional models (Logit, Probit, FE, Probit

IV and IV+FE) in extensive margin estimation and two additional models (FE and IV+FE) in intensive margin regression. Columns (1) and (2) in Table 5.7 employ Probit model and Logit

Table 5.7 Different methods estimates of labour supply at extensive and intensive margins

	Probability of Employment					Paid Working Hours	
	Logit	Probit	FE	IV Probit	IV FE	FE	IV FE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Elderly Care	-0.002	0.007	0.025	0.288	0.160*	-1.538**	-3.153
	(0.141)	(0.080)	(0.018)	(0.208)	(0.096)	(0.637)	(3.830)
Age	0.482***	0.273***	0.044	0.276***	0.042	0.933	0.733
	(0.080)	(0.043)	(0.042)	(0.035)	(0.045)	(2.311)	(2.187)
Age square	-0.007***	-0.004***	-0.001***	-0.004***	-0.001***	-0.007	-0.005
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.012)	(0.014)
Hukou	0.290***	0.166***		0.159***			
	(0.083)	(0.046)		(0.059)			
Lower middle school degree	-0.031	-0.005		-0.015			
	(0.151)	(0.083)		(0.064)			
Upper middle school degree	0.234***	0.142***		0.124			
	(0.075)	(0.042)		(0.081)			
Technical or vocational degree	1.531***	0.876***		0.858***			
	(0.292)	(0.155)		(0.117)			
University or college degree or higher	2.427***	1.259***		1.242***			
	(0.259)	(0.133)		(0.157)			
Health	-0.019	0.012	-0.053*	0.023	-0.053**	-0.978	-0.881
	(0.209)	(0.118)	(0.024)	(0.079)	(0.027)	(1.391)	(1.422)
Husband monthly income	0.277***	0.163***	0.042***	0.162***	0.041***	-0.087	-0.093
	(0.021)	(0.012)	(0.006)	(0.008)	(0.006)	(0.286)	(0.288)
Husband's second occupation	1.045***	0.541***	0.014	0.541***	0.023	0.247	0.218
	(0.194)	(0.094)	(0.048)	(0.115)	(0.054)	(2.669)	(2.648)
Child Care	-0.160	-0.109	0.034	-0.105	0.040*	-2.617*	-2.670*
	(0.171)	(0.094)	(0.024)	(0.072)	(0.023)	(1.350)	(1.414)
Household size	0.012	0.008	-0.017	0.006	-0.021	0.323	0.369
	(0.054)	(0.031)	(0.015)	(0.022)	(0.013)	(0.957)	(0.955)
Household total gross income	0.074	0.041	0.003	0.042**	0.003	0.892	0.919
	(0.052)	(0.026)	(0.012)	(0.019)	(0.012)	(1.048)	(1.053)
High-skilled occupation						-1.379	-1.319
						(1.400)	(1.311)
Permanent contract						-1.361	-1.300
						(1.344)	(1.398)
State-owned firm						-0.744	-0.694
						(1.717)	(1.709)
Constant	-9.574***	-5.410***	0.398	-5.535***	0.524	12.147	17.253
	(1.436)	(0.760)	(1.313)	(0.741)	(1.451)	(77.591)	(72.835)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4296	4296	4296	4296	4296	2881	2881
Adjusted R^2			0.121			0.021	
R^2-within			0.045		0.015	0.024	0.008
R^2-between			0.058		0.052	0.005	0.005
R^2-overall			0.059		0.055	0.005	0.005

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level.

model to report the nonlinear relationship between elderly care and probability of employment. Neither of the above two methods found a statistically significant relationship between elderly care and the possibility of employment, which might imply that without accounting for the endogeneity of elderly care, the impact of elderly care on married women's labour supply may be underestimated. Columns (3) and (6) report the regression results of individual fixed effects in both extensive and intensive margins. In panel data, individual fixed effects can help eliminate potential endogeneity bias caused by individual characteristics that don't change with

time but unobserved. When elderly care is considered an exogenous variable, the result in column (3) is positive but non-significant. In terms of intensive margin, elderly care significantly reduces 1.538 paid working hours for female caregivers, which is consistent with the regression results of the benchmark model. However, due to persistence and the identification coming from a small number of observations, individual fixed effects weren't included in the benchmark.

In order to address the potential endogeneity bias from the interaction between independent variable (elderly care) and dependent variable (employment probability and paid working hours), columns (4), (5) and (7) in Table 5.7 report the regression results of Probit IV and IV FE for extensive regression and FE IV for intensive regression, respectively. The regression results of Probit IV are positive but not significant. The regression results of FE IV for extensive regression are positive and significant, which is consistent with the benchmark. In terms of intensive margin, the negative impact of elderly care on paid working hours of female caregivers is no longer significant. One possible explanation is that those who provide elderly care have low dependence on labour supply, which cannot be controlled in the benchmark model, but can be captured by individual fixed effects.

5.5.2.2. Clustering Standard Errors at Individual Level

The second robust test comes from using different cluster standard errors. In panel data, clustering standard error can explain the heteroscedasticity in the model. In the benchmark model, the cluster standard error level we choose is provinces rather than individuals. It can avoid the correlation between variables and errors between different individuals but within the same province. In this section, we try to use individual robustness standard error to test the robustness of benchmark regression results. According to Table 5.8, providing elderly care significantly increases the probability of employment and significantly reduces the paid working hours of married women, which is consistent with the benchmark regression results.[29]

Table 5.8 2SLS estimate of labour supply clustered at individual level

	Probability of Employment (1)	Paid Working Hours (2)
Elderly Care	0.086*	-4.964**
	(0.051)	(2.429)
Age	0.069***	-0.414
	(0.009)	(0.408)
Age square	-0.001***	0.002
	(0.000)	(0.005)

[29] The first stage estimates results are reported in Tables F.1 and F.2 in Appendix F.

Hukou	0.043***	3.284***
	(0.016)	(0.885)
Lower middle school degree	-0.000	3.834***
	(0.019)	(1.153)
Upper middle school degree	0.039*	4.113***
	(0.024)	(1.285)
Technical or vocational degree	0.162***	1.885
	(0.024)	(1.306)
University or college degree or higher	0.144***	1.407
	(0.024)	(1.379)
Health	0.002	-0.711
	(0.019)	(0.936)
Husband monthly income	0.051***	-0.229*
	(0.003)	(0.122)
Husband's second occupation	0.143***	-5.587***
	(0.024)	(1.462)
Child Care	-0.024	-3.377***
	(0.017)	(0.796)
Household size	0.000	-0.588**
	(0.005)	(0.281)
Household total gross income	0.012*	0.675
	(0.006)	(0.505)
High-skilled occupation		-0.106
		(0.559)
Permanent contract		-0.801
		(0.635)
State-owned firm		-5.602***
		(0.708)
Constant	-0.921***	50.862***
	(0.187)	(9.190)
Year Fixed Effect	Yes	Yes
Province Fixed Effect	Yes	Yes
Number of Observations	4296	2881
Adjusted R^2	0.350	0.080

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at individual level.

5.5.2.3. Using a Single Instrumental Variable

The fourth robustness test focuses on the use of instrumental variables. As discussed in Section 5.4, while the two instruments used in the benchmark model (spouse's number of siblings and need for care) passed the Sargan-Hansen overidentification test and the Stock and Yogo weak instrument test, the first-stage results in Table 5.6 indicate that the spouse's number of siblings is not statistically significant. In this section, we re-estimate the benchmark model (equation 5.1) using only the need care as the instrumental variable. The results, presented in Table 5.9, show that the regression outcomes are consistent with the benchmark model, with the same significant level and nearly identical magnitude.[30] In order to increase control for endogeneity and eliminate the possibility that some need care may not completely eliminate all potential endogeneities, we still employ both need care and number of siblings for spouse in the benchmark model, consistent with most studies using CHNS data (Chen, et al, 2016; Fan and Chen, 2016; Huang, 2012; Liu, et al, 2010).

[30] The first stage estimates results are reported in Tables F.1 and F.2 in Appendix F.

Table 5.9 2SLS estimates of married women labour supply with a single instrumental variable (Need care)

	Probability of Employment (1)	Paid Working Hours (2)
Elderly Care	0.086*	-4.965***
	(0.051)	(1.793)
Age	0.069***	-0.414
	(0.009)	(0.436)
Age square	-0.001***	0.002
	(0.000)	(0.006)
Hukou	0.043***	3.284**
	(0.016)	(1.395)
Lower middle school degree	-0.000	3.834***
	(0.019)	(0.719)
Upper middle school degree	0.039*	4.113***
	(0.024)	(1.343)
Technical or vocational degree	0.162***	1.885*
	(0.024)	(0.969)
University or college degree or higher	0.144***	1.407
	(0.024)	(1.229)
Health	0.002	-0.711
	(0.019)	(0.860)
Husband monthly income	0.051***	-0.229*
	(0.003)	(0.131)
Husband's second occupation	0.143***	-5.587***
	(0.024)	(1.107)
Child Care	-0.024	-3.377***
	(0.017)	(0.979)
Household size	0.000	-0.588**
	(0.005)	(0.242)
Household total gross income	0.012*	0.675
	(0.006)	(0.493)
High-skilled occupation		-0.106
		(0.732)
Permanent contract		-0.801
		(0.506)
State-owned firm		-5.602***
		(0.980)
Constant	-0.921***	50.863***
	(0.187)	(8.292)
Province Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
Number of Observations	4296	2881
Adjusted R^2	0.350	0.080

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level.

5.5.2.4. Model Specification

Compared to previous studies, such as Chen, et al. (2016), this analysis fully accounts for the husband's employment status and labour market income. However, an individual's labour supply decision may be influenced by their spouse's labour supply as families aim to maximize overall utility rather than individual preferences. To address potential endogeneity related to the husband's labour supply, we test whether excluding the husband's second occupation and monthly labour income from the benchmark model affects the estimate results. These findings are shown in Table 5.10. In columns (1) and (6), spouse's monthly labour income is excluded. Coulmns (2) and (7) exclude husband's second occupation dummy variable. Columns (3) and (8) exclude both second occupation and monthly labour income. According to Table 5.10, the results are robustness with the benchmark results, with very close magnitude and the same

significant sign.[31]

Table 5.10 2SLS estimates of married women labour supply without husband's variables

	Probability of employment					Paid Working Hours				
	Excluding husband's monthly labour income	Excluding husband's second occupation	Excluding husband's monthly labour income & husband's second occupation	Excluding Household Total Gross Income	Excluding Health	Excluding husband's monthly labour income	Excluding husband's second occupation	Excluding husband's monthly labour income & husband's second occupation	Excluding Household Total Gross Income	Excluding Health
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Elderly Care	0.072**	0.084***	0.068*	0.0824***	0.0705*	-4.909***	-4.831***	-4.758***	-5.143**	-4.871**
	(0.034)	(0.023)	(0.038)	(3.63)	(2.03)	(1.775)	(1.756)	(1.731)	(-2.75)	(-2.82)
Age	0.082***	0.069***	0.084***	0.0688***	0.0818***	-0.435	-0.440	-0.466	-0.419	-0.417
	(0.013)	(0.009)	(0.012)	(7.38)	(6.39)	(0.440)	(0.438)	(0.443)	(-0.95)	(-0.95)
Age square	-0.001***	-0.001***	-0.001***	-0.000985***	-0.00118***	0.002	0.002	0.003	0.00217	0.00210
	(0.000)	(0.000)	(0.000)	(-7.38)	(-6.83)	(0.006)	(0.006)	(0.006)	(0.38)	(0.37)
Hukou	0.060**	0.028**	0.037	0.0426**	0.0601*	3.286**	4.027***	4.057***	3.248*	3.278*
	(0.028)	(0.014)	(0.028)	(2.97)	(2.16)	(1.385)	(1.355)	(1.349)	(2.38)	(2.35)
Lower middle school degree	-0.004	-0.005	-0.012	0.00192	-0.00330	3.862***	4.099***	4.142***	4.000***	3.801***
	(0.020)	(0.020)	(0.020)	(0.10)	(-0.17)	(0.717)	(0.777)	(0.769)	(5.16)	(5.25)
Upper middle school degree	0.050**	0.031**	0.036	0.0430***	0.0506*	4.145***	4.514***	4.569***	4.338**	4.085**
	(0.020)	(0.014)	(0.022)	(3.41)	(2.43)	(1.353)	(1.388)	(1.399)	(3.06)	(3.02)
Technical or vocational degree	0.203***	0.153***	0.190***	0.167***	0.204***	1.909*	2.243**	2.285**	2.162*	1.853
	(0.033)	(0.026)	(0.033)	(6.53)	(6.13)	(1.007)	(1.006)	(1.046)	(2.17)	(1.86)
University or college degree or higher	0.200***	0.138***	0.192***	0.152***	0.200***	1.408	1.562	1.569	1.800	1.394
	(0.030)	(0.025)	(0.030)	(6.45)	(6.64)	(1.238)	(1.276)	(1.283)	(1.36)	(1.12)
Health	0.010	0.001	0.007	0.000778		-0.805	-0.693	-0.806	-0.787	
	(0.024)	(0.026)	(0.024)	(0.03)		(0.883)	(0.839)	(0.862)	(-0.89)	
Husband's second occupation	0.234***			0.0526***	0.0326***	-5.765***			-0.144	-0.233
	(0.031)			(18.16)	(18.16)	(1.089)			(-1.62)	(-1.76)
Husband monthly income		0.052***		0.142***	0.234***		-0.275**		-5.632***	-5.584***
		(0.004)		(7.31)	(7.56)		(0.135)		(-5.03)	(-5.11)
Child Care	-0.023	-0.025	-0.025	-0.0234	-0.0236	-3.380***	-3.351***	-3.354***	-3.355***	-3.363***
	(0.019)	(0.020)	(0.018)	(-1.18)	(-1.25)	(1.004)	(0.960)	(0.990)	(-3.40)	(-3.47)
Household size	-0.009	-0.001	-0.011	0.00152	-0.00925	-0.543**	-0.538**	-0.481**	-0.524*	-0.597*
	(0.008)	(0.007)	(0.008)	(0.23)	(-1.13)	(0.231)	(0.232)	(0.218)	(-2.44)	(-2.42)
Household total gross income	0.060***	0.012*	0.062***		0.0599***	0.389	0.715	0.371		0.687
	(0.008)	(0.007)	(0.008)		(7.94)	(0.357)	(0.513)	(0.373)		(1.39)
High-skilled occupation						-0.136	-0.103	-0.139	-0.0892	-0.0945
						(0.708)	(0.776)	(0.747)	(-0.13)	(-0.13)
Permanent contract						-0.777	-0.917*	-0.892*	-0.849	-0.794
						(0.514)	(0.531)	(0.539)	(-1.73)	(-1.58)
State-owned firm						-5.652***	-5.512***	-5.570***	-5.579***	-5.596***
						(0.996)	(0.971)	(0.990)	(-5.78)	(-5.69)
Constant	-1.358***	-0.918***	-1.377***	-0.819***	-1.351***	52.536***	50.235***	52.237***	57.04***	50.20***
	(0.239)	(0.144)	(0.232)	(-5.93)	(-5.66)	(8.201)	(7.882)	(7.703)	(6.42)	(6.34)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	4296	4296	4296	4296	4296	2881	2881	2881	2881	2881
Adjusted R^2	0.243	0.345	0.229	0.233	0.081	0.079	0.072	0.070	0.241	0.070

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

[31] The first stage estimates results are reported in Tables F.1 and F.2 in Appendix F.

Moreover, concerns about potential endogeneity may also arise from wives' physical health conditions and household total gross income levels. Specifically, married women with higher labour supply intensity may have worse physical health compared to those with lower labour supply intensity or those who do not work (Mariappanadar, 2016; Wang et al., 2021). Extended working hours and employment-related stress may lead to neglect of personal health and self-care, thereby negatively affecting their overall well-being (Wang et al., 2021). From a household total gross income perspective, employed wives might contribute to total household income through their labour earnings. Similarly, those with longer paid working hours are more likely to receive higher labour market compensation, which in turn influences household income. These dynamics suggest that both health status and household income could be endogenous to wives' labour supply decisions, necessitating careful consideration of potential biases in empirical analysis.

To address potential endogeneity related to the wifies' health condition and household total gross income, we test whether excluding these two control variables from the benchmark model affects the estimate results. These findings are shown in Table 5.10. In columns (4) and (9), household total gross income is excluded. Coulmns (5) and (10) exclude health dummy variable. According to Table 5.10, the results are also robustness with the benchmark results, with very close magnitude.

5.5.2.5 The Impact of Attrition

As discussed in Section 5.3.1, a significant number of observations are lost during the process of selecting the research sample and incorporating control variables, particularly the husband's monthly income, whether he has a second occupation, and whether wife cares for children aged six and under.

However, I would like to first re-emphasise that the analysis in this study employs an instrumental variables (IV) approach to estimate the causal impact of elderly care responsibilities on individuals' labour supply. This strategy is specifically designed to address potential endogeneity concerns, including omitted variable bias that could arise from unobserved factors such as household preferences, family support networks, or health shocks. By isolating exogenous variation in caregiving responsibilities, the IV approach helps mitigate the bias stemming from these unobserved confounders—an issue that would pose a more significant threat under standard OLS estimation.

Based on the above discussion, I have conducted a sensitivity analysis to examine potential

attrition and selection biases in my sample. Table 5.11 explores the sample means of key variables in the original CHNS sample and the working sample. The fourth column presents different meanings of original sample and working sample, while columns fifth and sixth report t-value and p-value. In this table, the sample that does not exclude missing values for the husband's monthly income, the husband's second occupation, and whether the wife takes care of children aged six and under is referred to as the original sample, with a total of 11,997 observations. The sample that excludes missing values for these variables, the working sample, with a total of 4,296 observations. According to Table 5.11, although the descriptive statistics of the working sample variables differ significantly from those of the original sample—with the exception of health—the differences remain relatively small. The key independent variable, the probability of elderly caregiving, shows a marginal gap of only 1.9 percentage points. For the extensive margin of the dependent variable, the difference in employment probability is merely 2 percentage points. Meanwhile, for the intensive margin, the difference in paid working hours amounts to 2 hours. Therefore, although a substantial amount of observation was lost during the process of adding control variables, this did not lead to huge differences in sample distribution. From this perspective, we can reasonably mitigate concerns about potential biases in the variable selection process.[32]

Table 5. 11 Descriptive analyses by samples

Variable	Original Sample Mean	Working Sample Mean	Difference	t-value	p-value
Employed	0.700	0.720	-0.020	-5.982	0.000
Paid working hours	40.317	43.037	2.72	-15.834	0.000
Elderly Care	0.149	0.167	-0.019	-7.416	0.000
Age	40.302	40.082	0.220	4.270	0.000
Hukou	0.399	0.570	-0.171	-47.905	0.000
Education	2.266	2.590	-0.323	-37.306	0.000
Health	0.894	0.891	0.003	1.235	0.217
Household Total Gross Income	60451.440	61053.672	-602.232	-16.677	0.000
Household Size	3.924	3.841	0.083	8.294	0.000
High-skilled occupation	0.077	0.127	-0.050	-26.167	0.000
Permanent contract	0.758	0.692	-0.066	49.205	0.000
State-owned firm	0.216	0.262	-0.445	-44.884	0.000

[32] As a further robustness check, Tables S.1 and S.2 in Appendix S explores the estimate results under varying selection criteria. These results confirm that while data loss (attrition) may introduce some selection bias, its impact is unlikely to substantially affect the main conclusions of this study.

5.5.3. Heterogeneity Analysis

5.5.3.1 Living Arrangements

As research continues to deepen, in recent years, more and more studies have supported that the impact of elderly care on the probability of employment and paid working hours of married women will be significantly different due to different living arrangements (Heitmueller, 2007 for the US; Crespo and Mira 2014 for Europe; Naldini, Pavolini, and Solera, 2016 for Europe, Fan and Xin, 2019 for China and Chai et al, 2021 for China). The different impacts can be explained from the perspective of the primary caregiver. Because caregivers living with the elderly are more vulnerable to providing elderly care than other caregivers and become the primary caregivers. Compared with other order caregivers, it might lead to a different impact pattern on the supply of primary caregivers' labour force. To do so, we re-estimate equation (5.1) by co-residence status. Table 5.11 presents estimate results. In Table 5.11, all observations were divided into two sub-sample groups according to whether caregivers lived with parents and parents-in-law or not.[33]

The first two columns in Table 5.11 report the impact of elderly care on the probability of employment of married women in the two sub-sample groups, respectively. Compared with those who didn't provide elderly care, for wives who don't live with their parents (parents in law), caring for the elderly significantly increases the probability of employment by 20.3 percentage points. One possible explanation is that compared with co-resident caregivers, non-coresident caregivers might provide more diversified and flexible forms of elderly care, such as financial support rather than caring hours. Due to the extra money needed for elderly care, the income effect of elderly care will be stronger for non-coresident caregivers. They may work more actively to earn more wages to make up for the extra expenses. While the effect turns negative if wives live with parents and parents in law, which is consistent with the international empirical result (Cassado-Marin et al., 2011 for Spain; Nguyen and Connelly, 2014 for Australia) and our expectation. This turning may be because that the co-resident elderly caregivers are more likely to be primary carers to provide care time, which may occupy the working time of co-resident elderly caregivers, forcing them have to sacrifice some job opportunities.[34]

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[33] The first stage estimates results are reported in Tables F.1 and F.2 in Appendix F.

[34] The permutation test (employment probability difference between co-resident and non-coresident married women) result is 0.376^{***}

Table 5.12 2SLS estimates of wives' probability of employment and weekly working hours by living arrangements

	Probability of Employment		Paid Working Hours	
	Co-residence	Non-co-residence	Co-residence	Non-co-residence
	(1)	(2)	(3)	(4)
Elderly Care	-0.173***	0.203***	-4.724	-5.980**
	(0.065)	(0.055)	(2.968)	(2.640)
Age	0.057***	0.085***	0.256	-0.803**
	(0.014)	(0.021)	(1.070)	(0.407)
Age square	-0.001***	-0.001***	-0.007	0.007
	(0.000)	(0.000)	(0.014)	(0.005)
Hukou	-0.014	0.059**	3.452***	3.180
	(0.028)	(0.029)	(1.053)	(2.044)
Lower middle school degree	0.068	-0.029	2.085	4.066***
	(0.044)	(0.020)	(1.369)	(0.817)
Upper middle school degree	0.103*	0.013	0.359	5.177***
	(0.055)	(0.021)	(1.446)	(1.563)
Technical or vocational degree	0.221***	0.128***	-1.454	3.031***
	(0.056)	(0.026)	(1.289)	(1.106)
University or college degree or higher	0.194***	0.120***	-3.633**	2.905*
	(0.063)	(0.020)	(1.529)	(1.552)
Health	-0.065	0.017	-0.549	-0.611
	(0.040)	(0.027)	(1.984)	(0.999)
Husband monthly income	0.050***	0.050***	-0.036	-0.333**
	(0.005)	(0.005)	(0.172)	(0.158)
Husband's second occupation	0.100**	0.164***	-0.927	-6.913***
	(0.042)	(0.022)	(1.483)	(1.242)
Child Care	-0.052***	-0.005	-1.413	-4.730***
	(0.019)	(0.023)	(0.933)	(1.238)
Household size	-0.017*	-0.005	-0.637**	-1.053*
	(0.009)	(0.011)	(0.261)	(0.539)
Household total gross income	0.023*	0.009	-0.422	1.147*
	(0.013)	(0.008)	(0.640)	(0.638)
High-skilled occupation			1.676*	-0.545
			(0.858)	(0.830)
Permanent contract			-0.943	-0.633
			(0.680)	(0.701)
State-owned firm			-3.454***	-6.471***
			(1.330)	(1.227)
Constant	-0.548*	-1.235***	51.844**	55.221***
	(0.304)	(0.367)	(20.573)	(11.591)
Year fixed effects	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes
Number of Observations	1229	3059	928	1945
Adjusted R^2	0.350	0.331	0.089	0.088

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level.

When we turn our attention to the impact along the intensive margin, presented in columns (3) and (4) in the Table 5.11, elderly care significantly reduces the paid working hours of non-coresident caregivers by 5.980 hours per week, which is consistent with the international empirical evidence (see, for example, Kotsadam, 2011 for Europe, Meng, 2013 for Canada, Van Houtven et al., 2013 for the US and Heger and Korfhage, 2020 for Europe). However, for the co-resident caregivers, elderly care has non-significant effect on their paid working hours. This may be because co-residing wives, as primary caregivers, likely assess their time allocation before making labour supply decisions. For wives unable to balance both unpaid elderly care work and paid labour force work, increasing elderly care demands may force them to exit the labour market, as discussed in previous paragraph. In contrast, wives who believe they can participate in the labour market and are already employed may not experience a significant reduction in paid working hours. This could be due to either a lower caregiving burden, despite

co-residence, or the need for labour income to support additional caregiving expenses. The lack of a significant effect may result from the income and substitution effects balancing out on the intensive margin for co-residing wives.

5.5.3.2 Care Intensity

Turning to the elderly care effect on caregivers' labour supply by care intensity at both extensive and intensive margins, Lilly (2007) supports that individuals can balance work and life when their caregiving commitments are not heavy. However, when the caregiving for more than the range they can bear, it will have significant negative consequences for both labour force participation rate and working hours.[35] To do so, according to Table 5.12, the elderly care hours enter the regression as a dummy variable set according to the threshold value (20 hours, 25 hours, 30 hours) following Lilly et al. (2010) and Pardo-Garcia and Sotos (2014)[36].[37] We find that compared with those who do not provide elderly care and low care intensity caregivers, the elderly care intensity has no statistically significant impact on the possibility of employment as well as paid working hours.[38] Combine with the results in Section 5.5.1., we can get the enlightenment that caring for elderly parents or parents-in-law will significantly affect the employment status and paid working hours for married women caregivers. However, once the care is started, the hour of care has no effect on their employment status and paid working hours. One possible explanation is that when women's personal characteristics, family characteristics and financial characteristics are certain, they have already made a pre-judgment and necessary preparation for the possible situation when they decide to start providing elderly care. Women with higher family income may plan to purchase formal services. Women with lower family

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[35] The threshold for caregiving intensity varies across existing literature: 28 hours for Spain (Casado-Mar´ın et al., 2011), 20 hours for OECD countries (Colombo et al., 2011), 15 hours for Canada (Lilly et al., 2011), and 20 hours for China (Huang, 2012).

[36] I have also tried the regression results of other threshold values (10 hours, 15 hours, 35 hours and 40 hours). However, no significant effects of elderly care on labour supply were found. The regression results are presented in Table G.1 and Table G.2 in the Appendix G.

[37] The first stage estimates results are reported in Tables F.1 and F.2 in Appendix F.

[38] I also attempted to use different methods to definite elderly care intensity. However, no significant effects of elderly care on married women's labour supply. The regression results are presented in Table G.3 and G.4 in the Appendix G.

income may plan to quit the labour market or reduce paid working hours. They may not wait until the care intensity changes to change their employment status.

Table 5.13 2SLS estimates of married women' s labour supply by care intensity

	Probability of Employment			Paid Working Hours		
	20 HRS	25 HRS	30 HRS	20 HRS	25 HRS	30 HRS
	(1)	(2)	(3)	(4)	(5)	(6)
0HR< Elderly Care ≤ 20HRS	0.382			-4.457		
	(0.614)			(22.158)		
20HRS < Elderly Care	-0.679			-8.310		
	(1.722)			(60.386)		
0HR< Elderly Care ≤ 25HRS		0.592			-4.203	
		(1.333)			(28.266)	
25HRS < Elderly Care		-1.860			-11.163	
		(5.374)			(124.743)	
0HR< Elderly Care ≤ 30HRS			1.027			-3.931
			(4.348)			(34.559)
30HRS < Elderly Care			-4.271			-12.992
			(20.318)			(166.683)
Age	0.062***	0.059**	0.061	-0.408	-0.395	-0.397
	(0.018)	(0.029)	(0.038)	(0.487)	(0.466)	(0.456)
Age square	-0.001***	-0.001***	-0.001***	0.002	0.002	0.002
	(0.000)	(0.000)	(0.000)	(0.006)	(0.006)	(0.006)
Hukou	0.040**	0.038**	0.028	3.314**	3.266*	3.268*
	(0.017)	(0.017)	(0.050)	(1.363)	(1.732)	(1.708)
Lower middle school degree	-0.005	-0.008	-0.018	3.878***	3.883***	3.822**
	(0.023)	(0.025)	(0.092)	(0.775)	(0.726)	(1.711)
Upper middle school degree	0.047*	0.040***	0.028	4.325***	4.331***	4.308***
	(0.025)	(0.015)	(0.058)	(1.385)	(1.408)	(1.278)
Technical or vocational degree	0.143***	0.131*	0.116	1.890	1.909	1.874
	(0.039)	(0.069)	(0.193)	(2.009)	(1.684)	(2.399)
University or college degree or higher	0.141***	0.124**	0.109	1.552	1.548	1.495
	(0.023)	(0.053)	(0.159)	(1.213)	(1.212)	(1.878)
Health	0.020	0.046	0.106	-0.598	-0.547	-0.477
	(0.041)	(0.120)	(0.492)	(1.692)	(2.752)	(4.252)
Husband monthly income	0.051***	0.049***	0.045	-0.238	-0.244**	-0.251
	(0.004)	(0.007)	(0.030)	(0.159)	(0.117)	(0.218)
Husband's second occupation	0.145***	0.154***	0.165	-5.509***	-5.484***	-5.489***
	(0.020)	(0.042)	(0.121)	(1.543)	(2.006)	(1.931)
Child Care	-0.033	-0.040	-0.048	-3.367**	-3.390*	-3.383**
	(0.023)	(0.040)	(0.108)	(1.333)	(1.741)	(1.632)
Household size	-0.002	-0.002	-0.002	-0.555**	-0.550**	-0.550**
	(0.010)	(0.012)	(0.018)	(0.271)	(0.231)	(0.229)
Household total gross income	0.013	0.015	0.020	0.643	0.646	0.657
	(0.008)	(0.013)	(0.041)	(0.492)	(0.472)	(0.482)
High-skilled occupation				-0.221	-0.240	-0.239
				(0.879)	(1.189)	(1.182)
Permanent contract				-0.782	-0.782*	-0.787
				(0.479)	(0.468)	(0.529)
State-owned company				-5.520***	-5.512***	-5.500***
				(0.975)	(0.972)	(1.041)
Constant	-0.817***	-0.767*	-0.866**	50.653***	50.480***	50.337***
	(0.281)	(0.440)	(0.363)	(9.716)	(8.667)	(8.993)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4268	4268	4268	2866	2866	2866
Adjusted R^2	0.206	.	.	0.076	0.073	0.070

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level.

Although some studies based on Chinese data find the significant effect from caregiving intensity, this may be due to the neglect of married women's non-labour income[39]. After taking

[39] Without considering the effect of total household income and husbands' working status, Chen,

into account the household income factor, Huang (2012) based on the CHNS data from 1991 to 2009 finds that compared with the results of Chen, Zhao, Fan and Coyte (2017), the negative impact of elderly care on the possibility of employment of women is smaller (0.695 %). This may indicate that the influence of elderly care on women's employment possibilities in the model without considering family income may not only come from elderly care.

Moreover, compared to existing Chinese literature, updated data entirely from 2000 onwards may also be one of the reasons for inconsistency with previous empirical results. After China enters an ageing society, it faces an increasingly heavy burden of elderly care, and adult children may plan how to take care of the elderly earlier and more effectively. At the same time, the gradual introduction of family elderly care policies by the Chinese government may also have played an undeniable role (see detailed discussed in Section 2.2). With the joint efforts of all sectors of society, the increase in the intensity of elderly care is no longer the main reason for affecting the supply of married women labour supply at both extensive and intensive margins.

5.5.3.3 Age Group

Many international literatures find that women's age has a significant impact on their labour supply decisions (see detailed discussion in Section 3.2.2.2). The labour supply of Chinese women reaches its peak after completing childbirth and then significantly decreases with age after 45 years old. However, when Chinese women face the pressure of elderly care, little research has been conducted on whether and how their labour supply will change by age. In this subsection, I will divide the sample into three age subgroups. Table 5.13 reports the regression results.[40]

According to the first and fourth columns in Table 5.13, compared to 18-34 years old married women who do not provide elderly care, elderly care will reduce the labour supply of caregivers, both in terms of intensive and extensive margins. This may be because human capital investment is not yet in place in the early stages of younger caregivers' careers.

Zhao, Fan and Coyte (2017) find that women who provided more than 15 or 20 hours of elderly care will reduce probability of employment by 4.5-7.7 percentage points; Chai, Fu and Coyte (2021) find that the possibility of employment will be reduced by 0.14 percentage points for each additional hour of family care.

[40] The first stage estimates results are reported in Tables F.1 and F.2 in Appendix F.

Therefore,

Table 5.14 2SLS estimates of married women's labour supply by age

	Probability of Employment			Paid Working Hours		
	18-34 years (1)	35-44 years (2)	45-51 years (3)	18-34 years (4)	35-44 years (5)	45-51 years (6)
Elderly Care	-0.343**	0.138***	0.148**	-11.577*	-0.645	-9.491**
	(0.138)	(0.046)	(0.058)	(6.238)	(2.914)	(3.819)
Age	0.021	0.069	-0.067	2.631	-6.713*	-14.324
	(0.052)	(0.075)	(0.353)	(2.305)	(4.005)	(18.871)
Age square	-0.000	-0.001	0.000	-0.051	0.083	0.145
	(0.001)	(0.001)	(0.004)	(0.039)	(0.051)	(0.198)
Hukou	0.077***	0.107***	-0.036	2.113	3.530**	4.700*
	(0.022)	(0.021)	(0.033)	(1.413)	(1.655)	(2.744)
Lower middle school degree	0.078**	0.019	-0.055***	5.942***	4.896***	0.162
	(0.039)	(0.031)	(0.019)	(2.132)	(1.377)	(2.039)
Upper middle school degree	0.118**	0.035	0.018	5.698	5.405***	1.620
	(0.048)	(0.030)	(0.025)	(3.854)	(1.874)	(2.349)
Technical or vocational degree	0.234***	0.104***	0.229***	3.249	1.229	1.851
	(0.051)	(0.030)	(0.041)	(2.520)	(1.507)	(2.008)
University or college degree or	0.216***	0.075**	0.194***	2.462	1.314	1.617
	(0.050)	(0.034)	(0.026)	(2.854)	(1.796)	(2.551)
Health	0.007	0.004	-0.029	-0.655	0.030	-2.547
	(0.031)	(0.038)	(0.028)	(1.237)	(1.361)	(1.815)
Husband monthly income	0.055***	0.055***	0.044***	-0.145	-0.114	-0.481**
	(0.006)	(0.005)	(0.007)	(0.180)	(0.195)	(0.212)
Husband's second occupation	0.034	0.146***	0.196***	-6.631	-3.727**	-7.583***
	(0.056)	(0.030)	(0.049)	(4.675)	(1.805)	(2.466)
Child Care	-0.043***	-0.026	-0.049	-2.873**	-3.366**	-6.469**
	(0.014)	(0.021)	(0.049)	(1.333)	(1.325)	(3.013)
Household size	-0.010	-0.011	0.018*	-0.211	-0.817*	-0.708
	(0.008)	(0.010)	(0.009)	(0.487)	(0.475)	(0.637)
Household total gross income	0.017	0.012	0.012	-0.450	1.667**	0.480
	(0.012)	(0.011)	(0.010)	(0.483)	(0.796)	(1.172)
High-skilled occupation				0.416	-0.965	0.561
				(0.984)	(0.815)	(1.874)
Permanent contract				-0.726	-0.096	-2.754***
				(1.219)	(1.099)	(0.996)
State-owned firm				-4.684**	-5.378***	-6.877***
				(1.835)	(1.270)	(1.541)
Constant	-0.070	-0.981	2.730	19.234	159.328**	397.308
	(0.746)	(1.451)	(8.515)	(32.485)	(76.922)	(445.330)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1103	1733	1460	825	1287	769
Adjusted R^2	0.323	0.368	0.289	0.034	0.097	0.084

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

when women face the burden of elderly care, they can give up with less sunk cost. Compared to women who are unable to give up their careers, those younger caregivers may have lower incomes. At the same time, the Chinese government began advocating for having two children in 1970 and implemented the one child policy in 1980. The number of siblings of young married women in this study is relatively small. This means that the elderly care burden for young married women is hard to be shared. Without sufficient formal care support, they have to spend time providing elderly care and give up labour supply. For the group approaching retirement (45-51 years old), they report the positive impact of elderly care on the probability of employment and the significant negative impact of elderly care on paid working hours. There might be a bargaining power story. The women who in 45-51 years old group might be the ones that are able to afford it. So, they could tell their employer that they are going to reduce their

working hours. But for younger people, they may lack such bargaining power with their employer. For the middle-aged group (35-44 years old), we find that elderly care increases the probability of being employed but has no effect on paid working hours. Although we do not have empirical evidence to explain this phenomenon, the increase at the extensive margin for middle-aged women may be due to the potential pressure of elderly care, prompting them to earn additional labour income in advance to compensate for future caregiving-related expenses. While positive effects on the extensive margin are observed in both the middle-aged and elderly groups, the results of the permutation test indicate that the positive impacts between these two subgroups are not significantly different.[41]

5.5.3.4 Childcare

In addition to elderly care responsibilities, childcare is also an important factor affecting women's labour supply on both the extensive and intensive margins. As unpaid family caregiving responsibilities, elderly care and childcare may compete for a wife's/mother's available time, potentially crowding out one another. In order to explore whether the impact of elderly care on married women's labour supply varies across childcare provision, this subsection re-estimate equation (5.1) by childcare status.[42] Table 5.14 presents estimate results.[43] In Table 5.14, columns (1)-(2) and (5)-(6) report the impact of elderly care on the labour supply of wives with and without childcare responsibilities, respectively. We find that for wives without childcare responsibilities, elderly care has a significant income effect on their labour supply, increasing the probability of employment by 10.6 percentage points and paid work hours by 0.116 hours per week. However, for wives with childcare responsibilities, the burden of elderly care does not lead to greater labour market participation. Elderly care responsibilities do not significantly affect their probability of employment and significantly reduce their paid work hours by 0.483 hours per week. This may be because the combined

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[41] Permutation test result: middle-age-group – older-age-group= -0.011, p-value=0.49.

[42] Childcare status refers to whether the respondent provide childcare or not. Dummy variable is set according to the question " During the past week, did you take care of children under 6 in your household?" in the CHNS survey. If the respondent's answer is "Yes" then 'Childcare' dummy equals to 1 (the respondent provides childcare), and if the answer is "No", then 'Childcare' dummy equals to 0 (the respondent does not provide childcare).

[43] The first stage estimates results are reported in Tables F.1 and F.2 in Appendix F.

demands of childcare and elderly care consume too much of those wives' time and energy, preventing them from increasing labour supply, even when facing additional financial pressure from caregiving.

Table 5.15 2SLS estimates of married women' s labour supply by childcare

	Probability of Employment		Paid Working Hours	
	Provide childcare (1)	Not providing childcare (2)	Provide childcare (5)	Not providing childcare (6)
Elderly Care	-0.059	0.106***	-28.471***	-2.833
	(0.181)	(0.035)	(5.261)	(2.488)
Age	0.054***	0.080***	1.096	-0.402
	(0.009)	(0.013)	(1.318)	(0.407)
Age square	-0.001***	-0.001***	-0.020	0.003
	(0.000)	(0.000)	(0.018)	(0.005)
Hukou	-0.026	0.065***	2.349	3.602**
	(0.033)	(0.013)	(2.014)	(1.730)
Lower middle school degree	0.031	-0.007	5.830***	3.768***
	(0.041)	(0.019)	(1.910)	(0.956)
Upper middle school degree	0.088	0.031*	7.784**	3.732***
	(0.061)	(0.019)	(3.705)	(1.195)
Technical or vocational degree	0.223***	0.147***	2.802	1.448*
	(0.064)	(0.027)	(2.747)	(0.793)
University or college degree or higher	0.211***	0.138***	-1.335	1.513
	(0.053)	(0.024)	(3.088)	(1.110)
Health	0.009	-0.003	-0.321	-0.827
	(0.044)	(0.026)	(2.077)	(0.895)
Husband monthly income	0.050***	0.051***	-0.258	-0.241
	(0.005)	(0.004)	(0.321)	(0.147)
Husband's second occupation	0.104**	0.160***	-7.627***	-5.186***
	(0.052)	(0.021)	(2.870)	(1.089)
Child Care	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
Household size	-0.020**	0.009	0.236	-0.813***
	(0.009)	(0.007)	(0.564)	(0.309)
Household total gross income	0.020*	0.008	-0.571	1.002*
	(0.010)	(0.009)	(0.689)	(0.609)
High-skilled occupation			1.948	-0.171
			(1.954)	(0.667)
Permanent contract			-3.052	0.009
			(2.343)	(0.635)
State-owned firm			-0.430	-6.615***
			(2.555)	(0.967)
Constant	-0.689***	-1.139***	35.057	46.012***
	(0.188)	(0.227)	(24.675)	(8.943)
Year fixed effects	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes
Number of observations	1068	3228	694	2187
Adjusted R^2	0.370	0.351	.	0.089

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

5.5.3.5. Hukou

China's household registration system (Hukou) classifies citizens into urban and rural categories, shaping access to social security benefits, educational resources, and healthcare services (Kolodziej, Reichert and Schmitz, 2018). This division also significantly influences women's labour force participation, income levels, and caregiving responsibilities. Urban women, for example, generally have higher educational attainment and greater access to job

opportunities. As a result, women with urban Hukou often have more options to balance work and family life (Chatterjee et al., 2015). They can adjust their working hours, such as opting for flexible job arrangements, or mitigate caregiving burdens by hiring domestic help, enabling them to remain in the labour force. Moreover, urban areas typically offer more developed public eldercare and healthcare systems, allowing urban women to outsource eldercare responsibilities, such as hiring caregivers, thereby alleviating the burden of family care. In contrast, rural women face lower income levels, fewer employment opportunities, and limited access to public eldercare services. Consequently, married women in rural areas might often compelled to shoulder a greater share of caregiving responsibilities rather than outsourcing them.

Table 5. 16 2SLS estimates of married women' s labour supply by Hukou

	Probability of Employment		Paid Working Hours	
	Rural	Urban	Rural	Urban
	(1)	(2)	(3)	(4)
Elderly Care	0.0567	0.0900	-2.788	-12.98**
	(1.32)	(1.53)	(-1.14)	(-3.06)
Age	0.103***	0.0194	-0.211	0.0283
	(11.47)	(1.45)	(-0.56)	(0.04)
Age square	-0.00148***	-0.000283	0.00129	-0.00399
	(-11.88)	(-1.53)	(0.27)	(-0.45)
Lower middle school degree	0.0544	-0.0171	1.069	3.303***
	(1.93)	(-0.64)	(0.58)	(3.40)
Upper middle school degree	0.120***	-0.0491	0.421	4.616*
	(4.26)	(-1.55)	(0.17)	(2.25)
Technical or vocational degree	0.201***	0.210**	-1.247	3.094*
	(4.80)	(2.88)	(-0.55)	(2.47)
University or college degree or higher	0.199***	0.171***	-0.104	0.576
	(5.09)	(4.01)	(-0.04)	(0.20)
Health	-0.0288	0.0392	-0.0429	-2.190
	(-1.01)	(1.16)	(-0.05)	(-0.96)
Husband monthly income	0.0414***	0.0584***	-0.104	-0.327
	(13.06)	(10.55)	(-1.11)	(-1.39)
Husband's second occupation	-0.00479	0.165***	-4.016	-4.867***
	(-0.09)	(7.55)	(-1.56)	(-4.54)
Child Care	-0.0443	-0.0101	-1.510	-4.213*
	(-1.63)	(-0.30)	(-1.67)	(-2.32)
Household size	-0.00662	0.00105	-0.197	-0.890*
	(-1.29)	(0.12)	(-1.05)	(-2.08)
Household total gross income	0.0197*	0.0111	0.0184	1.389
	(2.35)	(1.32)	(0.05)	(1.47)
High-skilled occupation			-0.424	4.098
			(-0.69)	(1.09)
Permanent contract			2.608***	-8.240***
			(3.48)	(-7.13)
State-owned firm			-5.981***	-1.114
			(-6.03)	(-0.44)
Constant	-1.448***	-0.114	52.58***	47.13***
	(-9.73)	(-0.46)	(4.80)	(3.89)
Year fixed effects	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes
Number of observations	2448	1848	1805	1076
Adjusted R^2	0.392	0.551	0.460	0.689

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level.

According to Table 5.15, the employment probability of married women providing elderly care does not differ significantly from those who do not provide such care, regardless of their

Hukou status. However, the impact of elderly care responsibilities on married women's labour supply is evident in the intensive margin for urban Hukou holders. Specifically, married urban women who provide elderly care experience a significant reduction in paid working hours by 12.98 hours per week. Conversely, no significant change in paid working hours is observed among rural married women. This finding aligns with expectations, as the rural labour market is relatively inflexible, making it difficult for rural women to adjust their paid working hours through social support or government support. In urban areas, however, caregiving responsibilities lead to a significant reduction in women's paid working hours, reflecting the broader range of job opportunities available. Urban women may be more inclined to reduce working hours rather than exit the labor market entirely to accommodate caregiving responsibilities.

5.6. Conclusion

Using the latest data from the CHNS, this study explores the impact of elderly care on the probability of married women' employment as well as their paid working hours. It addresses the potential endogeneity between elderly care and married women labour supply at both extensive and intensive margins by employing need care (whether elderly parents or parents in law have elderly care demand) and the sum of number of siblings of both spouses as instruments for the elderly care. The study finds that in the whole sample, elderly care significantly increases the probability of employment of married women (8.6 percentage points) and it significantly reduce the paid working hours of married women (4.964 hours).

Further heterogeneity analysis by whether caregivers live together with their parents (parents in law) or not, shows that the elderly care effect is not uniform and varies by living arrangements. In particular, elderly care provision significantly increases the probability of employment of married women who do not live with elderly parents and parents-in-law (20.3 percentage points) while decreases the probability of employment of married women who do live with elderly parents and parents-in-law (17.3 percentage points). Furthermore, elderly care harms paid working hours for female caregivers regardless of whether they live with their parents or parents-in-law, while only significant for non-coresident married women. Regarding age, elderly care decreases the paid working hours of married women aged 45-51 but significantly boosts the employment probability for married women in both the 35-44 and 45-51 age groups. In contrast, for younger married women, elderly care has a detrimental effect on their labour supply, reducing their labour supply at both the extensive margin by 34.4

percentage points and the intensive margin by 11.577 hours per week. Further heterogeneity analysis indicates that married women without childcare duties, when taking on elderly care responsibilities, do not experience a reduction in their labour supply. In fact, they are more likely to increase their employment to generate additional income for caregiving costs. In contrast, those juggling both childcare and elderly care face substantial caregiving burdens, leaving them with insufficient time and energy to engage in the labour market. For women who are already employed, their weekly paid working hours are reduced by 28.47 hours. However, the intensity of elderly care does not significantly impact the labour supply of married women labour supply at both the extensive and intensive margins. However, there is no heterogeneity in employment probability based on household registration type. The heterogeneous effect of elderly caregiving on wife's labour supply is however observed in the paid working hours of urban married women.

Our results should be considered in conjunction with China's family friendly policies. Our findings suggest that income effect dominates the impact of elderly care on extensive margin of labour supply suggesting that increasing financial support for elderly caregivers, such as reducing taxes or providing more elderly care financial support might have potential benefits. In addition, based on the heterogeneous impact by living arrangements, age and childcare, we have reason to believe that targeted support for elderly caregivers with different characteristics may be more effective.

This research also has some limitations that can be improved in future studies. Firstly, compared to other available national data, CHNS provides long panel data and sufficient information on key variables in the regression, while the data for this study was last updated in 2015. In 2016, the Chinese government officially introduced the two-child policy, which may affect married women’s elderly care decisions because increasing burden of childcare. In 2019, the global spread of COVID-19 widely affected the lives of people in various countries. The changes in China's employment environment and medical service system may also affect the labour supply of married women at both intensive and extensive margins. But our data cannot capture these impacts. In the future, if updated data are available, we expect further empirical results. Secondly, this study only focuses on the labour supply at both intensive and extensive margins of married women. Single women due to their different family structures and marital status could be an interested extension in future research. Finally, China formally implemented the one-child policy in 1983. Now, the parents of the first generation (the only child born in 1976-1986) of only children have gradually become the elderly population in need of elderly

care (Feng, 2006). With the increasing burden of elderly care, elderly care may have a different impact on the labour supply at both intensive and extensive margins of only-child compared to children who have brothers or sisters, which is also worth researching in the future.

Chapter 6: The Impact of Family Elderly Care Responsibility on Husbands' Labour Supply

6.1. Introduction

With the acceleration of China's ageing process, care demand of elderly poses a significant challenge to the society (Zeng and Hesketh, 2016). According to data from the Seventh Population Census in 2020 in China, China's elderly dependency ratio already reached 19.69%, which means that each 5 working-age person are required to support an elderly person aged 65 and above.[44] As Chinese formal social care industry for elderly is still underdeveloped and family informal care continues to be the main form of care provision for the elderly, how to balance the family and work has gradually become an unavoidable issue for nearly every family member in China rather than solely the primary caregiver that usually the wife in the family. Indeed, a growing empirical literature suggests that men today are more likely to share responsibility for household chores, particularly in situations where the family face domestic shocks, such as an increasing demand for family elderly care requirement (Auspurg et al. al., 2017; Carlson et al. 2022).

Although there has been a rich of international literature to explore the impact of elderly care on the labour supply of female caregivers both at intensive and extensive margins, only a small number of studies consider the impact on their husbands (Nguyen and Connelly, 2014 for Australia; Kolodziej, Reichert and Schmitz, 2018 for Europe; Heger and Korfhage, 2020 for Europe and Chai, Li, Cai and Zeng, 2021 for China), which is mixed both in terms of the sign and the magnitude of the impact of the elderly care responsibility on husbands' labour supply. Moreover, the impact mechanism of elderly care on the labour supply of husbands, usually the second caregivers in the family, has not been thoroughly explored. This study aims to fill this evidence gap by exploring the impact of family elderly care responsibility on husbands' labour supply at both extensive margin (employment status) and intensive margin (paid working hours) and explore the mechanisms behind the impact.

The analysis employs data from the China Health and Nutrition Survey (CHNS) in 2004, 2006, 2009, 2011 and 2015, which in contrast to other national surveys for example, China

[44] The elderly dependency ratio refers to the number of elderly individuals aged 65 and above that need to be supported for every 100 working-age individuals (typically aged 15 to 64).

Family Panel Studies, Chinese General Social Survey and China Health and Retirement Longitudinal Study), covers both urban and rural areas in China and has a rich set of individual, family, and financial characteristics that are well established determinants of labour supply (Huang et al., 2021; Wang et al. al., 2022). By employing Two stage least squares (2SLS) and exploring the exogenous variation in need care and number of siblings for spouse which are used as instruments for family elderly care provision, the analysis addresses potential endogeneity between elderly care and husband's labour supply. The analysis shows that husbands whose families face elderly care responsibilities have a lower probability to be employment by 5.3 percentage points compared with those whose families do not face elderly care responsibilities, while family elderly care responsibility has no significant effects on paid working hours. These results are robust to different estimate methods, structure model, model specification, only single instrumental variable and levels of clustered standard errors.

In the further analysis, this analysis investigates the potential mechanisms behind these results and explore heterogeneity in the impact of elderly care on husbands' labour supply by living arrangement, age group and care recipient, which are the first empirical results based on Chinese data by our knowledge. These analyses suggest that the impact of elderly care is likely driven by husband's sharing of family care responsibilities. Furthermore, it also finds that the impact varies for husband by work type (part time/ full time job), living arrangement, Hukou and care recipient etc. More specifically, the negative impact of family elderly care responsibilities on the probability of husband employment is only reflected in the subgroup engaged in full time work rather than part time work. Compared to taking care of parents-in-law, husbands are more willing to sacrifice the possibility of being employed for their own parents. In terms of living arrangements, husbands who do not live with elderly parents in law are less likely to be employed, but the employment probability of husbands who live with elderly parents and parents in law is not affected. In terms of Hukou, the heterogeneous effect of elderly caregiving on husbands' labor supply is only observed in the paid working hours of urban married men (-7.514 hours per week).

The structure of this chapter is as follows: Section 6.2 reviews the previous literature that includes theoretical framework and empirical evidence. Sections 6.3 and 6.4 discuss the data and method. Section 6.5 presents the estimation results and presents results from the heterogeneity analysis by work type (part time/ full time job), living arrangement and care recipient. And finally, Section 6.6 concludes.

6.2. Literature Review

6.2.1. Theoretical Framework

6.2.1.1. Added Worker Effect

Since Woytinsky's (1942) seminal work, economists have been interested in the "added worker effect," which refers to the increase in labour supply by individuals in response to an unexpected financial shock to family income, such as the unemployment of a spouse. Theoretically, this effect assumes a hierarchical structure of labour supply within households. In this structure, one household member, typically the male breadwinner, has a permanent and primary attachment to the labour market, while the partner, usually the female, serves as a secondary earner with a more transitory or flexible participation in the labour force. For instance, when a husband experiences unemployment, the wife's labour supply tends to increase significantly (Maloney, 1987).

However, some empirical studies have found the added worker effect to be weak or even nonexistent (Lundberg, 1985; Maloney, 1987; Cullen and Gruber, 2000). The most widely accepted explanation is that the added worker effect is often offset by the discouraged worker effect. This theory suggests that unemployment sends a negative signal, reflecting a poor outlook for job opportunities, which may discourage wives from seeking employment. Additionally, unemployment insurance is another key factor. In developed countries with well-functioning public insurance systems, part of the added worker effect may be mitigated by social insurance, reducing the need for wives to compensate for lost household income (Cullen and Gruber, 2000).

Further research indicates that the magnitude of the added worker effect may also depend on the impact of the husband's unemployment on the value of the wife's non-labour activities, such as housework, childcare, and eldercare. The extent to which the husband's loss of income (and the corresponding increase in his available non-labour time) reduces the wife's time spent on non-labour activities is crucial (Bingley, 2001; Bloemen, 2010; Ding and Shi, 2016). In short, wives may re-enter the labour market when their husbands' unemployment causes the marginal value of their non-labour work to fall below their reservation wage.

Since the 1980s, an increasing number of women have shifted from unpaid household chores to participating in the labour market (Schultz, 1990). This transformation has redefined the roles within families. When women not only act as secondary earners but also as equal or primary earners, their unemployment can lead to a substantial decline in family income. This may result in an added-worker effect for husbands, with some empirical evidence supporting

this notion.

Triebe (2015), using data from the German Socio-Economic Panel Study (SOEP) and applying three different matching methods, examines the labour supply outcomes of individuals whose partners lost their jobs due to factory closures or layoffs. He finds evidence of an added-worker effect among men (0.024), while the women's group displays the discouraged-worker effect. Similarly, Tansel and Ozdemir (2018), using co-integration analysis and monthly time-series data from Canada, report analogous results. They attribute the added-worker effect for men and the discouraged-worker effect for women to women's high labour force participation rates and men's relatively lower family responsibilities. Their argument is that men, due to their limited caregiving roles, have greater flexibility to increase their labour supply in response to economic shocks.

As discussed in Chapter 5, unpaid caregiving, particularly elderly care by the wife, may reduce her participation in paid labour, thereby lowering family income. This, in turn, may prompt the husband to increase his labour supply to compensate him for the income loss. Male partners might exhibit a stronger response, as they generally face fewer social responsibilities compared to women, such as childcare or eldercare (Coe, Skira, and Van Houtven, 2011; Triebe, 2015).

However, in practice, when families face pressures such as caregiving, multiple factors influence the husband's labour supply decisions, including who dominates decision-making, the decision-making sequence, the criteria used, and the dynamics of spousal interaction. In the following section, we will explore potential models of labour supply decision-making in married households.

6.2.1.2. Labour Supply of Family Members

Section 3.1.2 has provided a detailed discussion on simple labour-leisure model and its extensions. These models try to explain how individuals choose between labour, leisure and unpaid family working time to maximize their individual utility from consuming goods and leisure when they face time and income constraints. These models consider the individual's labour supply decision to be independent of the labour supply decisions of others. As discussed below, there are four main types of labour supply models which consider family members. These are the single decision-making model, male/female chauvinist model, the family utility/family budget constraint model and the individual utility/family budget constraint model.

The first model to take into account the labour supply decisions of the family is single

family decision-making model by Becker (1965; 1976). Essentially, this model replicates individual decision-making processes aimed at utility maximization. Within the family decision-making framework, family members share consistent preferences, resulting in a unique and stable set of preferences governing family decisions. Consequently, family members typo to maximize the collective utility of the entire family while adhering to budget constraints and individual time limitations.

The second model is male/female chauvinist model. The male/female chauvinist model of labour supply suggests that the husband/ wife in the household is the first to make his/her labour supply decision. His/her decision is made totally independent of his/her husband's decision and is based solely on his/her own wage and property income. The wife's/husband's labour supply decision is conditional upon what her husband/his wife does. In the model it is assumed the secondary worker views the first worker's labour income as non-labour income when she/he makes the labour supply decisions. In its general form, the difference between the single-family decision-making model and the male/female chauvinist model lies in the treatment of the secondary worker's non labour income. In the male/ female chauvinist model, the non-labour income of secondary worker includes her/his partner's labour income. In the single-family decision-making model, the labour income of the partner is not considered as non labour income of the secondary workers.

The third type of family labour supply model is the family utility/family budget constraint model. In this model, family utility is maximised rather than individual utility. The utility is dependent upon the family's total consumption of consumer goods and each individual family member's leisure time. The model assumes that the family pools their earnings to purchase consumer goods. The structure of the family utility/family budget constraint model implies that the income compensated for cross-substitution effects for each family member must always be equal (Addison and Siebert, 1979 and Ashenfelter and Heckman, 1974). However, the income effects for the husband and wife may not be equal, implying that the uncompensated cross substitution effects need not be the same. The other problem with the family utility/family budget constraint model is the fact that the model is silent about how fundamental decisions are made within the family. This problem was saved by individual utility/family budget constraint model.

The individual utility/family budget constraint model focuses on the issue of who makes the decisions in the family. It is argued that each individual maximises his or her own utility function instead of that of the family. The main problem with the individual utility/family

budget constraint model is that the reaction process of the husband and the wife cannot be readily observed. Manserand and Brown (1980) and McElroy and Horney (1981) have developed models which examine the bargaining process of the husband and wife in greater detail. These models' emphasis is placed on the complex decision making processes of the husband and wife in regard to the consumption of consumer goods and labour supply. On the other hand, Chiappori (1988) argues that not all members in the household are altruistic, but that there is also the possibility of self-interest, and that there is heterogeneity of preferences among family members. On this basis, he proposes a collective model and divides the household labour supply decision into two steps: firstly, self-interested instincts lead to the division of non-labour income between members according to certain rules. The specific division ratio depends on the bargaining power of the different members. Secondly, the non-labour income divided by the individual constitutes the individual's budget constraint. The individual then makes labour supply decisions with the principle of individual utility maximization. This model combines individual utility with the household bargain organically.

According to the collective decision-making model (Chiappori, 1988), each family member is a rational agent who seeks to maximise their personal utility within the constraints of income and time. This model assumes that family members engage in both cooperation and competition, bargaining with each other to secure their respective interests. For example, due to differences in opportunity costs, bargaining power, or personal preferences, the distribution of caregiving responsibilities within families may be unequal. For example, lower-wage earners or those with more available time are more likely to assume caregiving roles, as their opportunity cost of time is lower. In contrast, higher-income family members may reduce direct caregiving involvement by offering financial support or other forms of assistance. This dynamic helps explain the gendered division of labour in both the labour market and household caregiving responsibilities (see detailed discussion in Section 2.1.3).

6.2.1.3. Household Time Allocation Theories

The pressure of informal family elderly care will inevitably lead to an increase in unpaid household work, such as caring for the elderly parents and parents in law, and/or supporting them. According to the Leisure-Labour Model (see detailed discussion in Section 3.1.2), paid labour working hours and unpaid household working hours (including informal family care) are crowded out from each other. However, unlike paid labour work, unpaid household work lack clear working time and wage, and household work's time allocation is more influenced by

the needs of family members and internal coordination within the family. For husbands and wives, when faced with new changes in family life, their unpaid household labour supply decisions and paid labour supply decisions are decided simultaneously, and they are interdependent. There are three theories to explain how to make the time allocation decision within the household: Social Economic Exchange Theory (including relative resource perspective and time availability theory), Gender Role Theory and Family Systems Theory.

Social and Economic Exchange Theory

Social and Economic Exchange Theories come from sociology and economics, respectively. Their principles are similar but are usually labeled with different usage backgrounds. The relative resources perspective posits that the allocation of unpaid household work depends on power factors of family numbers, such as education level and wage income (Bianchi et al., 2000; Finley, 1989). This allocation basis is similar to the economic exchange view, which assumes that husband and wife are rational decision makers who allocate work and family responsibilities in an optimal way to maintain the well-being of the whole family (Finley, 1989; McFarlane et al. 2000; Yeung and Stafford, 2005). According to Becker (1981), it was rational for women to specialise in homemaking because men had a comparative advantage in the labour market. As labour markets become more egalitarian and women increase their economic position in society, economic models expect the division of work in the home to become more egalitarian. In fact, there is some empirical evidence supporting this argument as double-income couples show a more egalitarian distribution of domestic work (Aassve et al., 2014), and women in full time paid work do less housework than women who do not work or who work fewer hours (Gershuny, 2003).

The above social and economic exchange theory is also indirectly supported by time allocation theory. The time availability theory suggests that the total amount of time each individual allocates to activities such as paid labour work, unpaid non-labour work, and leisure is a given under the constraint of finite time. The longer time an individual spends on labour market implies the shorter time spent on activities such as housework and leisure (Yu, 2014; Liu et al., 2015). Shelton (1992) confirms that time constraints can explain the differences in the amount of time that individuals spend on household work. Husbands spend less time on housework compared to their wives because they are traditionally expected to undertake market labour and do not have enough time for housework. However, women, especially when they become wives or mothers, take on more household work due to their inherent strengths in

household activities and family care, and accordingly spend less time on market labour. The time spent on market labour is correspondingly reduced.

Gender Role Theory

Gender role theory suggests that the division of non-labour household work is in fact an external manifestation of gender roles. Influenced by the traditional concept of "men dominate the outside and women dominate the inside" (West, 1987), individuals will mainly engage in behaviours appropriate to their own gender expectations in order to gain the approval of others. Therefore men are more involved in market labour and women are more engaged in household work (Zou and Sun, 2016). Sullivan (1997) confirmed the existence of gender role theory that the length of labour working time does not necessarily determine the amount of time spent in housework. The unemployed husbands with long free time are not heavily involved in housework. Coverman (1985) also support that the degree of a husband's gender role traditions affects the amount of time he spends on housework negatively.

Family System Theory

Family system theory suggests that relationships within a family can affect relationships with other family members (Belsky and Volling, 1987; Cowan and Cowan, 1987). It suggests that there are various roles and rules within the family that guide the way family members interact with each other. These roles and rules may play an important role in the proper functioning of the family, but they may also lead to problems and conflicts. For example, wives' expectations of their husbands' roles might affect their husbands' roles in the family, which may affect husband sharing of unpaid family responsibilities. On the other hand, family systems theory advocates viewing the family as an interconnected system. Each of its members and subsystems interact with each other. Changing one part may have a ripple effect on the whole system. For example, a poor marital relationship may affect a husband’s decision to provide care for his parents-in-law (parents of wife).

6.2.2. Empirical Literature on Husbands’ Labour Supply

With the improvement of the status of women in the world and the changes in traditional concepts such as "men work out of home and women work at home", although women continue to be the primary caregivers in family caregiving, more and more men are becoming elderly care providers of elderly parents and parents in law (Coltrane, 2000; Chai, Li, Cai and Zeng,

2021). Research on the impact of elderly care on the labour supply of caregivers has also gradually extended from women to men, especially from married women to married men (Chai, Li, Cai and Zeng, 2021). Indeed, a growing literature studies the impact of elderly care on the labour supply of married men (Nguyen and Connelly, 2014; Kolodziej, Reichert and Schmitz, 2018; Heger and Korfhage, 2020; Chai, Fu and Coyte, 2021).

The existing evidence shows that, while married men are less likely to be elderly carers than married women (Coltrane, 2000; Ziarat and Hossain, 2021; Hollingsworth, Ohinata, Picchio, and Walker, 2022). conditional on providing elderly care the impact of providing elderly care on the labour supply of man is not uniform. Several studies support that although the labour force participation of both male and female caregivers declines as a result of elderly caring, the decline in female labour force participation is more pronounced (Carmichael and Charles, 2003; Nguyen and Connelly, 2014; Kolodziej, Reichert and Schmitz, 2018). However, there is also contrasting evidence which suggests that elderly caregiving is more likely to drive male caregivers out of the labour market than female caregivers through early retirement (Heger and Korfhage, 2020). In terms of the impacts on labour supply along the intensive margin, with the exception of one study (by Meng, 2013), the evidence consistency shows that for those men who are employed, the impact of elderly care on their paid working hours is smaller than that of female elderly caregivers (Latif, 2006; Heger and Korfhage, 2020). These studies argue that this is because men are more likely to work full-time, and as such, they may be less flexible than women in reducing their working hours (Heger and Korfhage, 2020).

In terms of the research methods, the empirical literature often considers each member's labour supply independent than others within the family and ignores the interaction of labour supply decisions between spouses. Although some studies have considered the effect of spousal labour supply decision on individual's own labour supply decision when they face elderly care burden (Crespo and Mira 2014 for Europe; Naldini, Pavolini, and Solera, 2016 for Europe and Fan and Xin, 2019 for China), characteristics of spouses is often treated as exogenous. To the best of my knowledge, the only study focusing on elderly care that considers the interaction of labour supply decisions between spouses comes from Coe, Skira and Van Houtven (2011). Using data from the US Health and Retirement Survey, they develop a structural empirical model and explore how informal elderly care provision affects the labour supply of both members of a couple, at both the intensive and extensive margins. By employing an instrumental variables approach (2SLS), they find that providing elderly care reduces a married man's probability of employment by 3.2 percentage points, but providing such elderly care does

not affect a married woman's chance of working. Additionally, husbands' labour supply decisions remain inelastic in response to the wife's caregiving behavior. On the other hand, the woman increases her paid working hours by one hour if she is the only care provider and decreases her paid working hours when the husband is the only care provider.

Existing studies on elderly care and labour supply that based on Chinese data are mostly focus on female caregivers (see discussion in Chapter 5.2.2). As such, the relationship between family care provision and labour supply in China's for men has been overlooked by the literature with only few exceptions. The three latest studies exploring the impact of family care on the labour supply of man come from Liu, Qi and Dong (2016); Chai, Fu and Coyte (2021) and Chai, Li, Cai and Zeng (2021). In the study of Liu, Qi and Dong (2016), family care includes not only elderly care but also other types of family care including for children, disabled people and/or pregnant women. Using cross-sectional data from the 2010 CFPS and a two-stage probit method, they find that for every additional hour of family care provided by Chinese urban men aged 40-59, probability of being employment decreases by 7.9 percentage points and their daily paid working hours reduced by 0.87 hours conditional on employed. Chai, Fu and Coyte (2021) examines the relationship between weekly unpaid caregiving hours and paid working hours using data from the baseline survey (2011) of the CHARLS for women and men separately. However, unpaid caregiving services in Chai, Fu and Coyte's (2021) research includes not only elderly care but also grandchildren care. Using the Heckman selection model to account for the selection bias in weekly hours spent providing unpaid caregiving services to grandchildren, parents, and/or parents-in-law, and employing instrumental variables to address the potential endogeneity of these caregiving services, the study finds that for men aged 45-60, each additional hour of caregiving reduces their employment probability by 2.74 percentage points. Another empirical study from Chai, Li, Cai, and Zeng (2021) uses the same data and limited information maximum likelihood estimation to account for caregiving services to grandchildren, parents and/or parents-in-law and employment status and they find that low-intensity unpaid care is not related to the probability of employment for male caregivers. However, high-intensity unpaid care (defined as weekly care time being greater than or equal to 20 hours) has a negative correlation with male caregivers' probability of employment (5.4 percentage points).

Summarise the above literature, although some empirical literature suggests that men today are more likely to share responsibility for household chores, particularly in situations where the family face domestic shocks, there are relatively few studies focusing on the impact of family elderly care on married men's labour supply in China even in the world. The

mechanism that family care pressure affects Chinese men's labour supply is also unclear. With the increasing demand for elderly care in China, husband's labour supply decisions when facing the pressure of elderly care are worthy of further exploration.

6.3. Data

6.3.1. CHNS Data

In this chapter, we use data from the CHNS in 2000, 2004, 2006, 2009, 2011 and 2015.[45] The variables related to informal family elderly care are from the individual questionnaire of CHNS, namely "The Supplementary Survey on the Relationship between Children and Their Parents (in law)". This supplementary survey was conducted only on married women, rather than men, aged 51 and under (see discussion in Section 6.3.2.). In order to explore the labour supply of husbands whose families face elderly care responsibilities, the CHNS unique identification numbers are used to link each wife to their husband. This enables to have detailed demographic, family and financial information on both married women and their husbands, which is also a unique feature of CHNS.

6.3.2. Variables

This chapter uses information on the family elderly care responsibilities and the labour supply of husbands along the extensive and intensive margins (i.e. employment status and paid working hours, respectively) as the core independent variable and dependent variables, respectively. Besides these, this chapter also includes demographic characteristics, family characteristics, and financial characteristics as control variables. This subsection provides detailed explanations and definitions of these variables. Table 6.1 summaries the detailed definition and description for all variables in the benchmark models which are discussed in Section 6.4.

Dependent Variables

[45] Consistent with the discussion in section 5.3, compared with other available national datasets for China, such as CFPS, CGSS and CHARLS, CHNS provides a long-term data including information on family elderly care responsibility, number of siblings and elderly parents' care requirement that are necessary in this empirical research.

This chapter focuses on the labour supply decision (at both extensive and intensive margins) of married men. The dependent variables are the employment status and the paid working hours of married men. Employment status refers to whether the respondent has a labour paid job/ work at present or not. Dummy variable is set according to the question "Are you presently working?" in the CHNS survey. If the respondent's answer is "Yes" then 'Employed' dummy equals to 1 (the respondent is employed), and if the answer is "No", then 'Employed' dummy equals to 0 (the respondent is non-employed). Specifically, 'Employed' dummy =1 means respondents had at least one paid job/work at the time of the survey. For those respondents outside the labour market and/or those in the labour market but without at least one paid job at the time of the survey, 'Employed' = 0.

Paid working hours indicates weekly paid working hours of married men.[46] The value of this variable comes from respondent's answers to CHNS survey questions "How many hours do you work on average per day" and "How many days do you work on average per week". These two questions are only aimed at those who are employed. The relationship between 'Employed' dummy and Paid working hours is: if 'Employed' =1, then Paid working hours > 0; if 'Employed' = 0, then Working hours is missing.

Key Independent Variable

The independent variable is whether there are elderly care responsibilities within the household. Although, CHNS do not provide information on whether husbands directly provide elderly care, we assume that families where wives provide elderly care, the family face elderly care responsibilities, while families where wives do not provide elderly care, the family does not face elderly care responsibilities. Although seemingly strong, in this context, this assumption is not implausible as usually the wife rather than husband be the primary caregiver of the elderly care in China (see detailed discussion in subsection 2.3).

Therefore, the elderly care mentioned in this chapter refers to the family elderly care provided by wife to any one or more of the own parents and/or parents-in-law. More specifically, 'elderly care' dummy indicates whether the wife provided elderly care in the last week in the family and is set according to the question "Did you take care of his / her daily life (any one or more of the parents or parents in laws) last week?" If the respondent's answer is "Yes" then the

[46] Weekly paid working hours in this chapter does not include the hours for unpaid housework or public welfare work.

family elderly care responsibilities = 1. If the answer is “No”, then the family elderly care responsibilities = 0. It is worth noting that in this empirical chapter, those observations that elderly care is not provided to one or more of the parents or parents-in-law because they are not alive are also considered as not providing elderly care.

Other control variables

Most of the control variables in this chapter have the same definitions as those 5.3.2 in Chapter 5, including personal characteristics, family characteristics and financial characteristics. The only difference is that the subject of the variable is the husband rather than the wife in this chapter. The detailed definition of variables is summarised in Table 6.1.

In terms of personal characteristics, firstly, age is considered an important factor affecting the probability of employment and paid working hours. Especially in China, many companies consider 30 or 35 years old as the upper age limit for recruitment. Compared to job seekers under the age of 30 or 35, job seekers over the age of 30 or 35 are more difficult to enter the labour market or obtain a position that matches their abilities citation required. Moreover, age, as an important indicator that reflect human capital accumulation also plays an important role in determining the labour supply and bargaining power in the labour market (Chéron, Hairault, and Langot, 2011). Therefore, we include age among the control variables following Van Houtven, Coe and Skira (2011) and Chai, Li, Cai and Zeng (2021). Considering that the impact of age on the labour supply may be non-linear, this chapter follows Houtven, Coe and Skira (2011) includes age squared as an additional control variable. Secondly, education as the result of long-term human capital accumulation may affect labour supply directly by altering the preferences and attitudes for work and leisure, and indirectly by influencing the wage rate (Birch, 2005). Following Houtven, Coe and Skira (2011) and Chai, Li, Cai and Zeng (2021), we include highest education level as one of the control variables. In China, Hukou is not only a symbol of personal identity, but also closely related to an individual's social, economic, and political rights and welfare. Compared to rural household registration, urban household registration usually enjoys more social welfare and services, such as education, medical care, social security, etc. Following Kolodziej, Reichert and Schmitz (2018), we include Hukou among the controls. Following Jacobs, Van, Tanielian and Ramachand (2019), Chai, Cai and Li (2021) and Houtven, Coe and Skira (2011), we also include (self-assessed) health status among the controls. Literature suggests that individuals in better health tend to have higher labour supply. (Casado-Marin et al., 2011; Chai, Cai and Li, 2021). China's elderly care policies

are mostly policies with provincial characteristics. Due to the different levels of financial support and ageing among different provinces, this analysis employed province fixed effects. In addition, for those who are employed, whether they are high skill worker, whether they have permanent work and whether their companies are state-owned enterprises are also considered to directly affect the paid working hours (Schmitz and Westphal, 2017), and therefore are included among the control variables.

Family characteristics consist of household size, wife's secondary occupation and childcare following Kolodziej, Reichert and Schmitz (2018) and Huang, Xu, Liu, Yu and Yu (2021). According to labour supply models of family members and household allocation theories (see detailed discussion in section 6.2.1), the time allocation decisions of married couples are no longer solely influenced by their own characteristics. Family structure and family members' time allocation decisions also have a significant impact. Moreover, providing care for children aged 6 and under is also an important factor affecting the family labour supply as paid labour supply and childcare are both labour-intensive and time-intensive activities.

In terms of financial characteristics, we include wife's monthly labour income and household total income. As discussed in subsection 5.3.2, both two variables can more comprehensively reflect the married men's non-labour income and their living standard (see, for example, Houtven, Coe and Skira, 2011 and Chai, Li, Cai and Zeng, 2021). More non-labour income families might mean that a married individual can work less but obtain the same consumer goods. Higher non-labour income might lead an individual to provide less labour supply even withdraw from the labour market.

Table 6.1 Variable definitions

Variable Name		CHNS Question	Definition	Variable Type
Dependent variable	Employment status	Are you presently working? * If retired but rehired, record 1. 0 No 1 Yes	The employment status of the respondents: Employed Non-employed (unemployed + out of labour force)	Dummy variable
	Weekly working hours	How many hours do you work on average per day How many days do you work on average per week	Weekly working hours of the respondents.	Continuous variable
Key independent variable	Elderly care (provide by wife)	Is s/he still alive? 0. No(skip to next relative) 1. Yes During the past week, did you help your mother/father/mother in law and father in law with her/him daily life and shopping? 0. No 1. Yes	Whether the respondent provides elderly care: 1-Yes 0-No	Dummy variable
Control variables	Age	Age (years): * Record 018 if 18.00-18.99 years, 019 if 19.00-19.99 years, etc.	Age of the respondents	Continuous variable
	Age squared	Age (years): * Record 018 if 18.00-18.99 years, 019 if 19.00-19.99 years, etc.	Age squared = Age ^{2}	Continuous variable
	Education	What is the highest level of education you have attained? 1 primary school or below 2 lower middle school degree 3 upper middle school degree 4 technical or vocational degree 5 university or college degree or higher	Highest education level of the respondent	Categorical variable (included in the regression as 4 dummies leaving category primary school or below as the reference category)
	Hukou	To which type of household registration do you belong? 1 urban 2 rural	Respondent's household registration statues: 0- rural 1 - urban	Dummy variable
	Health	During the past 4 weeks, have you been sick or injured? Have you suffered from a chronic or acute disease? 0 no 1 yes	Respondent's health status: 0- unhealthy (answer "yes") 1- healthy (answer "no")	Dummy variable
	Childcare	During the past week, did you take care of children under 6 in your household? 0 no 1 yes	Whether the respondent provides childcare: 1-Yes 0-No	Dummy variable
	Wife's secondary occupation	Do you have a secondary occupation? 0 no 1 yes	Whether the respondent's wife have secondary occupation: 1-Yes 0-No	Dummy variable
	High-skilled occupation	What is your primary occupation? 1 Senior professional/technical worker (doctor, professor, lawyer, architect, engineer) 2 Junior professional/technical worker (midwife, nurse, teacher, editor, photographer) 3 Administrator/executive/manager (working proprietor, government official, section chief, department or bureau director, administrative cadre, village leader) 4 Office staff (secretary, office helper) 5 Farmer, fisherman, hunter 6 Skilled worker (foreman, group leader, craftsman) 7 Non-skilled worker (ordinary labourer, logger) 8 Army officer, police officer 9 Ordinary soldier, policeman 10 Driver 11 Service worker (housekeeper, cook, waiter, doorkeeper, hairdresser, counter salesperson, launderer, child care worker) 12 Athlete, actor, musician	Primary occupation of the respondent. 0-General Workers (categories 2,4, 5, 6, 7, 8,9,10,11 and 12) 1-Senior technician or manager (categories 1 and 3)	Dummy variable
	Permanent contract	What is your employment position in this occupation? 1 self-employed, owner-manager with employees 2 self-employed, independent operator with no employees (includes farmer) 3 works for another person or enterprise (includes small-, medium-, and large-scale collective enterprise, farm, and private enterprise) as a permanent employee 4 contractor with other people or enterprise 5 temporary worker 6 paid family worker	Primary position of the respondents. 0-Short-term contract with the work unit or temporary work (categories 1, 2, 4, 5 and 6) 1-Long-term contract with the work unit (categories is 3)	Dummy variable
	State-owned company	What type of work unit is this? 1 government department 2 state service/institute 3 state-owned enterprise 4 small collective enterprise (such as township-owned) 5 large collective enterprise (such as owned by county, city, province) 6 family contract farming 7 private, individual enterprise 8 three-capital enterprise (owned by foreigners, overseas Chinese and joint venture)	Work unit type of the respondent. 0-Not government departments or state-owned (categories 4, 5, 6, 7 and 8) 1-Government departments or state-owned (categories 1, 2 and 3)	Dummy variable
	Wife's monthly labour income	On the average, what was your monthly retirement wage/salary in the past year, including subsidies and bonuses? (yuan)	Logarithm of the wife's monthly wage (in 2015 price)	Continuous variable
	Household yearly total gross income	CHNS official website supplementary information	Logarithm of total gross household income (in 2015 price)	Continuous variable
	Household size	CHNS official website supplementary information	Number of family members	Continuous variable
	Province	City code 11= Beijing* 21 = Liaoning 23 = Heilongjiang 31 = Shanghai 32 = Jiangsu 37 = Shandong 41 = Henan 42 = Hubei 43 = Hunan 45 = Guangxi 52 = Guizhou 55 = Chongqing	Current residence of the respondents	Categorical variable (included in the regression as 11 dummies leaving category Beijing as the reference category)
Instrumental Variables	Need care	Is s/he still alive? 0. No (skip to next relative) 1. Yes Does s/he need to be taken care of (refers to the need for other people's help in daily life and shopping)? 0. No 1. Yes	Whether the respondent's parents and/or parents in law need to be taken care of. 0-No 1-Yes	Dummy variable
	Number of siblings	How many brothers do you have? How many sisters do you have? How many brothers does your husband have? How many sisters does your husband have?	Number of siblings for both spouses	Continuous variable

Instrumental variables

The two instrumental variables employed in this analysis are need care and number of sibllings of spouse, which will be discussed in Section 6.4. Need care, a dummy variable, is set according to the question “Is s/he still alive?” and “Does s/he need to be taken care of (refers to the need for other people’s help in daily life and shopping)?” in the CHNS survey. If the respondent’s answer is “Yes” for the second question, then ‘Need care’ dummy equals to 1 (the respondent’s parents/ parents in law need care), and if the answer for the second question is “No”, then ‘Need care’ dummy equals to 0 (the respondent’s parents/ parents in law does not need care). Number of siblings of spouse is a continuous variable setting according to the questions “How many brothers do you have?”, “How many sisters do you have?”, “How many brothers does your husband have?” and “How many sisters does your husband have?” in CHNS. The number of siblings of spouse indicates the result of the addition of the answers to the above four questions.

6.3.3. Sample Restrictions

The information on family’s elderly care responsibility has been collected since 1993 in CHNS, however, in earlier waves (1993, 1997 and 2000) the information on family’s elderly care responsibility is largely missing (only 34 observations include information on elderly care in waves earlier than 2004). As such, the analysis of this chapter uses data from five surveys in 2004, 2006, 2009, 2011 and 2015, spanning 11 years. Secondly, the sample is restricted to married men aged between 18-60 years old as only married men can be matched with information on whether their wives provide elderly care. The age restriction, [18,60] years old, is imposed, since CHNS only aims at the respondents aged 18 and above to ask about their spouses' information and marital status, which are included in the analysis, and 60 years old is the legal retirement age for men in China.

Table 6.2 presents all the sample restrictions imposed along with the number of observations and individuals lost due to sample restrictions and each control variable added to the regression equation in both extensive and intensive margin estimations. There are 143,564 initial observations in CHNS 2004-2015 pooled data. Among 143,564 initial observations, there are 10,252 observations including family elderly care responsibility information and labour supply (employment status and paid working hours) information.

Table 6.2 Sample restrictions

Variable		Extensive Margin Sample				Intensive Margin Sample			
		Number of observations	% lost	Number of individuals	% lost	Number of observations	% lost	Number of individuals	% lost
Initial sample size		143,564	-	38,536	-	143,564	-	38,536	-
Restrict the sample to married men		26,041	0.82	8,618	0.78	26,041	0.82	8,618	0.78
Restrict sample to be Interviewed in 2004, 2006, 2009, 2011, 2015		14,336	0.45	6,299	0.27	14,336	0.45	6,299	0.27
Restrict the sample to 18-60 years old		14275	0.00	6,278	0.00	14,275	0.00	6,278	0.00
Independent variable	Family elderly care responsibility	10,415	27.04	5,130	18.29	10,415	0.27	5,139	0.18
Key dependent variable	Employed	10,252	1.57	5,094	0.70	-	-	-	-
	Weekly working hours	-	-	-	-	8,746	16.02	4,551	11.44
Control variables	Age	10,251	0.01	5,093	0.02	8,746	0.00	4,551	0.00
	Hukou	10,242	0.09	5,089	0.08	8,744	0.02	4,550	0.02
	Education	10,231	0.11	5,087	0.04	8,735	0.10	4,547	0.07
	Health	10,205	0.25	5,078	0.18	8,715	0.23	4,538	0.20
	Wife's second occupation	10,178	0.26	5,073	0.10	8,693	0.25	4,533	0.11
	Wife monthly labour income	6,916	32.05	3,826	24.58	6,502	25.20	3,637	19.77
	Caring for children under 6 years old	4,842	29.99	3,097	19.05	4,559	29.88	2,951	18.86
	Household size	4,842	0.00	3,097	0.00	4,559	0.00	2,951	0.00
	Household total gross income	4,842	0.00	3,097	0.00	4,559	0.00	2,951	0.00
	High skill	-	-	-		4,303	5.62	2,824	4.30
	Permanent contracts	-	-	-		4,260	1.00	2,802	0.78
	State-owned company	-	-	-		4,159	2.37	2,757	1.61
Instrumental Variables	Need care	4,813	0.60	3,079	0.58	4,134	0.60	2,741	0.58
	Number of siblings	4,788	0.52	3,066	0.42	4,114	0.48	2,731	0.36
Province fixed effects		4,788	0.00	3,066	0.00	4,114	0.00	2,731	0.00
Year fixed effects		4,788	0.00	3,066	0.00	4,114	0.00	2,731	0.00

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015

The two main variables that reduces the number of observations are the wife's monthly labour income and whether or not husband caring for children aged six and under. Although we set the monthly labour income to zero for those women who are not employed, some respondents' reluctance to disclose their salary level or invalid information results in missing information and hence the loss of large number of observations. However, as wife's labour income is an important component of the husband's non-labour which has significantly impac on husband's labour supply decisions (Saha and Kalita, 2015; Mansor, Hong, Abu, and Shaari, 2015). Similarly, it is necessary to include childcare variable in the analysis as both childcare and elderly care are time intensive activities. Consistent with this, childcare is identified in the literature as a key variable influencing the decision-making and intensity of labour supply for family caregivers who also need to care for children (Gelbach, 2002). Although we could not identify the exact reason why this information is missing for a large number of observations, aligned with the convention in the literature, our analysis includes childcare variable among controls. Overall, according to Table 6.2, after restricting the sample to observations with non-missing values in all the variables included in the analysis the sample size is 4,788 (extensive

margin estimation sample) and conditional on employment the working sample includes 4,118 observations (intensive margin estimation sample).

6.3.4. Summary Statistics

Table 6.3 reports the descriptive statistics of the main variables, control variables and instrumental variables for extensive and intensive margin samples. In order to have a more detailed understanding of the data, Table 6.4 further reports the data distribution of categorical variables in the whole sample and for those with and without family elderly care responsibilities.

In Table 6.3, there are a total of 4,788 observations in the sample (left panel). Among them, 4,089 observations are from households without elderly care responsibility, accounting for 85.40% of the sample. There are 4,454 observations that are employed, accounting for 93.02% of all the observations. The average employment probability gap between the two sub-sample groups is 1%, with married men from households without elderly care responsibilities being slightly more likely to be employed than those from households with such responsibilities. This is in line with theoretical expectations and the empirical results of Chai, Li, Cai, and Zeng (2021), that is, husbands in families with less elderly care responsibilities can provide more labour supply.

However, we would like to note that a potential concern in the empirical analysis arises from the descriptive statistics, which show that 93% of husbands in the sample are employed, with only 7% being unemployed. This may be partly due to our focus on the working-age population, specifically those aged 18 to 60. The high employment rate may limit the variation in the dependent variable, which could make it more challenging to identify statistically significant effects of elderly care on husbands' employment probability. The limited variation in husbands' employment status may lead to less precise coefficient estimates, as there may not be enough diversity in the outcome variable. Additionally, this imbalance could reduce the statistical power of the analysis to detect more subtle effects of eldercare, as the small proportion of unemployed husbands may not provide sufficient data for strong statistical conclusions.

While, according to Timoneda (2021), in fixed effects models where the dependent variable is binary, the Linear Probability Model with Fixed Effects provides more accurate estimates and predicted probabilities, especially when the proportion of ones in the dependent variable is less than 25%, which he refers to as rare events. Although, due to data limitations, we are unable to explore alternative definitions of employment probability for a robustness

check, the empirical regression results in this study, based on the Linear Probability Model, somewhat enhance the credibility of the findings.

In terms of the weekly paid working hours (right panel in Table 6.3), among 4,118 observations, 3,528 observations are from families without elderly care responsibility, accounting for 85.67% of the sample. The average weekly working hours is 42.76 hours for the employed sample with those whose families face the elderly care responsibilities providing 1.3 higher paid working hours than those whose family do not face elderly care responsibilities.

Unlike the potential concerns regarding the data distribution of the dependent variable on the extensive margin, the distribution on the intensive margin does not pose any estimation concerns. Specifically, the median working hours is 40 hours, indicating that half of the individuals work fewer than this, while the other half work more. The interquartile range (IQR) is 35 to 56 hours, meaning that 50% of the individuals fall within this range. 10% of individuals work more than 66 hours per week, while 5% exceed 70 hours. Conversely, 10% of individuals work less than 18 hours per week, which could indicate part-time work.

In terms of personal characteristics, age and health of married men are similar between the two groups of men (from households with and without elderly care responsibilities), in both extensive and intensive margin samples. While, compared to married men with rural Hukou, married men with urban Hukou have higher probability to face family elderly care responsibilities consistent with Chai, Fu and Coyte (2021) and Chai, Li, Cai and Zeng (2021). This may be due to the large-scale labour migration from rural to cities, which has led the adult children in rural areas leaving their elderly parents and parents-in-law to work in cities. The geographical separation may make it difficult for married couples with rural Hukou but working in cities to undertake the family elderly care responsibilities. In terms of the highest education level, it is notably different between the two subgroups. The average educational level of men who are from families with elderly care responsibility is much higher than that of married men who do not come from families with elderly care responsibilities. Chai, Li, Cai, and Zeng (2021) and Houtven, Coe and Skira (2013) also reported that the percentage of subgroups providing family care with a university degree or higher was 2 percentage points higher than the percentage of subgroups not providing family care.

Table 6.3 Summary statistics

	Extensive Margin Sample						Intensive Margin Sample					
	Total		Noncaregivers		Caregivers		Total		Non-caregivers		Caregivers	
Variable	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
Elderly care	0.15	0.35	0	0	1	0	0.14	0.35	0	0	1	0
Employed	0.93	0.25	0.93	0.25	0.92	0.27	-	-	-	-	-	-
Weekly working hours	-	-	-	-	-	-	42.80	17.57	42.62	17.71	43.88	16.64
Age	41.37	7.36	41.37	7.4	41.35	7.14	41.18	7.27	41.18	7.30	41.19	7.07

Hukou	0.45	0.5	0.42	0.49	0.57	0.5	0.43	0.5	0.41	0.49	0.56	0.5
Education	2.59	1.26	2.54	1.25	2.86	1.29	2.61	1.28	2.57	1.27	2.91	1.33
Health	0.89	0.31	0.89	0.31	0.89	0.31	0.90	0.3	0.9	0.3	0.9	0.3
Wife's monthly labour income	935.30	1766.37	886.40	1687.01	1221.33	2152.58	914.68	1761.23	859.13	1650.95	1246.48	2286.73
Wife's second occupation	0.07	0.26	0.08	0.27	0.05	0.21	0.08	0.27	0.08	0.27	0.05	0.22
Caring for children under 6 years old	0.16	0.37	0.17	0.37	0.15	0.36	0.16	0.37	0.16	0.37	0.16	0.36
Household size	3.91	1.32	3.92	1.32	3.83	1.31	3.90	1.32	3.91	1.32	3.83	1.33
Household total gross income	60,536.24	72,388.26	60,022.1	69,870.41	63,543.84	85,643.23	61,577.35	71,761.96	60,743.64	67,887.97	66,556.96	91,476.09
High skilled occupation	-	-	-	-	-	-	0.15	0.36	0.14	0.35	0.19	0.4
Permanent contract	-	-	-	-	-	-	0.32	0.47	0.31	0.46	0.43	0.5
State-owned firm	-	-	-	-	-	-	0.27	0.44	0.25	0.43	0.35	0.48
Need care	0.17	0.38	0.12	0.33	0.48	0.5	0.17	0.38	0.12	0.33	0.48	0.5
Number of siblings	6.01	3.15	6.05	3.12	5.77	3.31	6.02	3.16	6.06	3.13	5.79	3.38
Sample Size	4,788		4,089		699		4,114		3,524		590	

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015

Table 6.4 Summary statistics for dummy variables

	Extensive Margin Sample						**Intensive Margin Sample**					
	Total		**Noncaregiver families**		**Caregiver families**		**Total**		**Noncaregiver families**		**Caregiver families**	
	Freq.	**Per cent**	**Freq.**	**Per cent**	**Freq.**	**Per cent**	**Freq.**	**Per cent**	**Freq.**	**Per cent**	**Freq.**	**Per cent**
Elderly Care												
Family without elderly care responsibility	4,089	85.40	-	-	-	-	3,524	85.66	-	-	-	-
Family with elderly care responsibility	699	14.60	-	-	-	-	590	14.34	-	-	-	-
Employed												
Non-employed	334	6.98	279	6.82	55	7.87	-	-	-	-	-	-
Employed	4,454	93.02	3,810	93.18	644	92.13	-	-	-	-	-	-
Hukou												
Rural	2,656	55.47	2,356	57.62	300	42.92	2,338	56.83	2,080	59.02	258	43.73
Urban	2,132	44.53	1,733	42.38	399	57.08	1,776	43.17	1,444	40.98	332	56.27
Education												
Primary school and below	851	17.77	767	18.76	84	12.02	739	17.96	664	18.84	75	12.71
Lower middle school degree	1,994	41.65	1,734	42.41	260	37.2	1,675	40.71	1,468	41.66	207	35.08
Upper middle school degree	868	18.13	720	17.61	148	21.17	723	17.57	604	17.14	119	20.17
Technical or vocational degree	422	8.81	339	8.29	83	11.87	385	9.36	312	8.85	73	12.37
University or college degree or higher	653	13.64	529	12.94	124	17.74	592	14.39	476	13.51	116	19.66
Health												
Was not sick or injured or did not have acute disease or chronic disease in the past four weeks	508	10.61	432	10.56	76	10.87	416	10.11	359	10.19	57	9.66
Have been sick or injured or have acute disease or chronic disease in the past four weeks	4,280	89.39	3,657	89.44	623	89.13	3,698	89.89	3,165	89.81	533	90.34
Wife's second occupation												
Husband dosen't have a second occupation	4,436	92.65	3,769	92.17	667	95.42	3,799	92.34	3,238	91.88	561	95.08
Husband has a second occupation	352	7.35	320	7.83	32	4.58	315	7.66	286	8.12	29	4.92
Childcare												
Didn't take care Children under 6 years old	3,998	83.5	3,407	83.32	591	84.55	3,441	83.67	2,945	83.57	497	84.24
Have take care Children under 6 years old	790	16.5	682	17	108	15.45	672	16.33	579	16.43	93	15.76
High skilled occupation												
Senior technician or manager	-	-	-	-	-	-	3,493	84.91	3,018	85.64	475	80.51
General Workers	-	-	-	-	-	-	621	15.09	506	14.36	115	19.49
Permanent contract												
Have Bianzhi	-	-	-	-	-	-	2,783	67.65	2,448	69.47	335	56.78
Don't have Bianzhi	-	-	-	-	-	-	1,331	32.35	1,076	30.53	255	43.22
State-owned company												
Government departments or state-owned units	-	-	-	-	-	-	3,023	73.48	2,641	74.94	2,644	74.94
Not government departments or state-owned units	-	-	-	-	-	-	1,091	26.52	883	25.06	884	25.06
Need care												
Parents or parents in law need to be cared	3,954	82.58	3,590	87.8	364	52.07	3,408	82.84	3,101	88.00	307	52.03
Parents or parents in law dosen't need to be cared	834	17.42	499	12.2	335	47.93	706	17.16	423	12.00	283	47.97
Province												
Beijing	217	4.53	161	3.94	56	8.01	185	4.50	142	4.03	43	7.29
Liaoling	440	9.19	341	8.34	99	14.16	403	9.80	310	8.80	93	15.76
Heilongjiang	552	11.53	488	11.93	64	9.16	521	12.66	463	13.14	58	9.83
Shanghai	182	3.8	144	3.52	38	5.44	157	3.82	125	3.55	32	5.42
Jiangsu	518	10.82	462	11.30	56	8.01	447	10.87	402	11.41	45	7.63
Shandong	441	9.21	347	8	94	13.45	377	9.16	294	8.34	83	14.07
Henan	399	8.33	324	7.92	75	10.73	351	8.53	284	8.06	67	11.36
Hubei	425	8.88	381	9.32	44	6.29	371	9.02	332	9.42	39	6.61
Hunan	366	7.64	326	7.97	40	5.72	279	6.78	248	7.04	31	5.25
Guangxi	650	13.58	578	14.14	72	10.3	502	12.20	449	12.74	53	8.98
Guizhou	458	9.57	419	10.25	39	5.58	409	9.94	379	10.75	30	5.08
Chongqing	140	2.92	118	2.89	22	3.15	112	2.72	96	2.72	16	2.71
Wave												
2004	707	14.77	615	15.04	92	13.16	615	14.95	534	15.15	81	13.73
2006	753	15.73	662	16.19	91	13.02	643	15.63	565	16.03	78	13.22
2009	1,334	27.86	1,148	28.08	186	26.61	1,168	28.39	1,006	28.55	162	27.46
2011	1,728	36.09	1,448	35.41	280	40.06	1,472	35.78	1,241	35.22	231	39.15
2015	266	5.56	216	5.28	50	7.15	216	5.25	178	5.05	38	6.44
Total	4,788	100	4,089	100	699	100	4,114	100	3,524	100	590	100

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015

In terms of family characteristics, among those whose families face the burden to provide elderly care, there is a relatively low proportion of married men who provide childcare simultaneously in both panels. This might be the case because childcare and elderly care are all time intensive activities. When a person's energy is limited and faces the dual pressure of childcare and elderly care, they may have to make a choice. According to Table 6.4, the proportion of husbands whose wives has a second occupation is lower for those from household with elderly care responsibilities compared to those without, which might be explained by the income effect and time allocation model. In other words, the wife's second occupation means that the family income increases, which might enable outsource formal care rather than elderly parents or parents-in-law being taken care of by the family. From another perspective, a wife having a second occupation might imply that she has a high labour supply. The increased time and energy they devote to the labour market may mean a reduction in the supply of elderly care. Regarding family size, men whose family face elderly care responsibilities come from smaller families. Although we cannot identify whether the large household size is due to the number of siblings who can share the responsibility of elderly care or due to the number of elderly parents and/or parents-in-law who might increase elderly care responsibilities. Houtven, Coe and Skira (2013) also reported that the household size of subgroups providing family care is higher than that of the subgroups not providing family care.

In terms of financial characteristics, there is no large gap in the wife's monthly income between the two subgroups. In terms of the household gross income, according to Table 6.3, those from families with elderly care responsibilities have a higher household total gross income, which might apply that families be able to afford to purchase formal elderly care service to gain more leisure time or opportunities provide labour supply.

The research observations of this study are from 12 provinces including Beijing, Liaoling, Heilongjiang, Shanghai, Jiangsu, Shandong, Henan, Hubei, Hunan, Guangxi, Guizhou and Chongqing. They cover cities in the east, middle and west of China. According to Table 5.4, the provinces that provide the most elderly care are Henan, Liaoning, Shandong and Guangxi in both extensive and intensive margins.

6.4. Method

To explore how the family’s elderly care responsibilities affect husband’s labour supply, this chapter estimates an empirical specification as follows:

$$H_{ipt\_m} = \alpha_0 + \alpha_1 EC_{ipt} + \alpha_2 P_{ipt\_m} + \alpha_3 M_{ipt\_m} + \alpha_4 F_{ipt\_m} + T_t + C_p + \mu_{ipt\_m} \quad (6.1)$$

In equaition 6.1, H_{ipt_m} is the labour supply (employment or conditional on employment working hours) of married man i (i=1,...,N) in province p at time t. EC_{ipt} is family's elderly care responsibility with the coefficient α_1. In equitation 6.1, the labour supply variable is also regressed on personal characteristics (P_{ipt_m}), family characteristics (M_{ipt_m}) and financial characteristics (F_{ipt_m}). T_t represents the time fixed effects, C_p represents the province fixed effects, μ_{ipt_m} is the random error term.

Although in China, men are usually not the main caregivers for elderly care, husbands might help their wives share elderly care work or other unpaid household work when the family facing elderly care responsibilities (Auspurg, Iacovou and Nicoletti, 2017 for UK; Zhang, 2019 for China; Carlson, Petts and Pepin, 2022 for US). Whether it is directly taking on elderly care work or helping wives reduce the burden of family care by sharing other household chores, for husbands, their unpaid working hours might increase. The increase in investment in unpaid family care work may affect the husband's paid labour work, which is the causal effect that this study aims to explore.

However, α_1 may not reflect causal effect of family's elderly care responsibility on labour supply due to reverse causality and potential endogeneity. In particular, men who do not work or work with lower paid working hours may be more inclined to share family elderly care work because they have more time and energy. The endogeneity problem can also arise due to omitted variables, such as sense of filial piety, included in the error term if these are correlated with dependent variable, labour supply, and the core independent variable, family's elderly care responsibility. According to Chen (2014) and Wooldridge, Wadud and Lye (2016), if the omitted variables that cause endogeneity problems are positively correlated with elderly care responsibilities, such as family concept, the OLS coefficient will be overestimated. If the omitted variables that cause endogeneity problems are negatively correlated with elderly care responsibilities, such as career expectations, the OLS coefficient will be underestimated. Even if we employ time and province fixed effects models, variables that change over time but cannot be observed can cause changes in the POLS coefficient. The interaction between the independent variable and the dependent variable can lead to a correlation between the independent variable and the residual term. It is also difficult to determine whether the POLS coefficient is overestimated or underestimated. Numerous empirical literatures have found that ignoring endogeneity problem of elderly care responsibilities on the labour supply of married

adult children might underestimate the POLS coefficient (Heitmueller, 2007 for the UK; Ciani, 2012 for Europe; Niimi, 2017 for Japan; Ciccarelli and Soest, 2018 for Europe; Fan and Xin, 2019 for China; Heger and Korfhage, 2020 for Europe).

A widely accepted method to address the reverse causality and omitted variable bias is to find an instrument correlated with the endogenous variable, family's elderly care responsibility, but correlated with dependent variable, male's probability of employment and paid working hours only through the endogenous variable. The instrumental variables employed in this empirical chapter are aligned with Chapter 5 and include need care (whether elderly parents or parents in law have elderly care demand) and the number of siblings of both spouse following Bolin et al (2008), Heitmueller (2007) and Huang (2021). Firstly, in terms of need care, it has reason to believe that compared with the family that the elderly parents (in law) do not need to be taken care of, those husbands whose family have elderly parents (in law) need be taken care of have higher probability to face elderly care responsibility. Moreover, although elderly care provision is a decision, whether elderly parents and/or parents in law need care is not, and hence likely to be exogenous to the labour supply decision. Secondly, more siblings means that there is a higher probability to share elderly care responsibilities with brothers or sisters, which might lead to a lower probability of facing elderly care responsibility or taking care of the elderly with a relatively small intensity (Huang, 2021; Chen. et al., 2016; Bolin, Lindgren and Lundbor, 2008; Heitmueller, 2007). At the same time, number of siblings of wife and husband are likely to be exogenous to the men's labour supply decisions.

Another widely accepted method for dealing with endogeneity problem caused by missing variables is the fixed effects method. For example, individual fixed effects can help us control for the effects of unobservable individual level variables that do not change over time. However, as discussed in subsection 5.4, the tracking ratio of CHNS is low (there are 60% of the observations in all five surveys occurred in two or more surveys and 30% of the observations in all five surveys occurred in three or more surveys. The detailed information has been shown in Tables I.1 and I.2 in Appendix I) and the independent variables (family's elderly care responsibility) and dependent variables (employment status and paid working hours) are persistent within an individual (the detailed information has been shown in Table I.3. to I.6 in Appendix I). If in this case, if individual fixed effects are still employed in our regression equation, according to Nguyen and Connelly (2014) and Kolodziej, Reichert and Schmitz (2018), the estimates are biased. Therefore, in our benchmark regression, province fixed effects and time fixed effects will be considered instead of individual fixed effects.

6.5 Results

This section first explores the impact of family elderly care responsibilities on husbands' labour supply along both extensive and intensive margins in Section 6.5.1. It also completes robustness checks to different estimate methods, structural model, sample restrictions, model specification, different cluster level and only one instrumental variable (need care) in Section 6.5.2. Then, this section explores potential mechanisms including sharing household responsibility and work type (part time/ full time) and then explores heterogeneity in the impact of elderly care on husbands' labour supply by living arrangement, age group and care recipient in Section 6.5.3.

6.5.1. Benchmark Model

Table 6.5 presents the benchmark estimation results. First, we focus on the POLS estimates of the empirical model specified in equation 6.1 where the outcome variable is the probability of employment (column (1)) or weekly paid hours (column (4)), and family's elderly care responsibility is assumed to be exogenous. These results suggest that there is no significant impact of family's elderly care responsibility on the husband's probability of employment or weekly paid working hours.

Before we turn our attention to IV estimation results, it is worth discussing the relevance and validity of instruments. In relation to the former Table 6.5, columns (2) and (5) report the first stage estimates. In both cases, the endogenous regressors are treated as linear functions of the instruments and the other exogenous variables. The instruments used the number of siblings of spouses and whether elderly parents and parents-in-law need care. Although the number of siblings in the first stage did not significantly affect the possibility of undertaking elderly care responsibility, Sargan-Hansen over identification test[47] and Stock and Yogo weak instrumental variable test[48] proved that the number of siblings of spouse and whether elderly parents and

[47] Sargan-Hansen over identification test is a joint test of the null hypothesis that the instruments are independently distributed of the error terms and that they are properly excluded from the model. The alternative hypothesis is at least one of the instrumental variables is systematically related to the error term.

[48] Stock and Yogo weak instrumental variable test is used to test whether the instruments included strongly correlate with the endogenous variable in the first stage regression. The null hypothesis is instrumental variables are not weak i.e. they are related to endogenous explanatory variables. The alternative hypothesis is instrumental variables are not related to endogenous

parents in law need care are likely to determine labour supply only through elderly care provision, which also support by empirical results of Chen et al (2016), Bolin et al. (2008) and Heitmueller (2007). According to Table 6.5, the p-values of Sargan-Hansen over-identification test are all larger than 0.1, indicating that overidentifying restrictions are valid for the two instrumental variables (care demand of parents and parents in law and the number of siblings of spouse) jointly. The F statistics for the Stock Yogo weak instrument test are all greater than 10[49], with the p-values of 0.000. Suggesting that instrumental variables are not weak and have sufficient explanatory power for the endogenous variable (elderly care) in the model.

Column (3) and (6) in Table 6.5 consider the family's elderly care responsibility as an endogenous variable and employ 2SLS. According to column (3), husbands whose families face elderly care responsibilities have a lower probability to be employment by 5.3 percentage points compared with those whose families do not face elderly care responsibilities, which is slightly lower than the estimation results of Heger and Korfhage (2020) for Europe and Israel (6.4-7.6 percentage points) but very closely with the estimate results of Liu, Qi and Dong (2016) for China (5.4-5.5 percentage points) and Chai, Li, Cai and Zeng (2021) for China (5 percentage points for high intensive subgroup). On the other hand, family elderly care responsibility has non-significant effects on paid working hours for husbands (column (6)). This might be due to the fact that conditional on employment, men are more likely to engage in full-time work, which might be less flexible than women in reducing their working hours (Heger and Korfhage, 2020). In turn, when their families face the responsibility of elderly care and men have to give up some

paid working hours for unpaid elderly care work, due to the inflexible of full-time work, one of the few options they have is to exit the labour market directly rather than reduce the paid working hours. Indeed, Heger and Korfhage (2020) find that men in fifteen European countries and Israel are more likely to choose early retirement with the elderly care responsibilities consistent with this argument.

Turning our attention to other coefficient estimates presented in Table 6.5, POLS and 2SLS estimates appear to be similar for other controls. According to the column (3), the probability of employment of husband increases by age but at a decreasing rate consistent with the existing

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explanatory variables.

[49] Stock and Yogo (2005) provide a rule of thumb that the strong instrument assumption would be satisfied if the F statistic is greater than 10. This rule of thumb is accepted by a number of researchers in the literature and also implemented in our analysis.

Table 6.5 POLS and 2SLS estimates of husband's labour supply

	Probability of Employment			Paid Working Hours		
	POLS	2SLS		POLS	2SLS	
		First Stage	Second Stage		First stage	Second Stage
	(1)	(2)	(3)	(4)	(5)	(6)
Elderly Care Responsibility	-0.000		-0.053*	-0.195		-3.253
	(0.010)		(0.031)	(0.596)		(2.696)
Age	0.026***	-0.002	0.026***	0.052	-0.005	0.069
	(0.008)	(0.007)	(0.007)	(0.340)	(0.008)	(0.318)
Age squared	-0.000***	0.000	-0.000***	-0.001	0.000	-0.002
	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)	(0.004)
Hukou	-0.065***	0.018	-0.064***	3.921***	0.011	3.979***
	(0.018)	(0.013)	(0.018)	(1.151)	(0.015)	(1.114)
Lower middle school degree	-0.005	0.012	-0.004	2.280	0.005	2.300*
	(0.007)	(0.012)	(0.006)	(1.321)	(0.013)	(1.261)
Upper middle school degree	0.013	0.033	0.015	2.239	0.024	2.330*
	(0.013)	(0.019)	(0.013)	(1.324)	(0.016)	(1.244)
Technical or vocational degree	0.090***	0.051*	0.093***	1.511	0.041	1.627
	(0.021)	(0.026)	(0.020)	(1.490)	(0.023)	(1.362)
University or college degree or higher	0.106***	0.017	0.107***	-1.311	0.024	-1.244
	(0.020)	(0.025)	(0.020)	(1.192)	(0.027)	(1.137)
Health	0.020	0.007	0.020	-0.524	0.014	-0.486
	(0.014)	(0.012)	(0.013)	(0.604)	(0.012)	(0.584)
Child Care	0.001	-0.016	0.000	-1.511**	-0.004	-1.524***
	(0.011)	(0.015)	(0.010)	(0.614)	(0.018)	(0.592)
Wife's second occupation	0.032**	-0.040**	0.031**	-3.592***	-0.038***	-3.654***
	(0.014)	(0.015)	(0.014)	(1.057)	(0.012)	(0.982)
Wife's monthly labour wage	-0.014***	0.006***	-0.013***	0.658***	0.007***	0.678***
	(0.002)	(0.002)	(0.002)	(0.114)	(0.002)	(0.113)
Household size	-0.005	0.002	-0.005	-0.286	0.002	-0.273
	(0.005)	(0.005)	(0.005)	(0.276)	(0.006)	(0.258)
Household total gross income	0.039***	0.001	0.039***	0.988**	-0.001	0.974***
	(0.006)	(0.004)	(0.006)	(0.344)	(0.005)	(0.330)
Higher skilled occupation				0.793	-0.003	0.762
				(0.635)	(0.032)	(0.638)
Permanent contract				-0.210	0.020	-0.129
				(1.080)	(0.026)	(1.056)
State-owned firm				-7.983***	-0.005	-8.004***
				(0.895)	(0.015)	(0.864)
Number of siblings of spouses		-0.001			-0.000	
		(0.002)			(0.001)	
Need care		0.313***			0.314***	
		(0.024)			(0.023)	
Constant	0.116	0.158	0.117	32.954***	0.190	33.075***
	(0.148)	(0.202)	(0.143)	(6.760)	(0.219)	(6.329)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Weak instrument test with Stock-Yogo critical value						
F statistic		159.574***			137.034***	
p-value		0.000			0.000	
Sargan-Hanson over-identification test						
Chi2(1) statistic		0.558			0.473	
p-value		0.455			0.491	
Number of Observations	4788	4788	4788	4114	4114	4114
Adjusted R2	0.095	0.146	0.090	0.085	0.149	0.082

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

evidence (Stone and short, 1990; Zahir et al., 2009 and Liu, 2014). Similarly in column (6), the coefficient estimates of age and the age squared are positive and negative, respectively, albeit statistically insignificant. In terms of Hukou, married men with rural household registration are less likely to be employed than those with urban household registration, but once been employed, they work longer hours, which is in line with the empirical results of Chai, Li, Cai and Zeng (2021). Regarding the education level, we find that the higher their education level, the higher the probability of being employed. In particular, the probability of employment for married men with Technical or vocational degree and University or college degree or higher is

significantly higher than those with primary education or below (by 9.3 percentage points and 10.7 percentage points, respectively). However, at the intensive margin (column (6)), there is no statistical difference between those with primary education or below and those with technical or vocational degree and higher. In terms of work-related characteristics which are included in the intensive margin specification (columns (4)-(6)), occupation and work type (permanent work/ temporary work) have no significant impact on paid working hours, while men who work in state-owned enterprises work shorter hours (-7.882 hours per week) than those who work in non-state enterprises.

In terms of the family characteristics, having childcare responsibilities is negatively associated with paid working hours. This may be due to time-intensive childcare, same as elderly care, and paid work are crowded with each other. However, childcare has no significant impact on the probability of employment. The variation in the extent of the influence of elderly care responsibilities on husbands' labour supply margins could stem from the more established formal childcare options for children, such as kindergartens and early childhood education centres, in China compared to elderly care services. Husbands who are willing to work may rely on formal childcare to reduce the intensity of care, without the need to completely withdraw from the labour market. Regarding household size, on the one hand, more siblings may help to share the responsibility of family care. On the other hand, more parents and parents-in-law may increase families' elderly care burden. Perhaps due to the offset of these two opposing effects, for men, we find no significant impact on labour supply at either margin.

In terms of the financial characteristics of the household, both the higher wife's monthly labour income and higher household total gross income (although include huaband's labour income) could provide more selections for the husband whose family face elderly care responsibility. For example, more disposable household income can help husbands pay for formal care, allowing them more time and energy to engage in paid labour work. On the other hand, sufficient household disposable income may also lead to husbands purchasing more leisure time or time taking care of the family, which indicates they may give up some paid labour supply. In our analysis, wives' monthly labour income has a negative effect on husbands' probability of employment (1.3 percentage points), while an increase in household total gross income leads to an increase in the probability of husbands' employment (3.9 percentage points). In terms of intensive margin, an increase in the wife's monthly labour income and household total gross income increases the husband's average paid working hours per week by 0.678 hours and 1.001 hours, respectively.

6.5.2. Robustness Checks

Our benchmark results presented in the previous section show that husbands whose families face elderly care responsibilities have a lower probability of being employed by 5.3 percentage points compared with those whose families do not face elderly care responsibilities, while family elderly care responsibility has no significant effects on paid working hours. In this section, we explore the robustness of these findings (i) to the methods by estimating IV probit method and IV FE method; (ii) to using structural model proposed by Coe, Skira and Van Houtven (2011); (iii) to sample restrictions and model specification; (IV) to the different cluster standard level and (V) to the different instrumental variable selection (only need care).

6.5.2.1. IV Probit and IV FE Results

As discussed in Section 5.5.2.1, IV Probit models suit binary outcomes, while individual fixed effects help control for unobserved heterogeneity. The first robustness test is conducted by comparing the benchmark regression results with IV Probit model and IV FE model at the extensive margin and IV FE model at the intensive margin, respectively. Moreover, time-invariant instruments such as the number of siblings of spouse (one of the two instrumental variables selected in the benchmark model) are excluded in fixed effects specifications. This subsection also explores the estimation results of the individual fixed effects model excluding the number of siblings of spouse.

Table 6.6 reports the regression results from employing the IV Probit model (column (1)) and IV FE (column (2)) model with two instrumental variables and IV FE (column (3)) model with one instrumental variables for the extensive margin estimation, IV FE model (column (4)) with two instrumental variables and IV FE (column (5)) model with one instrumental variables for the intensive margin estimation. Both IV Probit model and IV FE model in columns (1), (2) and (3) show that compared with those whose families do not face elderly care responsibilities, husbands whose families face elderly care responsibilities have a lower probability to be employed, which is consistent with the results of benchmark model. Both the magnitudes of IV probit and IV FE methods are slightly higher than those of the benchmark model but within a 95% error range of benchmark model. While, for the intensive margin, when the model captures the unobservable individual characters, the impact of family elderly care responsibilities on men's paid working hours remains to be negative, albeit turns significant. This may be due to individual fixed effects excluding the influence of unobservable individual characteristics that do not change with time. For example, whether a husband is more concerned about the feelings

of elderly parents and/or parents in laws, or whether husband is more concerned about career success, can have an impact on husband's labour supply decisions. However, based on the discussion in section 6.4, considering that only 30% of CHNS individuals are included observations of two years or more, we still do not employ individual fixed effects in the benchmark model.

Table 6.6 Different methods estimates of husband' s labour supply

	Probability of Employment			Paid Working Hours	
	IV Probit	IV FE		IV FE	
		Two instrumental variables	One instrumental variable (need care)	Two instrumental variables	One instrumental variable (need care)
	(1)	(2)	(3)	(4)	(5)
Elderly Care	-0.0645*	-0.090***	-0.091***	-4.562*	-4.586*
	(0.0393)	(0.033)	(0.033)	(2.454)	(2.454)
Age	0.0158***	0.004	0.004	2.456	2.454
	(0.037)	(0.030)	(0.030)	(2.406)	(2.407)
Age square	-0.002***	-0.000	-0.000	-0.012	-0.012
	(0.000)	(0.000)	(0.000)	(0.009)	(0.009)
Hukou	-0.039***	0.004	0.004	-2.863	-2.864
	(0.008)	(0.013)	(0.013)	(2.948)	(2.948)
Lower middle school degree	0.007	-0.005	-0.005	1.297	1.296
	(0.093)	(0.009)	(0.009)	(1.804)	(1.805)
Upper middle school degree	0.019	0.019	0.019	1.420	1.420
	(0.029)	(0.032)	(0.032)	(3.314)	(3.315)
Technical or vocational degree	0.013***	0.012	0.012	-2.140	-2.140
	(0.027)	(0.026)	(0.026)	(2.720)	(2.721)
University or college degree or higher	0.009***	0.012	0.012	-2.276	-2.276
	(0.028)	(0.028)	(0.028)	(3.126)	(3.126)
Health	0.020*	0.015	0.015	0.658	0.659
	(0.011)	(0.020)	(0.020)	(1.573)	(1.573)
Child Care	-0.003	0.009	0.009	-0.351	-0.351
	(0.009)	(0.008)	(0.008)	(1.067)	(1.066)
Wife's second occupation	0.033***	-0.018	-0.018	-0.801	-0.802
	(0.077)	(0.014)	(0.014)	(1.803)	(1.804)
Wife's monthly labour wage	-0.010***	-0.005***	-0.005***	0.468	0.467
	(0.001)	(0.002)	(0.002)	(0.314)	(0.314)
Household size	-0.005	-0.003	-0.003	0.781	0.782
	(0.024)	(0.007)	(0.007)	(0.823)	(0.823)
Household total gross income	0.022***	0.037***	0.037***	0.625	0.626
	(0.002)	(0.010)	(0.010)	(0.419)	(0.419)
High skilled occupation				1.310	1.310
				(1.136)	(1.137)
permanent contract				4.123*	4.124*
				(2.463)	(2.465)
State-owned firm				-1.269	-1.268
				(1.622)	(1.623)
Constant	-3.286***	0.954	0.957	-41.267	-41.201
	(0.866)	(0.845)	(0.846)	(85.046)	(85.089)
Province Fixed Effects	No	No	No	No	No
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effects	No	Yes	Yes	Yes	Yes
Number of Observations	4788	4788	4788	4114	4114
Adjusted R2					

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

6.5.2.2. Structural Model Estimates

Although there are rich studies that have focused on the impact of elderly care on caregivers' labour supply, few of them take into account the labour supply of caregivers' spouse in the regression. According to the discussion in Section 6.2.1.1, the spouse could increase labour supply at either extensive or intensive margins to compensate for the caregiver's reduced earnings or early exit from the labour force market (the added worker effect). To our knowledge, Coe, Skira and Van Houtven (2011) is the only study that addresses the potential of informal care demands on a couple's labour supply considering the interaction between the labour supply of husbands and wives. Another possibility is that husband and wife split their time between paid and unpaid labour through rational decision-making to achieve maximum family utility simultaneously. Therefore, when families face the responsibility of elderly care, even if the wife is often the primary provider of elderly care, the husband and wife may engage in rational redistribution of labour supply (including paid labour work and unpaid household work). Therefore, family's elderly care responsibilities may have two effects on the husband. One is indirect that is: the responsibility of elderly care affects the labour supply of wives (often the main caregivers in the family), and changes in the labour supply of wives affect the labour supply of men. At the same time, the responsibility for elderly care in the family may directly affect the husband's labour supply. We cannot distinguish between the two effects that the husband faces. Therefore, we consider the endogenous impact of the wife's labour supply on the husband's labour supply estimating a structural model proposed by Coe, Skira and Van Houtven (2011). This approach, which is presented more formally in Appendix J, assumes that, along with other personal, work-related and family characteristics, each spouse's labour supply is also a determinant of the labour supply of the other spouse. Following, Coe, Skira and Van Houtven (2011), the model can be estimates as a single equation model by substituting wife's labour supply equation to husbands.

Table 6.7 presents these results. Columns (1) and (4) present POLS estimate results where the elderly care responsibility is assumed to be exogenous. These results show that there is no significant impact of family's elderly care responsibility on the husband's probability of employment or weekly paid working hours. Columns (3) and (6) consider the family's elderly care responsibility as an endogenous variable and employ 2SLS. Although the magnitude of the impact of family elderly care responsibility on husbands' labour supply is within the error range of the benchmark model's estimation results at both extensive and intensive margins, it is unsignificant at extensive margin. One possible explanation is that the negative impact of

Table 6.7 POLS and Reduced 2SLS estimates of husband' s labour supply

	Probability of Employment			Paid Working Hours		
	POLS	2SLS		POLS	2SLS	
		First Stage	Second Stage		First stage	Second Stage
	(1)	(2)	(3)	(4)	(5)	(6)
Elderly Care Responsibility	0.002		-0.042	-0.353		-4.529
	(0.011)		(0.035)	(0.618)		(2.907)
Age_wife	0.001	-0.031*	-0.000	1.161*	-0.033*	1.000*
	(0.010)	(0.014)	(0.009)	(0.545)	(0.017)	(0.561)
Age squared_wife	0.000	0.000**	0.000	-0.013*	0.000*	-0.011
	(0.000)	(0.000)	(0.000)	(0.007)	(0.000)	(0.008)
Hukou_wife	-0.024	0.047*	-0.022	1.410	0.069**	1.691
	(0.018)	(0.022)	(0.016)	(1.700)	(0.027)	(1.675)
Lower middle school degree_wife	-0.010	0.013	-0.009	0.948	0.018	0.987
	(0.009)	(0.018)	(0.009)	(1.015)	(0.018)	(0.980)
Upper middle school degree_wife	-0.020	0.037	-0.018	1.468	0.054**	1.647
	(0.017)	(0.024)	(0.017)	(1.023)	(0.023)	(1.006)
Technical or vocational degree_wife	-0.029	0.024	-0.028	-1.178	0.024	-1.160
	(0.025)	(0.024)	(0.024)	(1.000)	(0.030)	(1.005)
University or college degree or higher_wife	-0.032	0.056*	-0.030	-2.424**	0.067**	-2.238**
	(0.029)	(0.026)	(0.027)	(1.086)	(0.024)	(1.086)
Health_wife	0.025*	-0.044**	0.022	-0.118	-0.039*	-0.345
	(0.014)	(0.018)	(0.014)	(0.845)	(0.020)	(0.907)
Age_husband	0.023*	0.018	0.024**	-0.720*	0.017	-0.592
	(0.012)	(0.011)	(0.012)	(0.396)	(0.014)	(0.365)
Age squared_husband	-0.000**	-0.000*	-0.000***	0.007	-0.000	0.005
	(0.000)	(0.000)	(0.000)	(0.005)	(0.000)	(0.005)
Hukou_husband	-0.039	-0.021	-0.039*	3.305**	-0.041	3.175***
	(0.023)	(0.016)	(0.022)	(1.222)	(0.023)	(1.167)
Lower middle school degree_husband	-0.005	0.009	-0.004	1.878	-0.002	1.881*
	(0.007)	(0.013)	(0.007)	(1.170)	(0.014)	(1.101)
Upper middle school degree_husband	0.018	0.022	0.019	2.173	0.002	2.209*
	(0.015)	(0.017)	(0.015)	(1.399)	(0.014)	(1.314)
Technical or vocational degree_husband	0.095***	0.034	0.096***	2.042	0.029	2.161
	(0.024)	(0.023)	(0.023)	(1.674)	(0.020)	(1.532)
University or college degree or higher_husband	0.117***	-0.013	0.116***	0.505	0.001	0.516
	(0.028)	(0.024)	(0.027)	(1.613)	(0.021)	(1.553)
Health_husband	0.018	0.012	0.019	-0.718	0.017	-0.644
	(0.015)	(0.011)	(0.014)	(0.593)	(0.010)	(0.566)
Childcare_wife	0.017	0.002	0.016	0.392	-0.012	0.320
	(0.012)	(0.018)	(0.011)	(1.337)	(0.020)	(1.262)
Childcare_husband	-0.010	-0.021	-0.010	-1.461	-0.000	-1.455
	(0.010)	(0.016)	(0.010)	(1.019)	(0.018)	(0.953)
Household size	-0.006	0.004	-0.006	-0.327	0.004	-0.302
	(0.005)	(0.005)	(0.005)	(0.301)	(0.005)	(0.280)
Household total gross income	0.038***	-0.001	0.038***	1.015**	-0.002	0.996***
	(0.006)	(0.004)	(0.006)	(0.356)	(0.005)	(0.343)
Wife's monthly labour wage	-0.012***	0.005**	-0.012***	0.761***	0.007**	0.788***
	(0.002)	(0.002)	(0.002)	(0.121)	(0.003)	(0.121)
High skilled occupation_husband				0.679	-0.006	0.631
				(0.734)	(0.029)	(0.760)
permanent contract_husband				0.242	0.023	0.353
				(0.931)	(0.024)	(0.912)
State-owned firm_husband				-7.520***	-0.004	-7.549***
				(0.831)	(0.017)	(0.805)
High skilled occupation_wife				0.838	0.007	0.888
				(0.747)	(0.031)	(0.733)
permanent contract_wife				1.283	0.022	1.346
				(0.951)	(0.024)	(0.902)
State-owned firm_wife				-1.491	-0.020	-1.558*
				(0.864)	(0.025)	(0.833)
Number of siblings of spouse		0.000			0.001	
		(0.002)			(0.002)	
Need care		0.308***			0.301***	
		(0.025)			(0.025)	
Constant	0.152	0.352	0.164	24.663**	0.355	25.805***
	(0.155)	(0.240)	(0.144)	(9.567)	(0.272)	(9.175)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4727	4727	4727	3964	3964	3964
Adjusted R2	0.096	0.148	0.093	0.089	0.146	0.082

** p < 0.1, ** p < 0.05, *** p < 0.01; Standard errors clustered at province level.*

elderly care responsibility on the probability of husband employment observed in the benchmark regression model may not entirely come from the elderly care responsibilities faced by the husband, but rather from the spouse's joint decision about division of paid and unpaid work when they are facing elderly care responsibilities, even from the indirectly influenced by the wife's (primary caregiver) labour supply decision. In terms of intensive margin, the structure model dose not find a significant impact of family elderly care responsibility on the husband's paid working hours, which is consistent with the benchmark regression results.

This structural model fully considers the internal decision-making between spouses when they are facing the impact of elderly care responsibilities, enriching existing literature. However, one concern is that this structural model incorporates the characteristics of both spouses into the regression, which may lead to collinearity in the estimation results. This is also the main reason that why we do not choose this structure model as benchmark model.

6.5.2.3. Model Specification and Sample Restrictions

The third robustness test relates to our benchmark specification and sample restrictions. As discussed in section 6.3.3, the inclusion of whether the husband provides childcare or not and the wife monthly labour income among controls results in a large sample loss. Firstly, we control the number of observations and do robustness checks for model specification. In the family, childcare and elderly care are both time and energy intensive unpaid household chores. They might squeeze each other for limited unpaid family care resources. Compared to fathers, mothers are often the primary providers of childcare, especially for children under 6 years old or infants. In this analysis, it is ideally control for presence of children in the house in husband labour supply regression, but CHNS does not provide information about child number in the household. Therefore, we focus on whether husband provide childcare information. Therefore, this study conducted robustness checks on three different expressions of husband's childcare. They are 1) do not consider whether the husband provides childcare in the regression (column (1) and (2) in Table 6.8), 2) consider whether the wife provides child care in the regression (column (3) and (4) in Table 6.8) and 3) consider a childcare dummy independent of which spouse is the primary carer (husband provides child care or wife provides child care) (column (5) and (6) in Table 6.8) in the regression. According to the coefficient in column (1)-(6), the estimate results based on these three different expressions for Childcare are very closely with

that of benchmark model, except for the loss of significance in column (3).[50]

In terms of the wife's monthly labour income, considering the flexibility of the wife's employment situation, monthly labour income may not intuitively reflect wife's value in the labour market. In this subsection, we set up robustness tests related to the wife's labour income. In table 6.8, columns (7) and (8) show the regression results without considering the wife's labour income. Columns (9) and (10) show the regression results using the wife's hourly labour income rather than the wife's labour monthly labour income as the control variable.[51] According to the coefficient in column (7)-(10), the estimate results are very closely with that of benchmark model, which indicates that the benchmark model specification is robust.

Secondly, we set robustness checks by relaxing sample restrictions. Table 6.9 reports the regression results after relaxing sample restrictions of childcare and wife's monthly labour income. We find that if we do not consider the impact of the husband's childcare provision on his labour supply, the family elderly care responsibility does not significantly affect the husband's labour supply at either extensive or intensive margin (column (1) and (2) in Table 6.9). In terms of column (3) and column (4) in Table 6.9, we use whether the wife provides childcare instead of whether the husband provides childcare in the model. Also in this case, we do not find a significant impact of family elderly care responsibility on the labour supply status of husbands at either margin. Finally, Columns (5) and (6) consider a childcare dummy independent of which spouse is the primary carer (generated based on the information husband provides child care or wife provides child care) in the model and find that elderly care responsibility significantly reduced the probability of the husband being employed with very closely magnitude as estimate results in Table 6.8 and have no effect on husbands paid working hours, consistent with the regression results (column (5) and (6) in Table 6.9) in Table 6.8.

In terms of the wife's monthly labour income (column (7)-(9)), we find regression results consistent with the Table 6.8 at intensive margin, that family elderly care responsibility has no effect on husbands' paid working hours. At the extensive margin, although employing wife's hourly labour income and not considering the wife's income in the regression loss the significance of the impact of family elderly care responsibility on the probability of the husband

[50] The first stage estimates results are reported in Tables K.1 and K.2 in Appendix K.

[51] CHNS does not provide information on the weeks the wife works per month. To construct hourly pay information, we assume that the wife works four weeks per month and construct hourly pay as monthly labour income/ (4 * weekly working days * daily working hours)

being employed, the regression coefficient is within the error range of that in Table 6.8.

Finally, this subsection consider the potential endogeneity stem from physical health status and household total gross income. Specifically, husbands with greater labour supply intensity may experience poorer physical health compared to those who work fewer hours or are not employed at all (Mariappanadar, 2016; Wang et al., 2021). Prolonged working hours and job-related stress can lead to reduced attention to personal well-being and self-care, ultimately deteriorating their health (Wang et al., 2021).

From the perspective of household income, husbands who participate in the labour market might contribute to overall household earnings through their wages. Likewise, those who work longer hours tend to receive higher labor market compensation, which subsequently affects total household income. Given these relationships, both physical health and household income may be endogenous to husbands' labour supply decisions, highlighting the need to account for potential biases in the empirical analysis.

To mitigate concerns about endogeneity related to husbands' health status and household income, we assess whether excluding these two control variables from the benchmark model alters the estimation results. Table 6.8 presents the findings. In columns (11) and (12), household income is omitted, while columns (13) and (14) exclude the health dummy variable. The results remain consistent with those of the baseline model, showing only minor differences in magnitude, indicating robustness.

Table 6.8 2SLS estimates of husband' s labour supply with different control variables

	Excluding husband's provision of childcare		Controlling for wife's provision of childcare		Controlling for provision of childcare by either spouse		Excluding wife's monthly labour income		Controlling for wife's hourly labour income		Excluding Household Total Gross Income		Excluding Health Status	
	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	**(13)**	(14)
Elderly care	-0.053**	-3.253	-0.049	-3.326	-0.055**	-3.238	-0.056*	-3.267	-0.064**	-3.380	-0.063**	-3.472	-0.054*	-3.246
	(0.031)	(2.708)	(0.032)	(2.749)	(0.030)	(2.754)	(0.029)	(2.856)	(0.030)	(3.103)	(0.031)	(2.262)	(0.030)	(2.260)
Child Care_husband							0.001	-1.536***	0.002	-1.569**	0.002	-1.464*	0.000	-1.511*
							(0.011)	(0.585)	(0.011)	(0.614)	(0.011)	(0.821)	(0.011)	(0.819)
Child Care_wife			0.012	-0.800										
			(0.010)	(0.823)										
Child Care_husband/wife					0.007	-0.772								
					(0.009)	(0.828)								
Wife's monthly labour wage	-0.013***	0.678***	-0.013***	0.653***	-0.013***	0.654***					-0.011***	0.746***	0.746***	0.678***
	(0.002)	(0.113)	(0.002)	(0.110)	(0.002)	(0.110)					(0.001)	(0.102)	(0.102)	(0.104)
Wife's hourly labour wage									-0.002***	-0.017				
									(0.000)	(0.026)				
Age	0.026***	0.248	0.028***	0.123	0.027***	0.126	0.028***	0.042	0.028***	0.046	0.027***	0.066	0.027***	0.066
	(0.008)	(0.316)	(0.007)	(0.324)	(0.007)	(0.331)	(0.008)	(0.299)	(0.008)	(0.282)	(0.005)	(0.376)	(0.005)	(0.375)
Age squared	-0.000***	-0.004	-0.000***	-0.002	-0.000***	-0.002	-0.000***	-0.002	-0.000***	-0.002	-0.000***	-0.002	-0.000***	-0.002
	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.005)	(0.000)	(0.005)
Hukou	-0.064***	3.979***	-0.061***	4.067***	-0.062***	4.056***	-0.104***	5.724***	-0.092***	5.685***	-0.066***	3.961***	-0.064***	3.982***
	(0.018)	(1.119)	(0.018)	(1.105)	(0.018)	(1.103)	(0.016)	(1.148)	(0.014)	(1.169)	(0.010)	(0.801)	(0.010)	(0.799)
Lower middle school degree	-0.004	2.365*	-0.006	2.348*	-0.006	2.348*	-0.010	2.499**	-0.011	2.500**	0.001	2.438***	-0.004	2.289***
	(0.006)	(1.273)	(0.005)	(1.242)	(0.006)	(1.232)	(0.007)	(1.223)	(0.007)	(1.233)	(0.010)	(0.770)	(0.010)	(0.769)
Upper middle school degree	0.015	2.389*	0.015	2.309*	0.015	2.343*	0.003	2.745**	0.002	2.787***	0.028**	2.609***	0.015	2.318**
	(0.013)	(1.259)	(0.013)	(1.232)	(0.013)	(1.220)	(0.013)	(1.168)	(0.012)	(1.082)	(0.013)	(0.967)	(0.013)	(0.968)
Technical or vocational degree	0.093***	1.686	0.088***	1.628	0.089***	1.636	0.074***	2.222*	0.072***	2.233*	0.108***	1.891	0.094***	1.602
	(0.020)	(1.392)	(0.020)	(1.404)	(0.020)	(1.397)	(0.020)	(1.310)	(0.017)	(1.332)	(0.017)	(1.271)	(0.016)	(1.270)
University or college degree or higher	0.107***	-1.223	0.103***	-1.206	0.104***	-1.192	0.078***	-0.354	0.086***	-0.286	0.132***	-0.815	0.108***	-1.254
	(0.020)	(1.163)	(0.020)	(1.138)	(0.020)	(1.122)	(0.019)	(1.026)	(0.017)	(0.959)	(0.016)	(1.309)	(0.016)	(1.311)
Health	0.020	-0.437	0.023*	-0.488	0.022*	-0.481	0.022*	-0.550	0.025**	-0.444	0.019	-0.558		
	(0.013)	(0.573)	(0.013)	(0.551)	(0.014)	(0.552)	(0.013)	(0.550)	(0.012)	(0.502)	(0.012)	(0.882)		
Wife's second occupation	0.031**	-3.603***	0.030**	-3.563***	0.030**	-3.561***	0.030**	-3.606***	0.027*	-3.739***	0.040***	-3.428***	0.030**	-3.650***
	(0.015)	(1.001)	(0.014)	(1.000)	(0.014)	(1.000)	(0.014)	(0.998)	(0.014)	(0.935)	(0.014)	(1.023)	(0.014)	(1.023)
Household size	-0.005	-0.332	-0.006	-0.290	-0.006	-0.290	-0.002	-0.371	-0.004	-0.459*	-0.001	-0.178	-0.005	-0.277
	(0.005)	(0.265)	(0.005)	(0.277)	(0.005)	(0.278)	(0.005)	(0.269)	(0.004)	(0.275)	(0.003)	(0.235)	(0.003)	(0.236)
Household total gross income	0.039***	0.964***	0.037***	0.967***	0.037***	0.957***	0.033***	1.291***	0.036***	1.481***			0.039***	0.978***
	(0.006)	(0.334)	(0.005)	(0.321)	(0.005)	(0.316)	(0.006)	(0.365)	(0.007)	(0.486)			(0.003)	(0.269)
High skilled occupation		0.760		0.772		0.764		0.788		0.838		0.901		0.760
		(0.640)		(0.657)		(0.655)		(0.644)		(0.621)		(0.894)		(0.893)
permanent contract		-0.122		0.044		0.038		0.737		0.722		-0.071		-0.132
		(1.058)		(1.043)		(1.045)		(0.976)		(1.050)		(0.831)		(0.829)
State-owned firm		-7.998***		-8.114***		-8.112***		-7.642***		-7.605***		-7.975***		-8.007***
		(0.868)		(0.886)		(0.883)		(0.811)		(0.810)		(0.912)		(0.910)
Constant	0.118	28.921***	0.098	31.849***	0.119	31.889***	0.110	32.449***	0.084	30.844***	0.466***	42.218***	0.132	32.705***
	(0.148)	(5.908)	(0.146)	(7.073)	(0.141)	(7.291)	(0.153)	(5.756)	(0.133)	(5.088)	(0.105)	(7.897)	(0.108)	(8.249)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effects	No	No	No	No	No	No	No	No	No	No	4788	4114	4788	4114
Number of Observations	4788	4114	4733	4074	4736	4075	4788	4114	4684	4033	0.063	0.078	0.089	0.081
Adjusted R2	0.090	0.081	0.088	0.080	0.088	0.080	0.069	0.072	0.067	0.073	-0.001	-0.178	0.027***	0.066

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table 6.9 2SLS estimates of husband' s labour supply with different sample

	Excluding husband's provision of childcare		Controlling for wife's provision of childcare		Controlling for provision of childcare by either spouse		Excluding wife's monthly labour income		Controlling for wife's hourly labour income	
	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Elderly care Responsibility	-0.017	-1.609	-0.024	-2.419	-0.054*	-2.999	-0.020	-0.531	-0.023	-0.542
	(0.016)	(1.623)	(0.025)	(1.968)	(0.029)	(2.467)	(0.040)	(2.154)	(0.042)	(2.304)
Child Care_husband							-0.004	-1.343*	-0.001	-1.329*
							(0.011)	(0.753)	(0.012)	(0.754)
Child Care_wife			0.014	-0.438						
			(0.010)	(0.767)						
Child Care_husband/wife					0.007	-0.350				
					(0.009)	(0.840)				
Wife's monthly labour income	-0.013***	0.539***	-0.013***	0.567***	-0.013***	0.664***				
	(0.002)	(0.089)	(0.002)	(0.113)	(0.002)	(0.110)				
Wife's hourly labour wage									-0.001	-0.023
									(0.000)	(0.024)
Age	0.024***	0.233	0.025***	0.271	0.026***	0.095	0.034***	-0.149	0.035***	-0.181
	(0.008)	(0.293)	(0.006)	(0.270)	(0.007)	(0.332)	(0.009)	(0.337)	(0.009)	(0.309)
Age squared	-0.000***	-0.004	-0.000***	-0.004	-0.000***	-0.002	-0.000***	0.001	-0.000***	0.001
	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.004)
Hukou	-0.062***	4.137***	-0.067***	4.445***	-0.064***	3.963***	-0.093***	5.826***	-0.089***	5.946***
	(0.011)	(1.014)	(0.013)	(1.086)	(0.019)	(1.046)	(0.021)	(1.278)	(0.021)	(1.280)
Lower middle school degree	-0.012**	1.709	-0.008	1.564	-0.007	2.086	-0.016	2.076**	-0.017	1.976**
	(0.006)	(1.095)	(0.005)	(1.372)	(0.005)	(1.320)	(0.015)	(0.915)	(0.014)	(0.907)
Upper middle school degree	0.011	1.371	0.016	1.071	0.015	2.235*	-0.005	2.210***	-0.008	2.157***
	(0.009)	(1.163)	(0.010)	(1.413)	(0.011)	(1.219)	(0.027)	(0.798)	(0.026)	(0.766)
Technical or vocational degree	0.080***	0.747	0.085***	0.760	0.091***	1.551	0.086**	1.216	0.086***	1.011
	(0.014)	(1.243)	(0.018)	(1.433)	(0.019)	(1.373)	(0.034)	(1.126)	(0.033)	(1.099)
University or college degree or higher	0.106***	-2.346**	0.105***	-2.023	0.105***	-1.199	0.113***	-1.294	0.116***	-1.259
	(0.013)	(1.164)	(0.019)	(1.261)	(0.019)	(1.170)	(0.030)	(1.077)	(0.029)	(1.008)
Health	0.033**	-0.328	0.025**	-0.390	0.021	-0.469	0.033**	-0.609	0.036**	-0.556
	(0.015)	(0.521)	(0.012)	(0.531)	(0.013)	(0.581)	(0.014)	(0.527)	(0.015)	(0.515)
Wife's second occupation	0.025***	-4.258***	0.022**	-3.820***	0.029**	-3.442***	0.096***	-3.720***	0.095***	-3.786***
	(0.010)	(1.086)	(0.010)	(1.110)	(0.014)	(0.908)	(0.030)	(0.982)	(0.030)	(0.940)
Household size	-0.006	-0.236	-0.008	-0.251	-0.005	-0.243	-0.005	-0.263	-0.006	-0.333
	(0.005)	(0.279)	(0.005)	(0.305)	(0.005)	(0.270)	(0.004)	(0.301)	(0.004)	(0.314)
Household total gross income	0.031***	0.467*	0.032***	1.070***	0.035***	0.906***	0.041***	0.704***	0.041***	0.780***
	(0.004)	(0.275)	(0.005)	(0.348)	(0.005)	(0.282)	(0.005)	(0.187)	(0.006)	(0.220)
High skilled occupation		0.902*		0.797		0.722		0.974		1.069
		(0.517)		(0.651)		(0.631)		(0.752)		(0.762)
permanent contract		-0.235		0.085		-0.064		0.406		0.436
		(0.797)		(0.862)		(1.004)		(0.989)		(1.049)
State-owned firm		-7.069***		-8.061***		-8.085***		-6.625***		-6.636***
		(0.916)		(0.836)		(0.875)		(0.896)		(0.891)
Constant	0.242*	35.028***	0.211	29.056***	0.170	33.018***	-0.148	41.816***	-0.185	41.824***
	(0.142)	(6.075)	(0.137)	(6.095)	(0.146)	(7.406)	(0.204)	(7.085)	(0.208)	(6.522)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	6845	5841	5764	4980	4862	4185	6810	5381	6624	5234
Adjusted R2	0.080	0.076	0.083	0.077	0.087	0.078	0.114	0.066	0.113	0.067

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

6.5.2.4. Clustering Standard Errors at Individual Level

The fourth robustness check relates to using different cluster standard errors. In the benchmark model, the standard errors are clustered at province level. In this subsection, we use individual level clustered standard errors to test the robustness of benchmark regression results. According to Table 6.10, the significance has been lost at extensive margin, compared with estimate results in the benchmark model. Column (2) report a consistent estimation result with benchmark model. However, it is necessary to set standard error cluster at province level.[52] This is because, in China, the modes of elderly care, attitudes towards ageing, and employment environments vary significantly across different provinces and are closely related to the economic development and folk culture of different provinces. Therefore, different individuals living in the same province are more likely influenced by the same macro factors, resulting in different individuals in the same province being correlated. When standard errors are clustered at the provincial level can effectively solve the heteroscedasticity problem caused by the above situation. More specifically, it can avoid the correlation of variables and errors between different individuals but within the same province.

Table 6.10 2SLS estimates of husbands' labour supply clustered at individual level

	Probability of Employment	Paid Working Hours
	(1)	(2)
Elderly Care Responsibility	-0.053	-3.253
	(0.033)	(2.422)
Age	0.026***	0.069
	(0.006)	(0.391)
Age squared	-0.000***	-0.002
	(0.000)	(0.005)
Hukou	-0.064***	3.979***
	(0.012)	(0.868)
Lower middle school degree	-0.004	2.300**
	(0.011)	(0.959)
Upper middle school degree	0.015	2.330**
	(0.016)	(1.122)
Technical or vocational degree	0.093***	1.627
	(0.018)	(1.244)
University or college degree or higher	0.107***	-1.244
	(0.020)	(1.218)
Health	0.020	-0.486
	(0.014)	(0.941)
Child Care	0.000	-1.524*
	(0.011)	(0.805)
Wife's second occupation	0.031***	-3.654***
	(0.009)	(1.209)
Wife's monthly labour income	-0.013***	0.678***
	(0.002)	(0.109)
Household size	-0.005	-0.273
	(0.003)	(0.260)
Household total gross income	0.039***	0.974***
	(0.006)	(0.339)
High skilled occupation		0.762
		(0.636)
permanent contract		-0.129
		(0.673)
State-owned firm		-8.004***
		(0.713)
Constant	0.117	33.075***
	(0.132)	(8.666)
Province Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Number of Observations	4788	4114
Adjusted R2	0.090	0.082

** p < 0.1, ** p < 0.05, *** p < 0.01; Standard errors clustered at individual level.*

[52] The first stage estimates results are reported in Tables K.1 and K.2 in Appendix K.

6.5.2.5. Using a Single Instrumental Variable

The fifth robustness test is about instrumental variables. According to the discussion in Section 6.5.1, although the two instrumental variables employed in the benchmark regression model (Number of siblings of spouse and need care) passed the Sargan-Hanson over identification test and Stock and Yogo weak instrumental variable test, according to the first stage results of Table 6.5, the number of siblings of spouses is not statistically significant at the first stage. In this section we rerun the benchmark regression model 6.1 with need care as the only instrumental variable. These results are presented in Table 6.11.[53]

Table 6.11 2SLS estimates of husband's labour supply with a single instrumental variable (Need care)

	Probability of Employment	Paid Working Hours
	(1)	(2)
Elderly Care Responsibility	-0.052*	-3.236
	(0.031)	(2.712)
Age	0.026***	0.097
	(0.007)	(0.315)
Age squared	-0.000***	-0.002
	(0.000)	(0.004)
Hukou	-0.063***	3.947***
	(0.017)	(1.107)
Lower middle school degree	-0.006	2.406*
	(0.006)	(1.244)
Upper middle school degree	0.015	2.364*
	(0.012)	(1.230)
Technical or vocational degree	0.093***	1.651
	(0.019)	(1.344)
University or college degree or higher	0.107***	-1.215
	(0.019)	(1.121)
Health	0.019	-0.559
	(0.013)	(0.588)
Child Care	-0.001	-1.513***
	(0.010)	(0.552)
Wife's second occupation	0.032**	-3.647***
	(0.015)	(0.967)
Wife's monthly labour income	-0.014***	0.676***
	(0.002)	(0.112)
Household size	-0.005	-0.276
	(0.005)	(0.257)
Household total gross income	0.039***	0.969***
	(0.006)	(0.329)
High skilled occupation		0.810
		(0.642)
permanent contract		-0.124
		(1.044)
State-owned firm		-7.953***
		(0.862)
Constant	0.135	32.675***
	(0.143)	(6.215)
Province Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Number of Observations	4813	4134
Adjusted R2	0.091	0.081

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level.

[53] The first stage estimates results are reported in Tables K.1 and K.2 in Appendix K.

According to Table 6.11, the regression results obtained when the need care is the only instrumental variable to address the endogeneity problem in the regression are consistent with the benchmark model. In order to increase control for endogeneity and eliminate the possibility that some need care may not completely eliminate all potential endogeneities, we still employ both need care and number of siblings for spouse in the benchmark model, consistent with most studies using CHNS data (Chen, et al, 2016; Fan and Chen, 2016; Huang, 2012; Liu, et al, 2010).

6.5.2.6. The Impact of Attrition

In line with Section 5.5.2.5, to mitigate potential biases introduced by sample selection, I performed descriptive analyses before and after incorporating two variables, wife's monthly income and whether husbands care for children under six years old, which resulted in substantial missing observations. Additionally, I conducted a t-test to assess whether the missing observations contribute to sample selection bias. The results are resented in Table 6.12.

In Table 6.12, the sample that includes observations with missing values for the wife's monthly income and whether the husband cares for children aged six and under is referred to as the original sample, consisting of 9,945 observations. Conversely, the working sample, also known as the benchmark model sample, excludes these missing values and comprises 4,788 observations. According to Table 6.12, while the descriptive statistics of the working sample differ significantly from those of the original sample—except for health, Hukou, and occupation—the overall differences remain relatively minor. The key independent variable, representing the probability of elderly caregiving, exhibits only a 0.5 percentage point difference. Regarding the extensive margin of the dependent variable, the gap in employment probability is 7.8 percentage points, whereas the intensive margin, measured by paid working hours, shows a 0.73-hour difference. Thus, despite the considerable loss of observations due to the inclusion of control variables, this process did not result in substantial shifts in sample distribution. From this perspective, we can reasonably mitigate concerns about potential biases in the variable selection process.[54]

[54] As a further robustness check, Tables S.3 and S.4 in Appendix S explores the estimate results under varying selection criteria. These results confirm that while data loss (attrition) may introduce some selection bias, its impact is unlikely to substantially affect the main conclusions of this study.

Table 6. 12 Descriptive analyses by samples

Variable	Original Sample Mean	Working Sample Mean	Difference	t-value	p-value
Employed	0.852	0.930	-0.078	-25.383	0.000
Paid working hours	43.959	43.228	0.730	5.618	0.000
Elderly Care	0.151	0.146	0.005	1.737	0.082
Age	42.344	41.371	0.972	17.584	0.000
Hukou	0.450	0.445	0.005	1.306	0.192
Education	2.537	2.589	-0.052	-6.103	0.000
Health	0.895	0.894	0.001	0.555	0.579
Household Total Gross Income	59927.85	60536.24	-608.400	-0.771	0.450
Household Size	3.863	3.907	-0.045	-4.703	0.000
High-skilled occupation	1.152	1.150	0.002	0.803	0.422
Permanent contract	0.315	0.307	0.008	2.323	0.026
State-owned firm	0.270	0.258	0.012	3.480	0.001

6.5.3. Mechanisms

6.5.3.1. What Limits Husbands in Balancing Work and Family Elderly Care?

According to the discussion in Section 6.5.1, one reason that family elderly care responsibilities may significantly reduce the probability of husband's employment is inflexible work arrangements. Full time work might limit the flexibility for husbands to coordinate paid labour work and unpaid elderly care work (see Heger and Korfhage, 2020 for fifteen European countries and Israel, from 2004 to 2015). Although our analysis period aligns with the period Heger and Korfhage (2020) analyse, it is unclear whether the above argument applies to China, where there is less comprehensive social welfare system and unemployment insurance system compared with European countries. In order to investigate whether the lack of flexibility in work is the underlying mechanism behind husbands having to withdraw from the labour market when facing family elderly care responsibilities in China, this section explores the impact of family elderly care responsibilities on the probability of husbands engageing in part-time and full-time work.

There is no uniform definition of part time work which varies across countries, and CHNS survey does not include a direct question about part-time/full-time employment of individuals. According to the Implementation Regulations of China's Labour Contract Law, however part-time work refers to a form of employment where hourly wages are the main basis and the cumulative working hours per week that do not exceed 24 hours.[55] This subsection estimates a

[55] This standard is less than 30 hours per week in other countries such as Finland and

version of equation 6.5 with dependent variable as work types (full-time/ part-time) with three alternative definitions of part-time work by using information on weekly working hours. (24 hours/ 30 hours/ 35 hours per week).[56]

$$\text{Work types} = \gamma_0 + \gamma_1 EC_{ipt} + \gamma_2 P_{ipt\_m} + \gamma_3 M_{ipt\_m} + \gamma_4 F_{ipt\_m} + T_t + C_p + \mu_{ipt\_m} \quad 6.5$$

The two new dependent variables, part-time and full-time, are all binary variables. For husbands who are not employed, the part-time variable is assigned a value of 0. For those who are employed, if the husband's weekly working hours fall below the maximum hours designated for part-time work (24 hours/30 hours/35 hours per week), the part-time variable is set to 1 to indicate engagement in part-time work. Similarly, when husbands are not employed, the full-time variable is set to 0. However, if the husband's weekly working hours surpass the defined standards, indicating full-time work, the full-time variable is assigned a value of 1.

Table 6.13 Mechanisms: 2SLS estimates of husbands' probability of full-time/ part-time employment

	24 hours		30 hours		35 hours	
	(1) Part time	(2) Full time	(3) Part time	(4) Full time	(5) Part time	(6) Full time
Elderly Care Responsibility	-0.044	-0.071**	-0.115	-0.070*	-0.126	-0.077**
	(0.058)	(0.036)	(0.071)	(0.037)	(0.081)	(0.039)
Age	0.028***	0.030***	0.032**	0.033***	0.033***	0.035***
	(0.010)	(0.008)	(0.014)	(0.009)	(0.012)	(0.010)
Age squared	-0.000***	-0.000***	-0.000**	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou	-0.398***	-0.059***	-0.356***	-0.059***	-0.325***	-0.061***
	(0.038)	(0.020)	(0.048)	(0.020)	(0.048)	(0.021)
Lower middle school degree	-0.017	-0.001	-0.017	0.000	-0.011	0.001
	(0.013)	(0.008)	(0.017)	(0.008)	(0.013)	(0.009)
Upper middle school degree	-0.073**	0.023	-0.047	0.026	-0.031	0.028
	(0.031)	(0.016)	(0.032)	(0.017)	(0.029)	(0.019)
Technical or vocational degree	0.088	0.100***	0.109	0.105***	0.214**	0.106***
	(0.089)	(0.023)	(0.100)	(0.024)	(0.096)	(0.026)
University or college degree or higher	0.010	0.111***	0.012	0.114***	0.112	0.116***
	(0.099)	(0.022)	(0.121)	(0.023)	(0.109)	(0.026)
Health	0.038	0.024	0.026	0.024	0.040	0.024
	(0.043)	(0.016)	(0.043)	(0.017)	(0.041)	(0.018)
Child Care	-0.004	-0.001	0.008	0.001	0.004	0.001
	(0.026)	(0.012)	(0.026)	(0.013)	(0.025)	(0.013)
Wife's second occupation	0.098**	0.034*	0.104***	0.032*	0.097***	0.037**
	(0.041)	(0.017)	(0.035)	(0.018)	(0.037)	(0.019)
Wife's monthly labour income	-0.058***	-0.014***	-0.054***	-0.014***	-0.050***	-0.015***
	(0.007)	(0.002)	(0.006)	(0.002)	(0.006)	(0.003)
Household size	-0.008	-0.006	-0.013	-0.007	-0.013	-0.007
	(0.010)	(0.006)	(0.009)	(0.007)	(0.009)	(0.007)
Household total gross income	0.054***	0.046***	0.051***	0.053***	0.048***	0.055***
	(0.011)	(0.008)	(0.012)	(0.009)	(0.009)	(0.009)

Malaysia. The United States, Australia, Denmark, Sweden, and Japan consider working less than 35 hours per week as the standard for part-time work.

[56] The definitions of EC_{ipt} , P_{ipt_m} , M_{ipt_m}, F_{ipt_m}, T_t , C_p and μ_{ipt_m} are same with that in equation 6.1

Constant	-0.356	-0.032	-0.286	-0.160	-0.183	-0.199
	(0.230)	(0.162)	(0.366)	(0.168)	(0.306)	(0.175)
T-test	0.398		-0.562		-0.547	
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effects	No	No	No	No	No	No
Number of Observations	887	4145	1095	3856	1315	3554
Adjusted R2	0.561	0.092	0.485	0.100	0.421	0.104

* p < 0.1, ** p < 0.05, *** p < 0.01; Robust standard errors clustered at province level.

Table 6.12 report the estimation results.[57] Consistent with the findings of Heger and Korshage (2020) (elderly care significantly decrease the probability of employment for full-time working husbands by 6.7 percentage points), the responsibility of family elderly care significantly decreases the probability of full-time employment for husbands at all three defined standards by 7.1 percentage points to 7.7 percentage points, which is slightly higher than that of estimate results of Heger and Korshage (2020). However, the responsibility of family elderly care does not significantly reduce the probability of part-time job employment. This may be because compared to husbands who work full-time, those who work part-time are more flexible in arranging paid labour time and unpaid household time. They can balance paid labour work and unpaid elderly care without leaving the labour market.

6.5.3.2. Early Retirement

According to the discussion in Section 6.5.3.2, family elderly care responsibility significantly decreases the probability of employment of husbands. However, it remains unclear in what form and at what age these husbands withdrew from the labour market with family elderly care responsibility. One important way to exit the labour market is through retirement. Heger and Korshage (2020) support early retirement as an important way for men to exit the labour market facing elderly care burden. In order to test whether the responsibility of family elderly care will lead to early retirement of married men in China, we estimate a version of our benchmark equation 6.1 which is specified in equation 6.6.[58] Early retirement is a binary variable and defined as 1 if husband retired before 60 years old,[59] and as zero if husband has been employed or seeking the job in the labour market. However, only 0.63% of the observations report early retirement that early retirement equals to 1.

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[57] The first stage estimates results are reported in Tables K.1 and K.2 in Appendix K.

[58] The definition of EC_{ipt} , P_{ipt_m} , M_{ipt_m}, F_{ipt_m} , T_t , C_p and μ_{ipt_m} are same with that in equation 6.1

[59] In China, the minimum retirement age for men is 60 years old.

$$\text{Early retirement}_{ipt} = \gamma_0 + \gamma_1 EC_{ipt} + \gamma_2 P_{ipt\_m} + \gamma_3 M_{ipt\_m} + \gamma_4 F_{ipt\_m} + T_t + C_p + \mu_{ipt\_m} \quad 6.6$$

The results are presented in Table 6.13 and indicate that there is no significant impact of family elderly care responsibility on male early retirement (column (1)).[60] Although this is inconsistent with international evidence (see, for example Fischer and Muller (2020) for German; Casta-Font et. Al (2023) for Spain and Niimi (2018) for Japan), these results might be in line with the actual situation of China's social and economic development. The current mandatory retirement age system in China still applies, and early retirement will lead to a shortened payment period. This not only results in an appropriate reduction of basic pension insurance benefits, but also reduces the accumulated number of personal accounts, ultimately leading to a varying degree of reduction in the benefits of pension insurance. Therefore, even if one approaches retirement age and assumes the responsibility of caring for the elderly, considering their own pension benefits in the future, workers may be avoiding making early retirement decisions as much as possible. Considering that the observations reporting early retirement are more likely to be concentrated in the ageing group (age 45-60), we rerun the equation 6.6 in the subgroup that aged 45 and above (column (2)). Although the magnitude increase, the estimate results is still unsignificant.

In order to further reduce the bias that might be caused by the small sample size of early retirement observations, further explore the benchmark results presented in Table 6.13 for the employment status and paid working hours of husbands by age groups. It divides all observations into three age groups (18-34 years old, 35-44 years old, and 45-60 years old) for both extensive and intensive margins from column (2) to column (7) in Table 6.13. According to Table 6.13, family elderly care responsibilities do not significantly reduce the probability of husband being employed in older age groups, which is consistent with the results of early retirement regression (column (1))

In terms of the extensive margin, only for middle age group, compared with the husbands whose families do not face elderly care responsibility, those husbands whose families face elderly care responsibility have lower probability to be employed by 12.5 percentage points. This may be due to the fact that men in the middle age group are in a stage where they face both for sufficient companionship for their children and the accelerated ageing of their parents. The

[60] The first stage estimates results are reported in Tables K.1 and K.2 in Appendix K.

Table 6.14 Mechanisms: 2SLS estimates of husband's early retirement decision and labour supply (by age)

	Retirement		Probability of Employment			Paid Working Hours		
		45-60	18-34	35-44	45-60	18-34	35-44	45-60
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Elderly Care	0.008	0.025	0.060	-0.125***	-0.036	-10.087***	-3.373	-0.727
	(0.010)	(0.024)	(0.061)	(0.046)	(0.049)	(3.686)	(3.343)	(3.409)
Age	-0.010***	-0.136***	-0.026	0.000	0.150***	0.584	-4.459	0.463
	(0.002)	(0.033)	(0.043)	(0.074)	(0.046)	(2.993)	(4.376)	(3.538)
Age square	0.000***	0.001***	0.000	-0.000	-0.002***	-0.010	0.056	-0.006
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.049)	(0.056)	(0.035)
Hukou	0.015***	0.038***	-0.018	-0.049**	-0.107***	1.229	4.971***	4.021***
	(0.004)	(0.010)	(0.019)	(0.024)	(0.022)	(1.672)	(1.396)	(1.355)
Lower middle school degree	0.007***	0.022***	-0.031	0.004	-0.002	3.897*	2.488	1.668
	(0.002)	(0.008)	(0.021)	(0.009)	(0.017)	(2.076)	(1.533)	(1.697)
Upper middle school degree	0.000	0.010	0.018	0.011	0.015	4.444**	2.571	1.061
	(0.003)	(0.008)	(0.041)	(0.017)	(0.022)	(1.972)	(1.770)	(2.120)
Technical or vocational degree	-0.007***	-0.025***	0.018	0.068***	0.179***	5.715***	0.711	-0.158
	(0.002)	(0.007)	(0.039)	(0.018)	(0.029)	(1.510)	(2.224)	(2.353)
University or college degree or higher	0.002	0.005	0.082*	0.088***	0.130***	-1.090	-1.253	-1.822
	(0.005)	(0.011)	(0.046)	(0.017)	(0.022)	(1.369)	(1.729)	(2.642)
Health	0.005	0.015**	-0.008	0.019	0.026	-3.018	1.372*	-1.124
	(0.003)	(0.007)	(0.025)	(0.017)	(0.018)	(2.071)	(0.814)	(1.140)
Childcare	-0.001	0.011	0.015	-0.020	-0.016	-2.884***	0.068	-1.836
	(0.002)	(0.009)	(0.018)	(0.015)	(0.037)	(0.657)	(1.027)	(2.349)
Wife's second occupation	-0.001	-0.009**	0.048***	0.013	0.045	-3.847	-0.364	-7.754***
	(0.001)	(0.004)	(0.014)	(0.013)	(0.028)	(2.947)	(0.921)	(2.804)
Wife's monthly labour wage	0.001**	0.002	-0.018***	-0.008***	-0.016***	0.899***	0.655***	0.604***
	(0.000)	(0.001)	(0.005)	(0.002)	(0.004)	(0.204)	(0.163)	(0.205)
Household size	-0.001	-0.002	-0.022***	-0.002	-0.001	0.207	-0.378	-0.447
	(0.001)	(0.002)	(0.005)	(0.005)	(0.009)	(0.689)	(0.443)	(0.802)
Household total gross income	-0.000	-0.002	0.074***	0.025***	0.038***	0.080	0.664*	1.719**
	(0.001)	(0.002)	(0.014)	(0.008)	(0.008)	(1.013)	(0.381)	(0.776)
High skilled occupation						1.247	1.066	0.592
						(0.952)	(1.119)	(1.094)
permanent contract						0.238	-1.404	0.989
						(0.956)	(1.055)	(2.262)
State-owned firm						-4.536***	-8.663***	-8.415***
						(1.352)	(0.656)	(1.464)
Constant	0.177***	3.283***	0.632	0.775	-2.901**	36.402	125.342	17.362
	(0.048)	(0.806)	(0.623)	(1.472)	(1.127)	(40.659)	(84.188)	(85.690)
Permutation test			0.133*	-0.117**	0.042	-8.030*	-0.584	4.438
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4607	1675	969	2044	1775	844	1800	1474
Adjusted R2	0.039	0.071	0.174	0.028	0.132	0.104	0.094	0.087

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Robust standard errors clustered at the province level.

family care pressure they face is the highest among all three age groups. If the burden of elderly care for families increases at this time, they are more likely to withdraw from the labour market. In terms of the intensive margin, for 18-34 years old husband we observe a significant negative effect of elderly care on paid working hours (-10.087 hours). For the other two age groups, family elderly care responsibility does not have significant effect on husband's paid working hours. This may be attributed to the Chinese government's policy

trajectory, which initially encouraged families to have two children during the 1970s, prior to the formal implementation of the one-child policy in 1980. As a result, younger spouses in this study tend to have fewer siblings, making it more difficult to share the responsibility of elderly care. In the absence of adequate formal care support, they are compelled to allocate time to caregiving, often at the expense of paid working hours, affecting both wives and husbands.

6.5.3.3. Household Chores

According to the discussion of Chapter 2, in China, wives, rather than husbands usually are the primary caregivers for the elderly. However, as one of the providers of total household utility, it is also worth exploring what role the husband plays in undertaking the responsibility of elderly care in the family. When family elderly care responsibility increases, understanding how family elderly care responsibilities shared between spouse and how family elderly care responsibilities affect the labour supply of husbands may also be informative for policy makers concerned with Chinese family policies. The CHNS does not directly provides information on whether husband provides elderly care or not, it is not possible to identify directly whether the husband shares the responsibility of elderly care. However, it includes information on whether the husband undertakes unpaid household work or not and household working minutes per day conditional on they undertake unpaid household work. In this section we utilise this information to explore the changes in the time allocated by husbands to unpaid family care work when facing elderly care responsibilities.

The definition of Household work and Household Time (in minutes) depends on the answers to following questions in CHNS that have been present in Table 6.14. Household work in this subsection is a dummy variable to indicate whether the respondents undertake unpaid household work or not. If the respondent's answer is "yes" for "During the past week, did you buy food/ prepare and cook food/ wash clothes/ cleaning house for your household?", then Household work equals to 1. If the answer is "no" for all of four questions, then the Household work equals to 0. Household Time (in minutes) is a continues variable. It is the sum of the minutes spent in all these activities.

Table 6.15 Definition of household work and household time (in munities)

Variable Name	CHNS Question	Definition	Variable Type
Buy food for household	During the past week, did you buy food for your household? 0 no 1 yes 9 unknown * If "no" or "unknown," skip down to next item.	Whether the respondent bought food for his/her own household: 1-Yes 1- No	Dummy variable
Buy food for household minutes	During the past week, how much time did you spend on buying food for household per day, on average? (minutes)	Minutes on buying food for respondents' own household	Continues variable
Prepare and cook food for household	During the past week, did you prepare and cook food for your household? 0 no 1 yes 9 unknown * If "no" or "unknown," skip down to next item.	Whether the respondent prepared and cook food for his/her own household: 1-Yes 1- No	Dummy variable
Prepare and cook food for household minutes	During the past week, how much time did you spend on buying food for household per day, on average? (minutes)	Minutes on preparing and cooking food for respondents' own household	Continues variable
Wash clothes for household	During the past week, did You wash clothes for your household? 0 no 1 yes 9 unknown * If "no" or "unknown," skip down to next item.	Whether the respondent washed clothes for his/her own household: 1-Yes 1- No	Dummy variable
Wash clothes for household minutes	During the past week, how much time did you spend on washing clothes for household per day, on average? (minutes)	Minutes on washing clothes for respondents' own household	Continues variable
Clean house	During the past week, did you clean house for your household? 0 no 1 yes 9 unknown * If "no" or "unknown," skip down to next item.	Whether the respondent cleaned house for his/her own household: 1-Yes 1- No	Dummy variable
Clean house minutes	During the past week, how much time did you spend on cleaning house for household per day, on average? (minutes)	Minutes on cleaning house for respondents' own household	Continues variable

To explore the impact of family elderly care responsibility on husbands' household work supply we estimate the following specification:

$$\text{Household work supply} = \gamma_0 + \gamma_1 EC_{ipt} + \gamma_2 P_{ipt\_m} + \gamma_3 M_{ipt\_m} + \gamma_4 F_{ipt\_m} + T_t + C_p + \mu_{ipt\_m} \quad 6.7^{61}$$

Household work supply measured as household work status and household time. Table 6.15 reports the changes in husband's household work status and time when his family facing the responsibility of elderly care at home.[62] For all observations (column (1) and (2)), compared with husbands whose families does not have family elderly care responsibilities, husbands whose families face elderly care responsibilities are more likely to undertake household work by 10.9 percentage points significantly and spend significantly more time on household working time by 14.7 minutes per day. This suggests that when facing the responsibility of

[61] The definition of EC_{ipt} , P_{ipt_m} , M_{ipt_m}, F_{ipt_m} , T_t , C_p and μ_{ipt_m} are same with that in equation 6.1.

[62] The first stage estimates results are reported in Tables K.1 and K.2 in Appendix K.

elderly care in the family, the husband shares the unpaid household work, regardless of whether or not he directly provides elderly care. This is consistent with the description in international literature which indicates that husbands would increase their time on unpaid household work when family care burden increases (see, for example, Auspurg, Iacovou and Nicoletti, 2017 for UK; Carlson, Petts and Pepin, 2022 for US). The additional unpaid family care work may be one of the mechanisms through which the decrease in the labour supply of husbands who face the responsibility of elderly care in the family at extensive margin operates.

The additional columns in Table 6.15 further explores the impact of family elderly care provision on husbands' labour supply by employment status (columns (3)-(6)) and work type (columns (7)-(10)). The results in columns (3)-(6) show that the probability that husbands share the responsibility of family care varies by their employment status. For those husbands who are not employed, the responsibility of elderly care in the family significantly increases the husband's probability to undertake household work by 38.2 percentage points. For husbands who have already been employed, the positive impact of family elderly care responsibilities on their probability to undertake household work is in only 9.7 percentage points.[63] The results in columns (7)-(10) further suggest that conditional on employment, for husbands who work part-time, although elderly care responsibility have no significant positive effect on husbands' probability to undertake household work, elderly care responsibility increase their household working time by 26.286 minutes per day. While, for husbands who work full-time, the positive impact of family elderly care responsibilities on household time turns to non-significant. This result also indirectly confirms the argument in section 6.5.3.1. that for husbands who work full-time, the elderly care responsibilities are not negatively affect their paid work hours, as they do not share any unpaid family care work at both extensive and intensive margins. For husbands who are relatively flexible in their work, they demonstrate more responsibility sharing.

This subsection further explores the behavioral preferences of husbands when they are sharing household chores facing the family elderly care burden. According to Table 6.16, we defined four dummy variables to represent whether the husband undertakes certain household chores (Buy food/ Cook/ Wash clothes/ Clean the house) or not and four continues variables to represent the time that husband undertake in these household chores (Buy food time/ Cooking time/ Wash clothes time/ Clean the house time). Table 6.16 reports the impact of family elderly

[63] 38.2 percentage points is significantly different from 9.7 percentage points. Permutation test results (have not been employed group- have been employed group = 3.08, p-value=0.000)

care responsibilities on the husbands' household work supply at both extensive and intensive margins. We find that the responsibility of elderly care might encourage husbands to increase their probability of cooking and cleaning house for the household by 10.7 percentage points and 9.9 percentage points, respectively, but there is no significant positive impact at the intensive margin for cooking and cleaning the house. The positive impact of elderly care responsibilities on buying food and washing clothes for households is concentrated at the intensive margin rather than extensive margin by 8.126 minutes and 11.306 minutes per day, respectively. Although no clear evidence has been found, one possible explanation is that buying food and washing clothes (including using a washing machine) are easier compared to the other two activities, and most husbands may undertake them before they face elderly care responsibilities. Therefore, when the husband faces the pressure of family elderly care, there is no significant change at the extension margin, but the husband will spend more time sharing to buy food and wash clothes for the family. However, cooking and cleaning the house requires some experience, patience, and skills. Before facing the responsibility of elderly care, husbands may not need do that for the family. But as family care responsibilities increase, husbands may have to start cooking and cleaning the house for their families.

Table 6.16 Mechanisms: 2SLS estimates results on husband's household work supply

	All observations		Have not been employed		Have been employed		Part time (weekly working hours <24 hours)		Full time (weekly working hours >24 hours)	
	Household work	household time (in minutes)	Household work	household time (in minutes)	Household work	household time (in minutes)	Household work	household time (in minutes)	Household work	household time (in minutes)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Elderly Care Responsibility	0.109**	14.700*	0.382*	52.853	0.097*	8.243	0.245	26.286*	0.063	5.781
	(0.054)	(7.802)	(0.225)	(43.673)	(0.059)	(8.476)	(0.174)	(15.218)	(0.055)	(10.547)
Age	0.014*	-1.855	0.019	5.205	0.016	-1.456	0.004	-1.096	0.022*	-1.971
	(0.008)	(1.779)	(0.037)	(5.465)	(0.011)	(1.705)	(0.011)	(2.446)	(0.012)	(2.011)
Age squared	-0.000	0.033	-0.000	-0.050	-0.000	0.026	-0.000	0.016	-0.000	0.034
	(0.000)	(0.022)	(0.000)	(0.067)	(0.000)	(0.021)	(0.000)	(0.032)	(0.000)	(0.025)
Hukou	0.006	11.707***	-0.019	22.435	-0.020	7.433	-0.011	35.302***	-0.025	5.853
	(0.029)	(3.919)	(0.046)	(17.637)	(0.028)	(5.834)	(0.064)	(4.680)	(0.028)	(6.239)
Lower middle school degree	-0.006	2.652	0.012	-6.904	-0.017	4.066	-0.075***	2.294	0.005	4.937
	(0.011)	(2.266)	(0.063)	(7.111)	(0.015)	(3.183)	(0.028)	(4.984)	(0.018)	(3.664)
Upper middle school degree	0.008	5.199	-0.017	-9.676	0.007	7.731	-0.148***	-12.059	0.040***	9.766*
	(0.019)	(5.312)	(0.078)	(12.874)	(0.021)	(5.385)	(0.055)	(7.496)	(0.016)	(5.571)
Technical or vocational degree	0.026	-8.705**	0.123	-67.593***	0.004	-0.469	-0.202*	-18.189	0.027	1.173
	(0.030)	(4.332)	(0.118)	(22.615)	(0.031)	(5.137)	(0.114)	(13.579)	(0.030)	(6.330)
University or college degree or higher	-0.001	-4.205	0.076	-11.461	-0.033	3.299	0.181**	23.895*	-0.009	5.289
	(0.030)	(6.026)	(0.130)	(10.707)	(0.029)	(6.506)	(0.082)	(12.824)	(0.028)	(7.464)
Health	-0.028	-1.407	0.004	25.824***	-0.027	-1.761	-0.061*	4.145	-0.019	-3.460
	(0.019)	(4.292)	(0.088)	(9.618)	(0.020)	(4.097)	(0.033)	(6.240)	(0.026)	(5.016)
Child Care	-0.049*	10.855***	-0.061	22.083**	-0.046	8.577***	-0.090	1.100	-0.031	11.069**
	(0.027)	(3.439)	(0.077)	(8.976)	(0.028)	(3.159)	(0.076)	(6.313)	(0.032)	(4.497)
Wife's second occupation	0.005	0.660	0.087	-41.576*	-0.004	2.951	0.038	3.654	-0.012	3.911
	(0.034)	(4.028)	(0.139)	(25.257)	(0.035)	(3.964)	(0.037)	(5.427)	(0.046)	(4.455)
Wife's monthly labour income	0.013***	1.705***	0.035***	1.008	0.011***	1.434**	0.015	2.650**	0.011***	1.243*
	(0.003)	(0.554)	(0.007)	(2.287)	(0.003)	(0.577)	(0.010)	(1.327)	(0.003)	(0.635)
Household size	-0.030***	-3.754***	-0.021	-6.315	-0.031***	-3.471***	-0.002	-1.733	-0.037***	-3.824***
	(0.008)	(0.868)	(0.022)	(4.170)	(0.008)	(0.869)	(0.010)	(2.348)	(0.009)	(0.801)
Household total gross income	0.002	-2.239***	-0.052***	-3.447	0.005	-1.011	0.009	-0.049	0.007	-0.981
	(0.005)	(0.780)	(0.014)	(3.065)	(0.005)	(0.763)	(0.012)	(2.455)	(0.007)	(0.760)
High skilled occupation					0.007	-0.262	-0.020	-101.241***	0.001	0.625
					(0.020)	(4.706)	(0.162)	(25.603)	(0.020)	(5.086)
permanent contract					-0.029	-3.297	-0.020	-49.634***	-0.030	-3.076
					(0.021)	(5.462)	(0.132)	(11.653)	(0.020)	(5.979)
State-owned firm					0.087***	1.799	0.328***	66.732***	0.083***	1.605
					(0.019)	(6.152)	(0.107)	(21.361)	(0.019)	(6.393)
Constant	0.799***	125.075***	0.541	-38.968	0.750***	112.131***	0.687**	25.173	0.602**	123.141***
	(0.143)	(32.690)	(0.744)	(89.786)	(0.238)	(32.770)	(0.273)	(50.664)	(0.275)	(36.947)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4774	2600	330	214	4106	2207	525	299	3494	1862
Adjusted R2	0.202	0.175	0.185	0.212	0.208	0.164	0.309	0.250	0.200	0.162

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, *Robust standard errors clustered at the province level.*

Table 6.17 Mechanisms: 2SLS estimates results on husband's household work supply by activities

	Buy food (1)	Buy food time (2)	Cook (3)	Cooking time (4)	Wash clothes (5)	Wash clothes time (6)	Clean the house (7)	Clean the house time (8)
Elderly Care Responsibility	0.039	8.126***	0.107**	3.828	0.042	11.306*	0.099***	8.011
	(0.052)	(2.919)	(0.043)	(4.614)	(0.045)	(6.525)	(0.036)	(6.767)
Age	0.015*	-0.167	0.022***	-1.011	-0.014*	0.720	-0.014	-0.849*
	(0.009)	(1.048)	(0.007)	(1.430)	(0.007)	(1.354)	(0.010)	(0.503)
Age squared	-0.000	0.005	-0.000**	0.016	0.000**	-0.008	0.000	0.011*
	(0.000)	(0.013)	(0.000)	(0.017)	(0.000)	(0.015)	(0.000)	(0.006)
Hukou	-0.033	5.072***	0.045	4.752***	0.055***	1.687	0.057***	3.323***
	(0.035)	(1.828)	(0.033)	(1.354)	(0.020)	(1.445)	(0.020)	(1.075)
Lower middle school degree	0.005	0.887	-0.022	1.183	0.018	-0.791	0.002	1.645**
	(0.012)	(1.274)	(0.014)	(1.421)	(0.014)	(2.319)	(0.013)	(0.725)
Upper middle school degree	0.025	-0.292	0.007	0.331	0.029	0.522	0.022	1.690*
	(0.016)	(2.201)	(0.032)	(2.121)	(0.022)	(2.964)	(0.026)	(0.997)
Technical or vocational degree	0.001	-0.964	0.013	-2.797	0.027	-5.144*	0.054**	-5.492***
	(0.028)	(4.787)	(0.024)	(3.001)	(0.022)	(3.069)	(0.021)	(1.550)
University or college degree or higher	0.019	-1.031	-0.041	-5.569*	0.013	-0.891	0.019	-0.446
	(0.025)	(2.437)	(0.033)	(2.972)	(0.020)	(2.636)	(0.027)	(2.373)
Health	-0.006	-0.244	-0.035*	0.382	-0.038	-3.301	-0.041*	1.705
	(0.023)	(1.509)	(0.020)	(2.138)	(0.025)	(2.578)	(0.023)	(1.549)
Child Care	-0.038	0.779	-0.008	3.428**	0.028**	0.623	0.022	3.207*
	(0.025)	(1.953)	(0.037)	(1.444)	(0.013)	(2.718)	(0.017)	(1.879)
Wife's second occupation	-0.000	-0.010	0.029	2.763	-0.005	-2.595	0.003	-1.669
	(0.028)	(1.977)	(0.022)	(2.139)	(0.029)	(2.708)	(0.032)	(1.662)
Wife's monthly labour income	0.009***	0.163	0.024***	-0.008	0.011***	-0.583	0.011***	0.195
	(0.003)	(0.149)	(0.003)	(0.202)	(0.002)	(0.482)	(0.002)	(0.263)
Household size	-0.034***	0.359	-0.050***	-0.946	-0.027***	1.203	-0.029***	-0.568
	(0.009)	(0.395)	(0.009)	(0.736)	(0.004)	(0.965)	(0.007)	(0.595)
Household total gross income	-0.005	0.056	-0.016**	0.154	-0.002	-0.416	-0.010**	-1.065**
	(0.006)	(0.349)	(0.007)	(0.318)	(0.003)	(0.412)	(0.004)	(0.505)
Constant	0.707***	30.532	0.341*	26.096	0.647***	29.333	0.980***	55.290***
	(0.190)	(22.849)	(0.183)	(29.317)	(0.125)	(32.557)	(0.162)	(12.450)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4774	2052	4773	1710	4771	887	4772	1434
Adjusted R2	0.130	0.051	0.139	0.504	0.076	0.040	0.083	0.098

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Robust standard errors clustered at the province level.

6.5.3.4. Heterogeneity by Care Recipient

According to the discussions in Chapter 2, following traditional Chinese family culture, daughter-in-law is often considered to be the main caregiver for taking care of husband's parents. With the progress of society, women not only face the responsibility of supporting their parents in law as daughter-in-law but also participate in their own parents' elderly care provision as daughters. In the process of allocating family elderly care resources, women, as primary providers of elderly care support, face a conflict of dual roles of "daughter-in-law and daughter". An increasing number of studies find that women are more inclined to prioritize family elderly care resources towards their own parents rather than their parents in laws (Gao, 2011). However, husbands, unlike wives, mostly still reside in their own homes after marriage and are subject to less moral constraints to provide elderly care for their parents-in-law. When we explore the impact of family elderly care responsibility, on husband's labour supply, it is unclear whether different care recipients will lead different labour supply responses.

In this section we explore this possibility and estimate a version of the benchmark specification (equation 6.1). More formally, we set three variables based on the care recipient, namely EC_ Parents (if the wife provides elderly care to the husband's parents, then EC_Parents=1; if the wife does not provide elderly care, then EC_Parents=0), EC_ Parents in law (if the wife provides elderly care to wife's parents, then EC_Parents in law=1; if the wife does not provide elderly care, then EC_Parents in law=0) and EC_ Both Parents and Parents in law (if the wife provides elderly care to both the husband's parents and the wife's parents, then EC_Both Parents and Parents in law=1; if the wife does not provide elderly care, then EC_Both Parents and Parents in law=0). Then we rerun the benchmark model by including each of these new independent variables (EC_ Parents, EC_Parents in law and EC_ Both Parents and Parents in law) rather than the Elderly Care Responsibility dummy.

According to Table 6.17, regardless of whether the person being cared is husband's own parents, parents-in-law or both own parents and parents in law, the husband's probability of being employment is significantly lower when there is elderly care responsibility in the household, which is consistent with the benchmark model.[64] However, there is a significant difference in magnitude by different care recipients at extensive margin. Specifically, a comparison of columns (1) and (2) suggest that, if the elderly taken care of is husband's own parents, which leads to a greater decrease in the probability of being employed than that for

[64] The first stage estimates results are reported in Tables K.1 and K.2 in Appendix K.

husband's parents in law. When the elderly care responsibility comes from both parents and parents in law, the negative impact of elderly care provision on the probability to be employed is largest at 33 percentage points (column (3)), which is greater in magnitude than the other two subgroups. In terms of the intensive margin, we do not find any significant effect of elderly care responsibility on husbands paid working hours in either of the three subgroups.

Table 6.18 Mechanisms: 2SLS estimate of husband's labour supply by care recipient

	Probability of Employment			Paid Working Hours		
	EC_Parents	EC_Parents in law	EC_Both Parents and Parents in law	EC_Parents	EC_Parents in law	EC_Both Parents and Parents in law
	(1)	(2)	(3)	(4)	(5)	(6)
Parents （husband）	-0.145**			-7.289		
	(0.057)			(5.216)		
Parents in law （husband）		-0.110**			-7.818	
		(0.055)			(5.497)	
Both Parents and Parents in law （husband）			-0.330**			-21.397
			(0.148)			(13.242)
Age	0.028***	0.028***	0.025***	0.132	0.023	-0.127
	(0.009)	(0.009)	(0.009)	(0.270)	(0.340)	(0.365)
Age squared	-0.000***	-0.000***	-0.000***	-0.003	-0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.004)	(0.004)	(0.005)
Hukou	-0.078***	-0.061***	-0.058***	3.894***	3.960***	4.201***
	(0.018)	(0.022)	(0.020)	(1.050)	(1.121)	(1.120)
Lower middle school degree	0.001	-0.005	-0.002	2.071	2.196*	2.314**
	(0.007)	(0.006)	(0.006)	(1.266)	(1.247)	(1.173)
Upper middle school degree	0.018	0.014	0.020	2.669**	2.946**	2.797**
	(0.013)	(0.012)	(0.016)	(1.248)	(1.158)	(1.245)
Technical or vocational degree	0.102***	0.096***	0.102***	1.611	1.754	1.630
	(0.020)	(0.022)	(0.025)	(1.321)	(1.231)	(1.295)
University or college degree or higher	0.118***	0.102***	0.111***	-1.253	-1.148	-1.121
	(0.022)	(0.020)	(0.023)	(1.121)	(1.064)	(1.166)
Health	0.013	0.024	0.012	-0.407	-0.036	-0.960
	(0.012)	(0.016)	(0.015)	(0.720)	(0.801)	(0.618)
Child Care	-0.005	-0.003	-0.002	-1.944***	-1.811***	-1.850***
	(0.009)	(0.010)	(0.008)	(0.481)	(0.669)	(0.676)
Wife's second occupation	0.031**	0.026*	0.039**	-3.152***	-3.828***	-3.094***
	(0.014)	(0.015)	(0.017)	(1.019)	(0.874)	(0.997)
Wife's monthly labour income	-0.013***	-0.014***	-0.014***	0.700***	0.679***	0.685***
	(0.002)	(0.002)	(0.002)	(0.125)	(0.132)	(0.126)
Household size	-0.003	-0.006	-0.005	-0.291	-0.352	-0.296
	(0.005)	(0.005)	(0.005)	(0.235)	(0.252)	(0.239)
Household total gross income	0.037***	0.039***	0.039***	0.888***	1.134***	1.046***
	(0.006)	(0.005)	(0.005)	(0.344)	(0.274)	(0.291)
High skilled occupation				0.820	1.080	0.827
				(0.643)	(0.745)	(0.739)
permanent contract				-0.649	0.084	0.186
				(0.977)	(1.135)	(1.195)
State-owned firm				-7.559***	-8.429***	-7.681***
				(0.857)	(0.958)	(1.026)
Constant	0.100	0.093	0.162	33.034***	32.212***	36.863***
	(0.180)	(0.172)	(0.181)	(5.355)	(7.114)	(8.027)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4351	4365	4250	3739	3757	3666
Adjusted R2	0.090	0.082	0.036	0.076	0.077	0.036

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Robust standard errors clustered at the province level.

The above results suggest that compared to the parents-in-law, the husband is more willing to withdraw from the labour market when his own parents to be cared for. At this time, compared to husbands who do not have family elderly care responsibilities, husbands who face dual care pressure from their own parents and parents in law have a greater sacrifice in labour supply as higher elderly care intensity.

6.5.3.5. Heterogeneity by Living Arrangements

The evidence suggests that there are heterogeneous effects of living arrangement citation required. To do so, we re-estimate equation 6.1 by co-residence status. Table 6.18 presents estimation results, where all observations are divided into two sub-sample groups according to whether husbands lived with parents and/or parents-in-law or not.[65]

Table 6.19 Mechanisms: 2SLS estimates of husband's labour supply by living arrangement

	Probability of Employment		Paid Working Hours	
	Co-resident	Not co-resident	Co-resident	Not co-resident
	(1)	(2)	(3)	(4)
Elderly Care Responsibility	-0.001	-0.081**	-6.342**	-1.343
	(0.046)	(0.041)	(2.581)	(3.884)
Age	0.034***	0.018*	0.483	0.405
	(0.013)	(0.009)	(0.479)	(0.378)
Age squared	-0.000***	-0.000**	-0.007	-0.005
	(0.000)	(0.000)	(0.008)	(0.005)
Hukou	-0.038	-0.076***	1.652	5.001***
	(0.024)	(0.018)	(1.634)	(1.260)
Lower middle school degree	-0.014	0.002	3.193***	2.015
	(0.027)	(0.011)	(1.020)	(1.360)
Upper middle school degree	0.009	0.020	1.673	2.604*
	(0.033)	(0.020)	(1.682)	(1.342)
Technical or vocational degree	0.030	0.124***	0.814	2.440**
	(0.030)	(0.023)	(2.240)	(1.093)
University or college degree or higher	0.087**	0.115***	-2.502	-0.324
	(0.035)	(0.024)	(1.956)	(1.258)
Health	-0.005	0.030**	-2.069	0.024
	(0.020)	(0.012)	(1.653)	(0.839)
Child Care	-0.022	0.015	-0.551	-2.449**
	(0.014)	(0.016)	(0.631)	(1.018)
Wife's second occupation	0.059***	0.016	-4.243**	-3.474**
	(0.012)	(0.018)	(2.077)	(1.608)
Wife's monthly labour income	-0.014***	-0.013***	0.802***	0.614***
	(0.004)	(0.002)	(0.205)	(0.120)
Household size	-0.002	-0.002	-0.327	-0.299
	(0.004)	(0.005)	(0.340)	(0.480)
Household total gross income	0.057***	0.034***	1.129	0.971***
	(0.010)	(0.006)	(1.055)	(0.196)
High skilled occupation			1.482	0.215
			(1.323)	(0.796)
permanent contract			-0.730	0.109
			(0.861)	(1.177)
State-owned firm			-4.986***	-9.524***
			(1.023)	(1.213)
Constant	-0.191	0.335**	29.731**	24.088***
	(0.297)	(0.155)	(14.414)	(8.559)
Province Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Number of Observations	1379	3400	1175	2930
Adjusted R2	0.132	0.093	0.111	0.080

** $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ Robust standard errors clustered at the province level.*

[65] The first stage estimates results are reported in Tables K.1 and K.2 in Appendix K.

The first two columns in Table 6.18 report the impact of elderly care responsibility on husband's employment probability in the two sub-sample groups, respectively. Compared with those whose families do not face elderly care responsibility, for husbands whose families face elderly care responsibility and don't live with their parents (parents in law), elderly care responsibility significantly decreases the probability of employment by 8.1percenage points. This may be due to the fact that when the family faces the elderly care responsibility, the husband will contribute more to the household care work (as discussed in section 6.5.3.3), thereby reducing the probability of being employed. However, for husbands who live with their parents and/or parents in laws, this negative impact disappears (column (1)). This may be because wives who live with elderly parents and parents-in-law are more likely to be the primary caregivers. They have to withdraw from the labour market and spend more time and energy providing elderly care. In this case, the husband may need to invest more in the labour market to earn labour income to compensate for the decrease in the wife's labour income (income effect). At the same time, living with elderly parents and/or parents-in-law is more likely for husband to provide time and energy for elderly care, which might squeesing time from husbands' labour supply (substitute effect). The positive income effect and negative substitute effect may cancel out each other, resulting in us not capturing the significant impact of family elderly care responsibilities on the probability of cohabiting husbands being employed when they live together. In terms of the intensive margin, compared with those whose family does not face elderly care responsibility, family elderly care responsibility significant decreases co-resident-husband's paid working hours by 6.342 hours. This may be due to families living with elderly parents and parents-in-laws facing a greater supply of time and energy, squeezing out paid working hours, which is indirectly supports the explanation that the responsibility of family elderly care does not significantly affect the probability of co-resident husbands being employed.

6.5.3.6. Heterogeneity by Hukou

In line with the discussion in Section 5.5.3.5, Hukou might significantly influence married adult children's labour supply through access to flexible job opportunities and social formal care support. This sub-Section continues to explore the potential heterogeneous effects of Hukou. To do so, we re-estimate equation 6.1 by Hukou status. Table 6.19 presents estimation results, where all observations are divided into two sub-sample groups according to Hukou type of the husband.

According to Table 6.19, the employment probability of husbands who face elderly care

responsibility does not differ significantly from those who do not face such care responsibility, regardless of their Hukou status. However, urban working husbands who face elderly care responsibility experience a significant reduction in paid working hours by 7.51 hours per week. Conversely, no significant change in paid working hours is observed among rural husbands.

This phenomenon may be attributed to the fact that, compared to rural areas, urban regions have more developed and comprehensive flexible work arrangements and formal caregiving industries. Husbands facing the pressure of elderly care in urban areas have relatively more opportunities to adjust their paid working hours, which helps them avoid directly exiting the labour market. However, in rural areas, where the traditional norm of "raising son for old-age support" is more deeply ingrained and where job opportunities and formal caregiving resources are scarce, it is more difficult for rural husbands to adjust their paid working hours.

Table 6. 20 Mechanisms: 2SLS estimates of husband's labour supply by Hukou

	Probability of Employment		Paid Working Hours	
	Rural	Urban	Rural	Urban
	(1)	(2)	(3)	(4)
Elderly Care	-0.072	-0.027	1.623	-7.514*
	(0.048)	(0.036)	(2.094)	(3.901)
Age	0.037***	0.018***	0.136	0.453
	(0.009)	(0.005)	(0.428)	(0.549)
Age square	-0.001***	-0.000***	-0.002	-0.006
	(0.000)	(0.000)	(0.005)	(0.007)
Lower middle school degree	0.093***	-0.012	0.570	1.862*
	(0.031)	(0.009)	(1.563)	(0.967)
Upper middle school degree	0.118***	-0.013	0.317	1.248
	(0.032)	(0.013)	(1.608)	(1.374)
Technical or vocational degree	0.176***	0.056**	-0.442	2.769
	(0.034)	(0.025)	(1.675)	(2.776)
University or college degree or higher	0.166***	0.080**	-0.677	1.563
	(0.033)	(0.034)	(1.706)	(3.767)
Health	0.006	0.035***	-0.614	-0.408
	(0.020)	(0.013)	(0.882)	(1.392)
Child Care	-0.002	0.002	-1.891**	-1.206
	(0.020)	(0.012)	(0.882)	(1.231)
Wife's second occupation	0.098**	0.019	-4.456**	-3.604***
	(0.048)	(0.012)	(2.030)	(1.278)
Husband monthly income	-0.014***	-0.013***	-0.225**	1.120***
	(0.002)	(0.001)	(0.112)	(0.158)
Household size	-0.018***	-0.003	-0.188	-0.241
	(0.006)	(0.003)	(0.291)	(0.334)
Household total gross income	0.075***	0.020***	0.790**	0.951**
	(0.007)	(0.003)	(0.319)	(0.382)
High-skilled occupation			-0.542	6.029**
			(0.679)	(2.380)
Permanent contract			-3.536***	4.533***
			(0.718)	(1.569)
State-owned firm			-7.549***	-4.686**
			(0.719)	(2.214)
Constant	-0.520**	0.366***	45.801***	29.473**
	(0.203)	(0.116)	(9.486)	(12.422)
Year fixed effects	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes
Number of observations	2132	2656	1776	2338
Adjusted R^2	0.134	0.072	0.195	0.078

* p < 0.1, ** p < 0.05, *** p < 0.01,

Robust standard errors clustered at the province level.

Another possible explanation is the increasing rural-to-urban labour migration in China (Qi, 2019), particularly among male workers, which has led to geographical separation—that is, husbands are often not physically present near their aging parents or parents-in-law. In such cases, their contributions to elderly care may be more financial or in the form of remote emotional support rather than direct caregiving in terms of time and effort. Under these circumstances, husbands who have migrated away from their hometowns do not need to devote significant time or economic resources to eldercare, and thus their labor supply remains largely unaffected, both in terms of its intensity and its extensive margin.

6.5.4. Summary

To summarise the above discussion, this chapter explores the impact of family elderly care responsibility on the husbands' labour supply, which usually been ignored by many studies. We find that the impact of elderly care responsibility is likely driven by husband's sharing of family care responsibilities. Moreover, we also find that the negative impact of family elderly care responsibilities on the probability of husband employment would be enlarged by lacking flexibility in husband's work, which means that the lack of flexibility in work arrangements makes it difficult for husbands to keep balance between unpaid family care work and paid labour work. Considering the allocation of family care resources, we also find that husbands in middle age who face the greatest pressure of family care are most negatively affected. Our further heterogeneity analysis, along with the findings of Chapter 5, suggest that husbands who live with elderly parents or parents in laws are more inclined to stay in the labour market to make up for the loss of labour income of their wives due to elderly care. Compared to married women with rural household registration, the significant impact of elderly care on married women's labour supply is concentrated at the intensive margin among the urban population. Finally, we find that husbands share the responsibility of elderly care, whether it is for their own parents or in laws who need care, but they seem more willing to give up employment for their own parents.

Reminding the results for wives, the impact of family elderly care responsibilities on the labour supply of wives and husbands is not consistent. According to Section 5.5, elderly care significantly increases the probability of employment of female caregivers by 8.6 percentage points, and it significantly reduces the paid working hours of female caregivers by 4.96 hours per week. While for husbands, elderly care responsibilities decrease the probability of employment by 5.3 percentage points, and family elderly care responsibility has no-significant effects on paid working hours. When facing the responsibility of elderly care in the family, it

seems that the wife reflects more income effects, while the husband's labour supply decisions are more affected by substitution effects. One possible explanation is that women seem to have a greater sense of family responsibility than men (Blundell, 2005; Starr, 2014). This sense of family responsibility might push female likely to participate in the labour market when the family face more heavy elderly care burden, which need more financial support. The arguments of Blundell, et al (2005) indirectly support the above explanation. They find women may be more concerned about household consumption than men. A decline in family financial conditions can prompt a woman who is not involved in work to return to work, not because both spouses believe this is the best choice, but because from a woman's perspective, men may not have responded adequately to the need to maintain family consumption. Secondly, the opposite causal effect may be a side effect of the husband's lack of flexibility in work. Husbands who are more likely to work full-time may face more obstacles when entering the labour market and have limited choices when they need to supply more unpaid household work, that can only be withdrawn from the labour market. While shorter employment cycles make wives easier to engage in part-time work. Based on the data from Chapter 5, we find that the responsibility of elderly family care can significantly increase the probability of wives engageing in part time working by 13.2-20.1 percentage points, which might mean that the majority of the positive impact of family elderly care responsibilities on the probability of wives' employment, as shown in Chapter 5, comes from part-time work.[66] Although further validation was not conducted in this study, the pattern presented in Table H.1 seems to suggest that family elderly care responsibilities are more likely to promote wives to enter the labour market and engage in part-time work with fewer paid working hours. As working hours increase, this positive effect disappears. Therefore, it becomes reasonable that we cannot observe the positive impact of family elderly care responsibility on the husbands' probability of employment, as husbands are more likely to work full-time.

In terms of living arrangements, we find that the responsibility of family elderly care has no significant impact on labour supply at extensive margin, regardless of whether the husband or wife. This may be because that the income effect and substitute effect caused by elderly care

[66] To explore whether the different effects of elderly care responsibility on wives and husbands stem from work types, we employed data from Chapter 5 and explored the impact of family elderly care responsibilities on wives' probability by work type following empirical methods from Section 6.5.3.1. The detailed information and estimation results reported in Appendix H.

may well be matched in strength for those elderly caregivers who live with parents and parents in law at extensive margin (see detailed discussion in section 5.5.3.1). But interestingly, for couples who do not live with their parents and/or parents in laws, elderly family care responsibilities significantly increase the probability of wives being employed (20.3 percentage points) while significantly reducing the probability of husbands being employed (8.1 percentage points). The gap may stem from the direct/indirect impact of care for wife and husband, respectively. As a primary caregiver who suffers the impact of elderly care directly, wives are more likely to provide flexible care for their parents and/or parents in laws, such as providing financial support. This may lead to a more pronounced income effect for wives. But for husbands who do not live with elderly parents and/or parents-in-laws, the impact of their elderly care responsibilities may be smaller. The negative impact of family elderly care responsibilities on the husbands' paid working hours may not directly come from elderly care responsibility but from the wife's labour supply decisions. Unfortunately, we have not found direct empirical support, which may be the direction of our future efforts.

6.6. Conclusion

Using the latest data from the CHNS, this study explores the impact of elderly care responsibility on the probability of husbands' employment as well as their paid working hours. It addresses the potential endogeneity between elderly care and husbands' labour supply at both extensive and intensive margins by employing need care (whether elderly parents or parents in law have elderly care demand) and the sum of number of siblings of both spouses as instruments for the elderly care. The study finds that husbands whose families face elderly care responsibilities have a lower probability of being employment (by 5.3 percentage points) compared with those whose families do not face elderly care responsibilities, while family elderly care responsibility has no-significant effects on paid working hours. Furthermore, it investigates the potential mechanisms behind these results that husband would like to share household work when the family face the elderly care responsibility, which is the first empirical results to showcasing the impact mechanism of elderly care on husbands' labour supply based on Chinese data. Moreover, the heterogeneity analysis of the impact of elderly care on husbands' labour supply by living arrangement, age group, Hukou and care recipient helps us further clarify which subgroup of husband's labour supply decisions are more susceptible to the influence of family elderly care.

Our analysis suggests that the inflexibility of work is one of the important reasons why the labour supply of husbands is negatively affected by the family's responsibility for elderly care

and this impact varies depend on care recipients, living arrangements, age, and type of work, which should be considered in conjunction with China's family friendly policies. Fully considering the flexible work requirements of married men and provide targeted policy support based on the actual situation of the caregiver might better assist couples with elderly care burdens in balancing family and work. For example, providing more flexible working policies for husbands and develop multi-level support policies based on the care recipients of married couples (one parent or both parents) might be a more effective measure.

This research also comes with certain limitations that could be addressed in future studies. While CHNS offers extensive long-term panel data and comprehensive information on key regression variables compared to other national datasets, it is important to note that the data used in this study was last updated in 2015. Notably, significant events such as the implementation of China's two-child policy in 2016 and the global impact of COVID-19 in 2019 might influence husbands' decisions regarding elderly care responsibility due to increased childcare responsibilities and changes in China's employment and healthcare systems. Unfortunately, our dataset does not encompass these effects. To enhance the empirical findings, we look forward to utilizing updated data in future research endeavors. Secondly, this ananlysis explores the causal effect of family elderly care responsibility on husbands' labour supply decisions. However, as secondary caregivers, the above causal effects are assumed include direct impacts from elderly care responsibilities and indirect impacts from wives' labour supply decisions. However, CHNS cannot provide information on whether the husband provides elderly care or not, making it cannot decompose the direct and indirect impact of family elderly care responsibilities on the husbands' labour supply. In future research, if we can further clarify the impact path of family elderly care responsibilities on husbands' labour supply decisions, the formulation and implementation of China's family friendly policies may have further development. Finally, based on the empirical results in Chapter 5, we find different responses to the impact of family elderly care responsibilities on the labour supply decisions of husbands and wives. The different reasons have not been fully explored yet, although it is an unresolved issue in international literature, it will be the direction we continue to strive for.

Chapter 7 The Impact of Home-Based Elderly Care Policies on Married Adult Children's Labour Supply

7.1. Introduction

In the past 20 years, the rapid ageing process has posed significant challenges to Chinese social and economic systems. By the end of 2020, China's population aged 65 and older reached 177.77 million, accounting for 12.60% of the total population (World Bank Data, 2024). This figure is significantly above the global average of 9.43% and places China among the leading countries in terms of ageing populations within the developing world. Among all of 31 provinces[67] in China, 16 provinces have more than 5 million people aged 65 and over, of which 6 provinces have more than 10 million elderly people (China's Seventh Population Census, 2020). However, as a developing country, Chinese formal social care industry for the elderly is still underdeveloped. As a results, informal family care continues to be the main form of elderly care provision for the elderly, leading to an increasingly heavy elderly care burden on adult children (Zhu and Österle, 2019).

In response to these challenges, the Chinese provincial governments have gradually implemented home-based care policies aimed at supporting elderly care within the familial and community contexts since 2008. These policies emphasise the provision of care services in familiar environments through a combination of family member involvement, community support services, and government subsidies. Key measures include free/discounted basic care services, which include a range of essential assistance, free/discounted health care services and psychological comfort services. Despite variations in the timeline and implementation methods across provinces due to differing levels of ageing populations, elderly care infrastructure, and economic development, by 2017, the home-based elderly care policy had been implemented in 29 out of the 34 provincial-level administrative regions in China.

The existing literature primarily focused on exploring the evolution and development of these policies (Gao, 2011; Ding and Qu, 2019) and evaluating the formulation and implementation of such policies (Luo, 2021; Wang and Zhou, 2019). It might be because that China's home-based elderly care policy has only been in place for a relatively short time, and given the varying implementation timelines across provinces, there has been, to the best of my

[67] Provinces are defined as China's provincial first-class administrative regions.

knowledge, no empirical research examining the impact of these policies on caregivers' labour supply in China. This study aims to fill this evidence gap by exploreing the causal impact of China home-based elderly care policy—gradually implemented across provinces since 2008—on the labour supply of married adult children at both extensive (employment status) and intensive margins (weekly paid working hours) and explore the mechanisms behind the impact.

The analysis employs individual level data from the CHNS in 2004, 2006, 2009, 2011 and 2015, supplemented with province level information on the timing of the implementation of the home-based elderly care collected from provincial local government websites (including government official websites, civil affairs bureau official websites, and elderly care office official websites), Baidu search engine and Peking University Treasure official websites.[68] By exploiting the variation in the timing of implementation across provinces and employing various methods, including static and dynamic two-way fixed effects and staggered difference-in-differences (as proposed by Sun and Abraham, 2021), the analysis reveals a robust negative impact of the policy on the employment probability of married women (around 5.4-8.6 percentage points). However, based on the dynamic model, this significant negative effect persists for only two years. No significant impact is observed on the intensive margin of married women's labour supply, nor on the extensive or intensive margins of married men's labour supply even for the short-term effect. These results are robust to different model specifications, estimation samples and levels of clustered standard errors.

In further analysis, this study investigates the potential mechanisms behind significant negative effect on wife's probability of employment and explore heterogeneity in the impact of home-based elderly care policy on adult children' labour supply by household total gross income, age, education and Hukou. These analyses suggest that the negative impact on wife's probability of employment is likely driven by early retirement due to increased elderly care provision, especially for older adults. The policy appears to reduce the need for married women to overwork due to the financial support provided for elderly care responsibility. Furthermore, the negative impact of home-based elderly care policy on the wives' probability of employment is only evident in subgroups that are older, have lower education levels, live in the low-income

[68] Baidu Search Engine is China's leading search engine, developed by Baidu, Inc. It allows users to search for web pages, images, videos, news, and other types of online content. Baidu is primarily designed for Chinese-language searches and the local internet ecosystem, making it the most influential search tool in China. Link: https://www.baidu.com/

household and living in rural areas.

The structure of this chapter is as follows: Section 7.2 introduces Home-Based Elderly Care policy in China. Section 7.3. reviews the previous theoretical and empirical literature. Sections 7.4 discusses the data. Section 7.5 and 7.6 discuss Difference-in-differences methods and identification strategy, respectively. Section 7.7 presents the estimation results. Finally, Section 7.8 concludes.

7.2. Home-Based Elderly Care Policy in China

In 2008, the National Ageing Office and the Ministry of Civil Affairs jointly issued the opinions on comprehensively promoting home-based elderly care services, which marks the formal implementation of home-based elderly care policy in China (Zhang, 2019). Home-based elderly care is a form of elderly care that takes the community as the carrier, community grassroots organisations as the leading force, leverages various forces such as government, community, family, and individuals and provides comprehensive services for the elderly person. China's home-based elderly care policy is a coordinated system rather than a single policy, aiming to provide comprehensive support for the elderly to age in their familiar environment. Although the home-based elderly care policies vary across provinces, they generally include the following three categories:

Firstly, there are Free/Discounted Basic Care Services, which include a range of essential assistance such as living support, meal provision, mobility aid, hygiene assistance, cleaning, medication management, and general daily care. These services include activities like grocery shopping, meal delivery, house cleaning, disability care, rehabilitation, cognitive support, and medication reminders.

Secondly, Free/Discounted Health Care Services are provided to maintain or improve the health of the elderly. This includes health management, rehabilitation training, and traditional Chinese medicine therapies such as massage, cupping, acupuncture, and moxibustion. Specific examples might involve guidance for manageing chronic diseases and conditions.

Lastly, there are Psychological Comfort Services, which focus on providing emotional and psychological support to the elderly. This can include counselling, emotional support, facilitation of family collabouration, and arrangements for social engagement and entertainment. Initiatives may involve establishing senior clubs and offering classes tailored to the interests of the elderly.

Since 2008, implementation of China's home-based elderly care policies has been found to benefit many elderly people with care requirements. For instance, according to the

construction plan for the social elderly care service system (2010), by the end of 2010, there were 40000 elderly care institutions and 3.149 million nursing beds in China. 12000 comprehensive community service centers with daytime care functions have been built, with 12000 overnight care beds and 47000 daytime care beds. By the end of 2015, the coverage rates of home-based and community-based elderly care services in China had reached 53.5% (Xinhua News, 2015). By 2021, the total coverage rate of home-based and community-based elderly care services in China has increased to 62%, benefiting 9.65 million households (2021 National Development Bulletin on Ageing, 2022).

Although there is no official data disclosing the number of beneficiaries of China's home-based elderly care policies, several studies have highlighted their significant impact. Zhang and Liu (2011), citing a report from the Shanghai Civil Affairs Bureau, find that in 2011, 130,000 elderly people in Shanghai received subsidies for home-based elderly care services, accounting for 52% of the population aged 60 and above.[69] During the same period, 303 community elderly care centers provided daytime services to 9,000 elderly individuals, and 404 community meal assistance programs benefited 40,000 elderly people. Wen and Wang (2017) report that the elderly people's satisfaction rate of support policies provided by the community in Xi'an reached 65%.[70] Zeng (2022) noted that the Fuzhou Civil Affairs Department utilised AI-based services for meal ordering, mobile payments, and remote food monitoring through home-based elderly care service centers.[71] By the end of 2022, Gulou District, has operated 30 senior canteens, achieving a 100% registration rate among the elderly living in the district.[72] According to a survey on home-based elderly care services in Dalian, Xu (2018) find that by the end of 2017, 52.57% of Dalian's elderly population participated in community learning and cultural activities, 38.91% received legal aid, 29.22% utilized domestic services, 18.36% received psychological counseling, and 17.77% benefited from emergency rescue clothing provided by the community.[73]

As discussed in Section 2.2.3, a significant characteristic of China's home-based elderly

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[69] Shanghai is one of China's four directly administered municipalities, holding the status of a provincial-level administrative region.

[70] Xi'an is the capital city of Shanxi Province in China.

[71] Fuzhou is the capital city of Fujian Province in China.

[72] Gulou District is one of 11 districts of Nanjing, the capital of Jiangsu province of China.

[73] Dalian is a major city in Liaoning province in China.

care policy is its "bottom-up" approach, which may result in variations in the time required to comprehensively promote home-based elderly care services and support instruments across different provinces and cities in China.[74] Hu and Jin (2020) suggest that variations in the development level of local elderly care services, coupled with the limitations and shortcomings of elderly care work and differing macro environments, have resulted in the adoption of different models and implementation timelines for home-based elderly care policies across provinces.[75] They find that compared to economically developed provinces, economically underdeveloped provinces put more emphasis on the survival requirement of the elderly population, leading to policies such as financial support, for example, providing senior allowance and offering discounted lunches, being prioritised. On the other hand, the home-based elderly care policies introduced in economically developed provinces emphasise more on the developmental requirement of the elderly, such as the establishment of elderly entertainment venues and the fairness of elderly rights and interests. Additionally, Provinces with low levels of ageing have been found to have more policies for standardised management of elderly care institutions, while provinces with higher levels of ageing are found to pay more attention to end-of-life care and training policies for professional service personnel.

Overall, although provinces have responded to the call of the Chinese's government and successively issued corresponding regulations since 2008, the regulations have strong flexibility and local characteristics. Due to the diverse support instruments and strategies

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[74] In China, although the central and local governments play a leading role in decision-making, financial support, market cultivation, supervision and management of home-based elderly care services, this does not mean that how to implement home-based elderly care policy is controlled by the central government. There are no specific and unified provisions on the specific service development, service mode selection, management and operation mode of provinces and cities, which is determined flexibly by the local government.

[75] Hu and Jin (2020) use Python text mining technology collecting Chinese elderly care policy texts and screen normative policy documents from the period 2010 to 2019. They used Term Frequency-Inverse Document Frequency (TF-IDF) weighting method to extract keywords by provinces. On this basis, the completeness of the content hierarchy of local elderly care policies was analysed using systematic clustering, and the linkage characteristics between different levels of elderly care policies were explored using social network analysis. The causes and rationality of regional differences were analysed in combination with major regional factors.

implemented across provinces, the timeline for the introduction of comprehensive and standardised home-based elderly care policies varies for each province. Figure 7.1 shows the implementation times in different provinces.[7677] In Figure 7.1, the shading intensity represents the timing of each province's implementation of comprehensive home-based elderly care policies. Darker shades indicate earlier implementation, while lighter shades indicate later implementation. Provinces with incomplete data are shown in gray, while those without implemented policies are in white.

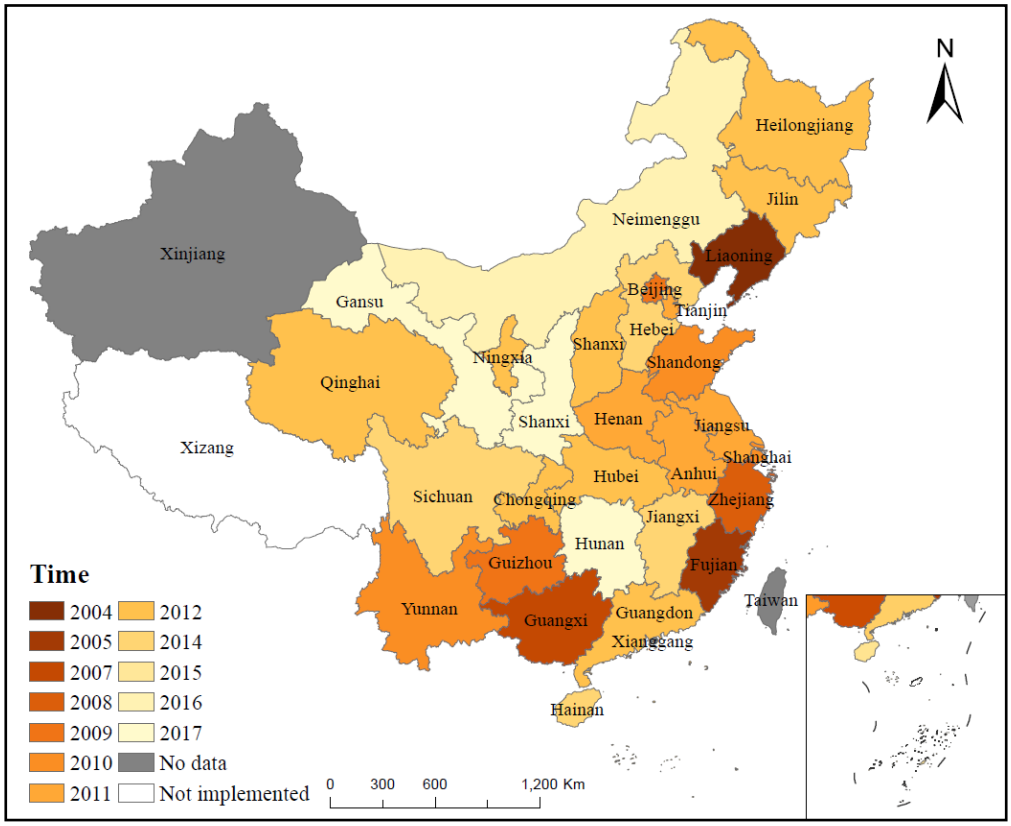

Figure 7.1 Home-based elderly care policies in China by Province

Source: Chinses provincial local government websites (including government official websites, civil affairs bureau official websites, and elderly care office official websites), Baidu search engine and Peking University Treasure official websites

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[76] In the Appendix L, Table L.1 shows the the names of policies and their respective implementation times, which that first clarified the comprehensive service contents of home-based elderly care policies in different provinces.

[77] The information regarding policy implementation comes from Chinese provincial local government websites (including government official websites, civil affairs bureau official websites, and elderly care office official websites), as well as Baidu search engine and Peking University Treasure official websites. For a more detailed discussion, see in Section 7.4.1.

7.3. Literature Review

7.3.1. Theoretical Framework

Based on the discussion and exploration in Chapters 5 and 6, it is clear that informal elderly care significantly affects the decision-making of labour supply for adult children. The important impact mechanism is the boundary crowing between unpaid family elderly care and paid labour supply, whether it is time allocation or financial allocation. Therefore, this section firstly introduces the work-family boundary theory to explain why and how the home-based elderly care policy can help adult children balance family and life. Moreover, it is worth emphasising that providing elderly care is a systematic approach that requires multi-party collabouration. Implementing home-based elderly care policy does not mean that the formal care provided by the government completely replaces the informal care provided by family members but rather finding a balance way for the family. Make formal care and unformal care mutually promote and complement each other's strengths and weaknesses. Therefore, in this subsection, we also introduce the welfare pluralism theory to explain how the home-based elderly care policy mobilises various forces at the family, social, and national levels to implement. Finally, this subsection introduces four relationship models to illustrate how formal elderly care and unformal elderly care complement each other and collabourate.

7.3.1.1. Work-Family Boundary Theory

Clark (2000) applied boundary theory to work family balance issues, which points out that workers, as boundary crossing agents, constantly cross boundaries and transform their roles in the fields of work and family. The handling of the scope and boundary issues between work and family by workers determines the balance between their work and family. For workers, when the pressure from two aspects is difficult to balance and regulate, work family conflicts arise.

The work family boundary theory suggests that although the fields of work and family are independent of each other, they have the characteristics of permeability and flexibility. If the worker fails to complete work tasks in the work field and brings them to the family to complete, it reflects the characteristics of the infiltration of the work domain into the family domain. On the contrary, if the worker brings unfinished family tasks to the work domain to complete, it reflects the infiltration of the family domain into the work domain. Flexibility refers to the fact that the boundary between the work and family domains is not fixed and unchanging. In order to better adapt to the role requirements of different fields, the boundary between the two domains can be adjusted flexibly.

Faced with the increasingly severe burden of elderly care, adult children who hope to

participate in labour market, as border crossing individuals, must bear pressure from both the work and family domains. The infiltration of work and family fields has made us realise that the enormous pressure from the family might affect the performance of adult children in the work field. Fortunately, the permeability and flexibility of the work family boundary theory provide us with a way to reconcile the work family conflicts faced by the adult children for both spouses. The home-based elderly care policies, such as provision of free formal elderly care and financial support for elderly, can alleviate the pressure and tasks generated in the family field, achieve its goal of less infiltration into the work field, alleviate work family conflicts, and improve the employment quality of adult children facing elderly care responsibilities. For example, for elderly people who can take care of themselves but cannot withstand high levels of exercise (such as being unable to frequently travel to supermarkets and markets to purchase daily necessities and cook ingredients), home-based food delivery services can effectively solve their daily dining difficulties. Their children don't need to come to their homes multiple times a day to prepare food for their elderly parents and in laws, saving some time for the labour market. For elderly people who have a risk of sudden events due to chronic diseases, the health monitoring services and smart information systems of daily care centers (elderly people can make emergency calls when encountering emergencies at home) can effectively replace the guardianship of elderly parents and parents in law for their children, reducing their psychological pressure.

7.3.1.2. Welfare Pluralism Theory

Welfare pluralism theory emerged in the 1970s, against the background of economic slowdown and population ageing in the Western world (Peng and Huang, 2006), which advocates for diversification in the sources of social welfare (Wang, 2007). The proposition of welfare pluralism also serves as a corrective and compensatory measure for the potential "market failure" and "government failure" phenomena resulting from single-entity welfare provision (Tian and Zhong, 2009), pushing the roles of individuals, families, and voluntary organizations to the forefront of economic and social welfare research.

In theoretical frameworks, scholars have expanded and revised the basic framework of welfare pluralism theory based on the different providers of social welfare. Rose (1986) initially proposed the basic framework of social welfare pluralism with the "tri-partite" model, which consists of government, market, and family as providers of social welfare. Subsequently, Evers (1995) further modified the inherent relationships within the "tri-partite" model, suggesting that the three categories of entities should have a collabourative rather than substitutionary

relationship. Johnson (2000) and Johnson (2006) also introduced a new entity of "voluntary organizations/non-profit organizations," innovating the analysis framework of social welfare provision into a "quadripartite" model. The "quadripartite" framework provides a basis for the extension of subsequent welfare pluralism theories (Dahlberg, 2005; Liu, 2016; Chen and Pang, 2020; Tong and Zhang, 2018).

In China, when families are unable to function properly, the government begins to intervene and assist them in fulfilling their due functions. However, with the increasing demand and pressure for elderly care, relying solely on the government to provide home-based elderly care services is difficult to meet the demand. According to the welfare pluralism theory, the Chinese government provides the necessary elderly care resources for home-based elderly care, while attracting participation from various stakeholders such as society, families, and the market, forming a diversified and socialized mechanism for providing elderly care resources. China's home-based elderly care policy has formed a policy system led by the government and combined with social and family forces. This not only emphasizes the necessity of government intervention in elderly care but also considers the indispensable role of families in elderly care. Based on this, elderly people in China are still being supported in their familiar environment, and the responsibility of elderly care faced by Chinese families is effectively shared by the government and society, which may effectively alleviate the pressure of elderly care on society and avoid the weakness and shortcomings of the government's single provision of home-based elderly care services.

There are indeed some literatures have studied economic relationships among different elderly care service entities, including the substitutive role of voluntary organizations for government elderly care support (Dahlberg, 2005) and the cooperative relationship between voluntary organizations and informal care within families (Skinner et al., 2021). In countries with a higher degree of eldercare marketisation, such as the United States and Canada, scholars find that government welfare support impact elderly care decisions (Sarma and Simpson, 2007; Stabile et al., 2016) and intra-family bargaining processes (Byrne et al., 2009).

7.3.1.3. Informal and Formal Care Relationship

Noelker and Bass (1994) outlined three models for informal and formal care relationship: the substitution model, hierarchical compensatory model, and task-specific model. Logan and Spitze (1994) expanded this to include four models: substitution model, bridge model, task-specific model, and hierarchical compensatory model.

Substitution model suggests that formal elderly care reduces the use of informal elderly

care, or informal elderly care reduces the use of formal elderly care. That is formal elderly care substitutes for informal elderly care, and vice versa. Both informal and formal elderly care can exist concurrently, allowing families the autonomy to choose which service to utilise or adjust the balance between both (Greene, 1983 and Hanley, Weiner and Harris, 1991). Based on this theory, the government supported formal care provided by China's home-based elderly care policy may reduce the amount of informal care provided by family members, thereby enabling elderly caregivers to achieve a balance between life and work.

Bridge model emphasises that family elderly caregivers not only take care of the elderly but also act as bridges, influencing the connection between the elderly and formal care. For example, family elderly caregivers may provide consultation services for formal care for the elderly, interact and negotiate with formal caregivers, use formal care services, and evaluate the results of formal care service usage (Logan and Spitza, 1994). In other words, the family members who provide informal elderly care also affect whether the elderly enjoy formal care and its intensity. The bridge model arouses our interest as family members may be an important factor influencing the effectiveness of China's home-based elderly care policy.

Task-Specific model suggests that informal elderly caregivers and formal elderly caregivers have unique characteristics and functions, which determine the division of tasks between informal elderly care systems and formal elderly care systems (Litwak, 1985). Informal elderly caregivers are better able to meet the psychological and social needs of the elderly, provide daily care, and effectively handle incidental events. Formal caregivers, on the other hand, can provide standardised, professional services. The arrangement of elderly care depends on the characteristics and functions of each group (family members, friends, neighbors, formal caregivers) to better utilise efficiency.

Hierarchical Compensatory model suggests that caregivers' choices are influenced by familial ties and social norms. Care preferences cascade outward in concentric circles, with closer relationships correlating to higher preferences for care provision (Cantor, 1979). The intensity of care preference diminishes in the order of spouse, children, extended family, friends, neighbours, and formal caregivers. When caregivers with high intensity care preferences cannot provide care, caregivers with lower preferences sequentially compensate.

7.3.2. Empirical Literature on Home-based Elderly Care Policy

The existing literature typically shows that there is a significant impact of informal elderly care on the labour supply of caregivers for both spouses (Nguyen and Connelly, 2014; Kolodziej, Heger and Korfhage, 2020). One of the important mechanisms is crowing out of adult children’s

paid working time by informal elderly care. The time and effort that adult children have to invest in elderly care forces them to withdraw from the labour market or reduce paid working hours.

Indeed, there is more and more empirical research to find that formal care provided by the government can significantly reduce informal elderly care provided by family members. Jiménez-Martín and Prieto (2012) employed National Institute of Statistics in 1999, and multinomial logit model find that an increase in the coverage of day care centers leads a decrease in the provision of informal elderly care by 30.4 percentage points. Johar and Maruyama (2012) employed data from the Health and Retirement Study in US find that for disabled elderly individuals aged 70 and above, formal elderly care could substitute for 60 percentage of the time provided by family caregivers.

In China, the above mechanism has also been validated. Liu and Kou (2015) used the results of the National Elderly Health and Longevity Tracking Survey in China and 2SLS models find that the elderly care services provided by communities or institutions can significantly reduce family care time by 45.84 hours per week, which is enough to release a complete offspring care member to play a role in the labour market. Liu et al (2017) conducted a study on disabled elderly individuals and used baseline data from the China Health and Elderly Care Tracking Survey to find a similar conclusion that formal care intervention can reduce an average of 21.6 hours of informal care per week and form a good substitute for family informal elderly care.

However, different voices come from Karlsberg Schaffer (2015). They conducted a difference in differences model based on the free personal care policy for the elderly in Scotland in 2002 and find that the implementation of this policy slightly reduced the elderly care hours for both males and females by 0.0434 hours and 0.031 hours, respectively, but significantly increased the probability of female caregivers providing elderly care by 6 percentage points. Karlsberg Schaffer (2015) attributed this positive impact at the extensive margins to adult children's sense of guilt. When formal caregivers arrive at home, children may feel that they should also help, even in small ways. In addition, the provision of free personal care may prompt discussions among families about whether they need to work harder to improve elderly care level, leading to an increase in the use of both types of care.

Following the impact mechanism of time conflicts mentioned above and the substitute effect of formal elderly care on informal elderly care, although rare, some empirical researches find that when the government employs social policies to serve as a substitute for familial informal care, typically by offering affordable and high-quality care services, it tends to

promote elderly caregiver's engagement in the labour market (Loken, Lundberg and Riise, 2016; Hollingsworth et al., 2022).

Loken, Lundberg and Riise (2016) used population survey data from the Norwegian National Bureau of Statistics from 1993 to 2006 and difference in differences model to explore the impact of home-based elderly care policy on the adult children's labour supply. In 1998, the Norwegian government began providing financial support to various levels of government to expand the capacity of the healthcare system to provide home-based eldely care. The aim of reform is to provide effective assistance for home-based elderly care for people aged 80 and above. A clearer goal is to increase the number of spaces in adaptive apartments and institutions between 1998 and 2001, and to increase labour input by 6000 working years nationwide. The main form of expanding services is to provide home care in renovated apartments, rather than institutional care in nursing homes, with a greater emphasis on providing medical and practical assistance at home. Loken, Lundberg and Riise (2016) divided the research period into two stages: short-term (1998-2000) and long-term (2001-2005) to explore the dynamic impact of this reform. The results report shows that expanding the number and coverage of daily care institutions does not have a significant impact on men, at both extensive and intensive margins. A more significant change is concentrated in the probability of only-daughters being employed, that is, in the short term after the reform, the probability of only-daughters being employed has significantly increased by 3.5 percentage points. The home-based elderly care policy implemented in China also includes government funding to support local governments in improving and building places that can provide daily care for the elderly. However, the Norwegian policies do not have subsequent regulations or friendly measures on how elderly people use day care facilities. While China's home-based elderly care policy clarifies the payment standards, usage conditions, and service scope.

Another important exception is Hollingsworth, Ohinata, Picchio and Walker (2022), which may provide more insights into the impact of China's home-based elderly care policy on the labour supply of adult children. They employ the repeated cross-sections of the UK Family Resources Surveys (FRS) and difference-in-differences framework to estimate the policy effects in Scotland (the treatment group) in comparison to England and Wales (the control group). The policy they rely on is free formal personal care for all those aged 65 and above offered by Scottish Community Care and Health Act (CCHA) in 2002. Although the ultimate manifestation of this elderly care support policy is allowance rather than direct formal elderly care. However, the policy stipulates that this allowance is only granted to elderly people aged 65 and above in Scotland who have elderly care requirements and received elderly care in home.

At the same time, this allowance can only be used to purchase formal care for the elderly (strictly evaluated by regulatory authorities for the types of formal care requirements, such as personal hygiene, diet, or medical assistance, etc.) and cannot be transferred within the family, thus achieving free formal care for the elderly and avoiding the drawbacks of support transfer caused by traditional financial support. We have reason to believe that the Scotland elderly care policy's payment method has a similar effect to that of China's home-based elderly care policy, where the government directly pays for formal elderly care services in all of province that implement home-based elderly care policy. In addition, Scotland's free formal elderly care policy has some similarities with the home-based elderly care policy being implemented by the Chinese government. For example, supporting policies only target elderly people who live at home and have elderly care requirements, and communities/government provide personalized elderly care services based on the different elderly care requirements of each individual. Hollingsworth, Ohinata, Picchio and Walker (2022) find that the free formal care reduced the caregiver's probability of informal caregiving and informal care hours. In terms of labour supply, although the policy did not significantly affect the probability of caregivers being employed, they find that conditional on employment, the policy significantly increases the caregiver's paid working hours by 0.41 hours per week. This result is significantly sensitive to gender. For male caregivers, reforms can significantly increase the probability of being employed (1.1 percentage points) and paid working hours (0.714 hours). However, the reforms do not have a significant impact on female caregivers' labour supply. This may be due to the fact that men are facing a higher opportunity cost of providing care. This may also reflect the cultural expectations of the female spouses of frail men, that the male spouses of frail women feel does not apply to them.

On the other hand, except substitution effects, the impact of informal elderly care on the labour supply of adult children may also come from income effects. Due to the need to pay extra money to take care of elderly parents and parents-in-laws, adult children (possibly one or both spouses) may choose providing more labour supply to obtain more labour income to make up for additional expense. In order to provide elderly care support from this perspective, governments might provide financial support. Some research finds that governments which mainly support 'cash for care' policies (based on providing financial transfers and allowances to the beneficiaries along or instead of providing services), without introducing strict regulations on the use of these benefits, tend to assign the main care responsibilities to the family, thus inhibit caregivers participate in the labour markey (DaRoit and Le Bihan, 2010; Schone, 2004). Although we have not found empirical research evidence on the impact of cash

for care on the labour supply of elderly caregivers, research from Schone (2004) provides some support in this regard. Since 1999, all parents in Norway who have children aged 1 to 3 and have not participated in public daycare are eligible for cash for childcare (CFC) subsidies. They used the triple difference, i.e., Difference in difference in differences method to find that CFC subsidies reduced women's probability of employment. This is because CFC subsidies affect the relative prices of childcare services. They achieved higher utility by adjusting their labour supply strategy to meet the standard of receiving subsidies, compared to working full-time and allowing children to participate in public dailycare services. While some research have also find that when financial support related to elderly care comes from companies, employee organizational commitment is significantly increased, leading to lower turnover rates (Gan, 2021). Gan suggests that this is because the company's family friendly policy has increased employee job satisfaction, thereby increasing their stickiness to job positions. A flexible work system also plays a similar role (Abbott, De Cieri, and Iverson, 1998; Brough, O'driscoll and Kalliath, 2005 and Timms et al., 2015).

China's home-based elderly care started relatively late and has been in the exploratory stage in recent years. Currently, there are two main directions for scholars to study China's home-based elderly care policies: one is to explore policy change paths based on the division of home-based elderly care policies (Gao, 2011; Ding and Qu, 2019). The second is to evaluate the formulation and implementation of home-based elderly care policies (Luo, 2021; Wang and Zhou, 2019). Perhaps it is because the implementation time of China's home-based elderly care policy is short and there is lag in the implementation time of home-based elderly care policies in each province. To the best of my knowledge, there is no empirical research to explore the impact of home-based elderly care policies on caregiver's labour supply in China as well as the welfare implications.

7.4. Data

7.4.1. CHNS Data

In this chapter, we use individual level data from the CHNS in 2004, 2006, 2009, 2011 and 2015 to explore the impact of home-based elderly care policy on married men and women's labour supply decisions at both extensive and intensive margins. As discussed in Chapter 4, compared with other available national datasets for China, such as CFPS, CGSS and CHARLS, CHNS provides a rich set of variables, including demographic characteristics, family characteristics and financial characteristics, that are well-established determinants of married men and women's labour supply decisions. Moreover, as discussed in Section 7.2, the time

when most provinces in China began to fully implement home-based elderly care policies was concentrated between 2005 and 2015. The time span of the CHNS surveys, covering the period from 2004 to 2015 can precisely capture the implementation of home-based elderly care policies in provinces.

The individual level data from the CHNS is supplemented with province level information on the timing of the implementation of the home-based elderly care collected from provincial local government websites (including government official websites, civil affairs bureau official websites, and elderly care office official websites), Baidu search engines and Peking University Treasure official websites. In particular, a manual search has been conducted based on local laws and normative documents with the keywords of elderly care, home-based elderly care, and community elderly care. Then, the search results were compared and supplemented with the search results of Li, Yang, and Yan (2021).[78] This resulted in 621 province level policies finally. Based on the unique province code provided by CHNS, this information is then matched with individual level CHNS data based on the individuals' residence information. However, CHNS only covers 12 provinces. Therefore, the sample of this analysis only includes individual residing in the 12 provinces.

As discussed in Section 7.2, the regulations for home-based elderly care policies in each province were implemented gradually rather than simultaneously. This analysis defines a province as being treated (i.e., implemented home-based elderly care policy) if this province has relative regulations/policies including service targets, service demand assessment methods, subsidy scope, subsidy standards, funding sources, application process, content of home-based elderly care services, and management measures for personnel providing home-based elderly care services. Then using the search results, we determine in which year this took place. For provinces that have initiated some of the relevant regulations/policies but have not fully implemented all the above-mentioned components, this analysis considers them as untreated. Table 7.1 summarises the gap in years from the introduction of regulations related to home-based elderly care policy to the full implementation of these policies 1.82 years. Figure 7.2 further illustrates the year of full policy implementation for each province.[79]

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[78] Li, Yang and Yan (2021) use a quantitative text analysis method based on text mining to analyse 3,618 provincial policies in China.

[79] This empirical analysis also uses the policy's introduction year, rather than the full implementation date, as the time of the policy shock to do the analysis. The static and dynamic

Table 7.1 Duration from regulation introduction to full implementation of home-based elderly care policies

	Introduction year	Ful implementation year	Gap
Beijing	2005	2009	4
Liaoning	2004	2004	0
Heilongjiang	2011	2012	1
Shanghai	2006	2010	4
Jiangsu	2011	2011	0
Henan	2006	2011	5
Hubei	2010	2012	2
Guangxi	2007	2007	0
Guizhou	2008	2009	1
Chongqing	2012	2012	0
Shanxi	2009	2012	3

Source: Chinses provincial local government websites (including government official websites, civil affairs bureau official websites, and elderly care office official websites), Baidu search engine and Peking University Treasure official websites

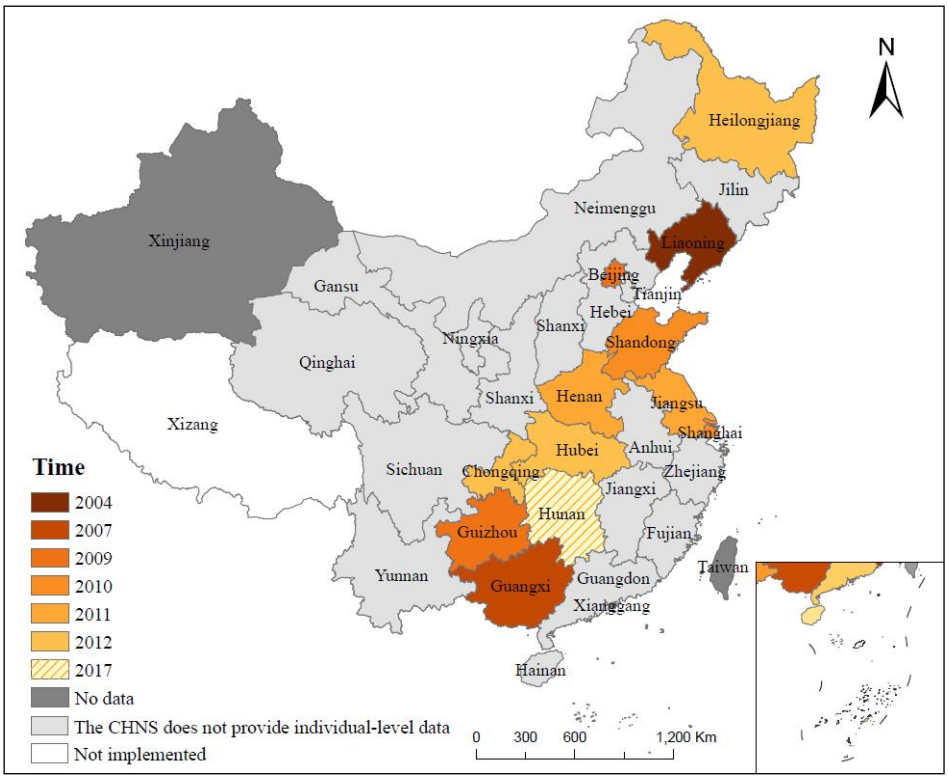

Figure 7.2 Year of Full Implementation of Home-Based Elderly Care Policies by Province in China (merged with CHNS)

Source: Chinses provincial local government websites (including government official websites, civil affairs bureau official websites, and elderly care office official websites), Baidu search engine and Peking University Treasure official websites. Note: the shading intensity represents the timing of each province's implementation of comprehensive home-based elderly care policies. Darker shades indicate earlier implementation, while lighter shades indicate later implementation. Provinces with incomplete data are shown in deep gray, those without implemented policies are in white, those with policy implementation timeline data but without individual-level data provided by CHNS are shown in light gray.

TWFE estimation results are presented in Tables P.1 and P.2 in the Appendix P.

It is noteworthy that while the overall goal of initiating home-based elderly care was mentioned in Hunan Province in 2011, professional skills training for home-based elderly care personnel was not addressed until 2015. The only policy related to caregiver training before 2015 was issued in February 2015. However, this policy was directed at personnel in elderly care institutions, rather than those providing home-based elderly care services. Until 2017, the Hunan Provincial Government addressed training for home-based elderly care service personnel in the implementation opinions on fully opening the elderly care service market and improving services quality. Therefore, this analysis considers that Hunan Province did not fully implement the home-based elderly care policy before 2017.

7.4.2. Variables

This analysis uses information on the policy implementation status of the province where the respondent resides as the core independent variable. The dependent variables are the respondent's labour supply along extensive margin (employment status) and the intensive margin (paid working hours). In addition, the analysis includes demographic, family, and financial characteristics as control variables. This subsection provides detailed explanations and definitions of these variables. Table 7.2 summaries the definitions and descriptions of all variables used in the benchmark models.

Dependent Variables

This chapter focuses on the labour supply decision (at both extensive and intensive margins) of both married men and women. The dependent variables are the employment status and the weekly paid working hours of the respondents as in Chapters 5 and 6. To avoid repetition, a detailed explanation will not be provided here (see detailed discussions in sections 5.3.2 and 6.3.2).[80]

[80] Employment status refers to whether the respondent has a labour paid job/work at present or not. Dummy variable is set according to the CHNS question "Are you presently working?". If the respondent's answer is "Yes" then 'Employed' dummy equals to 1 (the respondent is employed), and if the answer is "No", then 'Employed' dummy equals to 0 (the respondent is non-employed). Specifically, 'Employed' dummy =1 means respondents had at least one paid job/work at the time of the survey. For those respondents outside the labour market and/or those in the labour market but without at least one paid job at the time of the survey, 'Employed' = 0.

The value of paid weekly working hours comes from respondent's answers to CHNS

Key Independent Variable

The key independent variable in this analysis is a dummy variable for policy implementation status. If individual i observed in wave t resides in a province that has implemented the policy, the dummy variable equals 1, indicating that the individual is in a province where the home-based elderly care policy has been fully implemented. Conversely, if the individual i resides in a province that has not (yet) fully implemented the policy, the dummy variable equals 0. It is worth noting that this variable reflects the intended treatment effect rather than the actual benefit received by the individual.[81]

Other control variables

The inclusion of control variables aims to account for factors that might influence labour supply decisions for married men and women, in addition to home-based elderly care policies. The control variables in this analysis are defined consistently with those in Sections 5.3.2 in Chapter 5 for married women and section 6.3.2 for married men in Chapter 6. These include demographic characteristics (age, age square, Hukou, education, health for both extensive and intensive margins, conditional on employment, intensive margin also include high-skilled occupation, permanent contract and state-owned company), family characteristics (childcare responsibility, household size) and financial characteristics (spouse's second occupation, spouse's monthly labour income, household yearly total gross income). A detailed discussion of these variables is not repeated here. For precise definitions and descriptions, see Table T.1 in Appendix.

7.4.3. Sample Restrictions

Firstly, the sample is restricted to married women and men because the CHNS collects information on parents' living status only asked for married individuals, not for unmarried

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survey questions "How many hours do you work on average per day" and "How many days do you work on average per week". These two questions are only aimed at those who are employed. The relationship between 'Employed' dummy and Paid working hours is: if 'Employed' =1, then Paid working hours > 0; if 'Employed' = 0, then paid working hours is missing.

[81] In dynamic models, this approach involves using a series of dummy variables to represent each time period, including lead periods, the implementation year, and lag periods (see discussion in Section 7.6.3).

ones.[82] China's home-based elderly care policy supports both elderly parents and parents-in-law, making information on their living status essential for assessing the impact on adult children who may be affected by this policy. Furthermore, only married adults can be matched with their spouse's information. Including the spouse's monthly income and second occupation status is essential as these factors might influence the spouse's labour market behaviors (Triebe, 2015; Tansel and Ozdemir, 2018). Therefore, the sample is further restricted to married adults and does not include unmarried individuals.

Secondly, while information on parents' alive status has been collected since 1993 in CHNS, however, in earlier waves (1993, 1997 and 2000) the information on parents' alive status is largely missing. As such, the analysis uses data from the surveys in 2004, 2006, 2009, 2011 and 2015, covering a span of 11 years.

Thirdly, age restrictions, [18, 51] years old for wives and [18,60] years old for husbands are imposed as the CHNS only collects information on spouses and marital status for respondents aged 18 and above. The upper age limit for wives is 51 years old because "The Supplementary Survey on the Relationship between Children and Their Parents (in law)" only includes questions for ever-married women under 52 years old, providing data on elderly care, parents' care demand, and number of siblings. For husbands, the upper age limit is 60 years, which is the legal retirement age for men in China.

Fourthly, as noted earlier, China's home-based elderly care policy is designed to support ageing elderly individuals. The policy may have a minimal impact on adult children who do not have living elderly parents or in-laws, as they do not face immediate or potential future caregiving responsibilities. Therefore, this analysis focuses on adult children who have at least one living elderly parent or parents-in-law aged 50 or older to capture the potential policy impact.

Tables 7.3 and 7.4 present all the sample restrictions imposed along with the number of observations and individuals lost due to sample restrictions and each control variable added to the regression equation in both extensive and intensive margin estimations for both wife and

[82] Elderly care, parents' elderly care demand, parents' alive status and number of siblings information all comes from "The Supplementary Survey on the Relationship between Children and Their Parents (in law)" in CHNS, which only asked to ever be married women under the age of 52 years old. Excluding elderly care, parents' elderly care demand, parents' alive status and number of siblings information are same for both spouses.

husband. There are 143,564 initial observations in CHNS 2004-2015 pooled data for both wife and husband panels. For wife panel, among 143,564 initial observations, there are 12131 observations including policy implementation status (independent variable in extensive margin regression) and employment status (dependent variable in intensive margin) information. There are 7928 observations including policy implementation status (independent variable in intensive margin regression) and weekly paid working hours (dependent variable in intensive margin regression) information. For husband panel, among 143,564 initial observations, there are 10,025 observations including policy implementation status (independent variable in extensive margin regression) and employment status (dependent variable in intensive margin) information. There are 8,615 observations including policy implementation status (independent variable in intensive margin regression) and weekly paid working hours (dependent variable in intensive margin regression) information.

Consistent with the discussion in Sections 5.3.1 and 6.3.3, two main variables that reduce the number of observations is the spouse's monthly labour income and whether caring for children aged six and under. However, spouse’s labour income is an important component of the married individual's non-labour income, which has significantly impact on labour supply decisions (Saha and Kalita, 2015; Mansor et al., 2015). Similarly, it is essential to include childcare variable in the analysis as childcare is a time intensive activity that might crow out the time and energy for adult children’s labour supply. Consistent with this, childcare is identified in the literature as a key variable influencing the decision-making and intensity of elderly care for family caregivers who also need to care for children (Gelbach, 2002). Overall, according to Tables 7.3 and 7.4, after restricting the sample to observations with non-missing values in all the variables included in the analysis the sample size is 5,559 for wives and 4,412 for husbands (extensive margin estimation samples) and conditional on employment the working sample includes 2934 observations for wives and 3278 for husbands (intensive margin estimation sample).

Table 7.2 Sample restrictions, wives

Variable		Extensive Margine				Intensive Margine			
		Number of observations	% lost	Number of individuals	% lost	Number of observations	% lost	Number of individuals	% lost
Initial sample size		143,564	-	38,536	-	143,564	-	38,536	-
Restrict the sample to women		72,332	49.62	20,134	47.75	72,332	49.62	20,134	47.75
Restrict the sample to 18-51 years old		36,883	49.01	12,474	38.05	36,883	49.01	12,474	38.05
Restrict sample to be Interviewed in 2004, 2006, 2009, 2011, 2015		19,612	46.83	7,833	37.21	19,612	46.83	7,833	37.21
Restrict sample to married individuals		14,585	25.63	6,461	17.52	14,585	25.63	6,461	17.52
Restrict the sample to have at least one parents (in law) alive		12,135	16.80	5,640	12.71	12,135	16.80	5,640	12.71
Independent variable	Policy implementation status	12,135	0.00	5,640	0.00	12,135	0.00	5,640	0.00
Dependent variable	Employed	12,131	0.03	5,639	0.02	-	-	-	-
	Weekly working hours	-	-	-	-	7,928	34.67	4,208	25.39
Control variables	Age	12,131	0.00	5,639	0.00	7,928	0.00	4,208	0.00
	Hukou	12,131	0.00	5,639	0.00	7,918	0.13	4,204	0.10
	Education	12,113	0.15	5,635	0.07	7,918	0.00	4,204	0.00
	Health	12,095	0.15	5,635	0.00	7,908	0.13	4,201	0.07
	Spouse's second occupation	10,638	12.05	5,211	7.52	7,025	11.17	3,882	7.59
	Spouse's monthly income	6,775	36.31	4,299	17.50	4,060	42.21	2,654	31.63
	Caring for children under 6 years old	5,674	16.25	3,651	15.07	3,058	24.68	2,124	19.97
	Household size	5,582	1.62	3,612	1.07	3,058	0.00	2,124	0.00
	Household total gross income	5,559	0.41	3,600	0.33	3,058	0.00	2,124	0.00
	High-skilled occupation	-	-	-	-	3,056	0.07	2,123	0.05
	Long term contracts	-	-	-	-	3,046	0.33	2,114	0.42
	State-owned company	-	-	-	-	2,934	3.68	2,052	2.93
Province fixed effects		5,559	0.00	3,600	0.00	2,934	0.00	2,052	0.00
Year fixed effects		5,559	0.00	3,500	0.00	2,934	0.00	2,052	0.00

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015

Table 7. 3 Sample restrictions, husbands

Variable		Extensive Margin Sample				Intensive Margin Sample			
		Number of observations	% lost	Number of individuals	% lost	Number of observations	% lost	Number of individuals	% lost
Initial sample size		143,564	-	38,536	-	143,564	-	38,536	-
Restrict the sample to married men		26,041	81.86	8,618	77.64	26,041	81.86	8,618	77.64
Restrict sample to be Interviewed in 2004, 2006, 2009, 2011, 2015		14,336	44.95	6,299	26.91	14,336	44.95	6,299	26.91
Restrict the sample to 18-60 years old		14,275	0.43	6,278	0.33	14,275	0.43	6,278	0.33
Restrict the sample to have at least one parents (in law) alive		10,185	28.65	5,067	19.29	10,185	28.65	5,067	19.29
Independent variable	Policy implementation status	10,185	0.00	5,067	0.00	10,185	0.00	5,067	0.00
Key dependent variable	Employed	10,025	1.57	5,032	0.69	-	-	-	-
	Weekly working hours	-	-	-	-	8,615	15.41	4,517	10.85
Control variables	Age	10,024	0.01	5,031	0.02	8,615	0.00	4,517	0.00
	Hukou	10,013	0.11	5,027	0.08	8,612	0.03	4,516	0.02
	Education	10,002	0.11	5,025	0.04	8,604	0.09	4,514	0.04
	Health	9,976	0.26	5,019	0.12	8,582	0.26	4,507	0.16
	Spouse's second occupation	9,950	0.26	5,014	0.10	8,561	0.24	4,501	0.13
	Spouse's monthly labour income	6,792	31.74	4,102	18.19	5,476	36.04	3,438	23.62
	Caring for children under 6 years old	4,478	34.07	3,076	25.01	3,643	33.47	2,578	25.01
	Household size	4,422	1.25	3,052	0.78	3,643	0.00	2,578	0.00
	Household total gross income	4,412	0.23	3,043	0.29	3,643	0.00	2,578	0.00
	High-skilled occupation	-	-	-		3,415	6.26	2,444	5.20
	Permanent contracts	-	-	-		3,375	1.17	2,421	0.94
	State-owned company	-	-	-		3,278	2.87	2,363	2.40
Province fixed effects		4,412	0.00	3,043	0.00	3,278	0.00	2,363	0.00
Year fixed effects		4,412	0.00	3,043	0.00	3,278	0.00	2,363	0.00

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 201

7.4.4. Summary Statistics

Table 7.5 reports the descriptive statistics of the main variables and control variables for extensive and intensive margin samples for both wife and husband panels. In order to have a more detailed understanding of the data, Table 7.6 further reports the distribution of categorical variables.

The key independent variable in this analysis is policy implementation status dummy variable.[83] According to Table 7.6, there are total of 5,559 observations in the extensive margin sample for wives. Among them, 56% of observations are in the treatment group (i.e., residing in provinces that have implemented the policy), with the remaining 44% serving as the control group. For intensive margin, there are a total of 2934 observations in the sample of wives with 46% observations in the treatment group. For husbands, in terms of the extensive margin, there are 4412 observations in the sample. Among them, 2087 observations are in the treatment group, accounting for 47% of the sample. At intensive margin, there are a total of 3278 observations in the sample. Among them, 1562 observations are in the treatment group, accounting to 48%. For dependent variables, 73% of the wives' panel sample are employed, compared to a higher rate of 81% in the husbands' panel sample. Conditionally on employment, wives work on average 43.68 hours per week, while husbands work slightly more, averageing 45.32 hours per week. The observed differences in labour supply between husbands and wives are consistent with existing literature (Channar, et al., 2011) and national statistics in China (see detailed discussion in section 1.4.2).

In terms of personal characteristics, the average age of wives in the sample is 39.55 years

[83] The key independent variable—provincial policy implementation status—is a time-varying dummy at the province level, indicating whether a specific policy is in effect in a given year and province. Including province fixed effects does not conflict with this variable, because the policy status varies over time within provinces. The fixed effects control for time-invariant differences across provinces, such as baseline economic development or cultural norms, while the policy dummy captures within-province variation over time, which is central to the DID identification strategy. In other words, province fixed effects absorb level differences across provinces, and the policy dummy identifies the effect of interest from changes within a province before and after the policy implementation. Therefore, the inclusion of province FE is essential to address omitted variable bias and does not pose a multicollinearity issue in this setup.

at the extensive margin and 37.99 years at the intensive margin. In comparison, husbands have slightly higher average ages, with 39.83 years and 39.37 years at the extensive and intensive margins, respectively. This difference may be attributed to the different age ranges selected for the sample, as the upper age limit for wives is 51 years, while it is 60 years for husbands. Regarding HuKou, a higher proportion of wives in the sample have urban household registration, with 53% and 62% at the extensive and intensive margins, respectively. At the extensive margin of the husbands' panel, a larger proportion of observations have urban household registration, accounting for 58% of the sample. At the intensive margin, observations with urban household registration also dominate, comprising 62% of the sample. In terms of education, distinct distributions are observed between the extensive and intensive margins for both husbands and wives. At the extensive margin, observations with an upper middle school education or higher education level account for 42% and 49% for wives and husbands, respectively. For observations who are employed, this proportion increases to 50% for wives and 53% for husbands. This pattern, where individuals with higher educational levels are more likely to be employed, is consistent with the theory of human capital accumulation as proposed by Becker (1964). There are no significant differences in the reported health status between the wives' and husbands' samples, with approximately 10% of the observations reported no illness or medical visits in the past four weeks. Regarding the three work-related control variables (included in the intensive margin analysis), a higher proportion of wives are engaged in high-skilled occupation and are employed in state-owned enterprises, while the proportion of those with permanent contracts is slightly lower than that of husbands.

In terms of family characteristics, there is a notable difference between wives and husbands in the proportion providing care for children aged six and under. Specifically, 28% of wives provide childcare, compared to only 23% of husbands. This finding aligns with the discussion in Section 1.4.3, which highlights that men and women, particularly married individuals, exhibit different patterns when assuming family responsibilities. Women's roles in childbirth and breastfeeding may further contribute to this disparity. In terms of the household size, there are no significant differences between the wives' and husbands' panel samples, with the average household size being around 3.9 members.

In terms of financial characteristics, husbands are more likely to have secondary occupation compared to wives. This may be because husbands are often viewed as the primary financial supporters of the family and are more inclined to seek additional labour income (Maloney, 1991). Regarding spouse’s monthly labour income, we observe that husbands have significantly higher monthly labour income than wives, with this gap being larger than reported

in previous empirical studies (Wu et al., 2021; Liao, 2024). This discrepancy may be attributed to our method of defining monthly labour income, where we assigned a monthly income of zero to individuals who are not employed. Since a higher proportion of wives are not employed, this approach may lower the average labour income for wives. Another possible explanation is that the husband sample includes all working-age observations, whereas the wife sample is capped at age 51 due to elderly care information not being available for older women. This exclusion of older women, who might have accumulated more human capital and earned higher wages, could further contribute to the lower average labour income for wives.

Table 7.4 Summary statistics

	Wife Panel				Husband Panel			
	Extensive Margine		Intensive Margine		Extensive Margine		Intensive Margine	
variable	mean	sd	mean	sd	mean	sd	mean	sd
Policy implementation	0.56	0.50	0.46	0.50	0.47	0.50	0.48	0.50
Employed	0.73	0.44	-	-	0.81	0.39	-	-
Paid working hours	-	-	43.68	15.68	-	-	45.32	14.95
Age	39.55	7.67	37.99	7.39	39.83	8.43	39.37	8.20
Hukou	0.53	0.50	0.62	0.49	0.58	0.49	0.62	0.49
Education	2.64	1.33	2.87	1.38	2.84	1.26	2.98	1.31
Health	0.90	0.30	0.90	0.31	0.89	0.31	0.90	0.30
Spouse's monthly labour income	2,631.77	4,829.39	2,610.89	4,226.94	1,070.45	1,828.24	1,209.10	1,899.93
Spouse's second occupation	0.06	0.24	0.07	0.26	0.03	0.16	0.03	0.17
Child care	0.28	0.41	0.27	0.44	0.23	0.42	0.23	0.42
Household size	3.88	1.35	3.90	1.35	3.99	1.42	3.94	1.41
Household total gross income	70,912.06	91,803.21	69,923.51	69,093.82	64,330.52	75,206.92	70,520.56	79,826.65
High-skilled occupation	-	-	0.12	0.33	-	-	0.21	0.41
Permanent contract	-	-	0.58	0.49	-	-	0.47	0.5
State-owned firm	-	-	0.36	0.48	-	-	0.38	0.49
	5559		2934		4412		3278	

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015

Table 7.5 Summary statistics for dummy variables

	Wife Panel				Husband Panel			
	Extensive Margin Sample		Intensive Margin Sample		Extensive Margin Sample		Intensive Margin Sample	
	Total		Total		Total		Total	
	Freq.	Per cent	Freq.	Per cent	Freq.	Per cent	Freq.	Per cent
Policy implementation								
Control group	2,472	44.47	1,596	54.40	2,325	52.70	1,716	52.35
Treatment group	3,087	55.53	1,338	45.60	2,087	47.30	1,562	47.65
Employed								
Non-employed	1,479	26.61	-	-	817	18.52	-	-
Employed	4,080	73.39	-	-	3,595	81.48	-	-
Hukou								
Rural	2,597	46.72	1,114	37.97	1,838	41.66	1,257	38.35
Urban	2,962	53.28	1,820	62.03	2,574	58.34	2,021	61.65
Education								
Primary school and below	1,111	19.99	490	16.70	480	10.88	319	9.73
Lower middle school degree	2,106	37.88	973	33.16	1,760	39.89	1,203	36.70
Upper middle school degree	873	15.70	468	15.95	907	20.56	639	19.49
Technical or vocational degree	604	10.87	429	14.62	527	11.94	455	13.88
University or college degree or higher	865	15.56	574	19.56	738	16.73	662	20.20
Health								
Was not sick or injured or did not have acute disease or chronic disease in the past four weeks	562	10.11	307	10.46	477	10.81	327	9.98
Have been sick or injured or have acute disease or chronic disease in the past four weeks	4,997	89.89	2,627	89.54	3,935	89.19	2,951	90.02
Spouse's second occupation								
Husband dosen't have a second occupation	5,229	94.06	2,717	92.60	4,299	97.44	3,181	97.04
Husband has a second occupation	330	5.94	217	7.40	113	2.56	97	2.96
Childcare								
Didn't take care Children under 6 years old	3,093	72.13	2,155	73.45	3,407	77.22	2,537	77.39
Have take care Children under 6 years old	1,195	27.87	779	26.55	1,005	22.78	741	22.61
High-skilled occupation								
Senior technician or manager	-	-	2,569	87.56	-	-	2,591	79.04
General Workers	-	-	365	12.00	-	-	687	20.96
Permanent contract								
Have Bianzhi	-	-	1,222	42.00	-	-	1,737	52.99
Don't have Bianzhi	-	-	1,712	58.35	-	-	1,541	47.01
State-owned company								
Government departments or state-owned units	-	-	1,887	64.31	-	-	2,018	61.56
Not government departments or state-owned units	-	-	1,047	35.69	-	-	1,260	38.44
Province								
Beijing	340	6.12	176	6.00	272	6.17	223	6.80
Liaoling	548	9.86	294	10.02	366	8.30	300	9.15
Heilongjiang	484	8.71	291	9.92	395	8.95	360	10.98
Shanghai	292	5.25	160	5.45	214	4.85	178	5.43
Jiangsu	606	10.9	422	14.38	480	10.88	390	11.90
Shandong	553	9.95	308	10.50	465	10.54	343	10.46
Henan	489	8.80	192	6.54	453	10.27	276	8.42
Hubei	480	8.63	253	8.62	365	8.27	293	8.94
Hunan	489	8.80	210	7.16	427	9.68	271	8.27
Guangxi	622	11.19	324	11.04	504	11.42	303	9.24
Guizhou	424	7.63	222	7.57	298	6.75	228	6.96
Chongqing	232	4.17	82	2.79	173	3.92	113	3.45
Wave								
2004	819	14.73	500	17.04	580	13.15	401	12.23
2006	828	14.89	539	18.37	586	13.28	427	13.03
2009	885	15.92	633	21.57	1,114	25.25	833	25.41
2011	1,237	22.25	961	32.75	1,590	36.04	1,240	37.83
2015	1,790	32.20	301	10.26	542	12.28	377	11.50
Total	5559		2934		4412		3278	

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015

7.5. Difference-in-Differences (DiD) Methods

This section briefly introduces relevant Difference-in-Differences (DiD) methods and their extended forms. It further discusses potential challenges relevant to the analysis in this chapter and present solutions within the framework of the relevant DiD method.

7.5.1. Simple DiD

The DiD method is a widely utilised technique for identifying causal effects in applied economics research. In its simplest 2×2 design, the DiD approach involves a single treatment, two distinct periods (pre- and post-treatment), and two groups: the treated group, which receives the intervention, and the control group, which does not. The treatment group first exposed in post-period. The causal effect is estimated by comparing the pre-post period change in the average outcome for the treated group with the change in the average outcome for the control group (Baker et al., 2022). This method effectively controls for biases that could arise from inherent differences between the groups, as well as biases stemming from temporal changes within the treatment group.

The three key assumptions of the simple 2 × 2 DiD model include:

Parallel Trend Assumption: This assumption is essential for causal inference using the DiD method. It posits that in the absence of the policy intervention, the treatment and control groups should exhibit similar patterns over time in their potential outcomes. Since the counterfactual outcomes—what would have happened without the policy—are unobservable, directly testing this assumption is not feasible. Therefore, researchers typically examine whether the time trends of the treatment and control groups were parallel prior to the intervention. If the pre-intervention trends are parallel, it increases confidence that the post-intervention trends will also be parallel. In this empirical analysis, the parallel trend assumption posits that, in the absence of the impact of home-based elderly care policies, the labour supply trends of married men and women in provinces that have implemented these policies and those that have not should exhibit similar patterns over time.

No Anticipation Assumption: This assumption asserts that an individual's current outcome is not influenced by their future treatment status. In other words, individuals cannot predict their future exposure to the treatment and therefore cannot change their behavior in anticipation of it. In this empirical analysis, this assumption suggests that elderly caregivers in provinces with impending home-based elderly care policies do not alter their labour supply decisions in anticipation of the availability of these services before the policy is officially implemented.

Stable Unit Treatment Values Assumption*:* This assumption indicates that the treatment

of one individual is independent of the treatment of others. Specifically, the fact that one individual is affected by a policy intervention does not influence the outcomes of any other individuals. In this empirical analysis, this assumption implies that an individual's labour supply decision is not influenced by the implementation of home-based elderly care policies in other provinces.

7.5.2. Event Study Design

Most empirical studies involve data from more than just one pre- and post-period. A basic event study design typically includes two groups (a treatment group and a control group) but spans multiple time periods. The event study makes it possible to learn more about time varying treatment effects, and also enables some partial tests of the core DiD assumptions. According to Sun and Abraham (2021), the estimator for each period is a weighted average of the simple 2 × 2 DiD estimator constructed from the relative treatment and control groups in that period.

Compared to the simple 2 × 2 DiD models, event studies possess several attractive properties. Firstly, simple 2 × 2 DiD methods we discussed above can only estimate the average treatment effect of a policy over the sample period. However, some policy effects might delay and only manifest within specific periods. Additionally, the short-term and long-term impacts of a policy might differ significantly. These dynamic characteristics of policy effects, which simple 2 × 2 DiD method cannot explain, can be clearly illustrated through event studies estimators (Miller, 2023). Secondly, the identification assumptions of event studies are more relaxed compared to simple 2 × 2 DiD methods. Recent literature indicates that in cases of staggered policy implementations, if treatment effects are heterogeneous across groups or time periods, the estimates from the staggered DiD method may be biased (see detailed discussion in Section 7.5.4). Event studies can effectively address heterogeneity in treatment effects over time, making them applicable in a broader range of scenarios compared to the static staggered DiD method.

7.5.3. Two-Way Fixed Effects (TWFE)

In practice, however, many applications involve multiple groups and time periods, along with staggered adoption of treatments, as seen in the policy design analysed in this chapter. In these scenarios, researchers typically use more flexible regression methods, controlling for group and time period fixed effects in the regression (Angrist and Pischke, 2009), which is known as the on Two-Way Fixed Effects (TWFE) model (Baker et al., 2022).

The TWFE allows different policy implementation times for different treatment groups,

which is more suitable for examining the effects of progressive policies like China's home-based elderly care policy (Beck et al., 2010). Indeed, although in different contexts, numerous empirical studies have utilised staggered method to explore the impact of China's progressive policy implementation (Guo et al., 2022 for Spatio Temporal Information Cloud Platform Policy; Cao et al., 2021 for Ecommerce Demonstration Policy; Wang et al., 2022 for Broadband Policy; Guo et al., 2023 for digital economy Effect).

7.5.4. Threats to Validity of TWFE

Recent advances in the DiD literature have noted that based on the homogeneous treatment assumption, TWFE estimator with multiple treatment periods/multiple treatment groups is equivalent to the DiD estimator in the 2 × 2 setting and in the staggered adoption setting. However, the coefficients from staggered DiD models may not represent a straightforward weighted average of treatment effects when there is heterogeneity in treatment effects across different groups. In the presence of heterogeneous treatment effects, the staggered DiD estimator might even lead opposite causal effects (Sun and Abraham, 2020; Borussyak and Jaravel, 2021; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Strezhnev, 2018; Athey et al., 2018). Specifically, when treatment is staggered in adoption and varies with time, the regressions include both “clean” comparisons (between treated and not-yet-treated groups) as well as “forbidden” comparisons (between groups who are both already-treated (earlier treated group as control group and later treated group as treatment group)). When treatment effects are heterogeneous across groups, these “forbidden” comparisons potentially lead to severe drawbacks (Roth et al., 2023). In other words, the unbiasedness of staggered DiD estimators requires an additional assumption known as the Homogeneous Treatment Effect Assumption. This assumption necessitates homogeneity in two dimensions: first, the treatment effect must be homogeneous across different groups, meaning that the same policy has the same impact on different treatment groups. Second, the treatment effect must be homogeneous over time, implying that for all individuals receiving the policy intervention, the magnitude of the treatment effect remains constant over time. However, in our context, China's home-based elderly care policy is tailored by each province according to its unique social and economic characteristics. Therefore, the effects of these policies may differ across provinces, potentially leading to biased estimates.

To address the concerns associated with the staggered adoption design, various estimators that are robust to the bias introduced by treatment effect heterogeneity have been proposed. These advancements allow for more reliable policy evaluation and causal inference. The

alternative methods include those proposed by De-Chaisemartin and D' Haultfoeuille (2020), Callaway and Sant'Anna (2020), Sun and Abraham (2020), Borusyak et al. (2021) and Cengiz et al. (2019). Because these methods have different applicable scopes and data requirements, the next subsection provide an intuitive introduction to these estimators and then evaluate their applicability in the context of China's home-based elderly care policies and the CHNS data structure of CHNS.

7.5.5. Staggered DiD Methods

De-Chaisemartin and D'Haultfoeuille (2020) Estimator

In order to avoid comparing units that have already been treated early (as control group) and units that have been treated later (as treatment group), De-Chaisemartin and D'Haultfoeuille (2020; 2023) propose a method that only considers observations whose treatment status changes before and after the policy implementation as part of the treatment group. While the control group is limited to observations whose policy treatment status remains unchange before and after the policy implementation. In addition to the assumptions applicable to staggered DiD discussed in Section 7.4.1, this estimator also emphasizes the stable group assumption to ensure unbiased and consistent estimation. The stable group assumption posits that for any group in the sample that transitions from untreated to treated status between two time periods, there must exist a corresponding group that remains untreated in both periods to serve as the control group. Similarly, if a group transitions from treated to untreated status between two periods, there must be another group that remains treated in both periods to serve as the control. Since this study does not consider cases of policy withdrawal, the groups in the sample that have never been treated meet the stable group.

One side effect of this method is that it may result in a loss of observations, which could reduce the effectiveness of the estimator (De-Chaisemartin and D'Haultfoeuille, 2023). Moreover, the CHNS data utilised in this study were collected at discrete intervals, with survey years in 2004, 2006, 2009, 2011, and 2015. This lack of continuous yearly data makes it challenging to capture changes before and after policy implementation, potentially leading to omitted observations. For example, the home-based elderly care policy in Jiangsu was implemented in 2011, but the absence of labour supply information from the preceding year, 2010, means that, the policy effect for this group cannot be estimated.

One significant advantage of De-Chaisemartin and D'Haultfoeuille (2020) estimator is its ability to account for both the entry into and exit from a policy. However, in the context of China's home-based elderly policy policy exit situations are not relevant. Given the limitations

of sample loss and the inability to capture the policy treatment effects of all provinces in the sample (as in the case of Jiangsu), De-Chaisemartin and D'Haultfoeuille (2020) estimator is not applicable to this empirical analysis.

Sun and Abraham (2021) Estimator

Sun and Abraham (2021) estimator select the observations that have been first treated at the same time and have the same treatment duration as the treatment groups. "Never-received-treatment" observations are selected as a control groups. In this way, those groups that have already been treated cannot enter the control group, thus avoiding the problem caused by "forbidden" comparisons. They calculate the Cohort-specific Average Treatment Effects on the Treated (CATT) based on a linear regression with multiple fixed effects. Then the dynamic and average treatment effects calculated by weighted sum CATT by sample shares of each cohort in the relevant period.

It is worth noting that when using the Sun and Abraham (2021) estimator for estimation, it is necessary that there are groups who have never been treated as a control group. If there are no such groups in the sample, then the last groups to receive treatment in the sample need to be treated as a group that has never received treatment, and all samples of the last group to receive treatment must be deleted. In this analysis, the sample includes a province that has never implemented the home-based elderly care policy, which helps avoid this limitation (see detailed discussion in Section 7.4). Moreover, the Sun and Abraham (2021) estimator is particularly suitable for event study methods, as it can demonstrate the dynamic effects of policies before and after each period, rather than just the average treatment effect (ATE). The samples and policies analysed in this study meet the assumptions of Sun and Abraham (2021) estimator, and the dynamic effects can better help us capture the implementation effect of China's home-based elderly care policy, such as whether there are lags and whether the policy effect can be maintained or expanded. Compared with the De-Chaisemartin and D'Haultfoeuille (2020) estimator, fewer observations would be lost, which also ensures the effectiveness of the estimation (Liu et al., 2022).

Callaway and Sant'Anna (2021) Estimator

Callaway and Sant'Anna (2021) estimator is similar to that of Sun and Abraham (2021), which first calculates the average treatment effect on the Treated (ATT) for each cohort-specific group, and then a weighted-sum ATT is calculated to obtain an estimate of the average treatment effect (ATE). The differences between the Callaway and Sant'Anna (2021) estimator and the Sun and

Abraham (2021) estimator relevant to this empirical analysis lie in the selection of control groups and inference setting. Firstly, Callaway and Sant'Anna (2021) estimator also only considers the observations that have been first treated at the same time and have the same treatment duration as the treatment groups, while the control group observations for this estimator include those who have never received treatment or those who have not yet received treatment. Additionally, greater weight is given to control group samples that exhibit individual characteristics more frequently observed in the treatment group, and lesser weight to those less similar. This approach ensures the balance of individual characteristics between the treatment and control groups, which might lead more sample loss (De Chaisemartin and D'Haultfceuille, 2022). In terms of inference, Sun and Abraham (2021) estimator uses pointwise inference of average treatment effect, whereas Callaway and Sant'Anna (2021) estimator develops and argues for simultaneous confidence intervals, which can be estimated with a simple multiplier bootstrap procedure (Baker et al., 2022).

Although the control group selection and inference of Callaway and Sant'Anna (2021) estimator are extensive than the Sun and Abraham (2021) estimator, the lack of continuous year data makes it challenging to employ Callaway and Sant'Anna (2021) estimator. In the code implementation process of Callaway and Sant'Anna (2021) estimator, it automatically generates dummy variables for continuous leading or lagging years based on different policy implementation times and then calculates weighted sum average treatment effect. Due to CHNS's inability to provide continuous year data, a large number of cohort-specific estimators are missing, leading to the situation that in this analysis, the treatment effects cannot be obtained for both static and dynamic models. Sun and Abraham (2021) estimator can address this issue because they follow the idea of dynamic models directly in which the lead and lag dummy variables no longer distinguish different policy implementation times before calculating average treatment effect, so that each lead and lag dummy variable has sufficient observations.

Borusyak et al. (2021) Estimator

Based on parallel trend and no anticipation assumptions, Borusyak et al. (2021) estimator (imputation estimator) first estimates the counterfactual outcomes for each unit in the treatment group across each period using samples that have never been treated or have not yet been treated. Then the treatment effect for each unit in the treatment group is calculated as the difference between the observed outcomes and the counterfactual outcomes (obtained in step one). Finally, the individual level treatment effects are calculated as a weighted sum to obtain an estimate of the average treatment effect. This approach prevents the problem of using "forbidden"

comparisons by clearly separating of estimation and testing for individual level rather than group level compared with the above three discussed estimators. However, the counterfactual results strongly depend on the correct setting of the model and the homoscedasticity assumption, which is hard to satisfy (De-Chaisemartin and D'Haultfoeuille, 2023). Moreover, Borusyak et al. (2021) estimator relies on a more rigorous parallel trends assumption that is at the individual level rather than at the group level. Considering that it is difficult to guarantee the validity of these two more stringent assumptions, Borusyak et al. (2021) estimator is not applicable to this empirical analysis.

Cengiz et al. (2019) Estimator

Cengiz et al. (2019) estimator (tacked regression estimator) matches observations from the treatment group with observations from control group that have never been treated or have not yet been treated, to create event (policy implementation)-specific "clean 2 × 2" datasets. These datasets are then stacked together and further linearly regressed with multiple individual and time fixed effects. There are currently two main problems faced by stacked regression estimators: firstly, the statistical properties of the estimators provided by this method have not been given or rigorously proven. Secondly, this estimator may cause issues with data repetition during the estimation process. In addition, the existing software packages for stacked regression estimators are not comprehensive enough and can only calculate the coefficients of each period in the dynamic effects and cannot directly achieve weighted averageing. Currently, researchers mostly manually stack data before regression, so there is no unified and standardised approach. Therefore, Cengiz et al. (2019) estimator is not utilized in this empirical analysis.

Overall, although there is no unified conclusion on which robust estimator is better, based on the implementation background of China's home-based elderly care policy, data structures, and advantages and disadvantages of the estimators mentioned above, this analysis has employed Sun and Abraham's (2020) estimator as the benchmark staggered DiD method to address the potential bias.

7.6 Identification Strategy and Empirical Models

This section firstly introduces the data structure of the linked CHNS and province-level data relevant to the identification of the impact of the home-based elderly care policy on married adult children's labour supply in Section 7.6.1. It then introduces the empirical specifications employed to identify this effect, first using the TWFE, then the event study design, and the staggered DiD method proposed by Sun and Abraham (2021) in Sections 7.6.2, 7.6.3 and 7.6.4,

respectively. Finally, it discusses the variation in policy implementation across provinces in China in relation to the key assumptions of the DiD design in Section 7.6.5.

7.6.1. CHNS Data Structure

Despite its advantages for addressing the research questions of this chapter (see discussion in Chapter four), one limitation of the CHNS data is its lack of continuous coverage. This limitation prevents the CHNS from providing observations for each lead or lag year in event study design and staggered DiD model estimations. For example, while Jiangsu Province fully implemented the home-based elderly care policy in 2011, observations for the year prior to implementation (2010) are missing because the CHNS does not include individual-level data for that year. As a results, estimations for the year before policy implementation (-1 period) will not include data from Jiangsu Province. Similarly, Beijing fully implemented China's home-based elderly care policy in 2009. Simultaneously, the CHNS survey data includes individual-level data in 2004, 2006, 2009, 2011, and 2015, which corresponds to five years before, three years before, the year of, two years after, and six years after the 2009 policy implementation in Beijing. Therefore, in the dynamic DiD model, only the estimators for periods -5, -3, 0, 2, and 6 include observations from Beijing. The dynamic policy effects for periods -6, -4, -2, 1, 3, 4 and 5 cannot be captured information from observations who live in Beijing due to the lack of CHNS data for the years 2003, 2005, 2007, 2010, 2012, 2013, and 2014.

The potential consequence of this data structure is that, in dynamic (event study design and staggered DiD design) models, the treatment groups for different lead or lag periods may be drawn from slightly different provinces. This is illustrated in Tables 7.7 and 7.8, which present the data structure for lead and lag estimators in event study design and staggered DiD model for wife's panel and husband's panel, respectively. These two tables present the distribution of observations in the treatment group. The first part of each table shows the distribution of observations according to the policy implementation year and dynamic periods. The second part displays the years in which these observations were recorded by the CHNS. The third part lists the provinces of these observations, along with their corresponding CHNS codes. For example, in period -5 (wife panel), there are a total of 230 observations that contain information from five periods before the policy implementation. The policy implementation years for the provinces represented are 2009 and 2011. The CHNS observation years are 2004 and 2006.[84] These observations come from the following four provinces: Guizhou, Beijing,

[84] 2009-2004=5, 2011-2006=5

Jiangsu, and Henan (Guizhou and Beijing implemented the policy in 2009, while Jiangsu and Henan implemented it in 2011).

According to Tables 7.7 and 7.8, a side effect of the data structure is that the treatment groups in periods -4, -2, 1, 3, 6, 7, 8, and 11 are derived from a single survey wave. This could lead to absorption by time fixed effects, potentially affecting the interpretability of the estimates. However, time fixed effects are essential for capturing unobservable factors that vary over time.

To address this issue, we grouped the observations into the following periods: -1 year and -2 years, -3 years and -4 years, -5 years and -6 years, 1 year and 2 years, 3 years and 4 years, and 5 years and 6 years. Due to the reduced number of observations in periods 7, 8, and 11, their larger distance from the policy implementation, and the fact that these treatment groups are from a single rather than multiple waves, we consolidated the treatment effects from periods 7 to 11 into period 6. This approach ensures observations in each dynamic period are drawn from multiple waves, effectively controlling province and year fixed effects and allowing the dynamic period estimations to be based on a broader set of provinces, thus ensuring the comparability of the estimates.

Table 7.6 Merged data structure for wife's panel: CHNS and province-level data

	Number of observations															
	Pre-treatment periods						Implementation period	Post-treatment periods								
Policy implementation year	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**11**
2004	0	0	0	0	0	0	107	0	121	0	0	104	0	69	0	147
2007	0	0	0	96	0	78	0	0	130	0	123	0	0	0	195	0
2009	0	65	0	61	0	0	64	0	247	0	0	0	327	0	0	0
2010	104	0	119	0	0	107	0	278	0	0	0	237	0	0	0	0
2011	0	191	0	0	211	0	190	0	0	0	298	0	0	0	0	0
2012	168	0	0	178	0	247	0	0	0	450	0	0	0	0	0	0
Total	272	256	119	335	211	432	361	278	498	450	421	341	327	69	195	147
Treated observations waves	2004 2006	2004 2006	2006	2004 2006 2009	2009	2006 2009 2011	2004 2009 2012	2011	2006 2009 2011	2015	2011 2015	2009 2015	2015	2011	2015	2015
Province name	Shandong Shanghai Heilongjiang Hubei Chongqing	Guizhou Beijing Jiangsu Henan	Shandong Shanghai	Guangxi Guizhou Beijing Heilongjiang Hubei Chongqing	Jiangsu Henan	Guangxi Shandong Shanghai Heilongjiang Hubei Chongqing	Liaoning Guizhou Beijing Jiangsu Henan	Shandong Shanghai	Liaoning Guangxi Guizhou Beijing	Heilongjiang Hubei Chongqing	Guangxi Jiangsu Henan	Liaoning Shandong Shanghai	Guizhou Beijing	Liaoning	Guangxi	Liaoning
Treated group province	37	52	37	45	32	45	21	37	21	23	45	21	52	21	45	21
Province code in CHNS	31 23 42 55	11 32 41	31	52 11 23 42 55	41	37 31 23 42 55	52 11 32 41	31	45 52 11	42 55	32 41	37 31	11			

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015

Table 7.7 Merged data structure for husband's panel: CHNS and province-level data

	Number of observations															
	Pre-treatment periods						Implementation period	Post-treatment periods								
Policy implementation year	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**11**
2004	0	0	0	0	0	0	61	0	72	0	0	119	0	82	0	32
2007	0	0	0	65	0	59	0	0	144	0	152	0	0	0	84	0
2009	0	40	0	40	0	0	80	0	308	0	0	0	102	0	0	0
2010	69	0	83	0	0	140	0	323	0	0	0	64	0	0	0	0
2011	0	133	0	0	279	0	258	0	0	0	104	0	0	0	0	0
2012	136	0	0	228	0	340	0	0	0	102	0	0	0	0	0	0
Total	205	173	83	333	279	539	399	323	524	102	256	183	102	82	84	32
Treated observations waves	2004 2006	2004 2006	2006	2004 2006 2009	2009	2006 2009 2011	2004 2009 2012	2011	2006 2009 2011	2015	2011 2015	2009 2015	2015	2011	2015	2015
Province name	Shandong Shanghai Heilongjiang Hubei Chongqing	Guizhou Beijing Jiangsu Henan	Shandong Shanghai	Guangxi Guizhou Beijing Heilongiang Hubei Chongqing	Jiangsu Henan	Guangxi Shandong Shanghai Heilongiang Hubei Chongqing	Liaoning Guizhou Beijing Jiangsu Henan	Shandong Shanghai	Liaoning Guangxi Guizhou Beijing	Heilongiang Hubei Chongqing	Guangxi Jiangsu Henan	Liaoning Shandong Shanghai	Guizhou Beijing	Liaoning	Guangxi	Liaoning
Treated group province	37	52	37	45	32	45	21	37	21	23	45	21	52	21	45	21
Province code in CHNS	31 23 42 55	11 32 41	31	52 11 23 42 55	41	37 31 23 42 55	52 11 32 41	31	45 52 11	42 55	32 41	37 31	11			

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 2015

7.6.2. TWFE Specification

To identify the impact of the home-based elderly care policy, we start our analysis by employing a TWFE model, which compares married adult children's labour supply outcomes in provinces that have implemented home-based elderly care policy with those in provinces that have not implemented such policy.

$$Y_{ipt_g} = \alpha_g + \delta_g D_{pt_g} + \alpha_{1_g} P_{ipt_g} + \alpha_{2_g} M_{ipt_g} + \alpha_{3_g} F_{ipt_g} + C_{p_g} + \mathrm{T}_{t_g} + \varepsilon_{ipt_g} \quad (7.1)$$

In equation (7.1), Y_{ipt_g} is the labour supply (probability of employment or conditional on employment paid working hours) of married individual i ($i = 1, \ldots, n$), of gender g (f for females and m for males) in province p at time t. D_{pt_g} is the policy implementation status dummy for the province the individual is residing. If the province p has fully implemented the home-based elderly care policy at time t, then D_{pt_g} equals 1. If the province p has not fully implemented the home-based elderly care policy at time t, then D_{pt_g} equals 0. Under the assumption the homogeneous treatment assumption, in equation (7.1), the labour supply variable is also regressed on demographic characteristics (P_{ipt_g}), family characteristics (M_{ipt_g}) and financial characteristics (F_{ipt_g}). T_{t_g} represents the time fixed effects, C_{p_g} represents the province fixed effects, and ε_{ipt_g} is the random error term.[85]

7.6.3. Event Study Specification

In order to test for parallel trends and study the dynamics of treatment effects, this subsection estimate an event-study version of the staggered DiD model. Specifically, we estimate the following specification:

$$Y_{ipt_g} = \alpha_g + \sum_{l=-4}^{l=6} \delta_{l_g} D_{p_g}^{l} + \alpha_{1_g} P_{ipt_g} + \alpha_{2_g} M_{ipt_g} + \alpha_{3_g} F_{ipt_g} + C_{p_g} + \mathrm{T}_{t_g} + \varepsilon_{ipt_g} \quad (7.2)$$

[85] Consistent with the discussion in Sections 5.4 and 6.4, the attrition rate in CHNS is high and the dependent variables (employment status and paid working hours) exhibit persistence within an individual in the panel regardless of their gender. Given this, the inclusion of individual fixed effects in the model would lead a bias in the estimates (Nguyen and Connelly, 2014; Kolodziej, Reichert and Schmitz, 2018) (see detailed discussion in Sections 5.4 and 6.4). Therefore, in our benchmark model excludes individual fixed effects, but in Section 7.7.4.2, we explore the sensitivity of the benchmark results to their inclusion individual fixed effects. Detail data structure is presented in Tables M.1 to M.12 in the Appendix M.

Equation (7.2) mirrors Equation (7.1) except that the treatment variable, $D_{p_g}^{l}$ now represents a set of dummy variables that take value one if, for the province p at time t, the implementation of home-based elderly care policy was l years away, $-6 < l < 6$. If the implementation of home-based elderly care policy was not l years away for province p at time t, then $D_{p_g}^{l}$ equals to zero. According to Section 7.6.1, due to issues within the sample structure, equation (7.2) groups the observations from -1 year to -2 years, -3 years to -4 years, -5 years to -6 years, 1 year to 2 years, 3 years to 4 years, 5 years to 6 years. Therefore, in equation (7.2), l equals -6, -4, -2, 0, 2, 4 and 6. with the -6 being the base period. The definitions of other variables are identical to those in Section 7.4.2.

7.6.4 Staggered DiD Specification

Following the discussion in Sections 7.2 and 7.4.3, in our context, China's home-based elderly care policy is designed by each province based on their different social and economic characteristics. Therefore, the effects of home-based elderly care policies might vary across provinces, potentially leading to biased estimates (Sun and Abraham, 2020; Borussyak and Jaravel, 2021; Callaway and Sant'Anna, 2020; Goodman-Bacon, 2021; Strezhnev, 2018; Athey and Imbens, 2018). We address concerns about the reliability of TWFE estimates by replicating our results using the robust estimators introduced in Sun and Abraham (2021) by estimating the following specification:

$$Y_{ipt_g} = \alpha_g + \sum_e \sum_{l \neq -1} \delta_{e,l_g} \left(1\{E_i = e\} \cdot D_{pt_g}^{l}\right) + \alpha_{1_g} P_{ipt_g} + \alpha_{2_g} M_{ipt_g} + \alpha_{3_g} F_{ipt_g} + C_{p_g} + \mathrm{T}_{t_g} + \varepsilon_{ipt_g} \quad (7.3)$$

In equation (7.3), which mimics equations (7.1) and (7.2), $1\{E_i = e\}$ is now an indicator variable denoting whether the province has fully implemented the home-based elderly care policy for the first time in year e. l is the number of years away from (since/until) the fully implementation of home-based elderly care policy. $D_{pt_g}^{l}$ is the group-period policy implementation status dummy. If the province p at time t is l years away from policy fully implementation time, then $D_{pt_g}^{l}$ equals 1, otherwise equals 0. In equation (7.3), l equals -6, -4, -2, 0, 2, 4 and 6 with the -6 being the base period. The definitions of other variables are identical to those in Section 7.4.2.

7.6.5. Evaluation of Assumptions' Validity

This subsection examines how the variation in policy implementation across provinces relates to the key assumptions of the DiD design. The main concerns in our setting arise from potential endogeneity in the presence of, for instance, reverse causality and omitted variables. In relation to the former, the dependent variable of this analysis is individual labour supply decisions, while home-based elderly care policies are promoted at the national level and implemented at the provincial level. Thus, individual decisions are unlikely to influence policy implementation at either the provincial or national level. Regarding the latter, provincial characteristics, such as the degree of ageing and local financial conditions which might influence labour supply behavior.

In order to explore the validity of key identification assumptions and address the potential concerns, Figure 7.3 shows the pre-trend average employment rates of each province until the full implementation of the home-based elderly care policy for each province (indicated by vertical red lines). If the time trends in each province were roughly similar before the full implementation of the policy, we assume that the timing of the implementation of China's home-based elderly care policy was not influenced by the employment conditions in the provinces. In other words, the policy implementation is considered exogenous to provincial labour supply. Conversely, if the trends of employment rates vary significantly across provinces, a potential concern is that the implementation of the policy may have been influenced by differences in employment conditions, indicating a possible issue of endogeneity. Despite the differences in levels, the trend of employment rates in various provinces is roughly the same prior to the policy implementation within each province. For all provinces, the employment rate reached its lowest point from 2003 to 2005, and then exhibited an upward trend from 2005 to 2008. The rate of increase in of employment rates began to decline around 2009. Moreover, in our sample, the three earliest implementing provinces are Liaoning, Guangxi, and Guizhou. As shown in Figure 7.3, these provinces had relative low employment rates before the policy implementation, compared to other provinces in the figure. Moreover, the time trends in employment rates for these three provinces do not display unique but significantly different characteristics from those of the others. Therefore, we have reason to believe that the timing of the implementation of China's home-based elderly care policy across provinces was not influenced by employment conditions, which mitigates concerns about endogeneity issues.

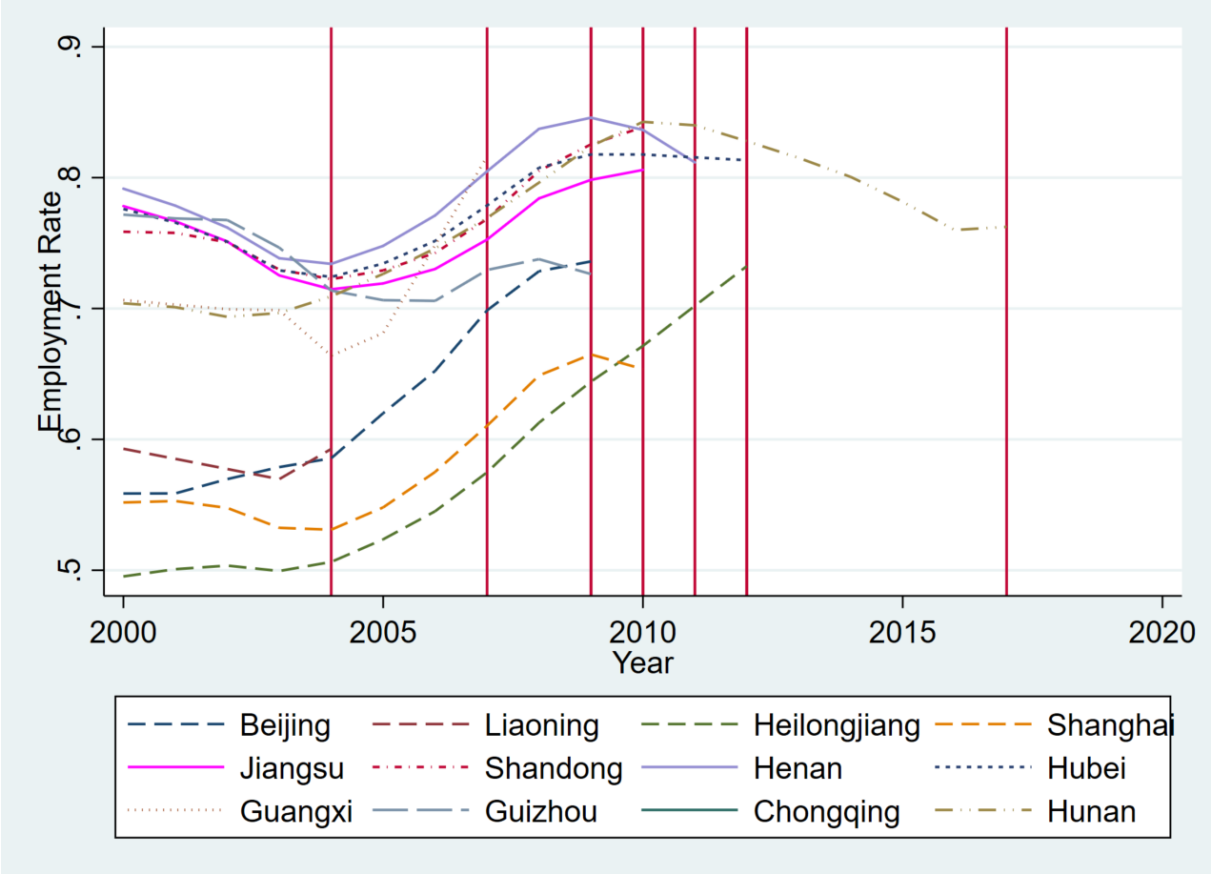

Figure 7.3 Employment rate by provinces

Note: Employment rate=total number of employed people/total number of people aged 15 and above. The number of employed individuals and the total number of people aged 15 and above come from annual population and employment statistics yearbook by provinces. The red lines indicate the year of full implementation time of the home-based elderly care policy by provinces (2004 for Liaoning, 2007 for Guangxi, 2009 for Guizhou and Beijing; 2010 for Shandong and Shanghai; 2011 for Henan and Jiangsu; 2012 for Heilongjiang, Hubei and Chongqing). Due to the lack of information on working hours and labour supply information by gender in the statistical yearbook, this subsection only infers the validity of the parallel trend assumption based on employment rates for all individuals.

Data source: Author's calculations based on China Statistical Yearbook (2000-2015) by province (https://www.stats.gov.cn/sj/ndsj/)

Secondly, considering the potential omitted variables, this analysis attempts to control for a set of time varying province level characteristics, which might affect both the timing of the home-based elderly care policy implementation and the labour supply of individuals residing in that province (the estimate results are reported in Section 7.7.4.2 as one of robustness checks). In particular, since the implementation of policy is influenced by local financial support and the demand for elderly care within a province (see detailed discussion in Section 7.2), we

additionally control for the average budget income of local governments and the elderly dependency ratio at the province level.[86] Financial conditions may also affect the provision of formal care services and the content of home-based elderly care policies. For example, residents in provinces with higher average living standards might be more likely to opt for more professional and convenient elderly care services, even if they must pay additional fees.[87] While residents in provinces with lower average living standards might be more inclined to accept financial subsidies or basic free services. In this case, the content of the province's home-based elderly care policies may vary slightly. Therefore, this analysis controls for per capita GDP at province level.[88] Moreover, we also consider controlling for time-varying conditions in the labour supply outcomes of married adults that are not explained by other control variables by including time trend interaction terms ($P_{ipt_g} * C_w, M_{ipt_g} * C_w$ and $F_{ipt_g} * C_w$, C_w captures the time trend, w=1, 2, 3, 4 and 5) (Hoynes and Schanzenbach, 2009 and Hoynes et al., 2016). The estimate results are reported in Section 7.7.4.2 as one of robustness checks.

Finally, we also estimate a dynamic version of equation (7.1) and check for potential pre-trends. If the pre-policy estimators are nonsignificant and around zero, then we would expect that before the full implementation of the policy, adult children's labour supply outcomes whose province implement policy have no significant difference with those whose province did not implement such policy. Overall, this evidence suggests that endogeneity is not a major source of concern in this framework.

7.7 Estimations Results

This section first explores the impact of home-based elderly care policy on married adult children's labour supply along both extensive and intensive margins using the TWFE specification. Then the dynamic policy effect on married adult children's labour supply is explored using the event study and the staggered DiD model proposed by Sun and Abraham (2021). It then presents a number of robustness checks that explore the sensitivity of these

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[86] The data is sourced from the China National Statistical Yearbook of 2000, 2004, 2006, 2009, 2011, and 2015 by provinces.

[87] China's home-based elderly care policy includes some services that require additional fees, but they are generally discounted, such as discounted lunch and discounted daytime care slots.

[88] The data is sourced from the China National Statistical Yearbook of 2000, 2004, 2006, 2009, 2011, and 2015 by provinces.

findings to the sample restrictions, model specification and clustering level of the standard errors. Finally potential mechanisms of identified effects are explored.

7.7.1 Benchmark Model

Table 7.9 presents estimate of δ_f in equation (7.1) on married adult children's labour supply decision at both extensive. Column (1) show the impact of the full implementation home-based elderly care policy in the province of residence on wife's probability of employment. The results show that home-based elderly care policy has a negative effect on wife's probability of employment by 8.0 percentage points. This negative effect is in line with results of Karlsberg Schaffer (2015) who explores the effects of the introduction of free personal care for the elderly in Scotland on informal care behavior and finds that the free formal care increased the caregiver's probability of informal caregiving by 6.26 percentage points. Karlsberg Schaffer (2015) attributes this to adult children's sense of guilt. When formal caregivers arrive at home, children may feel that they should also be seen to be helping. In addition, the availability of free personal care could prompt conversations amongst families about whether they should provide elderly care with more effort/began to provide elderly care for their parents (in law), resulting in increased use of both types of care (formal elderly care and informal elderly care). The increased informal family care might lead to a decreased probability of being employed. Another possible explanation for this negative effect is that elderly care policies may crowd out formal elderly care arrangements or informal elderly care provided by secondary caregivers. For example, they can appropriately reduce the proportion of formal elderly care purchased or reduce the supply of care by secondary caregivers. Both above situations may increase the caregiving pressure on primary caregivers and reduce their probability of being employed. The policy in this case might offset the personal costs of caregiving and increase welfare, especially for low-income individuals (Korfhage and Fischer-Weckemann, 2024).

It should also be pointed out that China's home-based elderly care policy is a policy system rather than a single policy, which includes both substitute service support and financial support for the elderly. Due to our inability to clearly distinguish the various dimensions of policies implemented by each province that cause changes in wives' labour supply, the causal effects we observe may be the result of the interaction of two opposite influencing mechanisms, the substitution effect and the income effect. The substitute service support for elderly may alleviate caregivers' time and energy pressure, allowing them to devote more time to the labour market. On the other hand, financial support can increase wives' non-labour income and raise the

threshold for them to enter the labour market, as their reserve wage has increased. The negative effect reported in Table 7.9, column (1) might stem from a stronger response to the income effect, which is also consistent with the empirical results presented in Chapter 5 of this thesis, indicating that the home-based elderly care policy could help wife better balance work and life.[89] In the other words, when a wife faces increasing elderly care responsibility, she does not need to overwork to ensure household income stability with the support of the home-based elderly care policy. Korfhage and Fischer-Weickmann (2024) emphasised the role of income effects in the policy effect that supports the above argument. Their research shows that based on the elderly care policies without financial support, women are less likely to provide elderly care, experience a reduced negative impact on their employment probability and retire later. For those who currently do not need to provide elderly care but face the elderly care responsibility in the foreseeable future, the potential income effect may be more pronounced. Because based on the home-based elderly care policy, they may reduce the expected financial pressure that future elderly care may bring, thereby reducing labour supply. This explanation is indirectly supported by the empirical results of Geyer and Korfhage (2015), although focus on different kinds of family care (care for person with impairments rather than elderly person). They focus on the incentives of long-term care insurance on the labour supply decision of family carers. They find that 1% increase in cash benefits will decrease caregiver's paid working hours by 0.46%. Geyer and Korfhage (2015) explain that because of the increased non-labour income, the marginal utility of an extra hour of working decreases. Therefore, the caregiver decreases labour supply and might use some of the time available on leisure and some on informal caring.

According to the results in column (2) in Table 7.9, the full implementation of home-based elderly care policy has a positive but non-significant average effect on wives' paid working hours conditional on employment. This may be due to the equal substitution effect and income effect of China's home-based elderly care policy on paid working hours.

For husbands, we find that the full implementation of home-based elderly care policy has

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[89] The results presented in Chapter 5 show that wives who provide elderly care has a higher probability to be employed by 6.8 percentage points compared to those who do not provide elderly care, indicating that in China, when married women face the pressure of elderly care, they might choose to actively participate in the labour market to earn more paid income to compensate for the additional expenses of providing elderly care. See detailed discussion in Section 5.5.1.

a non-significant effect on husband's labour supply at both extensive and intensive margins. This non-significant result is perhaps unsurprising, given the more active role of women in informal caregiving. The empirical results presentaed in Section 6.5.1, family caregiving responsibilities have a slight negative impact on the probability of husbands being employed (5.3 percentage points with a 90% confidence interval) and have no significant effect on their paid working hours. As the secondary caregiver in the family, a husband might face a smaller burden of elderly care than his wife leading to a lesser effect on their labour supply outcomes. Therefore, the impact of home-based elderly care policies is more likely to directly affect the labour supply of wives rather than husbands. On the other hand, due to husbands being more engaged in full-time work, the speed and degree of adjusting work arrangements are slower, resulting in a less significant impact of policies on their labour supply (Heger and Korfhage, 2020).

Table 7.8 TWFE estimates of married adult children's labour supply

	Wife		Husband	
	Probability of Employment (1)	**Paid Working Hours (2)**	**Probability of Employment (3)**	**Paid Working Hours (4)**
DiD coefficient	-0.080**	0.314	-0.039	1.128
	(0.031)	(1.327)	(0.023)	(1.151)
Age	0.067***	-0.148	0.022***	0.131
	(0.007)	(0.671)	(0.007)	(0.465)
Age squared	-0.001***	-0.002	-0.000***	-0.002
	(0.000)	(0.009)	(0.000)	(0.006)
Hukou	0.052**	2.829*	-0.009	2.190
	(0.021)	(1.387)	(0.035)	(1.554)
Lower middle school degree	0.002	4.373***	-0.011	1.658*
	(0.014)	(1.088)	(0.024)	(0.764)
Upper middle school degree	0.036	4.585**	0.005	1.804
	(0.021)	(1.505)	(0.034)	(1.081)
Technical or vocational degree	0.146***	1.828	0.081*	0.753
	(0.024)	(1.262)	(0.042)	(1.405)
University or college degree or higher	0.142***	1.625	0.093**	-0.538
	(0.026)	(1.419)	(0.042)	(1.280)
Health	0.007	-0.540	0.021	-0.597
	(0.021)	(0.907)	(0.030)	(0.753)
Spouse's monthly labour wage	0.042***	-0.258	0.010**	0.164
	(0.004)	(0.148)	(0.004)	(0.106)
Spouse's second occupation	0.176***	-5.086***	0.137***	-2.633*
	(0.025)	(0.938)	(0.041)	(1.465)
Childcare	-0.045**	-3.391***	-0.004	-1.169
	(0.016)	(0.816)	(0.012)	(1.105)
Household size	-0.002	-0.553*	-0.009**	-0.178
	(0.006)	(0.255)	(0.004)	(0.497)
Household total gross income	0.012**	0.693	0.038***	0.203
	(0.005)	(0.591)	(0.008)	(0.268)
High-skilled occupation		0.112		-0.169
		(0.686)		(1.064)
Permanent contract		-0.551		-0.928
		(0.555)		(0.931)
State-owned firm		-6.091***		-6.350***
		(1.118)		(1.006)
Constant	-0.737***	48.428***	0.088	42.171***
	(0.093)	(12.657)	(0.179)	(8.654)
Province Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Number of Observations	5,559	2,934	4,412	3,278
Adjusted R^2	0.3094	0.0875	0.1362	0.0692

** $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$*
Standard errors clustered at province level.

Turning our attention to other coefficient estimates presented in Table 7.9, the probability

of employment increases by age but at a decreasing rate consistent with the existing evidence (Stone and Short, 1990; Zahir et al., 2009 and Liu, 2014) for both wives and husbands. In terms of Hukou, we only observe significant effect on wife's labour supply at both margins by 5.2 percentage points and 2.829 hours per week, which is in line with the empirical results of Chai, et al (2021). Regarding education level, the higher their education level, the higher the probability of being employed for both spouses who with a technical or vocational degree or higher. In terms of the intensive margin for both spouses, the positive effect is only significant for lower middle school degree (both spouse) and upper middle school degree (wife). In terms of work-related characteristics which are included in the intensive margin specification (columns (2) and (4)), occupation and work type (permanent work/ temporary work) have no significant impact on paid working hours, while both women and men who work in state-owned enterprises have shorter paid working hours than those who work in non-state enterprises. This may be because the work in China's state-owned enterprises is relatively stable, the work intensity is moderate, and the risk of being punished for performance is small.

In terms of the family characteristics, having childcare responsibilities have a significant negative effect on wife's labour supply at both extensive and intensive margins by 4.5 percentage points and 3.391 paid working hours, respectively. This negative effect aligns with our expectations, specifically that childcare responsibilities reduce wives' labour supply. This may be because both unpaid childcare and paid labour supply are time-intensive activities. Women in the household, when faced with reproductive responsibilities and the necessity to allocate more time and energy to care children, may have to sacrifice their paid labour supply. Conversely, husbands, who typically serve as secondary providers of family care, experience a smaller impact of childcare on their labour supply. Although we observe negative effects of caring for children aged six and below on husbands' labour supply in both intensive and extensive margins, these effects are not statistically significant. In terms of the household size, for every increase in the number of people in the family, wife's paid working hours will be significantly reduced by 0.553 hours per week. While for husbands, the negative effect of household size occurs in the extensive margin that for every increase in the number of people in the family, husband's probability of employment will be significantly reduced by 0.9 percentage point. The effect of household size on adult children's labour supply comes from multiple factors. One reason may be that more elderly parents and parents-in-law or children in the family who need to take care of might lead to married adult children have less time to devote to paid work. Another possible reason is that there is more labour force in the family and married adult children have higher non-labour income. They can use this non-labour income to buy

more leisure time and reduce the labour supply. The negative outcomes we observe may be the result of the interplay of multiple factors mentioned above.

In terms of financial characteristics, the second occupation of the spouse, the spouse's monthly labour income and the household total gross income, play a similar role on the adult children's labour supply. As discussed in Sections 5.5.1 and 6.5.1, for married adult children, more non-labour income can provide them with more choices, leading to different impacts on labour supply. On the one hand, abundant non-labour income can provide adult children with more leisure time, reducing their labour supply. On the other hand, more non-labour income means that adult children can purchase more formal elderly care, allowing them to invest more energy and time into the labour market to increase their labour supply. According to Table 7.9, for both wives and husbands, an increase in any of the aforementioned three variables is likely to enhance the probability of employment of adult children for both spouses. This finding suggests that at the extensive margin of labour supply, adult children are more likely to use additional financial support to purchase formal caregiving services, which allows them to devote more time and energy to participating in the labour market. While for the intensive margin, spouse's second occupation harms adult children's paid working hours for both spouse.

7.7.2. Event Study Design Estimates

Given the limitations of our data structure described in Section 7.6.1, our benchmark results presented in the previous section are based on a TWFE estimation. However, since our data includes more than just a single pre- and post-time period, in this section we present the estimates from the event study design specification with TWFE, as outlined in Section 7.6.3. Assuming homogeneous treatment effects, this approach, in addition to tracking out time-varying ATTs in the post-period, also provides a means to partially test the identifying assumptions. Specifically, we expect that the pre-period DiDs will be equal to zero, ensuring that the common trend and no anticipation assumptions are met. Figure 7.4 presents these results. First, the estimates of pre-period DiDs (estimate results for -2 and -4 periods in the four subfigures) are insignificant across subfigure indicating that the common trend and no anticipation assumptions are met. Secondly, it also sheds light on the dynamics of treatment effects that couldn't be captured by static TWFE model. The point estimates are encircled by lines denoting a 90% confidence interval.[90]

[90] The detail estimate results are reported in Table N.1 in Appendix N.

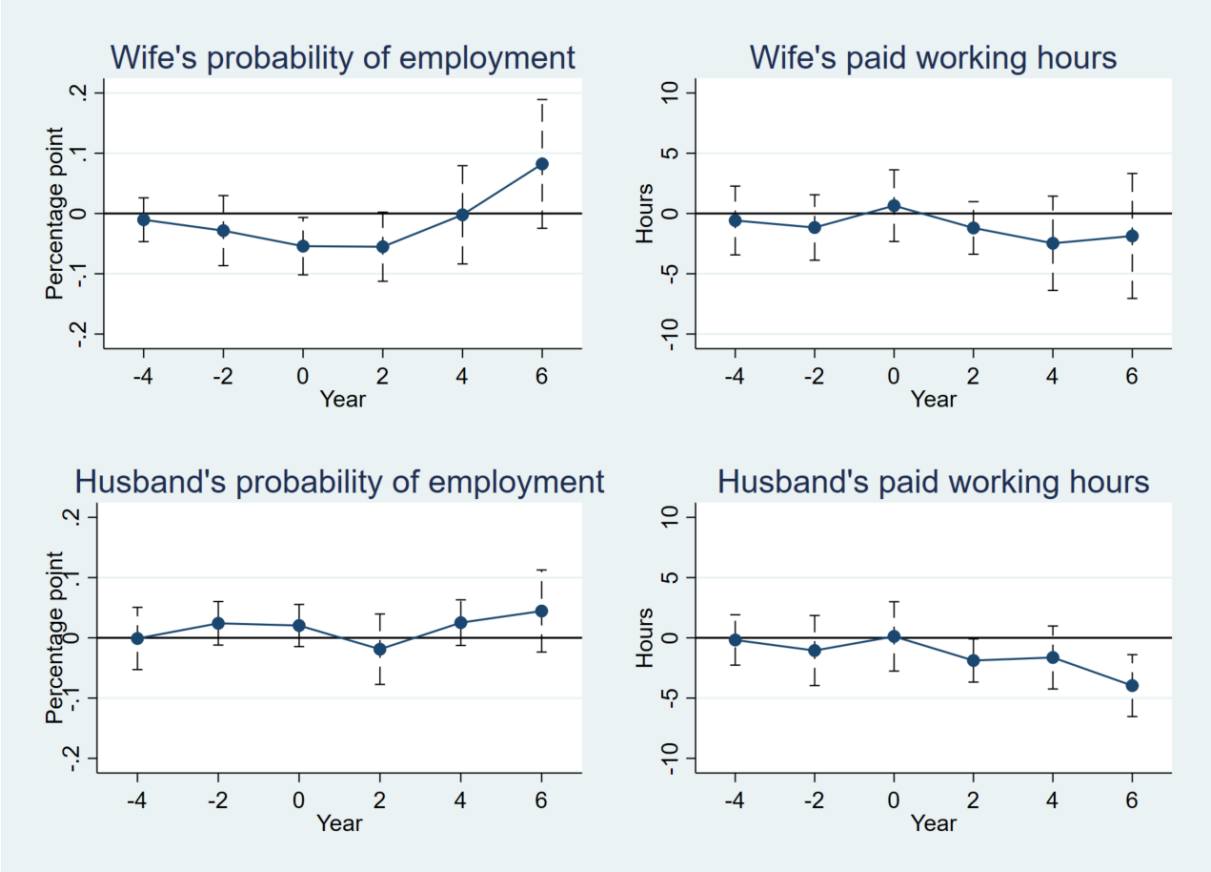

Figure 7.4 Event study design estimates on married adult children's labour supply

Notes: The four subpanels in Figure 7.4, arranged from top to bottom and left to right, respectively, illustrate the dynamic effects of the implementation of China's home-based elderly care policy on the probabbility of wives being employed, wives' paid working hours, the probabbility of husbands being employed, and husbands' paid working hours. The time window spans from four years prior to the full implementation of the policy to six years afterward. The point estimates are accompanied by lines representing a 90% confidence interval.

Regarding the policy's effect on wives' labour supply decisions, our analysis captures only short-term impacts. At the extensive margin, we find that during the first year of full policy implementation, the probability of wives being employed significantly decreased by 4.7 percentage points. However, this negative effect gradually dissipated starting from the second year after the policy's implementation. Although the observed upward trend in employment rates from the second to the sixth-year post-implementation is not statistically significant, it may suggest the potential for long-term positive effects of China's home-based elderly care policy. At the intensive margin, although not statistically significant, we initially observed an upward trend in paid work hours during the year of policy implementation, followed by a declining trend that gradually returned to zero by the fourth-year post-implementation. For

husbands, consistent with the static model estimation, the policy had almost no impact on the probability of employment, even in the short term. However, at the intensive margin, we observed a significant but modest declining trend in work hours after the policy were fully implemented.

The non-sustained effects of the policy on the extensive margin of wives' labour supply, as well as the divergent impact trends in the short and long term, might drive by a variety of factors. Firstly, the implementation and improvement strategies of China's home-based elderly care policy are not fully developed, with several issues still present, such as an imperfect regulatory evaluation system (Li, 2020; Liao, 2020) and insufficient funding sources (Li, 2023). These issues may lead to a weakening of the implementation effect of home-based elderly care policies, resulting in the gradual disappearance of policy effects. It may even compel wives who initially exited the labour market due to the policy's support to re-enter, as the policy's support diminishes over time. Specifically, the improvement and sustainable development of home-based elderly care services require supervision and evaluation mechanisms to ensure their quality. However, in practice, communities usually bear the main responsibility of both assessment and evaluation, which often makes it difficult to effectively fulfill their evaluation and supervision responsibilities, resulting in ineffective improvement in the quality of home-based elderly care services and affecting policy effectiveness. On the other hand, sufficient funding is an important prerequisite for providing high-quality elderly care services. Although the implementation of home-based elderly care services in China has multiple funding sources such as the government, society, and families, the increasing number of elderly people year by year places, financial security under strain. The weakening of financial support may directly affect the effectiveness of policy implementation.

Another possible explanation is that, with the continued implementation of policies, the demand for elderly care and the care structure of families may change. Family members can reasonably plan care resource arrangements and adjust the labour supply of elderly caregivers based on the implementation of policies and specific family circumstances. This may not only weaken the policy's effects but could also lead to different trend in its long-term impact. For example, with the support of home-based elderly care policies, some elderly individuals may spend more time independently at home (Korfhage and Fischer-Weckemann, 2024), allowing caregivers, especially primary caregivers, to return to the workforce. Over time, the caregiver or their spouse, siblings, may reach retirement age or reduce their paid working hours due to ageing, thereby altering the existing caregiving structure and impacting the labour supply of caregivers, particularly the primary caregivers in the long run. As Hegewisch and Gornick

(2021) noted, the impact of a policy is crucially dependent on its duration. The effect of China's home-based elderly care policy on the labour supply of adult children may largely depend on the policy's sustained implementation. Long-term and stable policy support may be more conducive to enabling adult children to adjust their labour supply decisions and achieve a better balance between work and family responsibilities.

In terms of the slight decline observed in the intensive margin of husbands' labour supply, we have not found adequate empirical evidence to support this finding. One possible explanation is the increasing caregiving needs of elderly parents and in-laws over time. Although policy support may help adult children better balance work and life on the extensive margin, for husbands who are already employed, a slight reduction in paid working hours to share family caregiving responsibilities may be inevitable. This is because the home-based elderly care model is still primarily centered around family caregiving, meaning that the unpaid elderly care provided by adult children cannot be fully replaced by formal care services.

7.7.3. Staggered DiD Estimates

As discussed in Section 7.5.4, the TWFE models in equations (7.1) and (7.2) estimated using OLS deliver consistent estimates only under relatively strong assumption regarding treatment effect homogeneity. In order to allow for heterogeneity in treatment effects across time and treated units, we also present the staggered DiD estimates using the method proposed by Sun and Abraham (2021). Compared with the staggered regression results presented in Sections 7.6.2 and 7.6.3, the regression results of Sun and Abraham (2021) (see Figure 7.5) show a consistent trend of policy effects, but with slight differences in magnitude.[91]

Specifically, the short-term effect of home-based elderly care policy on wives's labour supply at extensive margin reaches 8.6 percentage points and 9.3 percentage points in the current and second year of policy implementation respectively, slightly higher and with longer duration than that reported by the TWFE model (5.4 percentage points in current year of policy implementation). At intensive margins, although the regression results from the TWFE model indicate an upward trend in women's paid work hours during the year of policy implementation, this increase is not statistically significant. The Staggered DiD estimates report a significant positive effect of 2.87 hours per week during the implementation year. This significant positive impact persisted into the second year following the policy's enactment, before gradually fading.

[91] The detail estimate results are reported in Table O.1 in Appendix O.

For husband, at extensive margin, the full implementation of the policy significantly reduced the probability of employment and persisted for six years after the policy was enacted, though with the small and reducing magnitude (from -8.2 percentage points narrows to -5.4 percentage points). In terms of the intensive margin, the slightly declined trend is consistent with staggered TWFE estimate results.

Overall, compared to the TWFE estimates results shown in Figure 7.4, the policy effects presented in Figure 7.5 exhibit a similar trend but are more pronounced. This difference may be due to the exclusion of the "forbidden" comparisons group that may cause bias.

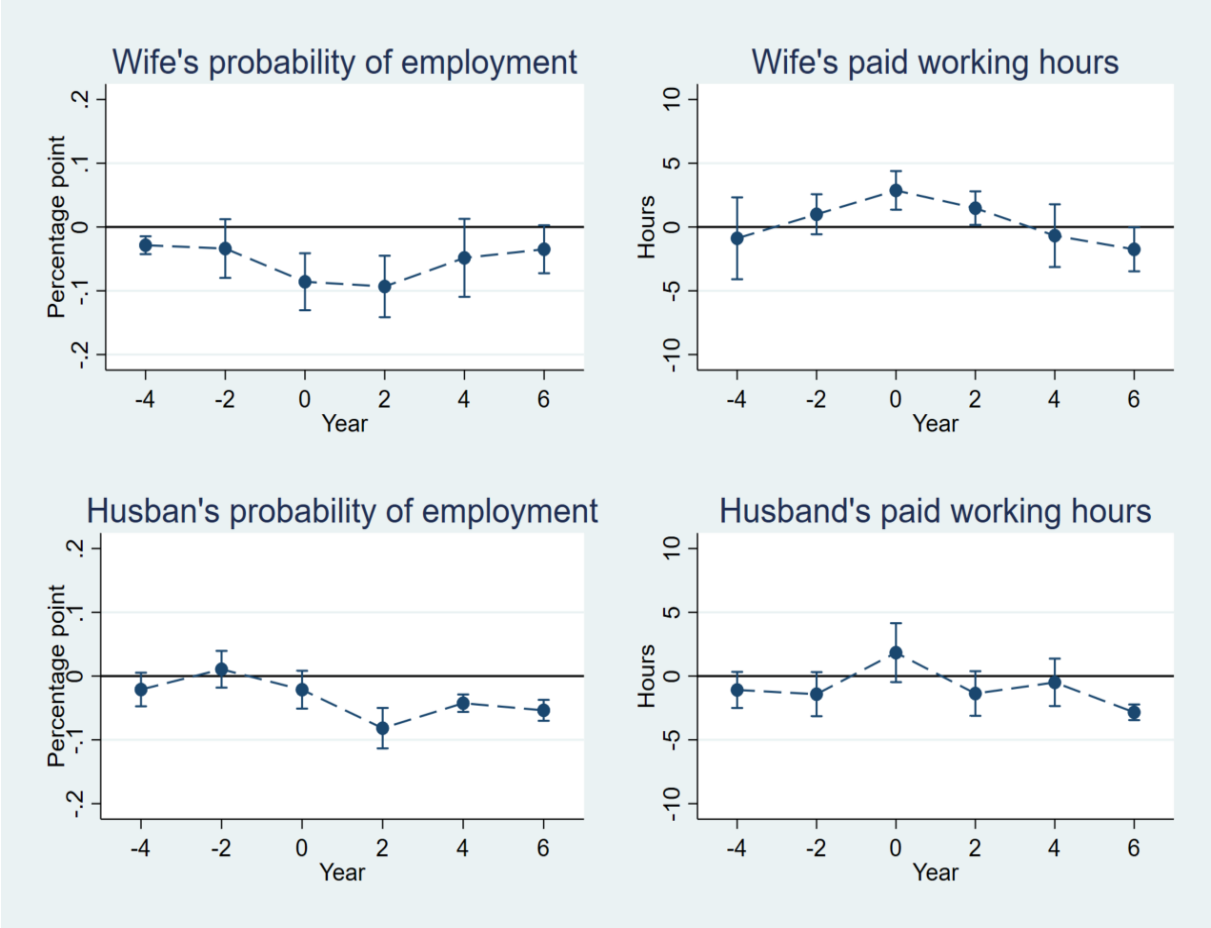

Figure 7.5 Event study design estimates on married adult children's labour supply

Notes: The four subpanels in Figure 7.5, arranged from top to bottom and left to right, respectively, illustrate the dynamic effects of the implementation of China's home-based elderly care policy on the probabbility of wives being employed, wives' paid working hours, the probabbility of husbands being employed, and husbands' paid working hours. The time window spans from four years prior to the full implementation of the policy to six years afterward. The point estimates are accompanied by lines representing a 90% confidence interval.

7.7.4. Robustness Checks

Our benchmark results presented in the previous section show that home-based elderly care policy has significant negative effect on wife's probability of employment and slightly declined trend on husbands' paid working hours, while there is no consistent significant policy effect on wives' paid working hours and husbands' labour supply at extensive. In this section, we explore the robustness of these findings (i) to different sample selection (the sample for adult children who have at least on parents (in law) need elderly care and who have provided elderly care for their parents (in law)); (ii) to model specification; (iii) to the level of clustering of standard errors.

7.7.4.1. Sample Restrictions

The first robustness test focuses on sample selection. China's home-based elderly care policy aims to provide better services and support for the elderly, rather than directly addressing the work-life balance of elderly caregivers or potential caregivers. Given that this policy includes financial support and substitute care services, which might alleviate the burden on caregivers, our analysis explores the impact of China's home-based elderly care policy on the labour supply of adult children. In the benchmark model, we selected the sample of married adult children with at least one elderly parent or parent-in-law aged 50 or older who are alive. We assume that having at least one elderly parent or parent-in-law still alive implies that these adult children face at least some potential caregiving pressure. However, one possible concern is that the empirical analysis might include samples that are not affected by the policy or may not capture variations in impact across groups experiencing different levels of caregiving pressure. In this subsection, we further narrow the sample to include those adult children most likely to be affected by the policy: specifically, those with at least one elderly parent or parent-in-law aged 50 or older who have a demand for elderly care (columns (1)-(2) (5)-(6) in Table 7.10), and those who provide elderly care to at least one elderly parent or parent-in-law aged 50 or older (columns (3)-(4) (7)-(8) in Table 7.10).[92]

According to Table 7.10, the estimated results for the restricted sample (adult children who with at least one parent or parent-in-law having elderly care demand as well as who provide elderly care to at least one elderly parent or parent-in-law aged 50 or older) are consistent with the benchmark estimate results (see Table 7.9) at both extensive and intensive margins.

[92] The parallel trend test results are presented in the Table P.1 in the Appendix P.

Table 7.9 Robustness checks: sample restrictions

	Wife				Husband			
	Need care		Elderly care		Need care		Elderly care	
	Probability of Employment (1)	Paid Working Hours (2)	Probability of Employment (3)	Paid Working Hours (4)	Probability of Employment (5)	Paid Working Hours (6)	Probability of Employment (7)	Paid Working Hours (8)
DiD coefficient	-0.087*	-1.368	-0.092*	-0.908	-0.051	2.296	0.059	2.292
	(0.046)	(1.074)	(0.047)	(1.684)	(0.047)	(2.646)	(0.037)	(2.832)
Age	0.083***	1.331*	0.085***	0.581	-0.001	-1.515	0.041**	0.102
	(0.012)	(0.727)	(0.015)	(1.022)	(0.020)	(0.861)	(0.016)	(0.910)
Age squared	-0.001***	-0.022**	-0.001***	-0.011	-0.000	0.016	-0.001**	-0.002
	(0.000)	(0.009)	(0.000)	(0.013)	(0.000)	(0.010)	(0.000)	(0.011)
Hukou	0.054**	3.297*	0.082**	2.955	-0.012	3.256	-0.010	2.087
	(0.021)	(1.728)	(0.032)	(2.391)	(0.061)	(2.225)	(0.044)	(1.999)
Lower middle school degree	-0.011	4.777***	-0.017	6.078*	0.003	-1.179	-0.051	2.957
	(0.026)	(1.455)	(0.038)	(3.382)	(0.067)	(1.975)	(0.076)	(3.645)
Upper middle school degree	-0.003	4.564*	-0.033	4.733	0.040	-2.938	-0.030	1.055
	(0.036)	(2.301)	(0.062)	(3.597)	(0.079)	(2.248)	(0.063)	(3.580)
Technical or vocational degree	0.134***	2.271	0.094**	2.402	0.141	-2.277	-0.013	2.269
	(0.040)	(1.791)	(0.034)	(2.968)	(0.093)	(2.633)	(0.087)	(3.845)
University or college degree or higher	0.142***	2.224	0.118**	3.324	0.162*	-4.966*	0.071	0.116
	(0.039)	(2.071)	(0.045)	(3.462)	(0.085)	(2.713)	(0.075)	(3.598)
Health	0.016	-1.772	0.032	-2.422	0.050	1.867	0.036	-1.146
	(0.034)	(1.663)	(0.040)	(2.249)	(0.032)	(1.599)	(0.039)	(1.182)
Spouse's monthly labour wage	0.041***	-0.174	0.034***	-0.208	0.012**	0.014	0.008	0.142
	(0.006)	(0.222)	(0.007)	(0.391)	(0.005)	(0.108)	(0.005)	(0.181)
Spouse's second occupation	0.225***	-6.673*	0.219***	-8.572***	0.137**	-8.910**	0.129**	-1.970
	(0.045)	(3.226)	(0.061)	(1.623)	(0.047)	(3.444)	(0.044)	(5.733)
Childcare	-0.033	-3.789**	-0.031	-3.468	0.024	-3.845**	0.027	-1.361
	(0.029)	(1.673)	(0.036)	(2.523)	(0.040)	(1.576)	(0.039)	(2.407)
Household size	-0.003	-0.715	-0.017*	-0.853	-0.016	-0.405	-0.021**	0.156
	(0.010)	(0.454)	(0.009)	(0.618)	(0.014)	(0.763)	(0.008)	(0.646)
Household total gross income	0.008	0.189	0.025**	1.163	0.023	0.093	0.055***	-0.400
	(0.010)	(0.635)	(0.010)	(1.373)	(0.013)	(0.574)	(0.014)	(0.568)
High-skilled occupation		0.379		-0.140		0.712		0.375
		(1.540)		(2.425)		(1.025)		(0.899)
Permanent contract		-0.971		0.118		2.095		-0.021
		(0.864)		(0.881)		(1.678)		(1.280)
State-owned firm		-5.783***		-4.743**		-6.926***		-7.421***
		(1.412)		(1.714)		(1.631)		(1.424)
Constant	-0.999***	27.985*	-1.062***	29.843	0.661	79.929***	-0.481	47.995**
	(0.200)	(13.816)	(0.239)	(22.733)	(0.507)	(15.970)	(0.270)	(20.621)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1639	823	1037	526	782	560	774	586
Adjusted R^2	0.298	0.107	0.317	0.118	0.136	0.149	0.141	0.142

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Specifically, the implementation of the home-based elderly care policy significantly decreases the probability of wives being employed, by 8.7-9.2 percentage points, which is slightly larger than the benchmark model results. This may be because adult children in these groups (at least one parent (in-law) have elderly care demand and provide elderly care for at least on parent (in-law)) face greater and more urgent caregiving pressures, leading to a larger policy effect. For the intensive margin of wives' labour supply, there is no significant impact of the policy on wife's paid working hours. For husbands, even for the adult children who might face more heavy elderly care burden, home-based elderly care policy has no significant impact on husbands' labour supply, either at the extensive or intensive margin.

7.7.4.2. Model Specification

In this subsection, we test the robustness of our model specifications from multiple perspectives. First, we address potential endogeneity concerns related to spouse-specific variables by excluding them from the analysis. Second, we consider the potential endogeneity from adult married children's household total gross income and health. Thirdly, we consider the possibility of parallel trend violations arising from provincial macroeconomic variables and the time trends. Finally, we evaluate the use of individual fixed effects rather than province fixed effects.

According to the discussion in Section 6.2.1, the individual's labour supply decision could be affected by their spouse's labour supply decision as they aim to maximise the family utility rather than individual. To prevent potential endogeneity caused by control variables related to spouses's labour supply, we first explore whether exclusion of spouse's second occupation and spouse's monthly labour income from the benchmark model one by one affect our results. These results are presented in Table 7.11.[93] For each margin of wives' and husbands' labour supply, there are five columns (columns (1)-(5) for wife's probability of employment, columns (6)-(10) for wife's paid working hours, columns (11)-(15) for husband's probability of employment, columns (16)-(20) for husband's paid working hours). Among these five columns, the first excludes spouse's second occupation dummy variable. In the second column, the spouse's monthly labour income is excluded. The third column excludes both second occupation and monthly labour income. The fourth column excludes household total income and finally excludes health status. According to Table 7.11, the results are robustness with the benchmark results, with very close magnitude and the same significant sign, excluding the extensive margin

[93] The parallel trend test results are presented in the Table P.2 in the Appendix P.

of husbands' labour supply when exclude the spouse's second occupation dummy (column (11) in Table 7.11). When we do not control for whether the wife has a secondary occupation, the negative effect of China's home-based elderly care policy turns statistically significant at the 90% confidence level, in contrast to the benchmark regression results. However, whether a spouse has a secondary occupation influences the non-labour income of adult children, which, as established by extensive research, affects labour supply decisions (Saha and Kalita, 2015; Mansor, Hong, Abu, and Shaari, 2015 and Merz, 2018). Additionally, the spouse's career preferences and employment patterns can also impact on the labour supply decisions of adult children (Ashenfelter and Heckman,1974). Therefore, in our benchmark regression, we continue to control whether the spouse has a secondary occupation.

As the discussion in Section 7.6.5, the potential endogeneity in this analysis may be caused by omitted variables, especially provincial characteristics variables. This is because the varying implementation timelines and specific strategies of China's home-based elderly care policies across different provinces are influenced by provincial macroeconomic factors, such as the pace of ageing and the level of economic development. Therefore, this subsection tends to add provincal time-varying variables (General Budget Revenue (billions of yuan), Per Capita GDP (yuan) and Elderly Dependency Ratio) to capture the impact of macroeconomic characteristics at the provincial level on adult children's labour supply. The estimate results are presented in the Table 7.12 (Columns (1)-(2) for both extensive and intensive margins of wives' labour supply decision. Columns (7)-(8) for both extensive and intensive margins of husbands' labour supply decision).

Additionally, some studies consider incorporating time trend interaction terms (Hoynes and Schanzenbach, 2009 and Hoynes et al., 2016) to control for time-varying conditions in the labour supply outcomes of married adults that are not explained by other control variables. To control for trends in the impact of observable determinants of married adults' labour supply we augment our benchmark model (equation 7.1) by including interactions between characteristics of the married adults and time trends ($P_{ipt_g} * C_w, M_{ipt_g} * C_w$ and $F_{ipt_g} * C_w$, C_w captures the time trend, w=1, 2, 3, 4 and 5). The estimate results are presented in the Table 7.12 (Columns (3)-(4) for both extensive and intensive margins of wives' labour supply decision. Columns (9)-(10) for both extensive and intensive margins of husbands' labour supply decision).

These results (both concluding provincial variables and time trend interaction), presented in Table 7.12 (columns (1)-(4), (7)-(10)), are consistent with the benchmark estimates (see Table 7.9) indicating that the above two adjustments do not affect our main conclusions, and the

estimates remain similar to those in the benchmark.

The final robustness test in this subsection is conducted by comparing the benchmark results with those obtained by employing individual fixed effects and time fixed effects rather than province fixed effects and time fixed effects. Individual fixed effects help capture (time-invariant) individual characteristics that cannot be observed in both extensive and intensive margin regressions. According to columns (5)-(6) and (11)-(12) in Table 7.12, at the extensive margin for wives's labour supply, the significant negative effect is consistent with that in the benchmark model, but the magnitude is increased from -8.0 percentage points to -3.2 percentage points. In terms of the intensive margin for wives' labour supply and both extensive and intensive margins for husbands' labour supply, consistent with the estimate results obtained in the benchmark model, no significant effect of the policy is identified.

Table 7.10 Staggered DiD estimates with different control variables

	Wife									
	Probability of Employment					Paid Working Hours				
	Exclude spouse's second occupation	Exclude spouse's monthly labour income	Exclude both spouse's second occupation & monthly labour income	Exclude Household total gross income	Exclude Health	Exclude spouse's second occupation	Exclude spouse's monthly labour income	Exclude both spouse's second occupation & monthly labour income	Exclude Household total gross income	Exclude Health
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiD coefficient	-0.085***	-0.089***	-0.096***	-0.081**	-0.080**	0.422	0.273	0.442	0.218	0.334
	(0.019)	(0.020)	(0.020)	(0.031)	(0.031)	(1.069)	(1.070)	(1.069)	(1.276)	(1.330)
Age	0.068***	0.080***	0.082***	0.066***	0.067***	-0.170	-0.171	-0.200	-0.144	-0.155
	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.416)	(0.409)	(0.416)	(0.679)	(0.677)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.005)	(0.006)	(0.009)	(0.009)
Hukou	0.037***	0.074***	0.054***	0.052**	0.052**	3.455***	2.834***	3.506***	2.776*	2.824*
	(0.014)	(0.016)	(0.015)	(0.021)	(0.021)	(0.900)	(0.907)	(0.901)	(1.353)	(1.391)
Lower middle school degree	-0.003	0.003	-0.003	0.004	0.002	4.538***	4.348***	4.581***	4.553***	4.350***
	(0.017)	(0.018)	(0.018)	(0.013)	(0.014)	(1.223)	(1.222)	(1.227)	(1.139)	(1.100)
Upper middle school degree	0.027	0.048**	0.036	0.040*	0.036	4.876***	4.586***	4.949***	4.822**	4.557**
	(0.022)	(0.023)	(0.024)	(0.020)	(0.021)	(1.367)	(1.366)	(1.367)	(1.569)	(1.522)
Technical or vocational degree	0.137***	0.190***	0.179***	0.151***	0.147***	2.099	1.780	2.116	2.098	1.804
	(0.021)	(0.022)	(0.022)	(0.024)	(0.024)	(1.361)	(1.361)	(1.366)	(1.247)	(1.285)
University or college degree or higher	0.133***	0.208***	0.198***	0.150***	0.142***	1.744	1.571	1.744	2.028	1.613
	(0.020)	(0.021)	(0.021)	(0.025)	(0.026)	(1.413)	(1.405)	(1.413)	(1.506)	(1.434)
Health	0.004	0.015	0.012	0.005		-0.582	-0.719	-0.695	-0.625	
	(0.017)	(0.018)	(0.018)	(0.020)		(0.965)	(0.951)	(0.961)	(0.916)	
Spouse's monthly labour wage	0.044***			0.044***	0.042***	-0.292**			-0.169	-0.261
	(0.002)			(0.004)	(0.004)	(0.129)			(0.100)	(0.148)
Spouse's second occupation		-0.046***		0.177***	0.176***		-3.430***		-5.123***	-5.081***
		(0.016)		(0.025)	(0.026)		(0.788)		(0.944)	(0.934)
Childcare	-0.045***	-0.010*	-0.046***	-0.045**	-0.045**	-3.412***	-0.516*	-3.423***	-3.382***	-3.384***
	(0.015)	(0.005)	(0.016)	(0.017)	(0.017)	(0.793)	(0.285)	(0.795)	(0.828)	(0.808)
Household size	-0.003	0.045***	-0.012**	-0.001	-0.002	-0.513*	0.392	-0.460	-0.487**	-0.562*
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.290)	(0.424)	(0.287)	(0.221)	(0.261)
Household total gross income	0.013***	0.234***	0.047***		0.012**	0.731	-5.306***	0.373		0.703
	(0.005)	(0.021)	(0.005)		(0.005)	(0.503)	(1.554)	(0.432)		(0.592)
High-skilled occupation						0.125	0.057	0.064	0.114	0.126
						(0.563)	(0.555)	(0.559)	(0.667)	(0.702)
Permanent contract						-0.644	-0.525	-0.631	-0.601	-0.544
						(0.615)	(0.613)	(0.615)	(0.552)	(0.550)
State-owned firm						-6.019***	-6.161***	-6.093***	-6.067***	-6.088***
						(0.685)	(0.681)	(0.686)	(1.099)	(1.121)
Constant	-0.742***	-1.092***	-1.113***	-0.616***	-0.732***	47.908***	50.448***	50.158***	54.916***	47.995***
	(0.149)	(0.164)	(0.166)	(0.087)	(0.092)	(9.152)	(8.787)	(8.967)	(14.052)	(12.226)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	5559	5559	5559	5559	5559	2933	2933	2933	2934	2934
Adjusted R^2	0.305	0.226	0.212	0.312	0.313	0.091	0.096	0.089	0.096	0.097

$* p < 0.1$, $** p < 0.05$, $*** p < 0.01$,

Standard errors clustered at province level.

Continued-Table 7.11 Staggered DiD estimates with different control variables

	Husband									
	Probability of Employment					Paid Working Hours				
	Exclude spouse's second occupation	Exclude spouse's monthly labour income	Exclude both spouse's second occupation & monthly labour income	Exclude Household total gross income	Exclude Health	Exclude spouse's second occupation	Exclude spouse's monthly labour income	Exclude both spouse's second occupation & monthly labour income	Exclude Household total gross income	Exclude Health
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
DiD coefficient	-0.041*	-0.039	-0.041	-0.044	-0.040	1.235	1.197	1.230	1.107	1.165
	(0.023)	(0.023)	(0.023)	(0.021)	(0.023)	(1.191)	(1.177)	(1.181)	(1.159)	(1.128)
Age	0.022***	0.027***	0.028***	0.020**	0.022***	0.091	0.211	0.190	0.117	0.123
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.457)	(0.460)	(0.460)	(0.474)	(0.461)
Age squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.002	-0.003	-0.003	-0.002	-0.002
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Hukou	-0.017	0.003	-0.004	-0.008	-0.010	2.456	2.462	2.574	2.203	2.194
	(0.034)	(0.035)	(0.035)	(0.034)	(0.035)	(1.538)	(1.592)	(1.571)	(1.553)	(1.554)
Lower middle school degree	-0.011	-0.007	-0.006	-0.010	-0.011	1.614*	1.727**	1.687**	1.668**	1.651*
	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)	(0.756)	(0.757)	(0.744)	(0.754)	(0.768)
Upper middle school degree	0.003	0.012	0.011	0.011	0.005	1.730	1.872	1.870	1.830	1.802
	(0.035)	(0.035)	(0.035)	(0.032)	(0.034)	(1.137)	(1.090)	(1.099)	(1.063)	(1.084)
Technical or vocational degree	0.080*	0.094**	0.094*	0.094**	0.082*	0.729	0.941	0.924	0.784	0.745
	(0.042)	(0.042)	(0.043)	(0.042)	(0.042)	(1.442)	(1.423)	(1.434)	(1.395)	(1.401)
University or college degree or higher	0.090*	0.114**	0.114**	0.113**	0.093*	-0.591	-0.269	-0.288	-0.487	-0.544
	(0.042)	(0.042)	(0.042)	(0.042)	(0.042)	(1.307)	(1.292)	(1.298)	(1.265)	(1.277)
Health	0.020	0.022	0.019	0.019		-0.579	-0.653	-0.623	-0.609	
	(0.029)	(0.030)	(0.029)	(0.030)		(0.722)	(0.735)	(0.721)	(0.765)	
Spouse's monthly labour wage	0.011**			0.014***	0.010**	0.149			0.181	0.166
	(0.004)			(0.003)	(0.004)	(0.112)			(0.107)	(0.106)
Spouse's second occupation	-0.003	-0.005	-0.006	0.148***	0.135***	-1.209	-1.262	-1.254	-2.568	-2.609
	(0.013)	(0.012)	(0.012)	(0.040)	(0.041)	(1.109)	(1.117)	(1.120)	(1.461)	(1.462)
Childcare	-0.010**	-0.011**	-0.012***	-0.004	-0.005	-0.156	-0.198	-0.185	-1.170	-1.133
	(0.004)	(0.004)	(0.004)	(0.012)	(0.011)	(0.493)	(0.486)	(0.480)	(1.090)	(1.103)
Household size	0.039***	0.044***	0.045***	-0.005	-0.009**	0.192	0.305	0.282	-0.152	-0.181
	(0.008)	(0.007)	(0.007)	(0.004)	(0.004)	(0.262)	(0.270)	(0.272)	(0.492)	(0.498)
Household total gross income		0.167***			0.038***		-2.172			0.205
		(0.049)			(0.008)		(1.632)			(0.269)
High-skilled occupation						-0.399	-0.432	-0.423	-0.119	-0.170
						(1.012)	(1.003)	(1.008)	(1.038)	(1.065)
Permanent contract						-0.854	-0.832	-0.812	-0.898	-0.928
						(0.952)	(0.908)	(0.921)	(0.919)	(0.928)
State-owned firm						-6.425***	-6.397***	-6.396***	-6.343***	-6.364***
						(1.014)	(0.986)	(0.990)	(1.011)	(0.999)
Constant	0.011	-0.098	-0.123	0.478**	0.106	44.844***	42.287***	42.704***	44.415***	41.698***
	(0.179)	(0.172)	(0.169)	(0.159)	(0.168)	(8.691)	(9.199)	(9.260)	(9.966)	(8.877)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4412	4412	4412	4412	4412	3277	3277	3277	3278	3278
Adjusted R^2	0.137	0.133	0.128	0.125	0.142	0.075	0.074	0.074	0.078	0.078

** p < 0.1, ** p < 0.05, *** p < 0.01,*

Standard errors clustered at province level.

Table 7.12 Robustness checks: model specification - controlling for provincial variables, time trend interaction terms and individual fixed effects

	Wife						Husband					
	Province Variables		Province Variables & Time interaction		Individual Fixed Effects		Province Variables		Province Variables & Time interaction		Individual Fixed Effects	
	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DiD coefficient	-0.076***	-0.714	-0.068**	0.464	-0.032*	1.759	-0.040	1.090	-0.034	1.086	-0.012	-0.091
	(0.023)	(0.918)	(0.023)	(1.219)	(0.017)	(1.948)	(0.024)	(1.042)	(0.021)	(1.035)	(0.016)	(1.189)
Age	0.067***	-0.188	0.061**	-0.373	0.022	-0.119	0.022***	0.102	-0.007	-0.826	0.057	4.444*
	(0.007)	(0.472)	(0.024)	(1.116)	(0.032)	(2.541)	(0.007)	(0.458)	(0.029)	(0.736)	(0.039)	(2.105)
Age squared	-0.001***	-0.001	-0.001**	0.000	-0.001***	0.004	-0.000***	-0.002	-0.000	0.011	-0.000	0.001
	(0.000)	(0.006)	(0.000)	(0.015)	(0.000)	(0.009)	(0.000)	(0.006)	(0.000)	(0.009)	(0.000)	(0.016)
Hukou	0.052**	2.461*	0.100***	6.512**			-0.010	2.222	0.040	4.610		
	(0.021)	(1.216)	(0.030)	(2.440)			(0.035)	(1.545)	(0.055)	(3.260)		
Lower middle school degree	0.002	4.320***	-0.027	4.133			-0.010	1.626*	-0.177***	4.279		
	(0.014)	(1.329)	(0.030)	(2.756)			(0.024)	(0.785)	(0.052)	(4.015)		
Upper middle school degree	0.036	4.306**	0.085	3.260			0.006	1.745	-0.138**	4.821		
	(0.020)	(1.888)	(0.055)	(2.309)			(0.035)	(1.104)	(0.059)	(4.088)		
Technical or vocational degree	0.148***	2.131	0.145**	0.982			0.081*	0.762	-0.001	2.304		
	(0.024)	(1.487)	(0.056)	(2.852)			(0.042)	(1.441)	(0.084)	(4.055)		
University or college degree or higher	0.143***	1.738	0.133**	0.811			0.093*	-0.615	-0.051	1.823		
	(0.025)	(1.777)	(0.046)	(2.844)			(0.043)	(1.299)	(0.081)	(3.213)		
Health	0.008	-1.532*	-0.021	1.187	0.004	-2.132	0.020	-0.523	-0.047	0.445	0.026	-1.351
	(0.021)	(0.790)	(0.054)	(1.546)	(0.020)	(1.202)	(0.030)	(0.768)	(0.053)	(2.269)	(0.034)	(0.830)
Spouse's monthly labour wage	0.043***	-0.082	0.063***	-0.196	0.036***	-0.143	0.010**	0.162	0.022**	0.362	0.019***	-0.087
	(0.004)	(0.127)	(0.006)	(0.226)	(0.004)	(0.218)	(0.004)	(0.102)	(0.008)	(0.375)	(0.005)	(0.181)
Spouse's second occupation	0.173***	-4.681***	0.184***	-6.496*	0.067	1.005	0.137***	-2.617	0.183**	3.694	0.006	0.542
	(0.027)	(1.009)	(0.053)	(3.407)	(0.044)	(2.323)	(0.041)	(1.620)	(0.071)	(4.427)	(0.031)	(1.726)
Childcare	-0.045**	-3.020***	-0.028	-4.643**	0.031	-3.394**	-0.004	-1.240	0.041	3.430	0.023	-0.705
	(0.016)	(0.907)	(0.022)	(2.035)	(0.028)	(1.326)	(0.012)	(1.112)	(0.041)	(2.099)	(0.028)	(1.660)
Household size	-0.002	-0.317	0.013	-0.384	-0.018	-0.233	-0.008*	-0.216	-0.030	-2.127**	0.024	0.069
	(0.006)	(0.209)	(0.012)	(0.632)	(0.012)	(0.909)	(0.004)	(0.465)	(0.018)	(0.796)	(0.017)	(0.795)
Household total gross income	0.012**	-0.563	0.012	0.661	0.013***	0.583	0.038***	0.189	0.043***	-0.591	0.018	-0.008
	(0.005)	(0.473)	(0.013)	(0.766)	(0.004)	(1.080)	(0.008)	(0.264)	(0.009)	(0.778)	(0.012)	(0.645)
High-skilled occupation		0.157		-0.503		-1.437		-0.144		-0.965		0.973
		(0.588)		(1.393)		(1.243)		(1.047)		(1.866)		(1.021)
Permanent contract		-0.591		-0.084		-1.540		-1.025		-3.750		0.220
		(0.458)		(1.599)		(1.307)		(0.940)		(4.070)		(0.806)
State-owned firm		-5.659***		-5.719**		-0.432		-6.320***		-4.733*		-2.308
		(1.091)		(1.892)		(1.815)		(0.999)		(2.386)		(1.737)
General Budget Revenue (billions of yuan)	-0.098	1.124	-0.065	-1.515			-0.204**	9.093**	-0.207***	9.947**		
	(0.080)	(2.912)	(0.066)	(4.331)			(0.082)	(3.954)	(0.065)	(3.466)		
Per Capita GDP (yuan)	-0.000	0.000**	0.000	0.000**			0.000	0.000	0.000	0.000		
	(0.000)	(0.000)	(0.000)	(0.000)			(0.000)	(0.000)	(0.000)	(0.000)		
Elderly Dependency Ratio	-0.478	-27.558	-0.495	-8.769			-0.766	68.876	-0.875	75.017*		
	(1.279)	(58.076)	(1.126)	(79.243)			(0.858)	(41.379)	(0.717)	(35.498)		
Constant	0.029	50.985	-0.401	49.250	0.583	41.343	1.571**	-33.373	1.579**	-41.594	-1.319	-128.561*
	(0.761)	(30.927)	(0.610)	(41.828)	(1.256)	(88.599)	(0.691)	(35.357)	(0.538)	(31.244)	(1.386)	(69.011)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No
Individual Fixed Effects	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Number of observations	5559	3934	5559	2934	3275	1496	4412	3278	4412	3278	2378	1618
Adjusted R^2	0.314	0.089	0.339	0.127	0.713	0.647	0.144	0.081	0.162	0.105	0.676	0.653

** p < 0.1, ** p < 0.05, *** p < 0.01,*

Standard errors clustered at province level.

7.7.4.3. Clustering Standard Errors at Individual Level

The third robustness check relates to using different level of clustering for standard errors. In the benchmark model, the standard errors are clustered at province level. This is because, following the discussion in Section 7.2, the issuance and implementation of home-based elderly care policy vary across provinces. Therefore, different individuals living in the same province are more likely to be affected by similar policy effects, resulting in within group correlation within province level. Table 7.13 considers using individual level clustered standard errors.[94] The estimate results are consistent for wives' labour supply at both extensive and intensive margins, while for husbands, the negative effect at extensive margin turns to significant although at 90% confidence interval.

Table 7.13 Robustness checks: individual-level clustered standard errors

	Wife		Husband	
	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours
	(1)	(2)	(3)	(4)
DiD coefficient	-0.080***	0.314	-0.039*	1.239
	(0.019)	(1.066)	(0.020)	(1.012)
Age	0.067***	-0.148	0.022***	0.106
	(0.007)	(0.409)	(0.007)	(0.327)
Age squared	-0.001***	-0.002	-0.000***	-0.002
	(0.000)	(0.005)	(0.000)	(0.004)
Hukou	0.052***	2.829***	-0.010	2.354***
	(0.014)	(0.906)	(0.015)	(0.764)
Education	0.142***	1.625	0.030***	-0.363
	(0.020)	(1.410)	(0.006)	(0.266)
Health	0.007	-0.540	0.022	-0.585
	(0.017)	(0.953)	(0.019)	(0.870)
Spouse's monthly labour wage	0.042***	-0.258**	0.010***	0.162*
	(0.002)	(0.129)	(0.002)	(0.085)
Spouse's second occupation	0.176***	-5.086***	0.137***	-2.585
	(0.021)	(1.564)	(0.019)	(1.880)
Childcare	-0.045***	-3.391***	-0.003	-1.225
	(0.015)	(0.787)	(0.016)	(0.768)
Household size	-0.002	-0.553*	-0.009*	-0.172
	(0.005)	(0.289)	(0.005)	(0.255)
Household total gross income	0.012**	0.693	0.038***	0.201
	(0.005)	(0.492)	(0.007)	(0.271)
High-skilled occupation		0.112		-0.442
		(0.558)		(0.587)
Permanent contract		-0.551		-0.925
		(0.614)		(0.607)
State-owned firm		-6.091***		-6.468***
		(0.681)		(0.636)
Constant	-0.737***	48.428***	0.020	44.586***
	(0.148)	(8.956)	(0.148)	(7.273)
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	5559	2934	4412	3278
Adjusted R^2	0.313	0.097	0.140	0.076

*Standard errors in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01*
Robust standard errors clustered at the individual level.

[94] The parallel trend test results are presented in the Table P.4 in the Appendix P.

7.7.4.4. The Impact of Attrition

As discussed in Section 7.4.3, a significant portion of the sample was lost during the sample selection process. In line with Sections 5.5.2.5 and 6.5.2.6, to mitigate potential biases introduced by sample selection, I performed descriptive analyses before and after incorporating relative variables, husband's monthly income, husband's second occupation and whether wife care for children under 6 years old for wife, wife's monthly income and whether husbands care for children under six years old for husband, which resulted in substantial missing observations. Additionally, I conducted a t-test to assess whether the missing observations contribute to sample selection bias. The results are presented in Table 7.14.

Table 7. 14 Descriptive analyses by samples

Wife Panel					
Variable	**Original Sample Mean**	**Working Sample Mean**	**Difference**	**t-value**	**p-value**
Employed	0.699	0.734	-0.035	-11.141	0.000
Paid working hours	41.201	43.584	-2.383	-14.481	0.000
did	0.446	0.555	-0.109	-32.862	0.000
Age	38.811	39.515	-0.741	-14.207	0.000
Hukou	0.398	0.538	-0.135	-41.820	0.000
Education	2.322	2.641	-0.320	-41.498	0.000
Health	0.896	0.899	-0.002	-1.163	0.245
Household Size	4.033	3.876	0.157	16.103	0.000
Household Total Gross Income	58195.860	70912.060	-12716.190	-26.485	0.000
High-skilled occupation	0.079	0.118	-0.039	-24.384	0.000
Permanent contract	0.752	0.618	-0.135	46.149	0.000
State-owned firm	0.217	0.342	-0.126	-46.276	0.000
Husband Panel					
Variable	**Original Sample Mean**	**Working Sample Mean**	**Difference**	**t-value**	**p-value**
Employed	0.857	0.815	0.042	17.974	0.000
Paid working hours	44.231	45.570	-1.338	-8.510	0.000
did	0.473	0.483	0.100	0.000	0.000
Age	40.858	39.826	1.032	18.250	0.000
Hukou	0.450	0.583	-0.133	-35.434	0.000
Education	2.579	3.838	-0.259	-28.974	0.000
Health	0.900	0.892	0.008	3.687	0.000
Household Size	3.970	3.926	-0.025	-2.509	0.012
Household Total Gross Income	61331.510	64330.520	-2999.010	-4.340	0.000
High-skilled occupation	0.150	0.207	-0.057	-21.175	0.000
Permanent contract	0.315	0.443	-0.128	-35.185	0.000
State-owned firm	0.269	0.373	-0.105	-30.346	0.000

In Table 7.14, the sample that includes observations with missing values for the relevant variables is referred to as the original sample. Conversely, the working sample, also known as the benchmark model sample, excludes these missing observations of relevant variables. According to Table 7.14, while the descriptive statistics of the working sample differ significantly from those of the original sample—except for health in wife panel—the overall differences remain relatively minor. Specifically, the reduction in sample size caused by adding control variables did not lead to significant differences in the overall characteristics of the sample. But we have to acknowledged that, compared to the original sample, the working sample has a slightly older average age, a slightly higher household income level, and slightly

increased paid working hours, for both men and women.[95]

7.7.5. Heterogeneity Analysis

7.7.5.1. Household Total Gross Income

The benchmark analysis finds that the comprehensive implementation of China's home-based elderly care policy significantly reduces the probability of wives being employed. From the perspectives of substitution and income effects, this outcome is driven by the dominance of the income effect. Specifically, with the policy's support, wives experience an increase in non-labour income (e.g., direct financial assistance) or a reduction in elderly care costs (e.g., free or discounted elderly medical services). This alleviates the need for wives to work excessively to cover the additional costs associated with elderly care. This finding also suggests that the financial burden of elderly care may be a primary challenge for families currently providing such care in China.

In order to further verify the above statement, this subsection re-estimate equation 7.1 by household total gross income. Higher-household-income adult children may experience a smaller income effect when facing the pressure of elderly care, as they tend to have more substantial non-labour income, reducing their need to participate in the labour market to cover additional caregiving expenses. In this context, the financial support provided by home-based elderly care policies may have a limited impact. Conversely, lower-household-income adult children, when confronted with the financial burden of elderly care, may be compelled to engage more actively in the labour market, even if it disrupts their work-life balance. In this case, the income effect of financial support from home-based elderly care policies is likely to be more pronounced. Table 7.14 presents estimate results, where all observations are divided into two sub-sample groups according to whether the adult children's household has higher total gross income than the average value in the whole sample.[96]

According to Table 7.14, the estimate results are consistent with our expectation though this effect is observed only at the extensive margin for wives' labour supply. Columns (1) and

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[95] As a further robustness check, Tables S.5 - S.8 in Appendix S explores the estimate results under varying selection criteria. These results confirm that while data loss (attrition) may introduce some selection bias, its impact is unlikely to substantially affect the main conclusions of this study.

[96] The parallel trend test results are presented in the Table P.5 in the Appendix P.

(2) of Table 7.14 report that China's home-based elderly care policy has a significantly negative effect on the employment probability of wives from low-income households, reducing it by 7.2 percentage points. For wives in households with income above the sample average, the policy's effect on employment is negative but no longer statistically significant. This might suggest that, with the policy's support, these wives from low-income household experience reduced financial

Table 7.15 TWFE estimates of married adult children's labour supply by household income

	Wife				Husband			
	Probability of Employment		Paid Working Hours		Probability of Employment		Paid Working Hours	
	Low household income (1)	High household income (2)	Low household income (3)	High household income (4)	Low household income (5)	High household income (6)	Low household income (7)	High household income (8)
DiD Coefficient	-0.072*	-0.063	0.777	0.533	-0.056	0.012	1.250	1.024
	(0.035)	(0.038)	(1.620)	(2.265)	(0.034)	(0.017)	(1.747)	(0.812)
Age	0.075***	0.047***	0.085	-0.450	0.026***	0.014	0.347	-0.392
	(0.010)	(0.008)	(0.631)	(0.707)	(0.008)	(0.011)	(0.515)	(0.712)
Age squared	-0.001***	-0.001***	-0.006	0.003	-0.000***	-0.000	-0.005	0.006
	(0.000)	(0.000)	(0.009)	(0.009)	(0.000)	(0.000)	(0.006)	(0.009)
Hukou	0.068**	0.014	3.744**	0.482	-0.027	0.027	2.696*	0.713
	(0.023)	(0.023)	(1.661)	(1.513)	(0.038)	(0.033)	(1.317)	(2.610)
Lower middle school degree	-0.001	0.016	3.686**	5.363***	-0.014	0.001	1.187	2.380
	(0.020)	(0.025)	(1.526)	(1.713)	(0.032)	(0.027)	(1.127)	(1.717)
Upper middle school degree	0.036	0.052	4.063**	5.223*	-0.004	0.034	1.558	2.164
	(0.029)	(0.045)	(1.551)	(2.378)	(0.034)	(0.056)	(1.195)	(2.034)
Technical or vocational degree	0.152***	0.158***	1.569	2.121	0.089*	0.064	0.815	0.832
	(0.032)	(0.036)	(1.528)	(2.226)	(0.047)	(0.049)	(1.630)	(2.311)
University or college degree or higher	0.160***	0.180***	2.424	1.253	0.110*	0.069	-0.339	-0.138
	(0.028)	(0.029)	(1.653)	(2.370)	(0.059)	(0.040)	(1.459)	(2.028)
Health	-0.005	0.026	-0.315	-0.965	0.027	0.008	-0.394	-1.022
	(0.029)	(0.023)	(0.599)	(1.617)	(0.032)	(0.024)	(1.064)	(0.808)
Spouse's monthly labour wage	0.047***	0.034***	-0.203	-0.544	0.010*	0.008	0.196	0.155
	(0.004)	(0.005)	(0.154)	(0.340)	(0.005)	(0.005)	(0.116)	(0.181)
Spouse's second occupation	0.179***	0.166***	-6.603***	-1.991	0.171***	0.094**	-2.756	-3.078
	(0.037)	(0.029)	(1.168)	(2.098)	(0.048)	(0.037)	(2.780)	(2.501)
Child Care	-0.042*	-0.057**	-3.428***	-3.451*	0.010	-0.021	-1.138	-1.319
	(0.023)	(0.019)	(0.925)	(1.788)	(0.016)	(0.019)	(1.417)	(1.612)
Household size	-0.001	0.006	-0.376	-0.953*	-0.021***	0.003	-0.165	-0.280
	(0.010)	(0.004)	(0.321)	(0.453)	(0.005)	(0.006)	(0.583)	(0.533)
Household total gross income	0.017***	-0.053***	-0.029	0.832	0.032***	0.004	-0.042	1.263*
	(0.004)	(0.012)	(0.720)	(0.888)	(0.009)	(0.018)	(0.345)	(0.600)
High-skilled occupation			0.067	-0.396			-0.495	0.324
			(0.708)	(0.901)			(1.292)	(1.042)
Permanent contract			-1.076	0.582			-0.650	-1.596
			(0.723)	(0.932)			(1.082)	(1.282)
State-owned firm			-6.169***	-5.307***			-6.295***	-6.401***
			(1.396)	(1.169)			(1.089)	(1.146)
Constant	-0.968***	0.369	51.191***	55.432***	0.114	0.540	40.564***	39.973**
	(0.143)	(0.251)	(9.919)	(16.390)	(0.219)	(0.349)	(9.709)	(14.184)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	3735	1824	1966	968	2960	1452	2216	1062
Adjusted R^2	0.315	0.280	0.105	0.130	0.128	0.118	0.080	0.095

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Robust standard errors clustered at the province level.

responsibilities with work. For wives in higher-income households, the responsibility of elderly care may not compel them to enter the labour market for additional labour force income. Therefore, the income effect of the home-based elderly care policy on these higher-income wives is not significant. In terms of the intensive margin of wife's labour supply as well as both margins (extensive and intensive) for husband's labour supply, Table 7.14 does not report any significant effect.

7.7.5.2. Education

This subsection explores whether adult children with different levels of education make different labour supply decisions under the support of China's home-based elderly care policies. Education, as the outcome of long-term human capital accumulation, is a crucial factor influencing adult children's labour supply behaviors. There is rich literature support that education can impact labour supply both directly, by shaping preferences and attitudes toward work and leisure, and indirectly, by affecting wage rates (Birch, 2005; Lincove, 2008; Tam, 2011). This subsection further examines the impact of the home-based elderly care policy on labour supply for both spouse at both extensive and intensive margins by education level. Individuals with higher education levels have accumulated more human capital, which makes them more competitive in the labour market. Consequently, the cost of exiting the labour market or reducing the supply of paid work hours is higher for them compared to those have relatively lower education levels. Therefore, even with policy support, adult children with higher education levels may be less inclined to reduce their labour supply.

This subsection divides the observations into two subgroups: those with technical or vocational degree or lower (low education) and those with a university or college degree or higher (high education). We re-estimate the benchmark model (Equation 7.1) for these subgroups.[97] The results, presented in Table 7.15, align with our expectations.[98] For wives with a lower education, they experience a significant reduction in employment probability due to the policy (column (1)). In contrast, for those with a higher education, this negative effect becomes to insignificant. This may be because the cost of exiting the labour market is higher for

[97] This section also attempts to classify observations as either low- or high-educated based on whether they possess a technical or vocational degree or higher. The TWFE estimation results are presented in Appendix R.

[98] The parallel trend test results are presented in the Table P.6 in the Appendix P.

individuals with higher education levels, making them less likely to reduce their labour supply, despite the policy's support. In terms of the intensive margin for wife's labour supply and both extensive and intensive margins for husband's labour supply, there are no significant effects on these margins.

Table 7.16 Static TWFE estimates of labour supply by education

	Wives				Husbands			
	Probability of Employment		Paid Working Hours		Probability of Employment		Paid Working Hours	
	Low educated (1)	High educated (2)	Low educated (3)	High educated (4)	Low educated (5)	High educated (6)	Low educated (7)	High educated (8)
DiD Coefficient	-0.091**	0.000	0.406	0.172	-0.044	-0.017	0.987	1.635
	(0.035)	(0.018)	(1.539)	(1.247)	(0.027)	(0.027)	(1.479)	(1.421)
Age	0.069***	0.050**	-0.225	-0.157	0.019**	0.047**	0.164	0.049
	(0.008)	(0.020)	(0.744)	(0.467)	(0.008)	(0.018)	(0.506)	(0.602)
Age squared	-0.001***	-0.001**	-0.002	0.001	-0.000***	-0.001**	-0.003	-0.001
	(0.000)	(0.000)	(0.010)	(0.006)	(0.000)	(0.000)	(0.006)	(0.007)
Hukou	0.056**	0.006	3.153*	-2.299	-0.011	0.055	2.406	-1.157
	(0.021)	(0.023)	(1.494)	(1.491)	(0.036)	(0.065)	(1.665)	(2.274)
Lower middle school degree	-0.002		4.152***		-0.011		1.484*	
	(0.014)		(1.042)		(0.024)		(0.804)	
Upper middle school degree	0.030		4.315**		0.007		1.493	
	(0.020)		(1.513)		(0.034)		(1.117)	
Technical or vocational degree	0.135***		1.607		0.079*		0.288	
	(0.025)		(1.259)		(0.041)		(1.432)	
University or college degree or higher		0.000		0.000		0.000		0.000
		(.)		(.)		(.)		(.)
Health	0.011	-0.015*	-0.515	-0.751	0.023	0.023	-0.393	-1.594
	(0.026)	(0.008)	(1.075)	(0.804)	(0.035)	(0.019)	(0.885)	(1.188)
Spouse's monthly labour wage	0.046***	0.011**	-0.350**	0.152	0.012**	-0.003	0.216*	-0.147
	(0.004)	(0.004)	(0.156)	(0.213)	(0.004)	(0.003)	(0.116)	(0.113)
Spouse's second occupation	0.177***	-0.065	-5.086***	-1.103	0.135***	0.017	-2.827*	-1.163
	(0.025)	(0.084)	(0.947)	(1.555)	(0.043)	(0.020)	(1.511)	(1.354)
Child Care	-0.045**	-0.003	-4.073***	0.070	-0.004	0.013	-0.890	-1.363
	(0.018)	(0.020)	(0.947)	(0.971)	(0.015)	(0.018)	(1.315)	(0.973)
Household size	-0.001	-0.014	-0.611*	-0.192	-0.008*	-0.015	-0.174	-0.435
	(0.007)	(0.008)	(0.286)	(0.264)	(0.004)	(0.010)	(0.590)	(0.294)
Household total gross income	0.011*	0.017	1.108	-1.979***	0.036***	0.049**	0.203	-0.046
	(0.005)	(0.019)	(0.699)	(0.508)	(0.009)	(0.016)	(0.261)	(0.472)
High-skilled occupation			-0.146	-0.224			0.256	-0.355
			(0.929)	(0.774)			(1.623)	(0.732)
Permanent contract			-0.781	0.219			-0.672	-2.285
			(0.667)	(0.786)			(1.089)	(1.622)
State-owned firm			-6.582***	-4.049***			-6.690***	-4.676***
			(1.208)	(1.033)			(1.191)	(1.079)
Constant	-0.778***	-0.130	47.687***	72.871***	0.133	-0.439	41.427***	51.892***
	(0.128)	(0.437)	(14.150)	(9.246)	(0.206)	(0.400)	(9.486)	(11.194)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	4694	865	2360	574	3674	738	2616	662
Adjusted R^2	0.288	0.153	0.101	0.152	0.126	0.132	0.069	0.143

*p < 0.1, ** p < 0.05, *** p < 0.01

Robust standard errors clustered at province level.

7.7.5.3. Age

Many international literatures find that age has a significant impact on adult children's labour supply decisions (see detailed discussion in section 3.2.2). Compared to younger adult children, older adult children are likely to bear greater elderly care responsibilities, making their labour supply decisions more susceptible to the influence of home-based elderly care policies. In this sub-section, I divide all observations into three age subgroups (18-34 years old, 35-44 years old and 45-51 years old) to explore the impact of home-based elderly care policy on married adult children's labour supply at both extensive and intensive margins. Table 7.16 reports the regression results.[99]

According to columns (1)-(3) in Table 7.16, the implementation of China's home-based eldercare policy negatively impacts the employment probability of wives across all age groups, but this effect is significant only for those aged 35-44 and 45-51, by 6.9 percentage points and 11.4 percentage points, respectively. A key driving factor behind this may be the increase in elderly care provision by older wives supported by the policy. The coefficients for the impact of the policy on their (wives aged 35-44, 45-51) paid working hours are positive, it is not statistically significant. In terms of the older husbands (age 34-44, 45-60), the implementation of China's home-based elderly care policy only has a significant effect on the paid working hours of husbands aged 45-60.

An interesting phenomenon emerges among the younger age subgroup (aged 18-34) for both spouse. According to the column (4) and the column (7) in Table 7.16, the implementation of the policy significantly reduces the paid working hours of young wives and the employment probability of young husbands. Compared to older adult children, younger adult children are less likely to immediately assume elderly care responsibilities. For young wives, policy support may alleviate the anticipated burden of future elderly care, leading those already employed to reduce their working hours due to lower expectations of future economic pressures related to elderly care. For younger husbands, the policy appears to significantly reduce their labour supply on the extensive margin. One possible explanation is that young husbands, as primary financial contributors to their households, may initially enter the labour market due to anticipated financial pressures, including the potential need to care for elderly parents and in-laws. With the support of the home-based elderly care policy, they may feel less compelled to work as much, leading to a reduction in their labour supply.

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[99] The parallel trend test results are presented in the Table P.7 in the Appendix P.

Table 7.17 Static TWFE estimates of labour supply by age

	Wives						Husbands					
	Probability of Employment			Paid Working Hours			Probability of Employment			Paid Working Hours		
	18-34 years old	35-44 years old	45-51 years old	18-34 years old	35-44 years old	45-51 years old	18-34 years old	35-44 years old	45-51 years old	18-34 years old	35-44 years old	45-51 years old
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
DiD coefficient	-0.044	-0.069***	-0.114*	-3.963***	2.336	2.197	-0.121***	0.039	-0.037	-1.509	1.398	3.499*
	(0.028)	(0.020)	(0.056)	(1.198)	(2.043)	(1.561)	(0.034)	(0.032)	(0.042)	(2.644)	(1.562)	(1.785)
Age	0.083*	0.079	0.526	1.638	-7.003	-8.095	-0.002	0.106	0.044	3.635	-12.274**	-6.105*
	(0.040)	(0.054)	(0.325)	(3.332)	(4.153)	(22.614)	(0.038)	(0.105)	(0.106)	(2.674)	(4.201)	(3.372)
Age squared	-0.001*	-0.001	-0.006	-0.032	0.085	0.076	0.000	-0.001	-0.001	-0.061	0.152**	0.059
	(0.001)	(0.001)	(0.003)	(0.057)	(0.053)	(0.236)	(0.001)	(0.001)	(0.001)	(0.048)	(0.052)	(0.034)
Hukou	0.061**	0.111***	-0.016	0.753	3.033	6.435**	0.008	0.015	-0.047	1.278	2.132	1.508
	(0.023)	(0.027)	(0.034)	(0.907)	(1.866)	(2.436)	(0.039)	(0.038)	(0.039)	(2.109)	(1.843)	(1.879)
Lower middle school degree	0.048	0.014	-0.021	7.378**	5.021***	-0.342	-0.047	-0.057	0.042	-1.900	2.654	4.326***
	(0.036)	(0.027)	(0.023)	(2.744)	(1.541)	(2.193)	(0.030)	(0.037)	(0.028)	(2.557)	(1.895)	(1.326)
Upper middle school degree	0.121**	0.022	0.042	6.379*	5.580**	1.387	-0.016	-0.057	0.071	1.480	2.162	2.648*
	(0.048)	(0.035)	(0.041)	(3.094)	(2.011)	(1.663)	(0.029)	(0.050)	(0.048)	(2.867)	(2.432)	(1.241)
Technical or vocational degree	0.175***	0.110***	0.213***	4.532	1.102	0.781	-0.029	0.029	0.261***	-0.933	0.703	2.318
	(0.051)	(0.030)	(0.037)	(2.657)	(1.277)	(1.823)	(0.053)	(0.042)	(0.050)	(2.840)	(2.186)	(1.724)
University or college degree or higher	0.170***	0.079**	0.242***	4.132	1.020	1.958	0.043	0.028	0.207***	-3.956	-0.992	3.020*
	(0.046)	(0.034)	(0.025)	(2.625)	(1.833)	(2.282)	(0.054)	(0.042)	(0.043)	(2.894)	(1.835)	(1.561)
Health	0.037	0.005	-0.019	-0.247	-0.452	-2.190	0.032	0.000	0.027	-4.284**	1.941*	-0.943
	(0.024)	(0.034)	(0.040)	(1.138)	(1.737)	(2.021)	(0.044)	(0.028)	(0.043)	(1.508)	(0.992)	(1.079)
Spouse's monthly labour wage	0.053***	0.042***	0.035***	-0.328**	-0.254	-0.357	0.009**	0.013**	0.009*	0.044	0.204	0.187
	(0.005)	(0.005)	(0.006)	(0.126)	(0.224)	(0.241)	(0.003)	(0.005)	(0.004)	(0.173)	(0.122)	(0.181)
Spouse's second occupation	0.079	0.176***	0.243***	-9.887**	-2.859*	-4.848	0.132***	0.100**	0.170*	-2.167	-1.306	-4.598
	(0.048)	(0.032)	(0.040)	(3.501)	(1.336)	(3.030)	(0.026)	(0.035)	(0.084)	(3.153)	(1.879)	(3.350)
Child Care	-0.043**	-0.046	-0.050	-2.126*	-4.361**	-6.200*	-0.026	-0.012	0.062	-1.008	-2.825	0.846
	(0.016)	(0.029)	(0.044)	(1.043)	(1.626)	(2.895)	(0.020)	(0.037)	(0.063)	(1.369)	(1.736)	(2.052)
Household size	-0.005	-0.008	0.017	0.054	-1.264*	-0.492	-0.004	-0.018**	-0.004	0.038	0.035	-0.984
	(0.005)	(0.009)	(0.010)	(0.388)	(0.666)	(0.648)	(0.009)	(0.006)	(0.010)	(0.753)	(0.493)	(0.761)
Household total gross income	0.020*	0.016*	0.002	-0.213	2.014**	0.015	0.034**	0.043***	0.038**	-0.885**	0.222	0.777*
	(0.009)	(0.008)	(0.009)	(0.542)	(0.862)	(1.091)	(0.012)	(0.013)	(0.013)	(0.401)	(0.449)	(0.367)
High-skilled occupation				-0.440	-0.354	0.889				-0.100	1.137	-1.243
				(0.848)	(0.886)	(2.178)				(1.416)	(1.688)	(1.070)
Permanent contract				-1.754	0.760	-0.904				1.172	-1.606	-2.124
				(1.147)	(1.159)	(0.781)				(0.995)	(1.204)	(1.941)
State-owned firm				-5.890***	-5.753***	-7.327***				-5.156***	-6.584***	-7.027***
				(1.634)	(1.359)	(1.595)				(1.118)	(1.092)	(1.180)
Constant	-1.104*	-1.059	-11.057	29.993	169.324*	259.646	0.512	-1.525	-0.539	8.520	286.398***	195.933**
	(0.567)	(1.076)	(7.810)	(44.492)	(79.343)	(537.154)	(0.475)	(2.000)	(2.595)	(33.585)	(83.052)	(79.707)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1490	2322	1747	984	1291	659	1298	1643	1471	1001	1279	998
Adjusted R^2	0.401	0.322	0.273	0.127	0.106	0.141	0.137	0.138	0.167	0.099	0.116	0.113

*p < 0.1, ** p < 0.05, *** p < 0.01, Robust standard errors clustered at province level.

7.7.5.4. Hukou

It has been supported by rich international empirical evidence that different household registration (hukou) types stem from the distinct socioeconomic and institutional disparities between urban and rural areas. Urban areas typically have more developed elderly care infrastructures, formal caregiving services, and flexible employment opportunities, which may enable urban adult children to balance caregiving responsibilities and labor market participation more effectively. In contrast, rural areas often lack such support systems, with stronger reliance on informal caregiving and traditional cultural norms, such as "raising children for old-age support," placing greater caregiving burdens on adult children. Home-based elderly care policies, which aim to support aging-in-place through financial subsidies, home services, and community-based care, therefore may have divergent impacts due to differences in labour market structures, caregiving norms, and access to formal elderly care resources.

This Section continues to explore the potential heterogeneous effects of Hukou. To do so, we re-estimate equation 7.1 by Hukou status. Table 7.17 presents estimation results, where all observations are divided into two sub-sample groups according to Hukou type of the wife (columns (1)-(4)) and husband (columns (5)-(8)).

According to the results in Table 7.17, wives and husbands with rural hukou benefit more from home-based eldercare policies in balancing work-family conflicts. Specifically, the implementation of these policies reduced labour force participation among wives, regardless of hukou type. However, the impact is significantly greater for rural wives than for their urban counterparts. This disparity may stem from the relative scarcity of formal eldercare resources in rural areas compared to urban areas. Given the limited availability of formal caregiving services in rural regions, the introduction of home-based eldercare services—supported by both government and social organisations—has a more pronounced effect on the employment probabilities of both rural husbands and wives. Consequently, these policies play a crucial role in alleviating caregiving burdens and facilitating labor market participation, particularly in rural households where alternative eldercare options are less accessible. However, regarding the impact on paid working hours, consistent with the benchmark model estimates, we do not find any statistically significant effects of the home-based elderly care policy, regardless of whether the individuals hold rural or urban household registration.

I would like to clarify that the findings in Chapters 5 and 6 are not in conflict with those in Chapter 7, even though they may initially appear contradictory. More specifically, while Chapters 5 and 6 suggest that rural workers are less able to adjust their working hours in response to caregiving needs, Chapter 7 finds that home-based elderly care policies enable rural

Hukou holders to reallocate their time by reducing their employment probability. This implies that the policy intervention effectively compensates for the structural constraints in rural areas. For urban workers, the policy's impact is weaker, possibly because they already have greater flexibility in adjusting their hours without exiting employment.

The key distinction lies in the context: Chapters 5 and 6 examine individual behavioral responses in the absence of policy support, whereas Chapter 7 illustrates how policy interventions reshape these responses. Without such support, rural workers tend to remain in employment despite caregiving burdens, while urban workers are more likely to reduce their hours. With policy support, however, rural workers—who previously lacked the flexibility to adjust—are finally able to reduce their employment, indicating that home-based care policies address a critical gap in rural caregiving support.

Table 7. 18 Static TWFE estimates of labour supply by Hukou

	Wife				Husband			
	Probability of employment		Paid working hours		Probability of employment		Paid working hours	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DiD coefficient	-0.049*	-0.103**	1.056	-0.958	-0.012	-0.104**	0.649	1.649
	(0.024)	(0.040)	(0.988)	(2.454)	(0.024)	(0.043)	(0.737)	(1.964)
Age	0.097***	0.033***	0.039	0.245	0.036***	0.008	-0.067	0.349
	(0.011)	(0.008)	(0.498)	(0.763)	(0.008)	(0.012)	(0.358)	(0.611)
Age squared	-0.001***	-0.000***	-0.002	-0.009	-0.001***	-0.000	-0.000	-0.005
	(0.000)	(0.000)	(0.007)	(0.010)	(0.000)	(0.000)	(0.004)	(0.007)
Hukou	0.000	0.000	0.000	0.000	-0.071**	0.038	4.263	0.001
	(.)	(.)	(.)	(.)	(0.030)	(0.058)	(2.817)	(1.651)
Lower middle school degree	0.006	0.004	1.382	3.951***	0.082*	-0.036	3.607**	0.066
	(0.027)	(0.019)	(1.803)	(1.260)	(0.041)	(0.038)	(1.571)	(1.304)
Upper middle school degree	0.071*	-0.009	0.756	4.601	0.137**	-0.070	3.984*	-0.159
	(0.034)	(0.027)	(2.014)	(2.785)	(0.057)	(0.056)	(1.948)	(1.465)
Technical or vocational degree	0.148***	0.177***	-1.727	4.567***	0.209***	0.006	2.451	-1.037
	(0.038)	(0.051)	(2.152)	(1.267)	(0.059)	(0.066)	(2.227)	(1.923)
University or college degree or higher	0.153***	0.181***	-0.169	1.877	0.200***	0.085	2.470	-3.429
	(0.037)	(0.048)	(2.432)	(2.542)	(0.051)	(0.088)	(1.854)	(2.639)
Health	-0.016	0.035	0.022	-1.863	0.032	0.011	-1.924**	1.796
	(0.022)	(0.026)	(1.141)	(2.512)	(0.022)	(0.049)	(0.770)	(1.244)
Spouse's monthly labour wage	0.034***	0.049***	-0.135	-0.406*	0.003	0.018**	-0.178	0.612***
	(0.004)	(0.005)	(0.128)	(0.218)	(0.002)	(0.006)	(0.102)	(0.192)
Spouse's second occupation	-0.012	0.207***	-3.866	-4.675***	0.124***	0.110**	1.980	-4.819***
	(0.045)	(0.025)	(2.820)	(0.883)	(0.037)	(0.042)	(2.229)	(1.190)
Child Care	-0.063**	-0.024	-1.099	-5.206**	0.007	-0.011	-1.324	-0.963
	(0.022)	(0.023)	(0.944)	(1.792)	(0.016)	(0.024)	(1.332)	(1.412)
Household size	-0.006	-0.002	-0.208	-0.783**	-0.016	-0.005	-0.128	-0.184
	(0.004)	(0.009)	(0.217)	(0.334)	(0.009)	(0.006)	(0.314)	(0.759)
Household total gross income	0.018***	0.008	0.129	1.513	0.063***	0.020**	0.194	0.182
	(0.004)	(0.006)	(0.485)	(1.110)	(0.013)	(0.007)	(0.518)	(0.450)
High-skilled occupation			-0.254	4.675			-0.636	2.142
			(0.554)	(2.797)			(0.950)	(1.906)
Permanent contract			2.991***	-7.184***			-3.202**	2.201
			(0.885)	(1.469)			(1.177)	(1.351)
State-owned firm			-6.344***	-2.887			-7.020***	-2.366
			(1.126)	(2.365)			(1.045)	(1.976)
Constant	-1.179***	-0.204	48.427***	44.088**	-0.462**	0.523*	47.896***	35.093**
	(0.171)	(0.144)	(10.026)	(15.585)	(0.160)	(0.272)	(8.741)	(12.454)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2962	2597	1820	1114	2444	1968	1916	1362
Adjusted R^2	0.319	0.296	0.168	0.133	0.166	0.154	0.188	0.071

*p < 0.1, ** p < 0.05, *** p < 0.01

Robust standard errors clustered at province level.

7.7.6. Mechanisms

Based on the discussion in Section 7.7.1, the significant decrease in the probability of wives being employed following the implementation of China's home-based elderly care policies may be attributed to the increased supply of elderly care, which could be driven by either children's sense of guilt or the crowding out formal/secondary elderly care provision. In order to explore the validity of this mechanism in China, this subsection explores the impact of the policy implementation on the elderly care provision of wives at both extensive and intensive margins. For this purpose, we estimate a version following our benchmark equation 7.1, where the dependent variable is an elderly care dummy variable at the extensive margin (results reported in Table 7.17, column (1)) and elderly care hours as a continuous variable at the intensive margin (results reported in Table 7.17, column (5)).[100][101]

According to columns (1) and (5) in Table 7.17, the policy does not affect on the decision of whether or not wives provide elderly care. However, for those wives who were already providing elderly care, the implementation of the policy increased the hours they spent caring for elderly parents or parents-in-law. This may be due to the financial support provided by the policy, which allows married women who previously faced the dual pressures of elderly care and paid work to reduce their labour market participation and devote more time to family care. Consequently, we observe a significant decrease in the probability of wives being employed in the benchmark regression results.

Moreover, we consider that if wives in the household take on more elderly care responsibilities—whether due to feelings of guilt, coordination with community-provided home-based care services (such as transporting the elderly to and from a daily care center), or

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[100] The elderly care dummy variable indicates whether the wife provided elderly care for at least one parent or parent-in-law in the past week. This is based on the CHNS question: "Did you take care of his/her daily life (any one or more of the parents or parents in laws) last week?" If the respondent answered "Yes", the family elderly care responsibility is coded as 1; if "No", it is coded as 0. The elderly care hours variable is a continuous measure derived from the CHNS response to the question "How long (hours) did you spend taking care of him/her last week". Respondents answer this question four times, once for each of the following: father, mother, father-in-law and mother-in-law. The total number of elderly care hours is the sum of these four responses.

[101] The parallel trend test results are presented in the Table P.8 in the Appendix P.

Table 7.19 Mechanisms: TWFE DiD estimates of wife's elderly care supply by age

	Elderly Care Provision				Elderly care hours			Early Retirement		
	All Observations	18-34 years old	35-44 years old	45-51 years old	All Observations	35-44 years old	45-51 years old	All observations	35-44 years old	45-51 years old
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DiD coefficient	0.026	-0.010	0.015	0.074**	6.613**	5.497	12.371*	0.029*	0.009*	0.076**
	(0.029)	(0.054)	(0.029)	(0.029)	(2.986)	(4.770)	(6.045)	(0.013)	(0.004)	(0.031)
Age	-0.022*	-0.020	0.063	-0.006	-1.826	-15.972	-15.991	-0.052***	0.009	-0.673***
	(0.011)	(0.085)	(0.075)	(0.228)	(1.259)	(17.506)	(26.582)	(0.007)	(0.022)	(0.171)
Age squared	0.000**	0.000	-0.001	0.000	0.019	0.193	0.172	0.001***	-0.000	0.007***
	(0.000)	(0.001)	(0.001)	(0.002)	(0.017)	(0.224)	(0.277)	(0.000)	(0.000)	(0.002)
Hukou	0.018	0.047**	0.021	-0.003	-0.108	2.180	0.838	0.071***	0.007**	0.190***
	(0.019)	(0.020)	(0.020)	(0.034)	(1.743)	(2.330)	(4.160)	(0.012)	(0.003)	(0.028)
Lower middle school degree	0.012	-0.001	-0.007	0.029	-2.004	-7.733	5.254	0.020***	0.004*	0.029**
	(0.017)	(0.040)	(0.025)	(0.031)	(2.973)	(6.263)	(3.949)	(0.005)	(0.002)	(0.013)
Upper middle school degree	0.059*	0.016	0.016	0.118**	-2.667	-5.970	1.749	0.029**	0.005	0.024
	(0.028)	(0.066)	(0.035)	(0.053)	(2.892)	(10.539)	(5.304)	(0.013)	(0.005)	(0.030)
Technical or vocational degree	0.056*	0.030	0.022	0.118**	-5.645	-9.689	2.570	-0.012	0.003	-0.085**
	(0.026)	(0.056)	(0.041)	(0.049)	(4.162)	(11.381)	(4.644)	(0.012)	(0.005)	(0.033)
University or college degree or higher	0.052*	0.025	0.029	0.124**	-2.675	-8.416	-3.411	-0.032***	-0.000	-0.140***
	(0.027)	(0.061)	(0.039)	(0.046)	(2.818)	(8.667)	(3.283)	(0.009)	(0.003)	(0.023)
Health	-0.048***	-0.102**	-0.026	-0.033	7.945***	8.457**	9.123**	0.004	-0.000	0.015
	(0.012)	(0.037)	(0.043)	(0.038)	(1.883)	(3.715)	(3.501)	(0.008)	(0.005)	(0.020)
Spouse's monthly labour wage	-0.000	-0.000	-0.005*	0.004	-0.249	-0.137	-0.116	-0.001	-0.000	-0.003
	(0.002)	(0.004)	(0.003)	(0.003)	(0.295)	(0.348)	(0.512)	(0.002)	(0.001)	(0.004)
Spouse's second occupation	-0.018	0.000	-0.048	-0.004	-3.686	-3.336	2.624	-0.008	-0.001	-0.023
	(0.024)	(0.032)	(0.029)	(0.053)	(2.064)	(7.719)	(5.967)	(0.007)	(0.001)	(0.016)
Child Care	-0.008	-0.029	0.016	0.024	-3.799	0.640	-0.103	0.002	0.002	-0.041*
	(0.019)	(0.024)	(0.034)	(0.046)	(2.901)	(8.253)	(8.449)	(0.005)	(0.001)	(0.019)
Household size	0.008	-0.001	0.014	0.010	-0.728	-1.120	-0.090	-0.005**	-0.002*	-0.020**
	(0.005)	(0.004)	(0.012)	(0.007)	(0.795)	(1.099)	(1.077)	(0.002)	(0.001)	(0.006)
Household total gross income	-0.003	0.002	-0.004	-0.006	0.625	0.739	-0.368	0.002	0.000	0.003
	(0.004)	(0.006)	(0.006)	(0.008)	(0.886)	(1.134)	(2.042)	(0.002)	(0.001)	(0.005)
Cnstant	0.559**	0.704	-1.135	0.037	49.554	337.292	372.206	0.799***	-0.197	15.109***
	(0.188)	(1.233)	(1.486)	(5.473)	(28.959)	(334.565)	(643.636)	(0.104)	(0.437)	(4.043)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	5123	1229	2214	1680	975	412	375	5291	2225	1651
Adjusted R^2	0.041	0.056	0.035	0.068	0.042	0.060	0.090	0.169	0.020	0.233

*p < 0.1, ** p < 0.05, *** p < 0.01
Robust standard errors clustered at province level.

adjustments in the family's care structure (such as reducing reliance on formal care services or decreasing the involvement of secondary caregivers like the husband or children)—then older adult children may be more likely to be influenced by the policy compared to younger ones. This is primarily because older wives are more likely to bear the responsibility of providing elderly care. Additionally, compared to younger wives, older wives may have the option to withdraw from the labour market through early retirement rather than job interruption, thus facing a smaller financial penalty. Therefore, we further explore the results presented in Table 7.17, columns (1) and (5), focusing on the elderly care status and elderly care hours of wives

by age groups (columns (2)-(4) and (6)-(7) in Table 6.17). Moreover, to test whether the home-based elderly care policy leads to early retirement of married women in China, we estimate a version of our benchmark equation 7.1, where the dependent variable is an early retainment dummy variable (Columns (8)-(10) in Table 7.17).[102][103]

The estimates provided in columns (2)-(4) and (6)-(8) in Table 7.17, support the argument that the impact of home-based elderly care policy on adult children's elderly care provision varies across age groups. Specifically, on the extensive margin of elderly care provision, the policy implementation, although not statistically significant, appears to reduce the burden of elderly care provision for younger wives aged 18-34, decreasing the probability of them providing elderly care. In contrast, for older wives aged 45-51, the probability of providing elderly care increases significantly by 7.4 percentage points due to the policy support. This finding is consistent with the finding of Karlsberg Schaffer (2015), who employs DiD method focusing on the free personal care policy for the elderly in Scotland and find that the implementation of this policy significantly increased the probability of female caregivers (aged 45 and over) providing elderly care by 6 percentage points. Despite the differences in country context, our estimates in column (4) in Table 7.17 are of similar magnitude to him. In terms of the intensive margin of elderly care supply, the significant increase in elderly care hours due to policy support is also concentrated in the 45-51 age subgroup.[104] Moreover, as shown in columns (8)-(10) of Table 7.11, these older wives are more likely to withdraw the labour market through early retirement, with an increase of 7.6 percentage points compared to just 0.5

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[102] Early retirement dummy variable is defined as 1 if the wife retired before the age of 51, and 0 if she is either employed or seeking work actively in the labour market. This variable is based on the CHNS question: "Are you presently working?" If the respondent's answer is "Yes", the dummy is set to 0. If the answer is "No", the respondent is then asked "Why are you not working?" If the response is "retired", the dummy variable is set to 1. If the response is "seeking work", the dummy variable remains to 0.

[103] As the CHNS does not provide information on whether husbands provide elderly care or the elderly care hours, and as discussed in Section 7.7.1, the significant impact of the home-based elderly care policy is observed only on wives' labour supply, this mechanism analysis focuses solely on wives, rather than husbands.

[104] Given that there are only 137 observations in the 18-34 age group, we only reported estimation results for 35-44 age group and 45-51 age group.

percentage points for the relatively younger age group.

In summary, the negative impact of policy implementation on the probability of employment for wives, as observed in the benchmark regression results, may be attributed to the income effect of the policy's financial support. This effect is particularly pronounced among older wives', who are more likely to retire early and face smaller financial losses compared younger women who might experience job interruptions. One possible explanation is that the income effect of the policy is significant for older married women who wished to care for their elderly parents or in-laws but were previously constrained by economic pressure to remain in the labour market. With the policy support, these women no longer need to purchase formal care services or rely on their husbands, children, or younger siblings to share the eldercare responsibilities. In other words, policy support enables older wives to take on more elderly care responsibilities while potentially reducing their reliance on formal eldercare services or secondary caregivers.

7.8 Conclusion

Using the latest data from the CHNS supplemented with province level information on the timing of the implementation of the home-based elderly care, this chapter explores the impact of the policy on the probability of adult children' s employment as well as their paid working hours. Static and dynamic TWFE and staggered difference-in-differences method proposed by Sun and Abraham (2021) consistently show that the implementation of China's home-based elderly care policy has a negative effect on wives' probability of employment reducing it by 5.4-8.0 percentage points. However, there is no effect on wives' paid working hours or on husbands' labour supply at both the extensive and intensive margins. The potential mechanisms behind the negative impact on wives' probability of employment is that wives choose early retirement with the support of the policy to alleviate the conflict between labour force work and family care. Moreover, the heterogeneity analysis of the impact of home-based elderly care policy by household income, age group and education helps us further clarify which subgroups of adult children's labour supply decisions are more susceptible to the influence of family elderly care.

Although China's home-based elderly care policies are primarily designed to provide better living environments and services for the elderly rather than to address the unbalanced work-life of adult children directly, the extent to which these policies can alleviate work-family conflicts faced by adult children can also impact the effectiveness of home-based elderly care system. Therefore, the impact of the policy on adult children's labour supply should also be carefully

considered by policymakers. Our findings suggests that the income effect dominates the impact of the policy on the extensive margin of labour supply. Moreover, older, less-educated and living in rural areas adult children are likely to further reduce their labour supply suggesting that developing targeted policies for different demographic groups may be a more effective approach.

Furthermore, our study also provides insights from the perspective of welfare economics. When analyzing policy effects from a welfare economics viewpoint, it is essential to consider two potential behavioral drivers: first, the restrictive influence of cultural norms on individual behavior, and second, the endogenous choices based on filial preferences. By examining these two perspectives, policy interventions can more precisely identify pathways to enhance social welfare, thereby optimizing policy design.

The reinforcement of gender roles through cultural norms is likely a key factor in the allocation of elderly caregiving responsibilities in many societies. Traditionally, women are often expected to take on caregiving duties, and this expectation subtly influences women's opportunities to participate in the labour market, even impacting their economic independence. If the allocation of caregiving responsibilities is indeed influenced by such social cultural norms, then policy interventions can enhance social welfare by alleviating these constraints. For instance, improving the social security system, increasing the supply of public elderly care services, or offering economic incentives can reduce the "forced" caregiving behaviors, especially for women, and thus affect women’s labour supply. Such interventions would not only improve the personal welfare of caregivers but also potentially enhance overall economic efficiency, as reallocating labour means more workers would be engaged in productive activities, thereby driving economic growth. In this way, policy interventions contribute to improving personal welfare and enhancing the overall economic benefits.

On the other hand, if caregiving responsibilities are based on personal filial preferences, meaning family members voluntarily choose to undertake caregiving duties, the welfare improvement from policy interventions may be relatively limited. In this case, caregiving responsibilities are not merely driven by cultural pressure, but by emotional or moral obligations to care for elderly relatives. Here, policy interventions should focus more on supporting family members to perform caregiving duties more efficiently, rather than simply reducing the caregiving burden. For example, providing home caregiving subsidies, family caregiving training, or improving the convenience of caregiving services can enhance caregiving efficiency, reduce caregiving costs, and alleviate the time pressures on family members. Such policies not only respect the filial preferences within families but also, by

improving caregiving efficiency, indirectly enhance the overall welfare of families and caregivers.

My empirical findings indicate that the policy's most significant impact is observed among particularly vulnerable groups—women with lower education levels, lower household incomes, and those living in rural areas. This suggests that social norms and economic pressures, rather than pure filial preferences, significantly shape caregiving and labour supply decisions. This implies that policies addressing these structural constraints can lead to meaningful welfare improvements.

Given these findings, if cultural constraints and labour market structures constitute the primary barriers to flexible work arrangements and caregiving, then expanding access to formal care services—such as nursing homes and community-based care—as well as increasing financial support through measures like household care subsidies, could help mitigate welfare losses by offering caregivers more viable and autonomous choices. Conversely, if caregiving is primarily driven by filial preferences, the direct welfare gains from such policies may be more limited, as individuals are already making choices that reflect their intrinsic well-being. However, even in this case, expanding formal care options can improve overall welfare by providing more flexibility to families and reducing economic strain.

Ultimately, by continuously improving policy design and strengthening social welfare support, home-based elderly care policies can enhance caregivers' ability to balance work and family responsibilities, leading to a more sustainable and welfare-enhancing equilibrium.

This research also comes with certain limitations that could be addressed in future studies. While the CHNS offers extensive long-term panel data and comprehensive information on key variables compared to other national datasets, it is important to note that the data used in this study was last updated in 2015. On one hand, the comprehensive implementation of home-based elderly care policies in some provinces of China only began in 2012 or even as late as 2015. This limitation prevents us from capturing the long-term effects of policies in those provinces. On the other hand, CHNS provides individual-level data from only 12 of the 34 provinces. A broader provincial coverage dataset would likely provide a more comprehensive understanding of how these policies affect the labour supply of adult children across different regions. Secondly, despite our careful cross-referencing and comparison with existing studies, the timing for the comprehensive implementation of China's home-based elderly care policies was ultimately determined based on the authors' interpretation of the retrieved data. During this process, we cannot entirely rule out the possibility of missing relevant policies or the influence of subjective bias in our judgment. An official compilation of policy documents could provide

more definitive data on the timing of policy implementation. Finally, since this analysis cannot clearly distinguish between different methods of policy implementation, such as caregiving substitution services or financial support, the estimated results reflect a combination of offsetting substitution and income effects. Accessing more detailed data on the specifics of policy implementation and effectively categorising policy types could potentially provide further insights.

Chapter 8 Conclusions

This thesis examines the impact of family elderly care responsibilities on the labour supply of married adult children, as well as the role of China's home-based elderly care policy, which was gradually implemented since in 2008, in helping adult children balance work and family care.

The data used for three empirical chapters in this thesis is drawn from the CHNS, covering the survey waves of 2004, 2006, 2009, 2011, and 2015. Compared to other national datasets, the CHNS offers comprehensive information on individual, family, and financial characteristics, which are essential for this research. Additionally, data on the timing of the implementation of home-based elderly care policies were collected from provincial government websites (including official government portals, civil affairs bureau websites and elderly care office sites), Baidu search engine results, and Peking University Treasure resources, to supplement the province-level data used in the third empirical chapter, Chapter 7.

The first empirical chapter, Chapter 5, explores the impact of family elderly care responsibilities on wives' labour supply at both the extensive and intensive margins, which is the first empirical research employ data from the period after China entered the ageing stage (post-2000). Using a 2SLS method and instrumental variables to address potential endogeneity issues, the empirical results suggest that elderly care increases the probability of employment for married female caregivers by 8.6 percentage points likely due to an income effect. Married women who provide elderly care are more likely to participate in the labour market compared to those who do not, possibly to offset the additional costs associated with caregiving (Kydland and Pretnar, 2018). For those who are already employed, however, the substitution effect dominates, as elderly care reduces their paid working hours by 4.96 hours per week.

We further extend the analysis to investigate the heterogeneity of these effects based on living arrangements, childcare, age, Hukou and the intensity of caregiving. Specifically, married women who co-reside with elderly parents or in-laws, typically the primary caregivers, often struggle to balance caregiving demands with active participation in the labour market. As a result, elderly care significantly reduces their probability of employment by 17.3 percentage points. In contrast, for non-co-residing married women, the income effect of elderly care remains at the extensive margin, increasing their employment probability by 20.3 percentage points. This may be because they are more likely to provide financial support as part of their elderly caregiving responsibilities. However, even for non-co-residing women who are already employed, elderly caregiving still reduces their paid working hours by 5.98 hours per week. However, the intensity of elderly care does not have a significant effect on either the intensive

or extensive margins of female caregivers' labour supply, regardless of whether they co-reside with elderly parents or in-laws.

In terms of age, elderly care reduces both the intensive and extensive margins of labour supply for married women aged 18-34 by 34.3 percentage points and 11.58 paid working hours, respectively, compared to their non-caregiving counterparts. For women nearing retirement (aged 45-52), elderly care has the most positive effect on employment probability among all age subgroups (14.8 percentage points), but also a significant negative impact on paid working hours (9.49 hours per week). These differences may be explained by varying different human capital accumulation across age groups and the Chinese pension system, which is linked to years of working.

In terms of childcare, our findings reveal a notable income effect of elderly caregiving on the labour supply of wives without childcare responsibilities. Specifically, it increases their probability of employment by 10.6 percentage points and adds an average of 0.116 hours to their weekly paid working hours. In contrast, for wives who are simultaneously responsible for both childcare and elderly care, caregiving does not drive greater participation in the labour market. While their weekly paid working hours are significantly reduced by 0.483 hours. This reduction may stem from the combined demands of childcare and eldercare, which exhaust a substantial amount of their time and energy, limiting their ability to increase labour supply despite the additional financial pressure caregiving may impose.

In terms of Hukou, the impact of elderly caregiving on married women’s labour supply is driven by the adjustments in paid working hours of those residing in rural areas. This may be due to the relative inflexibility of the rural labour market, which offers fewer opportunities for women to adjust their working hours or transition to part-time employment. Additionally, formal caregiving services are less developed in rural areas, increasing the burden on women to provide unpaid care. These findings suggest that expanding eldercare services and promoting workplace flexibility in rural areas could help mitigate the negative labour market effects of caregiving responsibilities.

Chapter 6, the second empirical chapter, examines the impact of family elderly care responsibilities on husbands' labour supply at both the extensive and intensive margins. It also explores the mechanisms linking elderly care responsibilities to husbands' labour supply, and analyses heterogeneity by living arrangement, age group, and care recipient. Using a 2SLS method and instrumental variables, the analysis addresses the potential endogeneity between elderly care and married men's labour supply. The results indicate that husbands with elderly care responsibilities are 5.3 percentage points less likely to be employed compared to those

without such responsibilities, a reduction likely driven by the increase in sharing family care responsibility. However, no significant effect is found on their paid working hours. One possible explanation is that men are more likely to engage in full-time work, which is typically less flexible in allowing reductions in working hours compared to part-time work (Heger and Korfhage, 2020). As a result, when their families are faced with elderly care responsibilities, husbands may have fewer options and are more likely to exit the labour market altogether.

The heterogeneity analysis of the impact of elderly care on husbands' labour supply by living arrangement and care recipient further clarifies which subgroups of husband's labour supply decisions are more susceptible to the influence of family elderly care responsibility. Specifically, while elderly care responsibilities negatively affect the probability of employment for husbands, the impact is more pronounced when caring for their own parents (14.5 percentage points) compared to caring for their parents-in-laws (11.0 percentage points). However, for husbands who are already employed, caregiving responsibilities—regardless of the care recipient—do not affect their paid working hours. In terms of living arrangements, the significant negative impact of elderly care responsibilities on husbands' probability of employment is observed only among non-co-residing husbands, not those who live with the elderly parents or parents-in-law. This may be because co-residing husbands' wives often serve as the primary caregivers, adversely affecting their own employment prospects. To ensure stable household income, these husbands remain employed. However, for co-residing husbands, their paid working hours significantly decrease, conditional on employment. In terms of Hukou, the impact of elderly caregiving on married men's labour supply is most evident in reductions in paid working hours among those in rural areas. This may stem from the rigid structure of the rural labour market, which offers fewer opportunities for men to adjust their work schedules while managing caregiving duties. Additionally, the lack of formal caregiving services in rural areas places a greater burden on family members, limiting men's ability to balance employment and caregiving responsibilities.

Chapter 7, the third empirical chapter, examines the impact of the home-based elderly care policy on the labour supply of married adult children at both the extensive and intensive margins. Using the latest available data from the CHNS, supplemented with province level information on the timing of policy implementation, this empirical research employs static and dynamic TWFE models and staggered DiD method proposed by Sun and Abraham (2021). The findings indicate that the implementation of China's home-based elderly care policy had a negative effect the probability of employment for wives, reducing it by 5.4 to 8.0 percentage points in the short-term. However, there is no observed effect on wives paid working hours or on

husbands' labour supply at either the extensive or intensive margins, even in the short term.

The negative impact on the extensive margin of wives' labour supply is consistent with the significant positive effect identified in the first empirical chapter regarding elderly care responsibilities. With policy support, the reduction in the probability of employment for wives may reflect an improved balance between work and family life, as they no longer need to overwork to cover additional elderly care expenses. Further heterogeneity and mechanism analyses in Chapter 7 suggest that this negative impact is particularly pronounced among older wives, who may withdraw from the labour market through early retirement. Additionally, for wives from low-income households, the probability of employment decreases by 7.2 percentage points with policy support, while no significant effect is found for those from high-income households. Similarly, the policy has a notable negative impact on the employment probability of wives with lower educational level (9.1 percentage points) and living in Rural areas (-10.3 percentage points), but no significant effect is observed for those with higher education levels.

In terms of policy, the empirical findings of this thesis are highly relevant to government committees, the Ministry of Civil Affairs, labour and social security agencies, or other organisations focused on elderly care and labour supply issues. First, the study provides a comprehensive analysis of the differential impacts of elderly caregiving responsibilities on the labour supply of both husbands and wives, revealing distinct pathways through which caregiving influences labour market participation, which might provide evidence for policymakers seeking gender equality in the workforce. This also offers crucial insights for policymakers on how to alleviate caregiving burdens and support labour market engagement. Second, the study further examines the role of factors such as age, work type, education, income and living arrangements, highlighting the heterogeneous responses of different groups to caregiving responsibilities. This provides empirical evidence to inform the development of more targeted policies, contributing to better resource allocation and enhanced policy effectiveness.

Overall, this study systematically investigates the impact of family elderly caregiving responsibilities on labour supply from the perspectives of husbands, wives, and policy implementation. At a macro level, the findings reveal that caregiving pressures, although shaped by traditional cultural norms and caregiving preferences, lead to constrained labour supply decisions rather than mere individual preferences. The observed labour supply increases among wives and reduction among husbands underscore the economic trade-offs families face in balancing caregiving and workforce participation. These findings highlight that the conflict between family elderly caregiving and labour supply is not a simple economic phenomenon but

a structural economic problem requiring significant policy attention at the national level. Addressing this issue is crucial to optimising both caregiving responsibilities and labour supply structures in the economy.

Detailed findings from this study's empirical chapters emphasise the nuanced dynamics of labour supply responses. For wives, the increased labour supply in response to caregiving responsibilities often represents an involuntary overextension driven by the need to meet additional financial demands. Indeed, home-based elderly care policies provide significant relief, allowing wives to reduce such labor supply pressures. If this increase in labour supply were purely preference-driven, these policies would not have yielded substantial effects. For husbands, caregiving responsibilities primarily affect those in full-time employment with inflexible schedules, leading to a reduction in the probability of employment. In contrast, part-time working husbands, who can adjust their paid work hours, demonstrate greater resilience to caregiving demands. These findings underscore the critical role of flexible work arrangements in mitigating the economic constraints faced by full-time employed husbands and relieving the labor supply burden on wives.

The individual-level estimates presented in this study can be scaled up to provide a broader sense of the aggregate labour market impact of elderly care responsibilities. According to nationally representative data from the CHNS and CFPS, 18–20% of married women and 15–17% of married men in the workforce provide some form of elderly care. Given that the labour market comprises approximately 2.8 million married women and 2.9 million married men, a substantial portion of the employed population is affected by caregiving demands. Based on my estimate results, elderly caregiving increases women's employment probability by 8.6 percentage points while reducing men's employment probability by 5.3 percentage points. Applying these estimates to the affected population, this implies an increase of approximately 240,800 employed married women and a reduction of approximately 153,700 employed married men. However, the increase in labour force participation among married women is driven primarily reflected by part-time employment rather than full-time positions.[105] This result may indicate a structural shift in overall employment patterns for married women, from full-time to part-time work, accompanied by job losses among married men under elderly caregiving pressures.

Similarly, if caregiving reduces weekly working hours by an average of 5 hours for women

[105] See Appendix H for estimations about the impact of elderly care on work type.

and 3 hours for men, this results in 14 million fewer working hours per week for married women and 8.16 million fewer working hours per week for married men, amounting to a total reduction of 22 million working hours per week, which is equivalent to 628,571 full-time jobs (assuming a 35-hour workweek). These estimates highlight the substantial macroeconomic effects of unpaid caregiving, reinforcing the importance of policies that provide greater flexibility in balancing work and care responsibilities. While these back-of-the-envelope calculations are based on simplifying assumptions, they suggest that elderly care policies have broader labour market implications beyond the individual-level effects observed in this study.

In the broader context of China, where elderly caregiving responsibilities predominantly fall on families due to the limited coverage and quality of formal care services—particularly in rural and underdeveloped areas—the policy implications are profound. A multi-faceted approach is essential to address this economic challenge effectively. First, expanding community-based care services, particularly in less developed regions, can alleviate the direct caregiving time burden on families. Second, professionalising and incentivizing the caregiving sector by raising wages and improving its societal recognition can attract more workers to this field, thereby reducing reliance on family caregivers. Third, increasing investment in public elderly care facilities, especially subsidized options for low-income families, ensures sustainable and equitable access to formal care.

Beyond these direct interventions, cultural norms surrounding gender roles also play a significant role in shaping labor supply decisions under caregiving pressures. Traditional norms often position women as primary caregivers, amplifying their labor market constraints. Promoting gender equality through educational campaigns, workplace policies, and legislative reforms is critical to reshaping societal expectations. For example, offering men equivalent caregiving leave and financial incentives to share caregiving responsibilities can foster a more balanced division of household labor, reducing the caregiving burden on women and promoting labor market gender equity.

Moreover, this study's findings reveal significant heterogeneity in labor supply responses across different demographic and socio-economic groups. For example, differences in education, employment type, and caregiving intensity result in varied impacts on labor supply. These variations suggest that a one-size-fits-all approach is insufficient. Instead, targeted policies tailored to the specific needs of different groups are more likely to yield effective and equitable outcomes. From a macroeconomic perspective, implementing these measures not only enhances individual and household welfare but also addresses broader aggregate challenges such as gender imbalances in the labor market and labor supply shortages,

particularly in aging societies like China.

Finally, the impact of home-based elderly care policies on married adult children's labour supply is primarily observed in wives' extensive labour supply margins and tends to diminish within a few years post-policy implementation. Therefore, maintaining consistent policy support could be an important consideration for policymakers to ensure sustained assistance for families dealing with elderly care responsibilities.

These research findings, however, come with certain limitations. Firstly, although the CHNS provides valuable long-term panel data and detailed information on key variables, the most recent data used in this study is from 2015. Since then, significant events—such as the introduction of China's two-child policy in 2016 and the global COVID-19 pandemic in 2019—may have influenced caregiving responsibilities, particularly with increased childcare duties and changes in China's employment and healthcare systems. Unfortunately, these developments are beyond the scope of the current dataset. Future research incorporating more recent data would be crucial for capturing these effects and enriching the empirical analysis.

Second, despite its representativeness of the target population and coverage of both urban and rural areas in China, the CHNS provides individual-level data from only 12 of the 34 provinces of China, which limit the generalisability of our findings from fully representing the situation across all of China. For future research, a dataset with similarly rich information but broader coverage of individuals across more provinces would be more desirable.

Finally, while all three empirical chapters of this thesis focus on elderly caregiving, we were constrained by the need to exclude detailed information on elderly parents and parents-in-law due to the significant reduction in sample size that would result from including such data. Consequently, our sample only includes individuals with at least one surviving parent or in-law aged 50 or older, without accounting for other relevant characteristics (such as pension levels, chronic disease status and health insurance coverage) of elderly parents and parents-in-laws. Although our specifications include a rich set of personal and family characteristics, the lack of detailed information on elderly parents and parents-in-law may impact on the robustness of our findings. Therefore, the development of a dataset with more comprehensive details on elderly parents and parents-in-laws would enable a more thorough analysis.

For future research, CHARLS may provide further valuable insights. Although it focuses solely on individuals aged 45 and above and thus does not encompass the entire working-age population, its broader geographic coverage across 28 provinces, more frequent and up-to-date data collection (with the latest wave available from 2018), and extensive information on elderly parents and parents-in-law offer significant advantages. While its age restriction limits direct

comparisons with younger workers, the wealth of longitudinal data in CHARLS allows researchers to explore long-term caregiving trends, changes in household economic decision-making, and the evolving impact of elderly care responsibilities over time. As such, CHARLS can serve as a valuable complement to other datasets by filling critical gaps in understanding how caregiving responsibilities shape labour market participation, household income, and gender disparities in employment. Moreover, the extensive health data in CHARLS, including information on chronic illnesses, disabilities, and mental health, serves as a critical resource for evaluating how health conditions impact labor supply, social participation, and economic well-being.

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Appendices

Appendix A: Background of Home-Based Elderly Care Policy Implementation

Table A.1Summary of elderly policies issued by China from 2008 to 2021

Year	Policies	Policy category
2008	Opinions on comprehensively promoting home-based elderly care services (In China's national level policies, there is a policy for "home-based elderly care" for the first time. The policy explains the significance of home-based elderly care, and expounds the basic tasks of home-based elderly care services and eight relevant security measures.)	home-based care services
2010	Opinions on strengthening and improving the construction of urban community residents' committees (In view of the outstanding problems and actual needs in the work, the opinions put forward policy suggestions on strengthening and improving the construction of urban community residents' committees from eight aspects: clarifying responsibilities, expanding community teams, strengthening community infrastructure construction, etc.)	Community work talent team
2011	The 12th Five Year Plan for the construction of urban and rural community service system (This plan expounds the pension pressure faced by China during the 12th Five Year Plan period, the connotation and positioning of the social elderly care service system, as well as the objectives, tasks and basic security measures of the social elderly care service system.)	Community elderly care service
2011	Notice on printing and distributing four national vocational skill standards for elderly care nurses (To stipulate the national professional skill standards for elderly nursing nurses)	Professional standards for elderly care nurses
2013	Measures for the administration of elderly care institutions (China's first administrative measures for elderly care institutions. The measures are divided into 6 chapters and 36 articles, including general provisions, service contents, internal management, supervision and inspection, legal responsibilities and supplementary provisions, and shall enter into force as of July 1, 2013.)	Management of elderly care institutions
2014	Notice on promoting the construction of urban elderly care service facilities (In order to accelerate the construction of urban elderly care service facilities, the opinions makes provisions and instructions in three aspects: implementation significance, implementation objectives and specific safeguard measures.)	Elderly care service facilities
2014	Notice on government procurement of elderly care services (This notice explains the work content, work objectives, work responsibilities and specific work steps of the government's purchase of elderly care services.)	Government purchase of services
2016	Opinions of the general office of the State Council on comprehensively liberalizing the elderly care service market and improving the quality of elderly care services (In order to promote the better and faster development of the elderly care service industry, with the consent of the State Council, the access threshold will be further reduced and social capital will be guided to enter the elderly care service industry. It also plans the market structure and service objectives of the elderly care service industry.)	optimize services
2017	Provisions on healthy ageing in the 13th five year plan (This plan expounds the new challenges faced by China's ageing cause during the 13th Five Year Plan period, and makes arrangements in five aspects: guiding ideology, overall principles, overall objectives, main tasks and safeguard measures.)	Improve the health level of the elderly
2019	Notice on clarifying the policy of value added tax exemption for elderly care institutions	Pension institutions
2019	Implementation plan for special action of urban enterprise linkage for inclusive elderly care (Trial) (In order to further promote the cause of elderly care, based on the principle of voluntary participation, various enterprises are encouraged to participate in the development of local elderly care with the support of national funds. It also explains the work content, linkage objectives, responsibility division, capital structure and so on.)	Pension fund support
2020	Notice on printing and distributing training program for directors of nursing homes (for Trial Implementation) and training program for elderly social workers (for Trial Implementation) (In order to ensure the training of 10000 directors of nursing homes and 100000 full-time and part-time elderly social workers by the end of 2022, the Ministry of Civil Affairs printed and distributed the above two notices and defined the training objects, standards, contents, time and assessment requirements.)	Social service provider
2020	Opinions on promoting property service enterprises to develop home-based community elderly care services (Combined with the current development status and shortcomings of home-based elderly care services in China, the policy gives further development direction, objectives and specific measures. It also explains and arranges the smart home-based elderly care.)	Community elderly care service

Source: China National Committee on Ageing and Ministry of Civil Affairs of the People's Republic of China

Link: http://www.cncaprc.gov.cn/ http://www.mca.gov.cn/

[Accessed: 15. 05. 2021]

Table A.2 Summary of the decision-making documents for the full implementation of home-based elderly care policies

Region	Time	Policy	Policy content	Department
Beijing	2009/11/12	Notice on the measures of Beijing Municipality on home-based elderly care (disability assistance) services ("nine support") [2009 No. 104]	Issue home-based elderly care service coupons for the elderly, enrich the forms of elderly care tables, strengthen the pilot support for standardized construction, preliminarily build an elderly care spiritual care service system, and carry out the transformation of family barrier free facilities.	General Office of Beijing Municipal People's Government
Tianjin	2011/1/25	Key points of Tianjin Civil Affairs in 2011	Comprehensively promote the construction of home-based elderly care service system, and implement government construction subsidies, purchase services and other support policies. The district (county) has completed the construction of 80 street, township and town elderly day care service centers and 100 community (Village) elderly day care service stations, improved the organization and operation mechanism of home-based elderly care services, and carried out day care services focusing on life care, meal delivery, medical rehabilitation and spiritual comfort according to local conditions.	Tianjin Civil Affairs Bureau
Jiangsu	2009/12/1	Opinions of the CPC Jiangsu Provincial Committee and Jiangsu Provincial People's Government on accelerating the development of the cause of ageing in our province	It is necessary to Vigorously develop home-based elderly care services. Relying on the community, provide life care, housekeeping, rehabilitation care and spiritual comfort services for the elderly at home, so that the elderly can not be separated from their families, but also obtain professional social services. Before 2012, the province's urban communities have basically established a multi form and full coverage home-based elderly care service network; Rural communities (villages) rely on the existing facilities and resources such as nursing homes and activity places of village level organizations to establish comprehensive elderly service centers (stations). The proportion of rural areas in southern Jiangsu, Central Jiangsu and Northern Jiangsu has reached more than 40%, 35% and 30% respectively. Increase financial support and build more than 6000 community (Village) home-based elderly care service centers (stations) in the province in the next three years.	Jiangsu Civil Affairs Bureau
Zhejiang	2007/7/30	Notice of Zhejiang Provincial Department of Civil Affairs on further deepening the socialization of elderly care services	Since the pilot work of the socialization demonstration of elderly care services in Zhejiang Province was launched one year ago, all localities have carefully organized, actively innovated, established organizations, formulated work plans, issued preferential policies, improved the service management mechanism, and achieved phased results. In order to further deepen the demonstration activities of the socialization of elderly care services in our province, combined with the spirit of the national experience exchange meeting on the socialization of elderly care services recently held by the Ministry of civil affairs in Dalian, Liaoning Province, we hereby make the following notice on further accelerating the development of the socialization of elderly care services	Zhejiang Civil Affairs Bureau
Yunnan	2010/5/17	Opinions of the general office of Yunnan Provincial People's Government on accelerating the development of elderly care services	Improve community elderly care service facilities. Community elderly care service facilities refer to the facilities built in the community to provide daytime care, medical care, culture and entertainment services for the elderly. Integrate the existing resources of community comprehensive service centers, rely on the community "Starlight home for the elderly", and strive to build a community elderly care service center in all urban communities and conditional rural communities by the end of 2015. All kinds of living services, cultural and sports facilities of various departments and units in towns (streets) and communities should be open to the elderly. At the same time, we should constantly expand service projects, improve service functions and meet the needs of the elderly. Give full play to the role of community medical and health service institutions to provide convenient and cheap medical and health care services for the elderly. Accelerate the pace of information construction of community elderly care services, and gradually establish a provincial, state (city), county (city, district) three-level elderly care service information management system.	Yunnan Civil Affairs Bureau
Shandong	2012/1/5	Notice on printing and distributing the key points of civil affairs in the province in 2012	Carry out activities to establish elderly care service demonstration units, summarize and promote the pilot experience of community day care centers for the elderly, and promote the construction of a social elderly care service system based on home, supported by community and supported by institutions.	Shandong Civil Affairs Bureau
Heilongjiang	2010/9/15	Notice on printing and distributing the implementation plan for creating a model county (city, district) of home-based elderly care service in Heilongjiang Province	In recent years, our province has carried out a series of fruitful work around the construction of an elderly care service security system based on home-based elderly care services, supported by communities and supplemented by institutional elderly care. In order to fully implement the work objectives of home-based elderly care services and further promote the in-depth development of socialized elderly care services, it is planned to carry out the creation activities of model counties (cities and districts) of home-based elderly care services throughout the province. The civil affairs departments of all cities (prefectures) shall actively promote the community home-based elderly care service in combination with the establishment activities, carefully summarize the experience, count the number of local home-based elderly care service communities, form written materials, and report to the provincial department before November 1, 2010.	Heilongjiang Civil Affairs Bureau

Source: Committee on Ageing and Ministry of Civil Affairs of the different provinces and cities

[Accessed: 21. 10. 2021

Appendix B: Summary of Recent Literature on Married Women's Labour Supply Based on Chinese Data

Table B.1 Summary of literature based on Chinese data in recent years

Name	Time	sample	Data	Method	Main findings	Time FE	Province FE	Individual FE
Liu, Qi and Dong	2016	Urban men and women aged 40-59	CFPS 2010	Probit	Men take care of their families for one more hour, the probability of employment will decrease by 6.0%, while women will decrease by 8.1%		√	
Zhou	2013	Rural married women aged 16-60	Field survey of the Institute of Rural Development, Jiangsu Academy of Social Sciences (2008, 2009, 2010, 2012)	Heckman model	Each increase in caring for an elderly person over 80 years old and 70-80 years old will reduce the non-agricultural working hours of rural married women by 31 96 days and 12 13 days.		√	
Wu, Li and Liu	2017	Married women under the age of 52	CHNS 1993-2011 (1993, 1995, 1997, 2000, 2004, 2006, 2009 and 2011)	IVprobit IV tobit	Engageing in elderly care will reduce the weekly working hours of women by 2.7 hours, and the overall labour participation rate will decrease by 4.5%. At the same time, this effect is more significant for rural women than for urban women. The working hours of urban and rural women in a week decreased by 1.8 hours and 4 hours respectively, and the labour participation rate decreased by 2.8% and 4.1% respectively. From the perspective of living style, compared with women living separately from the elderly, the negative impact of care activities on labour participation rate is more obvious in women living with the elderly (-0.055 and -0.036 respectively), while the negative impact of elderly care on labour time is only significantly reflected in the sample of women who do not live with the elderly (-2.945).	√	√	
Wu, Li and Liu	2018	Married and working women under the age of 52 in cities	CHNS 1993-2011 (1993, 1995, 1997, 2000, 2004, 2006, 2009 and 2011)	IV probit Probit	Family elderly care will reduce female labour participation rate by 4. 5%, and the weekly working hours are reduced by 2 7 hours.			
Chen, Fan, Zhao and Chu	2016	Female aged 18-51, at least one parent and parents-in-law is alive and over 50 years old	CHNS 1993-2011 (1993, 1995, 1997, 2000, 2004, 2006, 2009 and 2011)	2SLS	Providing more than 20 hours of intensive care per week will make it difficult for women to balance care and work, resulting in a "threshold effect" and a significant decrease in labour participation rate of 7.31%. For women who still work, the responsibility of care will reduce their working hours by 2.8-4.8 hours. The monthly labour income decreased by 7.21%. For urban women aged 45-49, family elderly care did not significantly increase their probability of early retirement.	√		√
Chen and Fan	2016	Married women aged between 18 and 51 years	CHNS 2009	2SRS 2SLS	The labour participation rate of women engaged in family elderly care decreased significantly by about 12.5%. At the same time, the number of urban women, women with lower education, living with the elderly, and women with fewer brothers and sisters declined more.		-	-
Ma and Li	2014	Women aged 16-64 years old	The third survey on the social status of Chinese women in 2010	Logistic	Taking care of the elderly has significantly reduced the labour participation rate of married young and middle-aged women in China by 29.6%, and female caregivers are also more difficult to enter the labour market.		√	
Huang	2012	Married women aged between 18 and 51 years	CHNS 1991-2009 (1991,1993, 1995, 1997, 2000, 2004, 2006 and 2009)	OLS FD IV	Caring for the elderly has significantly reduced the female labour participation rate, especially the long-term and intensive care activities. Compared with women without care responsibilities, the labour participation rate of women who live with their parents (parents-in-law) and have care responsibilities will decrease by 0.215%. Intensive care activities have a greater impact on women's labour participation, and the labour participation rate will drop by 0.695%	√	√	
Chai, Fu and Coyte	2021	women aged 45–60 and had a young grandchild and/or a parent/parent-in-law.	CHARLS 2012	Probit, 2SLS and Limited-Information Maximum Likelihood (LIML) model	There is a threshold for family care (8 hours), that is, before 8 hours, every additional care hour will increase the possibility of employment by 0.0275%. However, when the intensity of care is greater than 8 hours, the possibility of employment will be reduced by 0.0014% for each additional hour of family care.			
Wang，Li, Zhang, Ding,Feng, Tang, Sun and Zhou	2022	women aged from 18 to 51 with at least one living parent or parent-in-law in need of care.	CHNS 1993-2015 (1993, 1995, 1997, 2000, 2004, 2006, 2009, 2011 and 2015)	Multinomial logistic regressions + Oaxaca–Blinder decomposition techniques	Respondents with urban hukou were around 30% more likely to provide informal care than those with rural hukou, and the relative risk ratios value for both low (RRR = 1.29) and high (RRR = 1.30) intensity care were significantly at 5% level. the mean difference of informal care time between urban and rural was 3.11. Among them, education attainment can explain 25.10% of the total difference between urban and rural and was the largest contributor to the overall gap. Employed females were 1.30 times more likely than unemployed females to choose low-intensity care versus no care ($p < 0.05$).	√		
Huang， Xu， Liu， Yu and Yu	2021	married women aged from 18 to 51	CHNS 1991-2015 (1991, 1993, 1995, 1997, 2000, 2004, 2006, 2009, 2011 and 2015)	GS2SLS, FE , RE IV and Logit	The responsibility of elderly care in female families with strong bargaining power will significantly hinder their participation in employment (-8% and -19.6% consider endogneity).	√		√
Zhou, Kan and He	2022	married couples with a wife who is between 19- and 50-years-old	2008 Chinese Time Use Survey"	OLS	The direction of support changes according to the age of the coresident parents. Compared with those who do not live with parents, couples who live withrelatively young parents spend less time on housework and adult care, and those who live with relatively old parents have less paid work time, more housework and adult care time, and those rural wives living with elderly parents even spend less time on childcare. Compared with people who do not live with their parents, married couples living with relatively old parents reduce paid work time by 1.25 h for women.		√	
Chen， Zhao, Fan and Coyte	2017	married women aged between 18 and 51 years and having at least one living parent or parent-in-law aged 50 or older	CHNS 1991-2009(1991, 1993, 1995, 1997, 2000, 2004, 2006, 2009 and 2011)	bivariate probit and esimultaneous estimation	when caregivers were considered as an entire group, there was an insignificant positive relationship between employment and caregiving. However, after controlling for the intensity of caregiving, women who provided more than 15 or 20 hr of caregiving per week were 4.5–7.7% less likely to be in the labour force than either caregivers who provided less than 15 or 20 hr of caregiving or noncaregivers. caregivers who remained working worked 2.28 hr less per week than noncaregivers. After controlling for the intensity of caregiving, intensive caregivers had a significant 4.97–7.20 hr reduction in hours of work each week than nonintensive caregivers or noncaregivers."	√		

Appendix C: Data Structure for Married Women's Labour Supply Analysis

Table C.1 Panel statistic for employment status

	Overall		Between		Within
Employment status	Freq.	Percent	Freq.	Percent	Percent
0	1202	27.98	989	33.57	88.67
1	3094	72.02	2170	73.66	95.35
Total	4296	100.00	3159	107.23	93.26

Table C. 2 Panel statistic for elderly care in extensive margin

	Overall		Between		Within
Elderly Care	Freq.	Percent	Freq.	Percent	Percent
0	3577	83.26	2548	86.49	95.41
1	719	16.74	663	22.51	77.67
Total	4296	100.00	3211	109.00	91.75

Table C.3 Panel statistic for paid working hours

	Mean	Std. Dev.	Min	Max	Observations
overall	43.07428	15.07141	1	90	N = 2881
between		14.84323	1	84	n = 2041
within		6.103579	4.407613	84.40761	T-bar =1.41156

Table C. 4 Panel statistic for elderly care in extensive margin

	Overall		Between		Within
Elderly Care	Freq.	Percent	Freq.	Percent	Percent
0	2378	82.54	1751	85.79	95.64
1	503	17.46	463	22.68	79.11
Total	2881	100.00	2214	108.48	92.19

Table C. 5 Over identification test results in extensive margin

Sargan (score) chi2(1) = 0.355176 (p = 0.5512)
Basmann chi2(1) = 0.352642 (p = 0.5526)

Table C. 6 Week instrumental variable test results in extensive margin

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(24265)	Prob > F
Elderly_care	0.1336	0.1275	0.0994	135.315	0.0000

Shea's partial R squared

Variable	Shea's Partial R-sq.	Shea's Adj.Partial R-sq.
Elderly_care	0.0994	0.0926

Minimum eigenvalue statistic =235.381

Critical Values		**# of endogenous regressors:**	**1**	
Ho: Instruments are weak		**# of excluded instruments:**	**2**	
	5%	10%	20%	30%
2SLS relative bias		not available		
	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	19.93	11.59	8.75	7.25
LIML Size of nominal 5% Wald test	8.68	5.33	4.42	3.92

Appendix D: Over-Identification Test and Weak Instrumental Variable Test Results of Married Women's Labour Supply Analysis

Table D. 1 Over identification test results in intensive margin

Sargan (score) chi2(1) = 0.019807 (p = 0.8881)
Basmann chi2(1) = 0.019573 (p = 0.8887)

Table D.2 Week instrumental variable test results in intensive margin

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(24265)	Prob > F
Elderly_care	0.1252	0.1150	0.0942	87.4359	0.0000

Shea's partial R squared

Variable	Shea's Partial R-sq.	Shea's Adj.Partial R-sq.
Elderly_care	0.0942	0.0821

Minimum eigenvalue statistic =148.06

Critical Values	# of endogenous regressors:	1
Ho: Instruments are weak	# of excluded instruments:	2

	5%	10%	20%	30%
2SLS relative bias		not available		
	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	19.93	11.59	8.75	7.25
LIML Size of nominal 5% Wald test	8.68	5.33	4.42	3.92

Appendix E: POLS and 2SLS Regression Estimates of Married Women's Labour Supply

Table E. 1 POLS regression estimates of married women's probability of employment

	Elderly care (1)	Age (2)	Hukou (3)	Education (4)	Health (5)	Husband monthly income (6)	Husband's second occupation (7)	Child care (8)	Household size (9)	Household total gross income (10)
Elderly Care	0.022	0.028	0.018	0.012	0.012	0.008	0.008	0.008	0.008	0.008
	(0.022)	(0.022)	(0.021)	(0.021)	(0.021)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Age		0.093***	0.090***	0.091***	0.091***	0.072***	0.072***	0.068***	0.068***	0.068***
		(0.011)	(0.011)	(0.013)	(0.013)	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)
Age square		-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou			0.131***	0.043	0.043	0.032**	0.045***	0.044**	0.045**	0.045**
			(0.032)	(0.029)	(0.029)	(0.013)	(0.014)	(0.014)	(0.015)	(0.016)
Lower middle school degree				0.002	0.002	-0.000	0.005	0.004	0.004	0.002
				(0.022)	(0.022)	(0.020)	(0.019)	(0.020)	(0.020)	(0.021)
Upper middle school degree				0.066**	0.066**	0.040**	0.048***	0.047***	0.047***	0.044***
				(0.025)	(0.024)	(0.014)	(0.013)	(0.013)	(0.013)	(0.012)
Technical or vocational degree				0.234***	0.234***	0.163***	0.172***	0.171***	0.172***	0.167***
				(0.036)	(0.036)	(0.025)	(0.025)	(0.025)	(0.026)	(0.026)
University or college degree or higher				0.252***	0.252***	0.148***	0.155***	0.155***	0.156***	0.148***
				(0.032)	(0.032)	(0.023)	(0.022)	(0.022)	(0.024)	(0.025)
Health					-0.003	-0.003	-0.002	-0.002	-0.002	-0.001
					(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
Husband monthly income						0.054***	0.053***	0.053***	0.053***	0.051***
						(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Husband's second occupation							0.143***	0.142***	0.142***	0.143***
							(0.019)	(0.020)	(0.020)	(0.019)
Child Care								-0.023	-0.024	-0.025
								(0.021)	(0.021)	(0.020)
Household size									0.002	0.001
									(0.007)	(0.007)
Household total gross income										0.012
										(0.007)
Constant	0.775***	-0.763***	-0.809***	-0.962***	-0.960***	-0.872***	-0.863***	-0.780***	-0.790***	-0.888***
	(0.036)	(0.205)	(0.212)	(0.223)	(0.224)	(0.164)	(0.168)	(0.163)	(0.143)	(0.153)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	4296	4296	4296	4296	4296	4296	4296	4296	4296	4296
Adjusted R^2	0.084	0.147	0.165	0.200	0.200	0.348	0.353	0.354	0.354	0.354

** p < 0.1, ** p < 0.05, *** p < 0.01, Standard errors clustered at province level.*

Table E. 2 2SLS regression estimates of married women's probability of employment

	Elderly care (1)	Age (2)	Hukou (3)	Education (4)	Health (5)	Husband monthly income (6)	Husband's second occupation (7)	Child care (8)	Household size (9)	Household total gross income (10)
Elderly Care	-0.002	0.047	0.035	0.045	0.045	0.081***	0.083***	0.082***	0.082***	0.086***
	(0.050)	(0.047)	(0.045)	(0.044)	(0.044)	(0.024)	(0.023)	(0.023)	(0.023)	(0.022)
Age		0.093***	0.090***	0.091***	0.091***	0.073***	0.072***	0.069***	0.069***	0.069***
		(0.011)	(0.011)	(0.012)	(0.012)	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)
Age square		-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou			0.130***	0.042	0.042	0.030**	0.044***	0.042***	0.043***	0.043***
			(0.029)	(0.027)	(0.027)	(0.012)	(0.013)	(0.013)	(0.014)	(0.014)
Lower middle school degree				0.001	0.001	-0.002	0.002	0.002	0.002	-0.000
				(0.020)	(0.020)	(0.019)	(0.018)	(0.019)	(0.019)	(0.020)
Upper middle school degree				0.064***	0.064***	0.036***	0.044***	0.043***	0.043***	0.039***
				(0.025)	(0.024)	(0.014)	(0.012)	(0.013)	(0.013)	(0.012)
Technical or vocational degree				0.232***	0.232***	0.159***	0.168***	0.167***	0.167***	0.162***
				(0.034)	(0.034)	(0.025)	(0.024)	(0.025)	(0.026)	(0.026)
University or college degree or higher				0.251***	0.251***	0.145***	0.152***	0.151***	0.152***	0.144***
				(0.030)	(0.030)	(0.022)	(0.022)	(0.022)	(0.024)	(0.024)
Health					-0.001	-0.001	0.001	0.001	0.001	0.002
					(0.026)	(0.025)	(0.025)	(0.025)	(0.025)	(0.026)
Husband monthly income						0.054***	0.053***	0.053***	0.053***	0.051***
						(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Husband's second occupation							0.143***	0.142***	0.142***	0.143***
							(0.019)	(0.019)	(0.019)	(0.019)
Child Care								-0.023	-0.023	-0.024
								(0.020)	(0.020)	(0.020)
Household size									0.002	0.000
									(0.007)	(0.007)
Household total gross income										0.012*
										(0.006)
Constant	0.782***	-0.771***	-0.816***	-0.974***	-0.973***	-0.899***	-0.892***	-0.811***	-0.819***	-0.921***
	(0.036)	(0.193)	(0.198)	(0.208)	(0.208)	(0.160)	(0.165)	(0.158)	(0.138)	(0.150)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	4296	4296	4296	4296	4296	4296	4296	4296	4296	4296
Adjusted R^2	0.083	0.146	0.165	0.199	0.199	0.344	0.350	0.350	0.350	0.350

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Standard errors clustered at province level.

Table E. 3 POLS regression estimates of married women's paid working hours

	Elderly care	Age	Hukou	Education	Health	Husband monthly income	Husband's second occupation	Child care	Household size	Household total gross income	High-skilled occupation	Long contract with company	State-owned firm
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Elderly Care	-0.203	-0.130	-0.373	-0.392	-0.402	-0.409	-0.408	-0.462	-0.457	-0.439	-0.440	-0.445	-0.339
	(0.653)	(0.607)	(0.570)	(0.555)	(0.545)	(0.552)	(0.554)	(0.539)	(0.552)	(0.556)	(0.558)	(0.565)	(0.551)
Age		0.245	0.082	0.034	0.039	0.064	0.095	-0.397	-0.406	-0.406	-0.400	-0.394	-0.321
		(0.362)	(0.386)	(0.376)	(0.377)	(0.372)	(0.360)	(0.458)	(0.463)	(0.458)	(0.457)	(0.461)	(0.434)
Age square		-0.006	-0.003	-0.003	-0.003	-0.004	-0.004	0.002	0.002	0.002	0.002	0.001	0.001
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Hukou			2.803**	3.226**	3.227**	3.208**	2.490*	2.185	2.021	2.052	2.066	2.164	3.105**
			(1.229)	(1.232)	(1.229)	(1.227)	(1.222)	(1.234)	(1.233)	(1.256)	(1.255)	(1.288)	(1.394)
Lower middle school degree				3.871***	3.898***	3.944***	3.672***	3.663***	3.626***	3.464***	3.479***	3.531***	3.728***
				(0.934)	(0.932)	(0.944)	(0.878)	(0.872)	(0.875)	(0.822)	(0.831)	(0.855)	(0.822)
Upper middle school degree				3.833**	3.852**	3.936**	3.505**	3.407**	3.323**	3.095*	3.156*	3.329*	3.951**
				(1.489)	(1.490)	(1.494)	(1.419)	(1.458)	(1.467)	(1.412)	(1.460)	(1.525)	(1.494)
Technical or vocational degree				0.342	0.364	0.506	0.066	0.008	-0.032	-0.323	-0.228	0.083	1.707
				(1.097)	(1.079)	(1.042)	(0.965)	(0.990)	(0.998)	(1.000)	(1.012)	(1.102)	(1.121)
University or college degree or higher				-0.955	-0.955	-0.702	-0.974	-0.925	-1.047	-1.462	-1.256	-0.877	1.240
				(1.229)	(1.223)	(1.209)	(1.126)	(1.135)	(1.128)	(1.078)	(1.200)	(1.360)	(1.370)
Health					-0.653	-0.586	-0.602	-0.658	-0.594	-0.525	-0.534	-0.521	-0.596
					(0.855)	(0.840)	(0.872)	(0.900)	(0.875)	(0.852)	(0.847)	(0.845)	(0.845)
Husband monthly income						-0.210*	-0.172	-0.170	-0.178	-0.260	-0.259	-0.255	-0.229
						(0.110)	(0.109)	(0.105)	(0.106)	(0.149)	(0.149)	(0.146)	(0.139)
Husband's second occupation							-5.275***	-5.316***	-5.390***	-5.343***	-5.348***	-5.403***	-5.589***
							(1.263)	(1.272)	(1.249)	(1.234)	(1.234)	(1.228)	(1.185)
Child Care								-3.276**	-3.125**	-3.147**	-3.154**	-3.171**	-3.288***
								(1.127)	(1.058)	(1.048)	(1.054)	(1.053)	(1.054)
Household size									-0.435*	-0.495*	-0.504*	-0.517*	-0.598**
									(0.239)	(0.263)	(0.256)	(0.256)	(0.240)
Household total gross income										0.648	0.652	0.671	0.705
										(0.509)	(0.515)	(0.520)	(0.526)
Higher skill											-0.608	-0.470	-0.098
											(0.899)	(0.820)	(0.757)
Permanent contract												0.801	-0.856
												(0.747)	(0.543)
State-owned firm													-5.701***
													(0.999)
Constant	41.232***	39.618***	40.016***	40.087***	40.568***	41.367***	41.339***	52.849***	54.872***	49.078***	48.984***	48.015***	48.112***
	(1.265)	(6.748)	(6.447)	(5.892)	(5.943)	(5.954)	(6.045)	(8.458)	(9.099)	(8.582)	(8.610)	(8.919)	(8.385)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2881	2881	2881	2881	2881	2881	2881	2881	2881	2881	2881	2881	2881
Adjusted R^2	0.025	0.033	0.040	0.058	0.058	0.059	0.067	0.073	0.074	0.075	0.075	0.075	0.093

Table E. 4 2SLS regression estimates of married women's paid working hours

	Elderly care	Age	Hukou	Education	Health	Husband monthly income	Husband's second occupation	Child care	Household size	Household total gross income	High-skilled occupation	Long contract with company	State-owned firm
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Elderly Care	-5.412***	-4.345***	-4.544***	-4.795***	-4.896***	-5.039***	-5.146***	-5.150***	-5.264***	-5.102***	-5.106***	-5.088***	-4.964***
	(1.816)	(1.662)	(1.570)	(1.585)	(1.675)	(1.724)	(1.729)	(1.760)	(1.831)	(1.766)	(1.760)	(1.791)	(1.800)
Age		0.180	0.005	-0.043	-0.039	-0.015	0.014	-0.491	-0.502	-0.499	-0.494	-0.487	-0.414
		(0.376)	(0.392)	(0.381)	(0.382)	(0.378)	(0.369)	(0.460)	(0.464)	(0.458)	(0.456)	(0.461)	(0.436)
Age square		-0.005	-0.002	-0.002	-0.002	-0.002	-0.003	0.003	0.003	0.003	0.003	0.003	0.002
		(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Hukou			3.044**	3.417***	3.421***	3.408***	2.695**	2.379*	2.223*	2.246*	2.261*	2.361*	3.284**
			(1.207)	(1.216)	(1.215)	(1.213)	(1.223)	(1.227)	(1.234)	(1.252)	(1.253)	(1.291)	(1.395)
Lower middle school degree				3.962***	3.994***	4.044***	3.775***	3.765***	3.730***	3.573***	3.589***	3.642***	3.834***
				(0.831)	(0.828)	(0.839)	(0.776)	(0.769)	(0.769)	(0.718)	(0.728)	(0.749)	(0.719)
Upper middle school degree				3.979***	4.004***	4.093***	3.666***	3.564***	3.486***	3.264**	3.325**	3.503**	4.113***
				(1.366)	(1.365)	(1.369)	(1.295)	(1.326)	(1.332)	(1.273)	(1.318)	(1.372)	(1.343)
Technical or vocational degree				0.510	0.540	0.688	0.253	0.191	0.157	-0.126	-0.030	0.291	1.885*
				(1.023)	(1.005)	(0.969)	(0.899)	(0.913)	(0.920)	(0.925)	(0.911)	(0.957)	(0.969)
University or college degree or higher				-0.800	-0.797	-0.535	-0.804	-0.755	-0.871	-1.272	-1.064	-0.673	1.407
				(1.151)	(1.142)	(1.132)	(1.053)	(1.063)	(1.052)	(1.000)	(1.077)	(1.202)	(1.229)
Health					-0.761	-0.697	-0.716	-0.772	-0.712	-0.642	-0.652	-0.638	-0.711
					(0.873)	(0.861)	(0.881)	(0.913)	(0.892)	(0.872)	(0.867)	(0.866)	(0.861)
Husband monthly income						-0.213**	-0.175*	-0.174*	-0.182*	-0.260*	-0.258*	-0.254*	-0.229*
						(0.105)	(0.103)	(0.099)	(0.100)	(0.140)	(0.140)	(0.138)	(0.131)
Husband's second occupation							-5.271***	-5.314***	-5.387***	-5.342***	-5.347***	-5.404***	-5.587***
							(1.186)	(1.197)	(1.174)	(1.160)	(1.159)	(1.153)	(1.107)
Child Care								-3.366***	-3.220***	-3.238***	-3.245***	-3.263***	-3.377***
								(1.054)	(0.983)	(0.974)	(0.981)	(0.980)	(0.979)
Household size									-0.429*	-0.486*	-0.496*	-0.509**	-0.588**
									(0.243)	(0.264)	(0.264)	(0.257)	(0.242)
Household total gross income										0.617	0.621	0.641	0.675
										(0.475)	(0.481)	(0.486)	(0.493)
Higher skill											-0.614	-0.471	-0.106
											(0.884)	(0.804)	(0.732)
Permanent contract												0.828	-0.801
												(0.727)	(0.506)
State-owned firm													-5.602***
													(0.980)
Constant	42.443***	41.739***	42.138***	42.117***	42.719***	43.595***	43.620***	55.423***	57.484***	51.885***	51.793***	50.777***	50.862***
	(1.359)	(7.046)	(6.709)	(6.090)	(6.141)	(6.182)	(6.294)	(8.535)	(9.078)	(8.456)	(8.486)	(8.812)	(8.292)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2881	2881	2881	2881	2881	2881	2881	2881	2881	2881	2881	2881	2881
Adjusted R^2	0.009	0.022	0.029	0.046	0.046	0.046	0.053	0.059	0.059	0.061	0.061	0.062	0.080

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Appendix F: First Stage of 2SLS Regression Estimates of Married Women's Labour Supply

Table F.1 First stage regression estimates of married women's probability of emplyment

	Benchmark model	Living arrangement		Care intensive						Age group			Individual cluster
	Total observations	Non-coresidence	Co-residence	0HR< Elderly Care ≤ 20HRS	20HRS < Elderly Care	0HR< Elderly Care ≤ 25HRS	25HRS < Elderly Care	0HR< Elderly Care ≤ 30HRS	30HRS < Elderly Care	Elderly care-18-34	Elderly care-35-44	Elderly care-45-51	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Age	-0.016	-0.024	-0.020	-0.569	1.267	-0.900**	0.229	-1.205***	0.249	0.020	-0.009	-0.001	-0.016*
	(0.011)	(0.015)	(0.016)	(0.336)	(5.478)	(0.342)	(5.737)	(0.374)	(8.194)	(0.076)	(0.052)	(0.210)	(0.008)
Age square	0.000	0.000	0.000	0.008	-0.019	0.012**	-0.007	0.016***	0.001	-0.001	0.000	0.000	0.000*
	(0.000)	(0.000)	(0.000)	(0.004)	(0.071)	(0.004)	(0.076)	(0.005)	(0.109)	(0.001)	(0.001)	(0.002)	(0.000)
Hukou	0.023	0.020	0.017	1.015	-5.479	1.146	-6.667	1.351	-5.566	0.044*	0.019	0.021	0.023*
	(0.019)	(0.019)	(0.027)	(0.615)	(7.270)	(0.723)	(8.139)	(0.994)	(13.590)	(0.023)	(0.018)	(0.039)	(0.014)
Lower middle school degree	0.031*	0.022	0.046*	-0.563	-16.100	-0.540	-16.991	-0.528	-19.990	0.015	0.014	0.049	0.031**
	(0.015)	(0.020)	(0.024)	(0.724)	(17.499)	(0.753)	(24.122)	(0.825)	(27.331)	(0.033)	(0.027)	(0.032)	(0.014)
Upper middle school degree	0.057**	0.047**	0.083**	-0.545	-19.759	0.575	-16.075	0.704	-20.124	0.043	0.020	0.091**	0.057***
	(0.020)	(0.019)	(0.036)	(1.171)	(14.211)	(1.731)	(26.379)	(1.702)	(30.179)	(0.058)	(0.020)	(0.038)	(0.019)
Technical or vocational degree	0.058**	0.045*	0.098*	-0.440	-2.697	-0.535	-0.478	-1.056	-14.142	0.055	0.049*	0.059	0.058**
	(0.024)	(0.022)	(0.048)	(0.992)	(19.549)	(1.162)	(30.998)	(1.136)	(31.426)	(0.056)	(0.026)	(0.040)	(0.023)
University or college degree or higher	0.057**	0.045**	0.099*	-0.752	-17.616	0.095	-8.736	-0.128	-12.567	0.036	0.055	0.128***	0.057**
	(0.025)	(0.019)	(0.050)	(1.297)	(16.139)	(1.238)	(32.055)	(1.609)	(30.175)	(0.047)	(0.043)	(0.034)	(0.025)
Health	-0.023	-0.014	-0.053	1.255**	24.324***	1.223*	25.388***	1.057**	29.723***	-0.059	-0.015	-0.004	-0.023
	(0.018)	(0.020)	(0.038)	(0.510)	(5.293)	(0.659)	(4.343)	(0.463)	(9.139)	(0.040)	(0.041)	(0.028)	(0.018)
Husband monthly income	0.002	0.003	0.000	0.001	-0.884	0.036	-0.634	0.101	-0.452	0.002	-0.001	0.005*	0.002
	(0.002)	(0.002)	(0.003)	(0.063)	(1.257)	(0.062)	(1.250)	(0.072)	(1.175)	(0.004)	(0.003)	(0.003)	(0.002)
Husband's second occupation	0.005	-0.013	0.042	-0.903	-14.132	-0.984	-20.043	-0.642	-26.024	0.001	-0.007	0.003	0.005
	(0.021)	(0.021)	(0.027)	(0.818)	(10.132)	(1.060)	(13.432)	(1.131)	(18.847)	(0.046)	(0.028)	(0.047)	(0.020)
Child Care	-0.011	-0.014	0.007	-1.172*	-4.322	-1.178*	-4.193	-1.459*	-4.043	-0.042	0.010	0.017	-0.011
	(0.019)	(0.022)	(0.030)	(0.565)	(11.285)	(0.619)	(17.609)	(0.702)	(16.223)	(0.027)	(0.029)	(0.030)	(0.015)
Household size	0.007	-0.008	-0.006	0.567**	0.536	0.325	-0.567	0.223	-2.532	0.001	0.016	0.005	0.007
	(0.004)	(0.006)	(0.009)	(0.217)	(5.190)	(0.260)	(7.266)	(0.282)	(7.728)	(0.005)	(0.010)	(0.007)	(0.005)
Household total gross income	-0.002	-0.003	-0.003	-0.210	0.593	-0.168	0.970	-0.222	1.250	-0.003	-0.013	0.006	-0.002
	(0.006)	(0.005)	(0.010)	(0.232)	(4.321)	(0.257)	(4.615)	(0.286)	(6.235)	(0.007)	(0.014)	(0.005)	(0.005)
Need_care	0.306***	0.262***	0.375***	0.542	2.996	0.929	5.720	0.956	0.747	0.224***	0.333***	0.304***	0.306***
	(0.026)	(0.028)	(0.042)	(0.615)	(9.102)	(0.709)	(10.674)	(0.695)	(13.259)	(0.050)	(0.040)	(0.027)	(0.019)
Number of siblings	0.000	-0.001	0.008	-0.017	-0.234	0.098	0.412	0.162*	0.232	0.005	-0.002	-0.001	0.000
	(0.002)	(0.002)	(0.007)	(0.110)	(1.979)	(0.086)	(2.052)	(0.090)	(2.268)	(0.008)	(0.002)	(0.003)	(0.002)
Constant	0.460**	0.649**	0.609*	15.407**	33.556	21.033**	51.823	28.007***	60.269	0.109	0.399	0.014	0.460***
	(0.204)	(0.274)	(0.299)	(6.511)	(110.502)	(6.860)	(122.959)	(7.514)	(173.228)	(1.099)	(1.036)	(5.094)	(0.176)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	4296	3059	1229	541	150	570	121	591	100	1103	1733	1460	4296
Adjusted R^2	0.134	0.126	0.198	0.069	0.141	0.080	0.114	0.096	0.106	0.087	0.152	0.193	0.134

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table F.1. First stage regression estimates of married women's probability of employment (continued)

	Childcare		Only one instrumental variables	Excluding husbands' variables			Elderly care intensity orgniasation				
	Child care	Non-child care		Excluding Husband's monthly labour income	Excluding husband's second occupation	Excluding husband's monthly labour income and second occupation	Elderly care	Elderly care hours (including zero)	Elderly care hours (excluding zero)	Elderly care hours (excluding zero)	Elderly care hours square
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Age	-0.005	-0.025*	-0.016	-0.016	-0.016	-0.016	-0.017	-0.633*	-2.374	-2.374	-204.280
	(0.019)	(0.013)	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.293)	(1.615)	(1.615)	(253.408)
Age square	0.000	0.000*	0.000	0.000	0.000	0.000	0.000	0.007*	0.026	0.026	2.434
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.021)	(0.021)	(3.392)
Hukou	0.006	0.028	0.023	0.024	0.023	0.023	0.023	0.366	-0.866	-0.866	-307.987
	(0.038)	(0.022)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.427)	(1.939)	(1.939)	(265.715)
Lower middle school degree	0.053	0.018	0.031*	0.031*	0.031*	0.030*	0.032**	0.149	-2.123	-2.123	-698.084
	(0.030)	(0.018)	(0.016)	(0.015)	(0.016)	(0.016)	(0.014)	(0.759)	(3.994)	(3.994)	(825.630)
Upper middle school degree	0.124**	0.036	0.057**	0.057**	0.057**	0.057**	0.060**	1.020	-0.795	-0.795	-651.326
	(0.048)	(0.024)	(0.019)	(0.020)	(0.020)	(0.020)	(0.020)	(0.764)	(3.278)	(3.278)	(730.372)
Technical or vocational degree	0.061	0.055*	0.058**	0.060**	0.058**	0.059**	0.063**	0.544	-3.434	-3.434	-721.128
	(0.042)	(0.026)	(0.024)	(0.024)	(0.025)	(0.024)	(0.024)	(0.604)	(2.874)	(2.874)	(568.767)
University or college degree or higher	0.053	0.064**	0.057**	0.060**	0.057**	0.060**	0.063**	0.822	-1.598	-1.598	-399.557
	(0.055)	(0.027)	(0.025)	(0.025)	(0.025)	(0.025)	(0.024)	(1.003)	(3.723)	(3.723)	(696.555)
Health	-0.044	-0.011	-0.023	-0.023	-0.023	-0.023	-0.026	1.134**	8.372***	8.372***	1013.003***
	(0.034)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.413)	(1.702)	(1.702)	(198.042)
Husband monthly income	0.001	0.003	0.002		0.002		0.003	-0.014	-0.419	-0.419	-31.419
	(0.004)	(0.003)	(0.002)		(0.002)		(0.002)	(0.083)	(0.402)	(0.402)	(51.582)
Husband's second occupation	0.008	-0.001	0.005	0.009			0.007	0.191	-0.783	-0.783	-490.177
	(0.045)	(0.019)	(0.021)	(0.020)			(0.021)	(0.441)	(2.750)	(2.750)	(324.257)
Child Care	-	-	-0.011	-0.011	-0.011	-0.011	-0.008	-0.740	-3.203	-3.203	-73.165
	-	-	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.718)	(3.850)	(3.850)	(662.631)
Household size	0.009	0.006	0.007	0.006	0.007	0.006	0.008*	0.153	-0.024	-0.024	-113.245
	(0.007)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.180)	(1.364)	(1.364)	(241.787)
Household total gross income	0.006	-0.008	-0.002	-0.000	-0.002	-0.000	-0.002	0.069	0.417	0.417	-21.921
	(0.005)	(0.007)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.175)	(0.796)	(0.796)	(179.345)
Need_care	0.223***	0.327***	0.306***	0.305***	0.306***	0.305***	0.302***	6.052***	3.458	3.458	289.439
	(0.043)	(0.029)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.882)	(2.115)	(2.115)	(366.379)
Number of siblings	0.004	-0.001		0.000	0.000	0.000	0.001	0.064	0.361	0.361	45.639
	(0.006)	(0.002)		(0.002)	(0.002)	(0.002)	(0.002)	(0.143)	(0.786)	(0.786)	(103.435)
Constant	0.103	0.731**	0.459*	0.440*	0.460**	0.440*	0.445*	12.914*	54.960*	54.960*	5258.493
	(0.309)	(0.277)	(0.209)	(0.210)	(0.204)	(0.209)	(0.209)	(5.987)	(29.111)	(29.111)	(5641.056)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1068	3228	4296	4296	4296	4296	4280	4280	703	703	703
Adjusted R^2	0.079	0.163	0.134	0.133	0.134	0.133	0.134	0.047	0.052	0.052	0.029

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table F.1. First stage regression estimates of married women's probability of employment (continued)

	24 Hours		30 Hours		35 Hours	
	Full time	Part time	Full time	Part time	Full time	Part time
	(25)	(26)	(27)	(28)	(29)	(30)
Age	-0.006	-0.020	0.004	-0.024*	0.008	-0.016
	(0.015)	(0.011)	(0.014)	(0.011)	(0.013)	(0.011)
Age square	0.000	0.000	-0.000	0.000*	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou	0.018	0.021	0.022	0.019	0.019	0.023
	(0.027)	(0.018)	(0.028)	(0.020)	(0.025)	(0.019)
Lower middle school degree	0.033	0.032**	0.035	0.034*	0.030	0.031*
	(0.023)	(0.014)	(0.024)	(0.016)	(0.023)	(0.015)
Upper middle school degree	0.076**	0.057***	0.078**	0.058***	0.077**	0.057**
	(0.028)	(0.017)	(0.029)	(0.018)	(0.031)	(0.020)
Technical or vocational degree	0.083	0.058*	0.089	0.057*	0.091	0.058**
	(0.051)	(0.027)	(0.053)	(0.027)	(0.054)	(0.024)
University or college degree or higher	0.052	0.060**	0.047	0.062**	0.081	0.058**
	(0.057)	(0.024)	(0.057)	(0.026)	(0.062)	(0.025)
Health	-0.018	-0.027	-0.017	-0.031	-0.014	-0.023
	(0.033)	(0.018)	(0.028)	(0.020)	(0.026)	(0.018)
Husband monthly income	0.006**	0.002	0.005*	0.003	0.004*	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Husband's second occupation	-0.014	0.006	0.008	-0.010	0.023	0.005
	(0.033)	(0.027)	(0.031)	(0.027)	(0.033)	(0.021)
Child Care	-0.001	-0.020	0.004	-0.023	0.017	-0.011
	(0.018)	(0.021)	(0.021)	(0.021)	(0.018)	(0.019)
Household size	0.009	0.007	0.010	0.007	0.010	0.007
	(0.008)	(0.005)	(0.006)	(0.005)	(0.006)	(0.004)
Household total gross income	-0.002	-0.006	-0.002	-0.005	-0.002	-0.002
	(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
Need_care	0.307***	0.299***	0.304***	0.303***	0.292***	0.305***
	(0.021)	(0.028)	(0.020)	(0.029)	(0.019)	(0.026)
Number of siblings	-0.000	-0.000	-0.002	0.000	-0.002	-0.000
	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)
Constant	0.386	0.569**	0.160	0.644***	0.128	0.457**
	(0.282)	(0.204)	(0.255)	(0.198)	(0.236)	(0.204)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1482	3899	1583	3762	1689	4298
Adjusted R^2	0.162	0.129	0.154	0.131	0.155	0.134

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table F.2 First stage regression estimates of married women paid working hours

	Benchmark model	Living arrangement		Care intensive						Age group			Childcare		Individual cluster
	All observations	Non-coresidence	Co-residence	0HR< Elderly Care ≤ 20HRS	20HRS < Elderly Care	0HR< Elderly Care ≤ 25HRS	25HRS < Elderly Care	0HR< Elderly Care ≤ 30HRS	30HRS < Elderly Care	18-34 years old	35-44 years old	45-51 years old	Provide childcare	Not provide childcare	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Age	-0.025*	-0.034	-0.023*	-0.433	5.319	-0.773	3.010	-0.729	15.764	-0.006	-0.002	-0.190	-0.005	-0.038**	-0.025**
	(0.013)	(0.020)	(0.013)	(0.423)	(11.501)	(0.453)	(11.670)	(0.464)	(19.984)	(0.090)	(0.064)	(0.334)	(0.024)	(0.016)	(0.011)
Age square	0.000*	0.000	0.000*	0.005	-0.062	0.009	-0.032	0.008	-0.194	-0.000	0.000	0.002	0.000	0.000**	0.000**
	(0.000)	(0.000)	(0.000)	(0.005)	(0.153)	(0.006)	(0.155)	(0.006)	(0.261)	(0.001)	(0.001)	(0.003)	(0.000)	(0.000)	(0.000)
Hukou	0.035	0.040	0.016	0.358	-5.802	0.920	-9.289	0.595	-17.614	0.036	0.028	0.050	-0.008	0.052*	0.035*
	(0.026)	(0.034)	(0.028)	(0.987)	(12.952)	(0.989)	(14.261)	(1.422)	(21.585)	(0.031)	(0.024)	(0.050)	(0.054)	(0.025)	(0.019)
Lower middle school degree	0.023	0.019	0.030	-0.316	1.193	-0.328	10.493	0.672	28.657	-0.030	0.021	0.025	0.074*	-0.000	0.023
	(0.017)	(0.021)	(0.036)	(0.804)	(17.851)	(1.262)	(25.030)	(1.352)	(23.369)	(0.056)	(0.026)	(0.032)	(0.041)	(0.019)	(0.020)
Upper middle school degree	0.037	0.036	0.034	0.483	2.042	1.440	25.109	1.974	33.745	0.030	-0.007	0.060	0.148*	0.003	0.037
	(0.027)	(0.025)	(0.058)	(1.213)	(17.119)	(1.810)	(31.931)	(1.769)	(25.884)	(0.060)	(0.035)	(0.047)	(0.072)	(0.027)	(0.026)
Technical or vocational degree	0.042	0.029	0.085	-0.212	17.844	-0.707	34.899	-0.282	20.435	0.025	0.040	0.029	0.067	0.028	0.042
	(0.031)	(0.031)	(0.069)	(1.046)	(28.845)	(1.476)	(58.551)	(1.592)	(43.293)	(0.075)	(0.037)	(0.035)	(0.052)	(0.031)	(0.030)
University or college degree or higher	0.046	0.040	0.065	0.513	8.366	1.198	32.548	1.950	33.679	0.005	0.049	0.124**	0.031	0.045	0.046
	(0.030)	(0.034)	(0.080)	(1.275)	(21.616)	(1.352)	(42.627)	(1.509)	(33.761)	(0.063)	(0.060)	(0.054)	(0.065)	(0.033)	(0.035)
Health	-0.006	0.007	-0.035	0.280	23.929**	0.395	34.944***	0.109	40.536*	-0.046	-0.007	0.034	-0.002	-0.002	-0.006
	(0.025)	(0.029)	(0.039)	(0.454)	(8.014)	(0.671)	(10.893)	(0.425)	(21.403)	(0.043)	(0.039)	(0.044)	(0.044)	(0.027)	(0.023)
Husband monthly income	0.001	0.001	0.001	0.090	-1.026	0.177*	0.914	0.301**	2.130	0.004	-0.005	0.004	-0.000	0.001	0.001
	(0.003)	(0.003)	(0.007)	(0.075)	(1.853)	(0.081)	(2.497)	(0.117)	(2.588)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.003)
Husband's second occupation	0.006	-0.010	0.030	-0.481	-10.112	-0.359	-4.886	0.529	3.987	0.031	-0.024	0.027	-0.012	0.009	0.006
	(0.026)	(0.028)	(0.028)	(0.868)	(17.390)	(1.234)	(30.383)	(1.485)	(26.736)	(0.059)	(0.028)	(0.048)	(0.062)	(0.026)	(0.023)
Child Care	-0.020	-0.001	-0.039	-1.282	3.394	-1.331	-7.258	-1.951**	-12.164	-0.071**	0.025	0.054	0.000	0.000	-0.020
	(0.020)	(0.024)	(0.025)	(0.749)	(15.885)	(0.842)	(25.046)	(0.725)	(30.047)	(0.027)	(0.045)	(0.042)	(.)	(.)	(0.020)
Household size	0.004	-0.004	-0.018	0.630**	5.126	0.308	8.108	0.253	1.114	0.003	0.014	-0.005	0.012	0.002	0.004
	(0.007)	(0.010)	(0.011)	(0.258)	(5.924)	(0.309)	(10.696)	(0.368)	(13.141)	(0.012)	(0.011)	(0.010)	(0.012)	(0.007)	(0.006)
Household total gross income	-0.001	-0.003	0.001	-0.839**	4.928	-0.735	4.936	-0.990	13.946	-0.002	-0.009	0.017	-0.014	0.004	-0.001
	(0.007)	(0.009)	(0.020)	(0.338)	(7.282)	(0.500)	(13.153)	(0.612)	(20.451)	(0.013)	(0.019)	(0.011)	(0.017)	(0.007)	(0.008)
Higher skill worker	-0.000	-0.015	0.075	-0.398	-20.049	-0.714	-15.399	-0.830	-30.042	0.070	-0.046	-0.011	0.107*	-0.025	-0.000
	(0.027)	(0.026)	(0.059)	(0.483)	(13.093)	(0.722)	(21.668)	(0.703)	(28.100)	(0.042)	(0.031)	(0.042)	(0.059)	(0.021)	(0.024)
Permanent contract	0.013	-0.018	0.078**	-0.377	-2.825	-0.343	1.009	-0.271	12.264	0.056*	0.027	-0.063**	0.031	0.005	0.013
	(0.016)	(0.014)	(0.028)	(0.583)	(13.431)	(0.510)	(18.989)	(0.490)	(27.200)	(0.028)	(0.023)	(0.021)	(0.052)	(0.022)	(0.018)
State-owned company	0.019	0.007	0.045	-0.988**	-11.886	-0.921	-3.386	-0.978	8.370	0.033	0.030	-0.032	0.057*	0.007	0.019
	(0.024)	(0.028)	(0.042)	(0.406)	(24.256)	(0.663)	(23.636)	(0.736)	(33.633)	(0.022)	(0.041)	(0.033)	(0.029)	(0.027)	(0.021)
Need care	0.310***	0.269***	0.379***	0.107	1.936	0.608	5.683	0.578	-2.522	0.226***	0.327***	0.326***	0.169***	0.343***	0.310***
	(0.034)	(0.039)	(0.043)	(0.631)	(17.553)	(0.694)	(19.873)	(0.770)	(21.902)	(0.044)	(0.048)	(0.044)	(0.029)	(0.042)	(0.024)
Number of sibllings	-0.000	-0.002	0.010	0.001	0.700	0.130	1.867	0.172	1.438	0.005	-0.002	-0.001	0.007	-0.002	-0.000
	(0.002)	(0.001)	(0.006)	(0.134)	(2.663)	(0.116)	(3.426)	(0.106)	(3.461)	(0.008)	(0.002)	(0.004)	(0.008)	(0.002)	(0.003)
Constant	0.569*	0.777*	0.672*	20.200*	-103.828	25.410*	-123.706	28.285*	-429.673	0.479	0.251	4.475	0.198	0.856**	0.569**
	(0.280)	(0.399)	(0.307)	(10.162)	(204.007)	(12.487)	(257.602)	(13.794)	(503.048)	(1.338)	(1.289)	(8.002)	(0.504)	(0.337)	(0.232)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2881	1945	928	387	101	408	80	417	71	825	1287	769	694	2187	2881
Adjusted R^2	0.125	0.123	0.190	0.071	0.210	0.093	0.190	0.106	0.232	0.105	0.143	0.202	0.074	0.161	0.125

** p < 0.1, ** p < 0.05, *** p < 0.01, Standard errors clustered at province level.*

Table F.2. First stage regression estimates of married women's paid working hours (continued)

	Excluding husband's variables			Elderly care intensity orgniasation					One instrumental variable
	Excluding husband's monthly labour income	Excluding husband's second occupation	One instrumental variables	Elderly care	Elderly care hours (including zero)	Elderly care hours (excluding zero)	Elderly care hours (excluding zero)	Elderly care hours square	
	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Age	-0.025*	-0.025*	-0.025*	-0.025*	-0.464	-0.486	-0.486	39.731	-0.025*
	(0.013)	(0.013)	(0.013)	(0.014)	(0.438)	(2.068)	(2.068)	(335.090)	(0.013)
Age square	0.000*	0.000*	0.000*	0.000*	0.005	0.002	0.002	-0.649	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.025)	(0.025)	(4.248)	(0.000)
Hukou	0.035	0.034	0.034	0.032	0.092	-2.032	-2.032	-288.141	0.035
	(0.026)	(0.025)	(0.025)	(0.025)	(0.303)	(3.497)	(3.497)	(503.392)	(0.026)
Lower middle school degree	0.023	0.023	0.023	0.026	0.268	0.329	0.329	27.072	0.023
	(0.017)	(0.018)	(0.018)	(0.016)	(0.895)	(4.339)	(4.339)	(651.990)	(0.017)
Upper middle school degree	0.037	0.037	0.037	0.046	1.840*	4.050	4.050	295.310	0.037
	(0.027)	(0.027)	(0.027)	(0.027)	(0.924)	(3.892)	(3.892)	(425.194)	(0.027)
Technical or vocational degree	0.042	0.042	0.042	0.050	0.862	-0.652	-0.652	-76.885	0.042
	(0.031)	(0.031)	(0.031)	(0.030)	(0.886)	(3.592)	(3.592)	(613.677)	(0.031)
University or college degree or higher	0.046	0.045	0.045	0.055*	1.620	2.206	2.206	221.182	0.046
	(0.030)	(0.030)	(0.030)	(0.029)	(1.439)	(4.254)	(4.254)	(633.492)	(0.030)
Health	-0.005	-0.006	-0.005	-0.008	1.280***	7.890***	7.890***	997.873***	-0.006
	(0.024)	(0.025)	(0.024)	(0.025)	(0.346)	(1.861)	(1.861)	(268.546)	(0.025)
Husband's second occupation	0.006			0.008	0.510	1.840	1.840	-320.144	0.006
	(0.026)			(0.026)	(0.476)	(3.576)	(3.576)	(590.181)	(0.026)
Child Care	-0.020	-0.020	-0.020	-0.018	-1.334	-6.825	-6.825	-669.119	-0.020
	(0.020)	(0.020)	(0.020)	(0.021)	(0.873)	(4.710)	(4.710)	(679.613)	(0.020)
Household size	0.004	0.004	0.004	0.006	0.246	1.180	1.180	193.861	0.004
	(0.007)	(0.007)	(0.007)	(0.007)	(0.232)	(2.037)	(2.037)	(267.140)	(0.007)
Household total gross income	0.000	-0.001	0.000	0.000	0.055	0.551	0.551	214.932	-0.001
	(0.007)	(0.007)	(0.007)	(0.007)	(0.143)	(1.303)	(1.303)	(177.781)	(0.007)
Higher skill worker	-0.000	-0.000	-0.000	0.001	-0.951	-4.156	-4.156	-654.616	-0.000
	(0.027)	(0.027)	(0.027)	(0.027)	(0.747)	(4.162)	(4.162)	(587.436)	(0.027)
Permanent contract	0.013	0.013	0.013	0.013	-0.064	-2.251	-2.251	-479.243	0.013
	(0.016)	(0.016)	(0.017)	(0.015)	(0.914)	(3.771)	(3.771)	(487.422)	(0.016)
State-owned company	0.019	0.019	0.019	0.018	0.040	-1.113	-1.113	-247.936	0.019
	(0.023)	(0.024)	(0.023)	(0.024)	(1.113)	(3.589)	(3.589)	(682.258)	(0.024)
Need care	0.310***	0.310***	0.310***	0.307***	5.809***	2.221	2.221	110.836	0.310***
	(0.034)	(0.034)	(0.034)	(0.034)	(1.099)	(3.627)	(3.627)	(596.964)	(0.034)
Number of sibllings	-0.000	-0.000	-0.000	0.000	0.087	0.548	0.548	59.916	
	(0.002)	(0.002)	(0.002)	(0.003)	(0.262)	(1.095)	(1.095)	(142.208)	
Husband monthly income		0.001		0.001	-0.021	-0.205	-0.205	-32.234	0.001
		(0.003)		(0.003)	(0.102)	(0.425)	(0.425)	(59.501)	(0.003)
Constant	0.565*	0.570*	0.565*	0.545*	9.841	17.699	17.699	-2.1e+03	0.570*
	(0.286)	(0.280)	(0.286)	(0.280)	(8.673)	(33.217)	(33.217)	(5257.912)	(0.281)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2881	2881	2881	2872	2872	494	494	494	2881
Adjusted R^2	0.125	0.125	0.125	0.124	0.045	0.061	0.061	0.042	0.125

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Appendix G: 2SLS Regression Estimates of Married Women's Labour Supply by Care Intensity

Table G.1 2SLS estimates of married women's probability of employment by care intensity

	10 HRS (1)	15 HRS (2)	35 HRS (3)	40 HRS (4)
0HR< Elderly Care ≤10HRS	0.537			
	(0.769)			
10HRS < Elderly Care	-0.587			
	(1.043)			
0HR< Elderly Care ≤15HRS		0.712		
		(1.435)		
15HRS < Elderly Care		-1.409		
		(3.381)		
0HR< Elderly Care ≤ 35HRS			0.644	
			(2.535)	
35HRS < Elderly Care			-4.161	
			(18.709)	
0HR< Elderly Care ≤ 40HRS				1.203
				(11.085)
40HRS < Elderly Care				-8.072
				(79.225)
Age	0.069***	0.068**	0.073**	0.085
	(0.018)	(0.034)	(0.029)	(0.058)
Age square	-0.001***	-0.001**	-0.001***	-0.001
	(0.000)	(0.000)	(0.000)	(0.002)
Hukou	-0.008	-0.015	-0.045	-0.055
	(0.025)	(0.040)	(0.182)	(0.512)
Lower middle school degree	-0.003	-0.004	-0.006	-0.032
	(0.034)	(0.036)	(0.073)	(0.403)
Upper middle school degree	0.068*	0.110	0.066	0.043
	(0.036)	(0.148)	(0.090)	(0.069)
Technical or vocational degree	0.140***	0.116**	0.108	0.072
	(0.029)	(0.053)	(0.129)	(0.618)
University or college degree or higher	0.140***	0.159**	0.160	0.112
	(0.032)	(0.068)	(0.125)	(0.212)
Health	0.058*	0.062	0.095	0.161
	(0.033)	(0.058)	(0.265)	(1.232)
Husband monthly income	0.019*	0.025	0.019	0.021
	(0.010)	(0.023)	(0.016)	(0.045)
Husband's second occupation	0.081***	0.087***	0.068	0.076
	(0.022)	(0.019)	(0.077)	(0.078)
Child Care	-0.049	-0.060	-0.054	-0.072
	(0.034)	(0.069)	(0.111)	(0.448)
Household size	-0.002	-0.002	0.000	-0.003
	(0.006)	(0.011)	(0.026)	(0.030)
Household total gross income	0.011*	0.011	0.014*	0.017
	(0.006)	(0.007)	(0.008)	(0.049)
Constant	-0.637**	-0.688*	-0.642	-0.876
	(0.290)	(0.393)	(0.640)	(1.011)
Province Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Individual Fixed Effects	No	No	No	No
Number of Observations	3107	3107	3107	3107
Adjusted R^2	.	.	.	.

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table G.2 2SLS estimates of married women's paid working hours by care intensity

	10 HRS	15 HRS	35 HRS	40 HRS
	(1)	(2)	(3)	(4)
0HR< Elderly Care ≤10HRS	-17.600			
	(28.175)			
10HRS < Elderly Care	16.199			
	(43.787)			
0HR< Elderly Care ≤15HRS		-18.429		
		(33.291)		
15HRS < Elderly Care		27.410		
		(73.942)		
0HR< Elderly Care ≤ 35HRS			-19.297	
			(56.132)	
35HRS < Elderly Care			97.756	
			(385.383)	
0HR< Elderly Care ≤ 40HRS				-28.132
				(167.287)
40HRS < Elderly Care				161.787
				(1172.470)
Age	-0.111	-0.334	-0.476	-1.012
	(0.681)	(0.542)	(1.037)	(5.102)
Age square	-0.002	0.001	0.004	0.012
	(0.008)	(0.007)	(0.016)	(0.079)
Hukou	2.996**	3.191*	4.250	4.659
	(1.483)	(1.744)	(5.392)	(12.512)
Lower middle school degree	4.796***	4.733***	5.487	6.221
	(1.052)	(1.316)	(4.353)	(12.622)
Upper middle school degree	4.924***	4.112	5.206***	5.610**
	(1.809)	(3.609)	(1.997)	(2.606)
Technical or vocational degree	2.121**	2.396**	3.294	4.364
	(0.985)	(1.107)	(3.957)	(14.257)
University or college degree or higher	1.993	1.431	2.191	3.802
	(1.554)	(2.817)	(1.968)	(9.162)
Health	-1.334	-1.295	-2.258	-3.432
	(1.572)	(1.677)	(5.407)	(18.332)
Husband monthly income	-0.406	-0.515	-0.550	-0.724
	(0.796)	(1.051)	(1.376)	(3.405)
Husband's second occupation	-5.675***	-5.829***	-5.401***	-5.901
	(1.284)	(1.683)	(1.258)	(3.647)
Child Care	-2.953	-2.959	-3.282*	-3.062
	(2.105)	(2.182)	(1.922)	(5.321)
Household size	-0.600	-0.615	-0.680	-0.520
	(0.406)	(0.465)	(0.778)	(0.827)
Household total gross income	1.126	1.137	1.254	1.316
	(1.081)	(1.158)	(1.833)	(3.328)
Higher skill	0.148	0.125	0.573	1.897
	(1.286)	(1.445)	(3.085)	(14.901)
Permanent contract	-0.786	-0.960	-0.307	0.379
	(1.030)	(0.879)	(2.335)	(9.162)
State-owned firm	-5.077***	-5.066***	-5.709***	-6.577
	(1.682)	(1.701)	(1.613)	(7.315)
Constant	41.266**	47.234***	45.317***	54.185
	(16.661)	(11.775)	(12.314)	(57.670)
Province Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Individual Fixed Effects	No	No	No	No
Number of Observations	2516	2516	2516	2516
Adjusted R^2	.	.	.	.

Standard errors in parentheses $^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

Robust standard errors clustered at province level

Following Table G.3 tries three additional ways to organize the intensity of elderly care in the regression. In columns (1) and (4), elderly care hours (continuous variables) (including zero) entering the regression along with elderly care dummy. In columns (2) and (5), elderly care hours (continuous variables) (excluding zero) entering the regression to explore whether the increase of one hour of elderly care will affect the married women's labour supply (Do, 2008). Considering that the influence of elderly care hours on the caregiver's labour supply may be non-linear, the square of care hours is employed in the regression based on columns (2) and (5)

in columns (3) and (6). The estimate results in Table G.3 are consistent with benchmark that care intensity have no significant effect on female caregivers labour supply at both extensive and intensive margins.

Table G.3 2SLS estimates of married women's labour supply by care intensity

	Probability of employment			Paid working hours		
	(1)	(2)	(3)	(4)	(5)	(6)
Elderly Care	0.589			-0.072		
	(1.709)			(42.004)		
Elderly Care Hours (including zero)	-0.025			-0.268		
	(0.083)			(2.157)		
Elderly Care Hours (excluding zero)		-0.004	-0.004		-0.139	-1.717
		(0.009)	(0.051)		(0.338)	(5.250)
Elderly Care Hours Square (excluding zero)			0.000			0.018
			(0.001)			(0.058)
Age	0.062**	0.099***	0.099***	-0.408	0.177	-1.296
	(0.025)	(0.024)	(0.024)	(0.446)	(0.921)	(7.598)
Age square	-0.001***	-0.001***	-0.001***	0.002	-0.006	0.010
	(0.000)	(0.000)	(0.000)	(0.006)	(0.012)	(0.088)
Hukou	0.037	0.059*	0.061	3.165**	2.723	4.792
	(0.023)	(0.034)	(0.146)	(1.429)	(2.044)	(7.817)
Lower middle school degree	-0.013	-0.053	-0.049	3.843***	7.358**	7.270
	(0.055)	(0.057)	(0.319)	(0.762)	(2.897)	(6.919)
Upper middle school degree	0.035	-0.029	-0.025	4.494**	7.013**	8.202
	(0.024)	(0.052)	(0.346)	(2.127)	(3.331)	(8.602)
Technical or vocational degree	0.143**	0.075	0.078	1.982	4.460	4.703
	(0.064)	(0.053)	(0.251)	(1.211)	(3.004)	(8.695)
University or college degree or higher	0.132***	0.065	0.066	1.656	5.907*	5.438
	(0.043)	(0.052)	(0.163)	(1.276)	(3.235)	(7.407)
Health	0.044	0.004	0.002	-0.371	-0.763	-6.054
	(0.139)	(0.095)	(0.160)	(3.212)	(3.875)	(17.571)
Husband monthly income	0.049***	0.043***	0.043***	-0.246*	-0.229	0.024
	(0.007)	(0.010)	(0.011)	(0.131)	(0.312)	(1.020)
Husband's second occupation	0.143***	0.185***	0.188	-5.409***	-7.094***	1.688
	(0.021)	(0.064)	(0.271)	(1.600)	(1.876)	(30.011)
Child Care	-0.039	-0.031	-0.033	-3.557	-4.629	-3.637
	(0.039)	(0.054)	(0.132)	(2.336)	(3.046)	(5.191)
Household size	0.000	-0.020*	-0.019	-0.521	-0.911	-2.485
	(0.007)	(0.010)	(0.066)	(0.334)	(0.861)	(3.536)
Household total gross income	0.014	0.032***	0.033	0.682	0.589	-2.299
	(0.012)	(0.012)	(0.037)	(0.489)	(1.172)	(10.756)
Higher skill				-0.356	-0.935	4.091
				(1.907)	(1.977)	(17.936)
Permanent contract				-0.908	-0.555	4.438
				(0.969)	(0.821)	(15.742)
State-owned firm				-5.647***	-4.926***	-2.169
				(1.131)	(1.158)	(9.562)
Constant	-0.828**	-1.479***	-1.479***	50.430***	40.072*	103.820
	(0.337)	(0.520)	(0.527)	(8.516)	(21.530)	(264.088)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Individual Fixed Effects	4280	703	703	2872	494	494
Number of Observations	.	0.318	0.330	0.027	0.020	.

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Appendix H: 2SLS Regression Estimates of Married Women's Labour Supply by work type

Table H. 1 2SLS estimates of married women's labour supply by work type

	24 Hours		30 Hours		35 Hours	
	Part time	Full time	Part time	Full time	Part time	Full time
	(1)	(2)	(3)	(4)	(5)	(6)
Elderly Care	0.132**	0.068**	0.135***	0.059**	0.201***	0.018
	(0.057)	(0.030)	(0.050)	(0.030)	(0.057)	(0.027)
Age	0.054***	0.072***	0.068***	0.072***	0.074***	0.072***
	(0.015)	(0.010)	(0.013)	(0.010)	(0.016)	(0.010)
Age square	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou	-0.118***	0.070***	-0.112***	0.078***	-0.097***	0.084***
	(0.026)	(0.013)	(0.031)	(0.011)	(0.033)	(0.011)
Lower middle school degree	-0.060**	0.015	-0.048*	0.016	-0.053*	0.027*
	(0.025)	(0.022)	(0.027)	(0.018)	(0.030)	(0.016)
Upper middle school degree	-0.113***	0.071***	-0.111***	0.075***	-0.091***	0.078***
	(0.031)	(0.015)	(0.025)	(0.016)	(0.028)	(0.018)
Technical or vocational degree	0.008	0.198***	0.029	0.210***	0.083	0.218***
	(0.070)	(0.029)	(0.068)	(0.029)	(0.081)	(0.027)
University or college degree or higher	0.084	0.170***	0.152	0.181***	0.213**	0.198***
	(0.145)	(0.027)	(0.122)	(0.026)	(0.083)	(0.027)
Health	0.048	-0.004	0.047	-0.003	0.050	-0.006
	(0.029)	(0.025)	(0.034)	(0.027)	(0.033)	(0.028)
Husband monthly income	0.034***	0.050***	0.041***	0.050***	0.045***	0.051***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.005)	(0.003)
Husband's second occupation	0.354***	0.115***	0.342***	0.101***	0.322***	0.091***
	(0.034)	(0.032)	(0.041)	(0.033)	(0.035)	(0.033)
Child Care	0.014	-0.039**	0.058*	-0.047***	0.048	-0.052***
	(0.025)	(0.018)	(0.030)	(0.018)	(0.034)	(0.018)
Household size	0.011	-0.002	0.008	-0.003	0.012	-0.003
	(0.009)	(0.007)	(0.009)	(0.006)	(0.010)	(0.007)
Household total gross income	-0.001	0.020***	-0.001	0.020***	0.001	0.019**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Constant	-0.992***	-1.071***	-1.211***	-1.077***	-1.303***	-1.070***
	(0.292)	(0.174)	(0.250)	(0.163)	(0.293)	(0.168)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1481	3899	1582	3762	1688	3551
Adjusted R2	0.290	0.399	0.307	0.412	0.304	0.422

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Appendix I: Data Structure for Husband's Labour Supply Analysis

Table I.1 Number of appearances in the survey (extensive)

Employed				
Number of appearances in the survey	**Observations**	**Percent**	**Individuals**	**Percent**
1	1,836	38.35%	1,836	0.60
2	1654	34.54%	827	0.27
3	954	19.92%	318	0.10
4	324	6.77%	81	0.03
5	20	0.42%	4	0.00
Total	4,788	100%	3066	100%

Table I.2 Number of appearances in the survey (intensive)

Weekly working hours				
Number of appearances in the survey	**Observations**	**Percent**	**Individuals**	**Percent**
1	1,714	41.62%	1,714	62.69%
2	1432	34.77%	716	26.19%
3	735	17.85%	245	8.96%
4	232	5.63%	58	2.12%
5	5	0.12%	1	0.04%
Total	4,118	100.00%	2734	100.00%

Table I.3 Panel statistic for employment status

	Overall		Between		Within
Employment status	Freq.	Percent	Freq.	Percent	Percent
0	334	6.98	284	9.26	78.34
1	4454	93.02	2898	94.52	98.26
Total	4788	100.00	3182	103.78	96.48
(Number of observations=3066)					

Table I.4 Panel statistic for elderly care in extensive margin

	Overall		Between		Within
Elderly Care	Freq.	Percent	Freq.	Percent	Percent
0	4089	85.40	2720	88.71	95.3
1	699	14.60	637	20.78	75.00
Total	4788	10.00	3357	109.49	91.45
(Number of observations=3066)					

Table I.5 Panel statistic for paid working hours

	Mean	**Std. Dev.**	**Min**	**Max**	**Observations**
overall	42.75644	17.60862	1	119	N = 4118
between		16.0031	1	84	n = 2734
within		8.624567	7.243565	92.75644	T-bar = 1.50512

Table I.6 Panel statistic for elderly care in intensive margin

	Overall		Between		Within
Elderly Care	Freq.	Percent	Freq.	Percent	Percent
0	3528	85.67	2429	88.84	95.73
1	590	14.33	539	19.71	79.19
Total	4118	100.00	2392	108.19	92.18
(Number of observations=27.34)					

Appendix J: Structural 2SLS Model Estimates of Husband's Labour Supply

$$H_{ipt\_w} = \lambda_0 + \lambda_1 EC_{ipt\_w} + \lambda_2 P_{ipt\_w} + \lambda_3 M_{ipt\_w} + \lambda_4 F_{ipt\_w} + \lambda_5 H_{ipt\_h} + T_t + C_p + \mu_{ipt\_w} \quad 6.2$$

$$H_{ipt\_h} = \beta_0 + \beta_1 EC_{ipt\_w} + \beta_2 P_{ipt\_h} + \beta_3 M_{ipt\_h} + \beta_4 F_{ipt\_h} + \beta_5 H_{ipt\_w} + T_t + C_p + \mu_{ipt\_h} \quad 6.3$$

Equations 6.2 and 6.3 are structural empirical model in Section 6.5.2.2, where H_{ipt_w} is the labour supply (employment or conditional on employment working hours) of wife i in province p at time t, H_{ipt_h} is the labour supply (employment or conditional on employment working hours) of husband i in province p at time t, f is the member of the family consisting of husband and wife (f = w, h), i is individual (i=1,...,N), t is survey year (t = 2004, 2006, 2009, 2011 and 2015), p is province. EC_{ipt_w} is a binary indicator for the family's elderly care responsibility. The empirical specifications also controls for personal characteristics (P_{ipt_w}), family characteristics (M_{ipt_w}) and financial characteristics (F_{ipt_w}) for wife in equation 6.2 and personal characteristics (P_{ipt_h}), family characteristics (M_{ipt_h}) and financial characteristics (F_{ipt_h}) for husband in equation 6.3 along with T_t represents the unobservable quantity varying with time, that is, time fixed effects and C_p donating the unobservable quantity varying with province, that is, province fixed effects. Finally, in equation 6.2 and 6.3 μ_{ipt_w}, μ_{ipt_h} and μ_{ipt} represent the random error terms varying with individual and time for wife and husband respectively.

Substitution of equation 6.2 into equation 6.3 leads to a single equation:

$$H_{ipt\_h} = \alpha_0 + \alpha_1 EC_{ipt\_w} + \alpha_2 P_{ipt\_w} + \alpha_3 P_{ipt\_h} + \alpha_4 M_{ipt\_w} + \alpha_5 M_{ipt\_h} + \alpha_6 F_{ipt\_w} + \alpha_7 F_{ipt\_h} + T_t + C_p + \mu_{ipt} \quad 6.4$$

Same with the benchmark model, instrument variables (whether the elderly parents and parents in law have elderly care demand and number of siblings of spouse) turn to address the potential endogeneity bias.

Appendix K: First Stage of 2SLS Regression Estimates of Husband's Labour Supply

Table K.1 First stage of 2SLS regression estimates of husband's probability of employment

	Model specifications							Work type					
	Excluding husband's provision of childcare	Controlling for wife's provision of childcare	Controlling for provision of childcare by either spouse	Excluding wife's monthly labour income	Controlling for wife's hourly labour income	Cluster at individual level	Only one instrumental variable	Part time-24 hours	Full time-24 hours	Part time-30 hours	Full time-30 hours	Part time-35 hours	Full time-35 hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Age	-0.001	-0.002	-0.000	-0.003	-0.002	-0.002	-0.003	0.008	-0.003	0.009	-0.005	0.011	-0.005
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.014)	(0.007)	(0.012)	(0.009)	(0.009)	(0.009)
Age squared	-0.000	0.000	-0.000	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou	0.018	0.020	0.020	0.036**	0.034**	0.018	0.018	-0.023	0.022	-0.011	0.020	-0.011	0.024*
	(0.013)	(0.015)	(0.014)	(0.015)	(0.015)	(0.014)	(0.013)	(0.029)	(0.014)	(0.027)	(0.013)	(0.029)	(0.013)
Lower middle school degree	0.013	0.014	0.014	0.015	0.014	0.012	0.013	0.024	0.011	0.020	0.014	0.010	0.020
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.028)	(0.016)	(0.018)	(0.015)	(0.015)	(0.014)
Upper middle school degree	0.034	0.033	0.036*	0.038*	0.037*	0.033**	0.034	0.084***	0.022	0.079**	0.024	0.078**	0.028
	(0.019)	(0.019)	(0.019)	(0.018)	(0.018)	(0.016)	(0.019)	(0.027)	(0.027)	(0.028)	(0.026)	(0.027)	(0.025)
Technical or vocational degree	0.051*	0.047	0.048	0.060**	0.059**	0.051**	0.051*	0.124	0.040	0.109	0.038	0.147*	0.046
	(0.026)	(0.028)	(0.027)	(0.025)	(0.024)	(0.023)	(0.025)	(0.105)	(0.032)	(0.103)	(0.031)	(0.081)	(0.033)
University or college degree or higher	0.017	0.016	0.017	0.030	0.025	0.017	0.018	0.073	0.009	0.043	0.013	0.070	0.006
	(0.025)	(0.027)	(0.027)	(0.023)	(0.023)	(0.023)	(0.025)	(0.064)	(0.031)	(0.058)	(0.030)	(0.056)	(0.029)
Health	0.007	0.008	0.009	0.006	0.006	0.007	0.007	-0.000	0.006	-0.007	0.007	0.002	0.009
	(0.012)	(0.012)	(0.011)	(0.013)	(0.012)	(0.015)	(0.012)	(0.036)	(0.011)	(0.032)	(0.010)	(0.033)	(0.014)
Wife's second occupation	-0.039**	-0.038**	-0.038**	-0.039**	-0.041**	-0.040**	-0.040**	-0.015	-0.036*	-0.031	-0.044*	-0.033	-0.036
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.015)	(0.043)	(0.019)	(0.033)	(0.021)	(0.031)	(0.022)
Wife's monthly labour income	0.006***	0.006***	0.006***			0.006***	0.006***	0.006	0.006**	0.005	0.006**	0.004	0.006**
	(0.002)	(0.002)	(0.002)			(0.002)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)	(0.002)
Household size	0.001	0.002	0.001	0.000	0.000	0.002	0.002	0.006	0.003	0.003	0.002	0.002	0.002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.011)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
Household total gross income	0.000	0.001	0.000	0.004	0.001	0.001	0.001	0.009*	-0.001	0.008	-0.001	0.009*	-0.000
	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Number of sibllings	-0.001	-0.000	-0.001	-0.001	-0.001	-0.001		0.003	-0.002	0.004	-0.003	0.004	-0.002
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)		(0.004)	(0.002)	(0.004)	(0.002)	(0.003)	(0.002)
Need care	0.313***	0.310***	0.311***	0.314***	0.314***	0.313***	0.313***	0.262***	0.320***	0.255***	0.322***	0.263***	0.320***
	(0.024)	(0.025)	(0.025)	(0.024)	(0.023)	(0.018)	(0.024)	(0.040)	(0.023)	(0.036)	(0.026)	(0.030)	(0.028)
Wife provide childcare		-0.008											
		(0.016)											
Either spouse provide childcare			0.001										
			(0.016)										
Husband provide childcare				-0.016	-0.015	-0.016	-0.015	-0.070**	-0.010	-0.065**	-0.009	-0.055*	-0.005
				(0.015)	(0.015)	(0.015)	(0.015)	(0.031)	(0.017)	(0.026)	(0.018)	(0.028)	(0.020)
Wife's hourly wage					0.001								
					(0.001)								
Constant	0.117	0.138	0.109	0.158	0.181	0.158	0.165	-0.022	0.164	-0.036	0.211	-0.048	0.211
	(0.184)	(0.199)	(0.201)	(0.205)	(0.189)	(0.154)	(0.205)	(0.335)	(0.189)	(0.289)	(0.232)	(0.242)	(0.232)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4788	4733	4736	4788	4684	4788	4788	887	4145	1095	3856	1315	3554
Adjusted R2	0.145	0.143	0.143	0.143	0.143	0.146	0.145	0.158	0.146	0.149	0.145	0.161	0.143

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table K.1 First stage of 2SLS regression estimates of husband's probability of employment (Continued)

	Early retirement	Age groups				Care Recipient			Living arrangement	
	All observations	45-51 years old	18-34 years old	35-44 years old	45-51 years old	EC_Parents	EC_Parents in law	EC_Both Parents and Parents in law	Co-resident	Not co-resident
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)
Age	-0.003	0.028	-0.001	-0.106	0.052	0.005	-0.005	-0.004	0.019	0.018*
	(0.007)	(0.061)	(0.082)	(0.082)	(0.063)	(0.004)	(0.006)	(0.004)	(0.013)	(0.009)
Age squared	0.000	-0.000	-0.000	0.001	-0.001	-0.000	0.000	0.000	-0.000	-0.000**
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou	0.021	0.039	0.010	0.015	0.028	0.004	0.006	0.013	-0.022	-0.079***
	(0.014)	(0.026)	(0.034)	(0.016)	(0.027)	(0.010)	(0.008)	(0.009)	(0.023)	(0.018)
Lower middle school degree	0.010	0.007	0.022	0.008	0.007	0.009	0.006	-0.001	0.027	0.001
	(0.011)	(0.017)	(0.029)	(0.024)	(0.015)	(0.013)	(0.013)	(0.004)	(0.020)	(0.011)
Upper middle school degree	0.032*	0.016	0.035	0.039	0.015	0.012	0.019*	0.011	0.003	0.015
	(0.018)	(0.019)	(0.037)	(0.040)	(0.016)	(0.011)	(0.009)	(0.013)	(0.018)	(0.020)
Technical or vocational degree	0.047*	0.097**	0.077	0.012	0.103**	0.020	0.034	0.016	0.053	0.120***
	(0.026)	(0.039)	(0.047)	(0.041)	(0.039)	(0.017)	(0.020)	(0.014)	(0.049)	(0.024)
University or college degree or higher	0.017	0.020	0.035	0.001	0.021	0.006	0.004	0.012	0.080**	0.115***
	(0.026)	(0.029)	(0.054)	(0.038)	(0.029)	(0.015)	(0.016)	(0.014)	(0.034)	(0.024)
Health	0.011	0.015	0.001	0.007	0.007	0.008	0.003	-0.007	0.020	0.030**
	(0.011)	(0.019)	(0.027)	(0.025)	(0.021)	(0.010)	(0.012)	(0.010)	(0.028)	(0.013)
Childcare	-0.011	0.025	-0.040**	-0.017	0.011	-0.008	-0.013	-0.001	-0.041	0.014
	(0.017)	(0.027)	(0.018)	(0.028)	(0.025)	(0.013)	(0.010)	(0.007)	(0.029)	(0.017)
Wife's second occupation	-0.039**	-0.049	-0.018	-0.041*	-0.051*	-0.024***	-0.028**	0.003	-0.023	0.020
	(0.015)	(0.030)	(0.048)	(0.020)	(0.028)	(0.006)	(0.012)	(0.012)	(0.019)	(0.017)
Wife's monthly labour income	0.007**	0.006**	0.010*	0.006	0.006**	0.002	0.004***	0.003***	0.009*	-0.013***
	(0.002)	(0.003)	(0.005)	(0.004)	(0.002)	(0.002)	(0.001)	(0.001)	(0.005)	(0.002)
Household size	0.003	-0.003	-0.009	0.014	-0.003	0.008*	-0.005	-0.002	-0.008	-0.001
	(0.005)	(0.007)	(0.010)	(0.010)	(0.007)	(0.004)	(0.003)	(0.003)	(0.008)	(0.005)
Household total gross income	-0.001	0.006	0.002	-0.007	0.008	-0.005	0.006*	-0.000	0.001	0.034***
	(0.004)	(0.007)	(0.005)	(0.006)	(0.007)	(0.003)	(0.003)	(0.002)	(0.008)	(0.007)
Number of sibllings	-0.001	-0.002	-0.001	-0.002	-0.002	0.001	-0.002	-0.001	0.001	
	(0.002)	(0.003)	(0.006)	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)	(0.005)	
Need care	0.321***	0.312***	0.312***	0.325***	0.305***	0.200***	0.171***	0.076***	0.399***	
	(0.025)	(0.038)	(0.061)	(0.026)	(0.037)	(0.023)	(0.017)	(0.021)	(0.028)	
Constant	0.168	-0.694	0.247	2.190	-1.289	-0.041	0.107	0.145	-0.191	0.300*
	(0.204)	(1.520)	(1.236)	(1.691)	(1.581)	(0.086)	(0.162)	(0.093)	(0.223)	(0.152)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4607	1675	969	2044	1775	4351	4365	4250	1379	3400
Adjusted R2	0.150	0.190	0.126	0.147	0.185	0.105	0.079	0.053	0.191	0.107

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table K.1 First stage of 2SLS regression estimates of husband's probability of employment (Continued)

	Model Specification					household work supply									
						All observations		Have not been employed		Have been employed		Part time (weekly working hours <24 hours)		Full time (weekly working hours >24 hours)	
	Excluding husband's provision of childcare	Controlling for wife's provision of childcare	Controlling for provision of childcare by either spouse	Excluding wife's monthly labour income	Controlling for wife's hourly labour income	Household work	household time (in minutes)	Household work	household time (in minutes)	Household work	household time (in minutes)	Household work	household time (in minutes)	Household work	household time (in minutes)
	(24)	(25)	26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)
Age	-0.001	-0.001	0.000	0.006	0.007	-0.002	-0.007	0.020	0.028	-0.004	-0.013	0.009	0.002	-0.007	-0.015
	(0.006)	(0.005)	(0.007)	(0.005)	(0.004)	(0.007)	(0.010)	(0.027)	(0.022)	(0.008)	(0.011)	(0.014)	(0.017)	(0.008)	(0.012)
Age squared	-0.000	-0.000	-0.000	-0.000	-0.000*	0.000	0.000	-0.000	-0.000	0.000	0.000	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou	0.021**	0.024	0.019	0.039***	0.036***	0.018	0.004	0.019	0.007	0.012	0.003	-0.103	-0.093	0.019	0.020
	(0.009)	(0.014)	(0.014)	(0.010)	(0.010)	(0.014)	(0.023)	(0.040)	(0.054)	(0.015)	(0.029)	(0.078)	(0.099)	(0.017)	(0.029)
Lower middle school degree	0.004	0.015	0.017	0.013	0.013	0.011	-0.003	0.062	0.023	0.004	-0.011	0.017	0.029	-0.001	-0.030
	(0.008)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.014)	(0.058)	(0.070)	(0.013)	(0.018)	(0.026)	(0.047)	(0.016)	(0.020)
Upper middle school degree	0.019	0.029*	0.039*	0.042**	0.040**	0.032	0.051**	0.070	0.123	0.023	0.031	0.091	0.116	0.008	0.001
	(0.015)	(0.015)	(0.019)	(0.015)	(0.014)	(0.020)	(0.017)	(0.063)	(0.093)	(0.017)	(0.027)	(0.054)	(0.084)	(0.025)	(0.027)
Technical or vocational degree	0.044	0.045	0.051*	0.054**	0.056**	0.051*	0.046*	0.063	0.050	0.041*	0.012	0.235*	0.352*	0.025	-0.026
	(0.026)	(0.027)	(0.027)	(0.023)	(0.023)	(0.026)	(0.025)	(0.159)	(0.244)	(0.023)	(0.038)	(0.124)	(0.164)	(0.024)	(0.035)
University or college degree or higher	0.010	0.018	0.020	0.025	0.025	0.015	0.022	0.021	0.006	0.023	0.003	0.389***	0.269	0.010	-0.029
	(0.018)	(0.025)	(0.026)	(0.020)	(0.021)	(0.025)	(0.020)	(0.074)	(0.106)	(0.027)	(0.037)	(0.106)	(0.190)	(0.030)	(0.032)
Health	0.006	0.011	0.007	-0.002	-0.002	0.006	0.005	-0.032	-0.027	0.013	0.009	0.031	0.025	0.011	0.008
	(0.011)	(0.011)	(0.010)	(0.012)	(0.012)	(0.013)	(0.023)	(0.063)	(0.112)	(0.012)	(0.024)	(0.054)	(0.043)	(0.012)	(0.026)
Wife's second occupation	-0.036**	-0.041**	-0.040**	-0.037**	-0.039**	-0.040**	-0.042*	0.088	0.088	-0.038***	-0.043*	-0.012	-0.056	-0.033*	-0.035
	(0.013)	(0.014)	(0.016)	(0.015)	(0.015)	(0.015)	(0.021)	(0.184)	(0.169)	(0.012)	(0.023)	(0.046)	(0.045)	(0.018)	(0.030)
Wife's monthly labour income	0.004**	0.005**	0.006**			0.006**	0.007**	-0.003	-0.008	0.006**	0.008***	0.008	0.013	0.007***	0.008***
	(0.002)	(0.002)	(0.002)			(0.002)	(0.003)	(0.006)	(0.010)	(0.002)	(0.002)	(0.006)	(0.008)	(0.002)	(0.002)
Household size	0.000	0.002	0.001	0.002	0.003	0.002	0.000	0.003	-0.020	0.002	0.002	0.007	0.002	0.003	0.005
	(0.004)	(0.005)	(0.005)	(0.003)	(0.003)	(0.005)	(0.007)	(0.017)	(0.015)	(0.006)	(0.007)	(0.011)	(0.016)	(0.006)	(0.008)
Household total gross income	0.001	0.002	0.000	0.000	-0.001	0.000	0.001	0.013	0.015	-0.001	-0.004	0.011	-0.013	-0.004	-0.004
	(0.003)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)	(0.006)	(0.010)	(0.023)	(0.005)	(0.008)	(0.007)	(0.021)	(0.006)	(0.009)
Number of sibllings	-0.001	-0.000	-0.001	-0.004**	-0.003**	-0.001	-0.002	-0.013*	-0.013	-0.000	-0.003	0.009*	-0.002	-0.002	-0.003*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.006)	(0.010)	(0.002)	(0.002)	(0.004)	(0.004)	(0.002)	(0.002)
Need care	0.325***	0.308***	0.310***	0.308***	0.306***	0.314***	0.317***	0.232***	0.218**	0.314***	0.331***	0.281***	0.295***	0.324***	0.344***
	(0.019)	(0.025)	(0.025)	(0.019)	(0.018)	(0.023)	(0.031)	(0.062)	(0.076)	(0.023)	(0.030)	(0.053)	(0.053)	(0.022)	(0.030)
Wife provide childcare		-0.006													
		(0.015)													
Either spouse provide childcare			-0.000												
			(0.015)												
Husband provide childcare				-0.007	-0.007	-0.016	-0.046*	-0.097	-0.034	-0.003	-0.037	-0.049	-0.113**	0.005	-0.025
				(0.010)	(0.011)	(0.015)	(0.024)	(0.079)	(0.104)	(0.018)	(0.025)	(0.047)	(0.037)	(0.020)	(0.028)
Wife's hourly wage					0.001										
					(0.001)										
High-skilled occupation										-0.002	0.039	-0.197*	-0.116	0.003	0.048*
										(0.032)	(0.027)	(0.101)	(0.204)	(0.032)	(0.026)
Permanent contract										0.018	0.024	0.196	0.245	0.016	0.024
										(0.025)	(0.023)	(0.135)	(0.185)	(0.023)	(0.023)
State-owned firm										-0.004	-0.014	-0.088	-0.263	-0.004	-0.008
										(0.014)	(0.017)	(0.138)	(0.235)	(0.014)	(0.015)
Constant	0.112	0.092	0.095	0.035	0.043	0.151	0.287	-0.246	-0.298	0.175	0.406	-0.275	0.114	0.226	0.417
	(0.150)	(0.166)	(0.189)	(0.109)	(0.087)	(0.205)	(0.265)	(0.624)	(0.552)	(0.220)	(0.273)	(0.362)	(0.377)	(0.212)	(0.265)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	6845	5764	4862	6810	6624	4774	2600	330	214	4106	2207	525	299	3494	1862
Adjusted R2	0.155	0.147	0.144	0.138	0.137	0.146	0.169	0.155	0.176	0.149	0.182	0.211	0.271	0.153	0.194

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table K.1 First stage of 2SLS regression estimates of husband's probability of employment (Continued)

	Household work supply by activities							
	Buy food	**Buy food time**	**Cook**	**Cooking time**	**Wash clothes**	**Wash clothes time**	**Clean the house**	**Clean the house time**
	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)
Age	-0.002	-0.010	-0.002	-0.022**	-0.002	-0.015	-0.002	-0.002
	(0.007)	(0.012)	(0.007)	(0.010)	(0.007)	(0.018)	(0.007)	(0.010)
Age squared	0.000	0.000	0.000	0.000**	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou	0.018	0.005	0.018	0.006	0.018	0.013	0.018	0.013
	(0.014)	(0.020)	(0.014)	(0.025)	(0.014)	(0.034)	(0.014)	(0.025)
Lower middle school degree	0.011	0.009	0.012	0.020	0.012	-0.014	0.012	-0.009
	(0.012)	(0.015)	(0.012)	(0.013)	(0.012)	(0.028)	(0.012)	(0.023)
Upper middle school degree	0.032	0.081***	0.032	0.098***	0.032	0.003	0.032	0.050**
	(0.020)	(0.018)	(0.020)	(0.021)	(0.020)	(0.042)	(0.020)	(0.022)
Technical or vocational degree	0.051*	0.043	0.051*	0.085*	0.051*	-0.041	0.051*	0.067*
	(0.026)	(0.043)	(0.026)	(0.040)	(0.026)	(0.040)	(0.026)	(0.034)
University or college degree or higher	0.015	0.069**	0.015	0.030	0.015	-0.068	0.015	-0.055
	(0.025)	(0.028)	(0.025)	(0.031)	(0.025)	(0.040)	(0.025)	(0.033)
Health	0.006	0.035	0.006	-0.006	0.006	-0.024	0.006	0.003
	(0.013)	(0.022)	(0.013)	(0.031)	(0.013)	(0.047)	(0.013)	(0.036)
Child Care	-0.016	-0.028	-0.016	-0.065**	-0.016	-0.075	-0.016	-0.025
	(0.015)	(0.029)	(0.015)	(0.021)	(0.015)	(0.043)	(0.015)	(0.023)
Wife's second occupation	-0.040**	-0.043*	-0.040**	-0.029	-0.040**	-0.102*	-0.040**	-0.038
	(0.015)	(0.021)	(0.015)	(0.033)	(0.015)	(0.050)	(0.015)	(0.034)
Wife's monthly labour income	0.006**	0.007**	0.006**	0.005	0.006**	0.012*	0.006**	0.011***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.006)	(0.002)	(0.003)
Household size	0.002	-0.002	0.002	-0.005	0.002	-0.003	0.002	-0.001
	(0.005)	(0.007)	(0.005)	(0.009)	(0.005)	(0.016)	(0.005)	(0.012)
Household total gross income	0.000	-0.002	0.000	0.007	0.000	0.018	0.000	0.012
	(0.004)	(0.008)	(0.004)	(0.010)	(0.004)	(0.011)	(0.004)	(0.009)
Number of sibllings	-0.001	-0.001	-0.001	-0.004*	-0.001	-0.008***	-0.001	-0.004
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Need care	0.314***	0.329***	0.314***	0.316***	0.314***	0.335***	0.314***	0.321***
	(0.023)	(0.030)	(0.023)	(0.043)	(0.023)	(0.064)	(0.023)	(0.040)
Constant	0.151	0.343	0.151	0.607*	0.151	0.432	0.151	0.100
	(0.205)	(0.291)	(0.205)	(0.276)	(0.205)	(0.464)	(0.205)	(0.292)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4774	2052	4773	1710	4771	887	4772	1434
Adjusted R2	0.146	0.185	0.146	0.175	0.146	0.188	0.146	0.185

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table K. 2 First stage of 2SLS regression estimates of husband's paid working hours

	Model specifications					Cluster at individual level	Only one instrumental variable	Care Recipient			Living arrangement	
	Excluding husband's provision of childcare	Controlling for wife's provision of childcare	Controlling for provision of childcare by either spouse	Excluding wife's monthly labour income	Controlling for wife's hourly labour income			EC_Parents	EC_Parents in law	EC_Both Parents and Parents in law	Co-resident	Not co-resident
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Age	-0.005	-0.005	-0.004	-0.005	-0.005	-0.005	-0.005	0.005	-0.004	-0.007	0.019	-0.017
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.004)	(0.006)	(0.004)	(0.013)	(0.012)
Age squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	0.000	0.000*	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou	0.011	0.015	0.014	0.027*	0.027	0.011	0.011	-0.005	0.004	0.017	-0.041	0.024
	(0.015)	(0.016)	(0.016)	(0.015)	(0.016)	(0.016)	(0.015)	(0.013)	(0.009)	(0.011)	(0.030)	(0.013)
Lower middle school degree	0.005	0.004	0.004	0.006	0.006	0.005	0.005	0.007	-0.000	-0.003	0.012	0.001
	(0.013)	(0.014)	(0.013)	(0.014)	(0.014)	(0.013)	(0.013)	(0.011)	(0.014)	(0.004)	(0.021)	(0.017)
Upper middle school degree	0.024	0.022	0.023	0.027	0.025	0.024	0.024	0.014	0.011	0.004	-0.001	0.037*
	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)	(0.018)	(0.016)	(0.010)	(0.012)	(0.013)	(0.018)	(0.020)
Technical or vocational degree	0.041	0.035	0.036	0.046*	0.047*	0.041	0.041*	0.028	0.025	0.003	0.072	0.026
	(0.023)	(0.025)	(0.024)	(0.024)	(0.023)	(0.027)	(0.023)	(0.016)	(0.019)	(0.013)	(0.055)	(0.020)
University or college degree or higher	0.024	0.021	0.022	0.032	0.028	0.024	0.024	0.029	0.003	-0.000	0.100*	-0.006
	(0.027)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.027)	(0.023)	(0.014)	(0.017)	(0.048)	(0.024)
Health	0.015	0.016	0.017	0.014	0.014	0.014	0.014	0.015	0.009	-0.009	0.016	0.016
	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.017)	(0.012)	(0.010)	(0.012)	(0.011)	(0.030)	(0.014)
Wife's second occupation	-0.038***	-0.037**	-0.037**	-0.038***	-0.040***	-0.038**	-0.038***	-0.024***	-0.028**	0.004	-0.020	-0.047**
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.017)	(0.012)	(0.007)	(0.010)	(0.011)	(0.017)	(0.018)
Wife's monthly labour income	0.007***	0.006***	0.006***			0.007***	0.007***	0.003	0.004***	0.002**	0.011*	0.003**
	(0.002)	(0.002)	(0.002)			(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.006)	(0.001)
Household size	0.002	0.003	0.002	0.001	0.002	0.002	0.002	0.009*	-0.005	-0.002	-0.008	-0.010
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)	(0.003)	(0.003)	(0.010)	(0.007)
Household total gross income	-0.001	-0.001	-0.001	0.002	-0.001	-0.001	-0.001	-0.006*	0.006	-0.001	0.003	-0.004
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.003)	(0.004)	(0.002)	(0.010)	(0.006)
High skilled occupation	-0.003	-0.004	-0.004	-0.003	-0.007	-0.003	-0.003	0.003	-0.003	0.000	-0.026	0.010
	(0.032)	(0.031)	(0.031)	(0.032)	(0.033)	(0.019)	(0.032)	(0.016)	(0.021)	(0.015)	(0.030)	(0.037)
permanent contract	0.020	0.019	0.019	0.029	0.028	0.020	0.020	-0.001	0.017	0.013	-0.022	0.033
	(0.026)	(0.026)	(0.025)	(0.025)	(0.027)	(0.018)	(0.026)	(0.010)	(0.014)	(0.015)	(0.030)	(0.027)
State-owned firm	-0.005	-0.004	-0.004	-0.001	-0.006	-0.005	-0.005	-0.010	-0.004	0.004	0.008	0.000
	(0.015)	(0.014)	(0.014)	(0.016)	(0.015)	(0.021)	(0.015)	(0.012)	(0.012)	(0.015)	(0.026)	(0.028)
Number of sibllings	-0.000	-0.000	-0.000	-0.001	-0.001	-0.000		0.002	-0.001	-0.002	0.003	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.001)	(0.005)	(0.001)
Need care	0.314***	0.312***	0.313***	0.314***	0.314***	0.314***	0.314***	0.197***	0.170***	0.083***	0.406***	0.273***
	(0.023)	(0.024)	(0.024)	(0.023)	(0.023)	(0.020)	(0.023)	(0.019)	(0.018)	(0.023)	(0.027)	(0.030)
Wife provide childcare		-0.007										
		(0.019)										
Either spouse provide childcare			0.003									
			(0.018)									
Husband provide childcare				-0.005	-0.004	-0.004	-0.004	-0.007	-0.007	0.005	-0.029	0.020
				(0.018)	(0.018)	(0.016)	(0.018)	(0.015)	(0.012)	(0.007)	(0.035)	(0.016)
Wife's hourly wage					0.001							
					(0.001)							
_cons	0.179	0.187	0.152	0.181	0.204	0.190	0.192	-0.037	0.068	0.208*	-0.235	0.487
	(0.196)	(0.218)	(0.219)	(0.222)	(0.201)	(0.167)	(0.219)	(0.098)	(0.165)	(0.098)	(0.228)	(0.296)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	4114	4074	4075	4114	4033	4114	4114	3739	3757	3666	1175	2930
Adjusted R2	0.149	0.147	0.148	0.147	0.147	0.149	0.149	0.107	0.082	0.062	0.204	0.146

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table K.2 First stage of 2SLS regression estimates of husband's paid working hours (Continued)

	Model specifications					Age groups		
	Excluding husband's provision of childcare	**Controlling for wife's provision of childcare**	**Controlling for provision of childcare by either spouse**	**Excluding wife's monthly labour income**	**Controlling for wife's hourly labour income**	18-34 years old	35-44 years old	45-51 years old
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	-0.005	-0.004	-0.003	0.001	0.001	-0.041	-0.158*	0.027
	(0.006)	(0.006)	(0.008)	(0.006)	(0.005)	(0.085)	(0.077)	(0.045)
Age squared	0.000	0.000	0.000	-0.000	-0.000	0.001	0.002*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Hukou	0.011	0.015	0.016	0.036**	0.038**	0.011	-0.005	0.033
	(0.011)	(0.015)	(0.017)	(0.015)	(0.015)	(0.031)	(0.014)	(0.030)
Lower middle school degree	-0.006	0.006	0.006	0.008	0.009	0.011	0.002	-0.004
	(0.010)	(0.012)	(0.013)	(0.012)	(0.012)	(0.033)	(0.023)	(0.018)
Upper middle school degree	0.007	0.019	0.027	0.037**	0.034**	0.007	0.033	0.007
	(0.014)	(0.013)	(0.016)	(0.014)	(0.014)	(0.044)	(0.037)	(0.020)
Technical or vocational degree	0.028	0.035	0.038	0.044**	0.046**	0.060	0.002	0.092***
	(0.022)	(0.023)	(0.023)	(0.018)	(0.018)	(0.059)	(0.035)	(0.024)
University or college degree or higher	0.007	0.020	0.024	0.040*	0.039	0.020	0.020	0.016
	(0.025)	(0.027)	(0.026)	(0.022)	(0.023)	(0.075)	(0.047)	(0.012)
Health	0.009	0.016	0.015	0.004	0.005	0.010	0.015	0.019
	(0.012)	(0.010)	(0.010)	(0.016)	(0.015)	(0.023)	(0.026)	(0.019)
Wife's second occupation	-0.038***	-0.039***	-0.038**	-0.038***	-0.040***	-0.018	-0.034	-0.056*
	(0.010)	(0.012)	(0.013)	(0.012)	(0.012)	(0.046)	(0.021)	(0.027)
Wife's monthly labour income	0.005**	0.004**	0.006**			0.008*	0.008**	0.005
	(0.002)	(0.002)	(0.002)			(0.004)	(0.003)	(0.003)
Household size	-0.000	0.002	0.002	0.002	0.003	-0.008	0.014	-0.003
	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.009)	(0.010)	(0.008)
Household total gross income	0.000	0.000	-0.002	-0.001	-0.003	0.008	-0.009	0.006
	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.010)	(0.006)	(0.008)
High skilled occupation	0.005	-0.001	-0.005	-0.007	-0.009	-0.024	-0.009	0.020
	(0.027)	(0.031)	(0.031)	(0.019)	(0.019)	(0.045)	(0.038)	(0.052)
permanent contract	0.018	0.027	0.020	0.019	0.021	-0.017	0.028	0.035
	(0.023)	(0.028)	(0.027)	(0.021)	(0.022)	(0.038)	(0.025)	(0.043)
State-owned firm	-0.005	-0.006	-0.004	-0.011	-0.017	0.049	-0.015	-0.034
	(0.011)	(0.012)	(0.015)	(0.013)	(0.013)	(0.043)	(0.027)	(0.042)
Number of sibllings	-0.000	0.000	-0.000	-0.003**	-0.002*	0.002	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.003)	(0.003)
Need care	0.332***	0.312***	0.313***	0.308***	0.306***	0.336***	0.322***	0.299***
	(0.019)	(0.025)	(0.024)	(0.022)	(0.021)	(0.059)	(0.029)	(0.037)
Wife provide childcare		-0.002						
		(0.016)						
Either spouse provide childcare			0.003					
			(0.017)					
Husband provide childcare				0.001	0.002	-0.019	-0.018	0.024
				(0.013)	(0.013)	(0.018)	(0.033)	(0.040)
Wife's hourly wage					0.001			
					(0.001)			
Constants	0.167	0.144	0.134	0.113	0.130	0.801	3.187*	-0.682
	(0.148)	(0.173)	(0.202)	(0.144)	(0.117)	(1.248)	(1.580)	(1.105)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	5841	4980	4185	5381	5234	844	1800	1474
Adjusted R2	0.163	0.152	0.148	0.138	0.137	0.147	0.153	0.189

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix L: Timeline of Home-Vased elderly care policies in China by Province

Table L. 1 Timeline of Home-based elderly care policies in China by province

Region	Date
Beijing	2009
Heilongjiang	2012
Shanghai	2010
Jiangsu	2011
Shandong	2010
Hubei	2012
Guizhou	2009
Chongqing	2012
Shanxi	2017
Guangxi	2007
Hunan	2017
Zhejiang	2008
Henan	2011
Yunnan	2010
Liaoning	2004
Hebei	2014
Shanxi	2012
Jilin	2012
Anhui	2011
Fujian	2005
Jiangxi	2014
Guangdong	2012
Hainan	2014
Gansu	2017
Qinghai	2012
Ningxia	2012
Xinjiang	No available data
Xianggang	No available data
Aomen	No available data
Taiwan	No available data
Tianjin	2011
Neimenggu	2016
Xizang	No implementation
Sichuan	2014

Source: Chinses provincial local government websites (including government official websites, civil affairs bureau official websites, and elderly care office official websites), Baidu search engine and Peking University Treasure official websites

Appendix M: Data Structure for Home-Based Elderly Care Policies Analysis

Table M.1 Number of appearances in the survey (wives, extensive)

	Employed			
Number of appearances in the survey	**Observations**	**Percent**	**Individuals**	**Percent**
1	2,290	41.19%	2290	63.61%
2	1740	31.30%	870	24.17%
3	813	14.62%	271	7.53%
4	516	9.28%	129	3.58%
5	200	3.60%	40	1.11%
Total	5,559	100%	3600	100%

Table M.2 Number of appearances in the survey (wives, intensive)

	Weekly working hours			
Number of appearances in the survey	**Observations**	**Percent**	**Individuals**	**Percent**
1	1,441	49.11%	1,441	70.22%
2	810	27.61%	405	19.74%
3	429	14.62%	143	6.97%
4	244	8.32%	61	2.97%
5	10	0.34%	2	0.10%
Total	2,934	100.00%	2052	100.00%

Table M. 3 Panel statistic for employment status (wives)

	Overall		Between		Within
Employment status	**Freq.**	**Percent**	**Freq.**	**Percent**	**Percent**
0	1479	26.61	1229	34.14	86.55
1	4080	73.39	2681	74.47	94.6
Total	5559	100.00	3910	108.61	92.07
(Number of observations=3826)					

Table M. 4 Panel statistic for policy implementation (wives)

	Overall		Between		Within
Policy implementation	**Freq.**	**Percent**	**Freq.**	**Percent**	**Percent**
0	2472	44.47	1724	47.89	85.59
1	3087	55.53	2396	66.56	88.67
Total	5559	100.00	4120	114.44	87.38
(Number of observations=3826)					

Table M. 5 Panel statistic for paid working hours (wives)

	Mean	Std. Dev.	Min	Max	Observations
overall	43.6803	15.67502	1	112	N = 2934
between		15.47651	1	112	n = 2052
within		6.256298	3.6803	85.01363	T-bar = 1.42982

Table M. 6 Panel statistic for policy implementation in intensive margin (wives)

	Overall		Between		Within
Policy implementation	**Freq.**	**Percent**	**Freq.**	**Percent**	**Percent**
0	1596	54.40	1142	55.65	91.83
1	1338	45.60	1116	54.39	89.9
Total	2934	100.00	2258	110.04	90.88
(Number of observations=2105)					

Table M. 7 Number of appearances in the survey (husbands, extensive)

	Employed			
Number of appearances in the survey	**Observations**	**Percent**	**Individuals**	**Percent**
1	2,044	46.33%	2044	67.17%
2	1432	32.46%	716	23.53%
3	615	13.94%	205	6.74%
4	276	6.26%	69	2.27%
5	45	1.02%	9	0.30%
Total	4,412	100%	3043	100%

Table M. 8 Number of appearances in the survey (husbands, intensive)

	Weekly working hours			
Number of appearances in the survey	**Observations**	**Percent**	**Individuals**	**Percent**
1	1,663	50.73%	1,663	70.38%
2	1058	32.28%	529	22.39%
3	387	11.81%	129	5.46%
4	160	4.88%	40	1.69%
5	10	0.31%	2	0.08%
Total	3,278	100.00%	2363	100.00%

Table M. 9 Panel statistic for employment status (husbands)

	Overall		Between		Within
Employment status	**Freq.**	**Percent**	**Freq.**	**Percent**	**Percent**
0	817	18.52	682	22.41	85.03
1	3595	81.48	2551	83.83	96.55
Total	4412	100.00	3233	106.24	94.12
(Number of observations=3043)					

Table M. 10 Panel statistic for policy implementation in extensive margin (husbands)

	Overall		Between		Within
Policy implementation	**Freq.**	**Percent**	**Freq.**	**Percent**	**Percent**
0	2325	52.70	1694	55.67	89.58
1	2087	47.30	1720	56.52	88.69
Total	4412	100.00	3414	112.19	89.13
(Number of observations=3043)					

Table M. 11 Panel statistic for paid working hours (husbands)

	Mean	Std. Dev.	Min	Max	Observations
overall	45.31635	14.94848	1	119	N = 3278
between		14.58788	2	112	n = 2363
within		5.890933	7.316351	79.31635	T-bar = 1.38722

Table M. 12 Panel statistic for policy implementation in intensive margin (husbands)

	Overall		Between		Within
Policy implementation	**Freq.**	**Percent**	**Freq.**	**Percent**	**Percent**
0	1716	52.35	1287	54.46	91.1
1	1562	47.65	1317	55.73	90.4
Total	3278	100.00	2604	110.20	90.75
(Number of observations=2386)					

Appendix N: Event Study Design Estimates of Married Adult Children's Labour Supply

Table N. 1 Event study design estimates of married adult children's labour supply

	Wife		Husband	
	Probability of Employment	**Working hours**	**Probability of Employment**	**Working hours**
	(1)	**(2)**	**(3)**	**(4)**
Four years before policy implementation	-0.010	-0.580	-0.001	-0.177
	(0.020)	(1.589)	(0.029)	(1.162)
Two years before policy implementation	-0.028	-1.162	0.024	-1.054
	(0.032)	(1.513)	(0.020)	(1.619)
Policy implementation	-0.054*	0.652	0.020	0.119
	(0.027)	(1.656)	(0.019)	(1.602)
Two years after policy implementation	-0.055	-1.198	-0.019	-1.881*
	(0.032)	(1.214)	(0.033)	(0.999)
Four years after policy implementation	-0.002	-2.470	0.025	-1.632
	(0.045)	(2.178)	(0.021)	(1.455)
Six years after policy implementation	0.082	-1.864	0.044	-3.962**
	(0.060)	(2.887)	(0.038)	(1.430)
Age	0.067***	-0.176	0.022**	0.157
	(0.007)	(0.677)	(0.007)	(0.449)
Age squared	-0.001***	-0.002	-0.000***	-0.002
	(0.000)	(0.009)	(0.000)	(0.006)
Hukou	0.052**	2.850*	-0.009	2.193
	(0.021)	(1.397)	(0.035)	(1.563)
Lower middle school degree	0.002	4.376***	-0.012	1.705**
	(0.014)	(1.078)	(0.024)	(0.770)
Upper middle school degree	0.035	4.567**	0.004	1.835
	(0.020)	(1.494)	(0.035)	(1.069)
Technical or vocational degree	0.145***	1.779	0.079*	0.766
	(0.024)	(1.266)	(0.043)	(1.419)
University or college degree or higher	0.144***	1.566	0.092*	-0.585
	(0.025)	(1.426)	(0.043)	(1.312)
Health	0.007	-0.561	0.021	-0.661
	(0.021)	(0.938)	(0.030)	(0.758)
Spouse's monthly labour wage	0.174***	-5.034***	0.138***	-2.567*
	(0.026)	(0.955)	(0.041)	(1.427)
Spouse's second occupation	-0.003	-0.541**	-0.009**	-0.172
	(0.006)	(0.243)	(0.004)	(0.488)
Child Care	0.012**	0.693	0.038***	0.211
	(0.005)	(0.601)	(0.008)	(0.263)
Household size	-0.044**	-3.362***	-0.003	-1.172
	(0.016)	(0.837)	(0.012)	(1.118)
Household total gross income	0.043***	-0.266	0.010**	0.161
	(0.004)	(0.150)	(0.004)	(0.104)
Higher skilled occupation		0.137		-0.127
		(0.681)		(1.059)
Permanent contract		-0.546		-0.969
		(0.546)		(0.934)
State-owned firm		-6.080***		-6.308***
		(1.117)		(1.028)
Constant	-0.771***	49.786***	0.061	43.073***
	(0.107)	(13.530)	(0.182)	(8.242)
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	5559	2934	4412	3278
Adjusted R^2	0.315	0.099	0.142	0.080

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level.

Appendix O: Staggered DiD Estimates of Married Adult Children' s Labour Supply Propose by Sun and Abraham (2021)

Table O. 1 Event study estimates of married adult children's labour supply propose by Sun and Abraham (2021)

	Wife		Husband	
	Probability of Employment	**Paid Working Hours**	**Probability of Employment**	**Paid Working Hours**
	(1)	**(2)**	**(3)**	**(4)**
4 years before policy implementation	-0.028***	-0.887	-0.021	-1.191
	(0.008)	(1.951)	(0.016)	(0.826)
2 years before policy implementation	-0.034	0.997	0.011	-1.781
	(0.028)	(0.954)	(0.017)	(1.050)
Policy implementation	-0.086***	2.869***	-0.021	1.464
	(0.027)	(0.921)	(0.018)	(1.366)
2 years after policy implementation	-0.093**	1.477*	-0.082***	-1.999*
	(0.029)	(0.802)	(0.019)	(0.923)
4 years after policy implementation	-0.048	-0.677	-0.042***	-1.309
	(0.037)	(1.494)	(0.008)	(1.234)
6 years after policy implementation	-0.035	-1.752	-0.054***	-3.065***
	(0.023)	(1.048)	(0.010)	(0.363)
Province Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Number of Observations	5559	2934	4412	3278
Adjusted R^2	0.311	0.078	0.014	0.097

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level

Appendix P: Parallel Trend Checks of Married Adult Children' s Labour Supply

Table P.1 Parallel trend test on sample restrictions

	Wife				Husband			
	Need care		Elderly care		Need care		Elderly care	
	Probability of Employment (1)	Paid Working Hours (2)	Probability of Employment (3)	Paid Working Hours (4)	Probability of Employment (5)	Paid Working Hours (6)	Probability of Employment (7)	Paid Working Hours (8)
Four years before the policy implementation	-0.033	-2.651*	-0.110***	-1.059	-0.040	-5.661	-0.028	-4.006
	(0.028)	(1.432)	(0.032)	(1.914)	(0.061)	(3.502)	(0.066)	(2.280)
Two years before the policy implementation	-0.014	-0.636	-0.050	-1.186	0.062	-0.284	-0.071	-1.045
	(0.050)	(1.544)	(0.070)	(1.761)	(0.064)	(1.736)	(0.043)	(1.505)
Policy implementation	-0.018	-0.234	0.004	2.502	0.025	-1.352	0.029	-0.001
	(0.031)	(0.959)	(0.045)	(2.529)	(0.035)	(1.623)	(0.030)	(1.374)
Two years after the policy implementation	-0.085**	-1.177	-0.069*	-3.134	-0.018	-4.500*	-0.057	-1.543
	(0.036)	(2.586)	(0.032)	(3.352)	(0.096)	(2.309)	(0.048)	(2.039)
Four years after the policy implementation	0.022	0.019	-0.022	1.050	0.126	-5.397	0.114*	-4.268*
	(0.050)	(2.705)	(0.066)	(2.791)	(0.077)	(3.460)	(0.060)	(2.364)
Six years after the policy implementation	0.085**	3.131	0.090	1.082	0.121	-12.649**	-0.028	-5.339
	(0.036)	(5.139)	(0.058)	(4.000)	(0.069)	(4.719)	(0.073)	(3.340)
Age	0.082***	1.309*	0.082***	0.626	-0.003	-1.387	0.044**	0.208
	(0.012)	(0.698)	(0.015)	(1.018)	(0.021)	(0.895)	(0.017)	(0.817)
Age squared	-0.001***	-0.021**	-0.001***	-0.011	-0.000	0.015	-0.001**	-0.004
	(0.000)	(0.009)	(0.000)	(0.013)	(0.000)	(0.011)	(0.000)	(0.010)
Hukou	0.053**	3.359*	0.079**	3.001	-0.011	2.922	-0.007	1.653
	(0.021)	(1.737)	(0.032)	(2.503)	(0.062)	(2.141)	(0.043)	(1.990)
Lower middle school degree	-0.011	5.075***	-0.019	5.764	-0.004	-1.190	-0.044	2.809
	(0.025)	(1.485)	(0.037)	(3.361)	(0.062)	(1.840)	(0.075)	(3.567)
Upper middle school degree	0.000	4.894*	-0.032	4.407	0.035	-2.583	-0.025	1.104
	(0.035)	(2.371)	(0.059)	(3.636)	(0.077)	(2.058)	(0.064)	(3.480)
Technical or vocational degree	0.134***	2.542	0.090**	2.171	0.137	-1.596	-0.006	2.225
	(0.042)	(1.976)	(0.036)	(3.121)	(0.095)	(2.478)	(0.088)	(3.637)
University or college degree or higher	0.145***	2.541	0.118**	3.252	0.162*	-4.529*	0.082	0.142
	(0.038)	(2.174)	(0.043)	(3.428)	(0.082)	(2.440)	(0.075)	(3.536)
Health	0.013	-1.627	0.027	-2.737	0.051	2.188	0.035	-1.004
	(0.033)	(1.644)	(0.038)	(2.295)	(0.032)	(1.752)	(0.038)	(1.224)
Spouse's monthly labour wage	0.228***	-6.369*	0.224***	-8.391***	0.139**	-9.068**	0.131**	-2.672
	(0.045)	(3.367)	(0.057)	(1.624)	(0.047)	(3.468)	(0.043)	(6.234)
Spouse's second occupation	-0.003	-0.697	-0.017*	-0.820	-0.017	-0.455	-0.021**	0.117
	(0.010)	(0.455)	(0.008)	(0.625)	(0.014)	(0.779)	(0.008)	(0.667)
Childcare	0.007	0.156	0.022**	1.080	0.022	-0.014	0.057***	-0.476
	(0.010)	(0.662)	(0.010)	(1.403)	(0.013)	(0.598)	(0.014)	(0.583)
Household size	-0.028	-3.662*	-0.031	-3.292	0.029	-3.987**	0.029	-1.721
	(0.029)	(1.718)	(0.036)	(2.522)	(0.041)	(1.518)	(0.038)	(2.406)
Household total gross income	0.041***	-0.175	0.035***	-0.189	0.011**	-0.010	0.008	0.112
	(0.006)	(0.225)	(0.007)	(0.382)	(0.005)	(0.104)	(0.005)	(0.183)
High-skilled occupation		0.497		-0.104		0.734		0.604
		(1.599)		(2.423)		(1.213)		(0.846)
Permanent contract		-1.019		-0.017		2.227		-0.068
		(0.881)		(0.850)		(1.586)		(1.300)
State-owned firm		-5.876***		-4.920**		-7.142***		-7.422***
		(1.440)		(1.753)		(1.593)		(1.475)
Constant	-1.009***	27.695*	-1.027***	30.188	0.673	82.940***	-0.514*	49.978**
	(0.212)	(14.077)	(0.274)	(23.709)	(0.508)	(15.915)	(0.252)	(18.126)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1640	824	1038	526	782	560	774	586
Adjusted R^2	0.302	0.109	0.323	0.125	0.142	0.171	0.149	0.149

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table P.2 Parallel trend test on different control variables

	Wife						Husband					
	Probability of Employment			Paid Working Hours			Probability of Employment			Paid Working Hours		
	Exclude spouse's second occupation	Exclude spouse's monthly labour income	Exclude both spouse's second occupation & monthly labour income	Exclude spouse's second occupation	Exclude spouse's monthly labour income	Exclude both spouse's second occupation & monthly labour income	Exclude spouse's second occupation	Exclude spouse's monthly labour income	Exclude both spouse's second occupation & monthly labour income	Exclude spouse's second occupation	Exclude spouse's monthly labour income	Exclude both spouse's second occupation & monthly labour income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Four years before the policy implementation	-0.014	-0.006	-0.011	-0.462	-0.506	-0.497	-0.001	-0.003	-0.004	-0.107	-0.119	-0.113
	(0.021)	(0.023)	(0.023)	(1.170)	(1.177)	(1.176)	(0.028)	(0.028)	(0.028)	(1.124)	(1.145)	(1.150)
Two years before the policy implementation	-0.031	-0.037	-0.041*	-1.167	-1.114	-1.140	0.024	0.020	0.020	-0.992	-1.060	-1.044
	(0.021)	(0.023)	(0.023)	(1.212)	(1.214)	(1.214)	(0.020)	(0.021)	(0.022)	(1.653)	(1.645)	(1.661)
Policy implementation	-0.061**	-0.067**	-0.077***	0.839	0.647	0.857	0.017	0.017	0.013	0.316	0.189	0.266
	(0.025)	(0.027)	(0.027)	(1.447)	(1.443)	(1.449)	(0.019)	(0.019)	(0.019)	(1.631)	(1.624)	(1.621)
Two years after the policy implementation	-0.058***	-0.080***	-0.085***	-1.200	-1.111	-1.085	-0.021	-0.025	-0.026	-1.793	-1.855*	-1.849*
	(0.022)	(0.023)	(0.024)	(1.392)	(1.399)	(1.396)	(0.033)	(0.034)	(0.034)	(0.999)	(0.960)	(0.971)
Four years after the policy implementation	-0.006	-0.015	-0.022	-2.479	-2.429	-2.370	0.021	0.025	0.023	-1.350	-1.434	-1.380
	(0.026)	(0.027)	(0.027)	(1.833)	(1.829)	(1.832)	(0.021)	(0.022)	(0.023)	(1.441)	(1.423)	(1.429)
Six years after the policy implementation	0.084***	0.053*	0.054*	-1.961	-1.707	-1.713	0.043	0.044	0.044	-3.807**	-3.856**	-3.841**
	(0.028)	(0.030)	(0.030)	(2.105)	(2.101)	(2.105)	(0.036)	(0.041)	(0.039)	(1.469)	(1.422)	(1.455)
Age	0.068***	0.080***	0.082***	-0.199	-0.198	-0.229	0.022***	0.027***	0.028***	0.118	0.235	0.215
	(0.007)	(0.008)	(0.008)	(0.416)	(0.409)	(0.416)	(0.007)	(0.007)	(0.007)	(0.440)	(0.442)	(0.441)
Age squared	-0.001***	-0.001***	-0.001***	-0.002	-0.001	-0.001	-0.000***	-0.000***	-0.000***	-0.002	-0.003	-0.003
	(0.000)	(0.000)	(0.000)	(0.006)	(0.005)	(0.006)	(0.000)	(0.000)	(0.000)	(0.005)	(0.005)	(0.005)
Hukou	0.037***	0.074***	0.054***	3.469***	2.855***	3.521***	-0.016	0.004	-0.004	2.461	2.467	2.577
	(0.014)	(0.016)	(0.015)	(0.898)	(0.905)	(0.900)	(0.034)	(0.035)	(0.035)	(1.550)	(1.602)	(1.582)
Education	0.135***	0.209***	0.200***	1.676	1.519	1.685	0.029**	0.035***	0.035***	-0.388	-0.319	-0.317
	(0.020)	(0.021)	(0.021)	(1.415)	(1.407)	(1.414)	(0.010)	(0.010)	(0.010)	(0.358)	(0.358)	(0.359)
Health	0.004	0.015	0.011	-0.607	-0.743	-0.722	0.020	0.022	0.019	-0.644	-0.716	-0.687
	(0.017)	(0.018)	(0.018)	(0.967)	(0.954)	(0.963)	(0.029)	(0.030)	(0.029)	(0.726)	(0.736)	(0.723)
Household size	-0.004	-0.011*	-0.012**	-0.501*	-0.504*	-0.448	-0.010**	-0.012**	-0.012***	-0.150	-0.192	-0.179
	(0.005)	(0.005)	(0.006)	(0.291)	(0.286)	(0.288)	(0.004)	(0.004)	(0.003)	(0.484)	(0.477)	(0.472)
Household total gross income	0.012**	0.045***	0.047***	0.731	0.382	0.363	0.039***	0.044***	0.045***	0.201	0.311	0.289
	(0.005)	(0.005)	(0.005)	(0.505)	(0.426)	(0.434)	(0.008)	(0.007)	(0.007)	(0.256)	(0.266)	(0.267)
Childcare	-0.044***	-0.045***	-0.045***	-3.382***	-3.400***	-3.394***	-0.003	-0.004	-0.005	-1.212	-1.267	-1.258
	(0.015)	(0.016)	(0.016)	(0.794)	(0.789)	(0.796)	(0.012)	(0.011)	(0.012)	(1.122)	(1.130)	(1.133)
Spouse's monthly labour income	0.044***			-0.301**			0.011**			0.146		
	(0.002)			(0.130)			(0.004)			(0.110)		
Spouse's second occupation		0.233***			-5.261***			0.169***			-2.108	
		(0.021)			(1.550)			(0.048)			(1.595)	
High-skilled occupation				0.148	0.080	0.086				-0.366	-0.399	-0.390
				(0.565)	(0.557)	(0.561)				(1.009)	(1.000)	(1.006)
Permanent contract				-0.637	-0.521	-0.624				-0.895	-0.873	-0.855
				(0.615)	(0.613)	(0.615)				(0.955)	(0.913)	(0.925)
State-owned firm				-6.003***	-6.153***	-6.082***				-6.387***	-6.360***	-6.358***
				(0.684)	(0.681)	(0.686)				(1.036)	(1.008)	(1.012)
Constant	-0.777***	-1.121***	-1.143***	49.329***	51.794***	51.596***	-0.016	-0.123	-0.148	45.778***	43.313***	43.709***
	(0.149)	(0.164)	(0.166)	(9.187)	(8.833)	(9.007)	(0.181)	(0.176)	(0.174)	(8.155)	(8.560)	(8.599)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	5559	5559	5559	2933	2933	2933	4412	4412	4412	3277	3277	3277
Adjusted R^2	0.307	0.228	0.213	0.093	0.097	0.091	0.137	0.134	0.129	0.077	0.076	0.076

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table P. 3 Parallel trend test on model specifications

	Wife						Husband					
	Province Variables		Province Variables & Time interaction		Individual Fixed Effects		Province Variables		Province Variables & Time interaction		Individual Fixed Effects	
	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Four years before the policy implementation	-0.016	-0.672	-0.021	-0.250	-0.005	0.406	-0.003	0.540	0.036	0.158	0.005	1.442
	(0.020)	(1.653)	(0.023)	(1.644)	(0.025)	(1.315)	(0.025)	(1.399)	(0.026)	(0.640)	(0.023)	(1.521)
Two years before the policy implementation	-0.033	-1.309	-0.017	-0.899	0.021	-0.230	0.020	-0.354	-0.021	-0.122	-0.002	-1.282
	(0.034)	(1.489)	(0.032)	(1.678)	(0.021)	(1.107)	(0.020)	(1.101)	(0.025)	(1.304)	(0.025)	(1.162)
Policy implementation	-0.063*	0.323	-0.051*	0.960	0.006	1.875	0.010	2.018	-0.027	2.538	0.005	-1.997*
	(0.030)	(1.629)	(0.025)	(1.639)	(0.030)	(1.904)	(0.029)	(1.741)	(0.032)	(1.993)	(0.038)	(0.944)
Two years after the policy implementation	-0.057*	-0.875	-0.048	0.130	-0.020	-1.480	-0.017	-1.711	-0.018	0.052	-0.003	-3.236**
	(0.029)	(1.214)	(0.030)	(1.079)	(0.027)	(1.055)	(0.027)	(1.062)	(0.011)	(1.455)	(0.030)	(1.258)
Four years after the policy implementation	-0.009	-2.488	0.000	-2.213	0.018	-0.829	0.019	-0.966	-0.031	-1.326	0.011	-2.459
	(0.049)	(2.154)	(0.040)	(2.381)	(0.026)	(1.062)	(0.024)	(0.868)	(0.029)	(2.170)	(0.028)	(2.089)
Six years after the policy implementation	0.072	-1.929	0.076	-1.252	0.038	-2.829	0.039	-2.586*	0.001	-0.537	0.008	-3.898**
	(0.054)	(2.981)	(0.047)	(2.946)	(0.039)	(1.847)	(0.033)	(1.374)	(0.039)	(3.083)	(0.041)	(1.578)
Age	0.067***	-0.141	0.062**	-0.388	0.022***	0.124	-0.007	-0.787	0.024	-0.295	0.059	4.392**
	(0.007)	(0.665)	(0.025)	(1.129)	(0.007)	(0.448)	(0.029)	(0.736)	(0.030)	(2.628)	(0.040)	(1.970)
Age squared	-0.001***	-0.002	-0.001**	0.001	-0.000***	-0.002	-0.000	0.010	-0.001***	0.005	-0.000	-0.001
	(0.000)	(0.009)	(0.000)	(0.015)	(0.000)	(0.006)	(0.000)	(0.009)	(0.000)	(0.009)	(0.000)	(0.015)
Hukou	0.051**	2.843*	0.093***	6.693**	-0.009	2.266	0.038	4.702				
	(0.021)	(1.406)	(0.030)	(2.416)	(0.035)	(1.568)	(0.055)	(3.268)				
Lower middle school degree	0.002	4.393***	-0.024	4.099	-0.011	1.641*	-0.181***	4.446				
	(0.014)	(1.071)	(0.032)	(2.761)	(0.024)	(0.782)	(0.053)	(3.973)				
Upper middle school degree	0.036	4.607***	0.084	3.249	0.005	1.738	-0.141**	4.981				
	(0.020)	(1.479)	(0.056)	(2.349)	(0.036)	(1.089)	(0.059)	(4.074)				
Technical or vocational degree	0.146***	1.774	0.144**	0.952	0.079*	0.729	-0.006	2.473				
	(0.024)	(1.267)	(0.056)	(2.784)	(0.043)	(1.435)	(0.084)	(3.932)				
University or college degree or higher	0.145***	1.576	0.138**	0.721	0.092*	-0.700	-0.057	2.039				
	(0.025)	(1.415)	(0.046)	(2.800)	(0.044)	(1.333)	(0.083)	(3.077)				
Health	0.007	-0.608	-0.025	1.224	0.021	-0.562	-0.047	0.266	0.006	-2.240*	0.026	-1.585
	(0.021)	(1.007)	(0.055)	(1.473)	(0.030)	(0.779)	(0.053)	(2.275)	(0.020)	(1.240)	(0.034)	(0.892)
Spouse's monthly labour wage	0.171***	-4.941***	0.180***	-6.381*	0.137***	-2.532	0.185**	4.042	0.067	1.305	0.007	0.254
	(0.028)	(0.944)	(0.057)	(3.381)	(0.041)	(1.602)	(0.072)	(4.229)	(0.044)	(2.195)	(0.032)	(1.556)
Spouse's second occupation	-0.002	-0.539**	0.016	-0.389	-0.009*	-0.225	-0.029	-2.181**	-0.019	-0.184	0.023	0.111
	(0.006)	(0.240)	(0.012)	(0.564)	(0.004)	(0.460)	(0.019)	(0.815)	(0.012)	(0.913)	(0.017)	(0.827)
Childcare	0.012**	0.705	0.010	0.712	0.038***	0.201	0.043***	-0.578	0.013***	0.601	0.018	-0.014
	(0.005)	(0.615)	(0.014)	(0.800)	(0.008)	(0.255)	(0.009)	(0.779)	(0.004)	(1.066)	(0.012)	(0.633)
Household size	-0.045**	-3.320***	-0.029	-4.556*	-0.003	-1.224	0.043	3.494	0.032	-3.482**	0.024	-0.844
	(0.016)	(0.855)	(0.023)	(2.079)	(0.012)	(1.115)	(0.040)	(2.167)	(0.027)	(1.387)	(0.028)	(1.637)
Household total gross income	0.043***	-0.283*	0.063***	-0.209	0.010**	0.160	0.022**	0.336	0.036***	-0.139	0.019***	-0.105
	(0.004)	(0.153)	(0.007)	(0.234)	(0.004)	(0.100)	(0.008)	(0.385)	(0.004)	(0.222)	(0.005)	(0.187)
High-skilled occupation		0.093		-0.436		-0.108		-0.794		-1.446		1.099
		(0.700)		(1.449)		(1.051)		(1.920)		(1.304)		(1.090)
Permanent contract		-0.483		-0.087		-1.082		-3.931		-1.591		0.304
		(0.516)		(1.601)		(0.936)		(3.982)		(1.288)		(0.826)
State-owned firm		-6.080***		-5.807**		-6.276***		-4.432		-0.461		-2.207
		(1.159)		(1.885)		(1.020)		(2.514)		(1.885)		(1.775)
General Budget Revenue (billions of yuan)	-0.108	1.323	-0.070	-0.960	-0.186*	10.876**	-0.187**	11.933***				
	(0.098)	(5.256)	(0.080)	(5.010)	(0.092)	(4.022)	(0.075)	(3.339)				
Per Capita GDP (yuan)	-0.579	-12.005	-0.450	1.031	-0.181	102.547*	-0.264	114.852**				
	(1.260)	(89.680)	(1.047)	(91.440)	(0.974)	(47.020)	(0.765)	(44.714)				
Elderly Dependency Ratio	0.000	0.000*	0.000*	0.000**	0.000	0.000	0.000	0.000				
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
Constant	0.082	37.383	-0.412	45.122	1.350*	-49.165	1.348**	-59.629*	0.517	46.048	-1.435	-122.707*
	(0.855)	(51.338)	(0.685)	(49.983)	(0.742)	(38.412)	(0.594)	(32.621)	(1.175)	(92.785)	(1.439)	(66.091)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No
Individual Fixed Effects	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Number of observations	5559	2934	5559	2934	4412	3278	4412	3278	3275	1496	2378	1618
Adjusted R^2	0.316	0.100	0.340	0.128	0.144	0.083	0.162	0.108	0.714	0.649	0.676	0.657

** p < 0.1, ** p < 0.05, *** p < 0.01, Standard errors clustered at province level.*

Table P. 4 Parallel trend test on Individual-level clustered standard errors

	Wife		Husbands	
	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours
	(1)	(2)	(3)	(4)
Four years before the policy implementation	-0.010	-0.580	-0.001	-0.193
	(0.021)	(1.169)	(0.025)	(1.092)
Two years before the policy implementation	-0.028	-1.162	0.024	-1.053
	(0.021)	(1.212)	(0.023)	(1.051)
Policy implementation	-0.054**	0.652	0.020	0.218
	(0.025)	(1.441)	(0.027)	(1.253)
Two years after the policy implementation	-0.055**	-1.198	-0.021	-1.793
	(0.022)	(1.394)	(0.027)	(1.261)
Four years after the policy implementation	-0.002	-2.470	0.023	-1.428
	(0.025)	(1.833)	(0.034)	(1.657)
Six years after the policy implementation	0.082***	-1.864	0.043	-3.784**
	(0.028)	(2.099)	(0.037)	(1.768)
Age	0.067***	-0.176	0.022***	0.131
	(0.007)	(0.409)	(0.007)	(0.327)
Age squared	-0.001***	-0.002	-0.000***	-0.002
	(0.000)	(0.005)	(0.000)	(0.004)
Hukou	0.052***	2.850***	-0.009	2.362***
	(0.014)	(0.905)	(0.015)	(0.767)
Education	0.144***	1.566	0.030***	-0.380
	(0.020)	(1.412)	(0.006)	(0.268)
Health	0.007	-0.561	0.022	-0.648
	(0.017)	(0.955)	(0.019)	(0.871)
Spouse's second occupation	0.174***	-5.034***	0.139***	-2.514
	(0.021)	(1.560)	(0.019)	(1.862)
Household size	-0.003	-0.541*	-0.009*	-0.166
	(0.005)	(0.290)	(0.005)	(0.255)
Household total gross income	0.012**	0.693	0.038***	0.209
	(0.005)	(0.495)	(0.007)	(0.274)
Childcare	-0.044***	-3.362***	-0.002	-1.230
	(0.015)	(0.788)	(0.016)	(0.766)
Spouse's monthly labour wage	0.043***	-0.266**	0.010***	0.159*
	(0.002)	(0.130)	(0.002)	(0.085)
High-skilled occupation		0.137		-0.409
		(0.560)		(0.588)
Permanent contract		-0.546		-0.965
		(0.614)		(0.609)
State-owned firm		-6.080***		-6.432***
		(0.680)		(0.639)
Constant	-0.771***	49.786***	-0.007	45.585***
	(0.148)	(9.000)	(0.149)	(7.326)
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	5559	2934	4412	3278
Adjusted R^2	0.315	0.099	0.140	0.078

** p < 0.1, ** p < 0.05, *** p < 0.01, Standard errors clustered at province level.*

Table P. 5 Parallel trend test on household total gross income heterogeneity analysis

	Wife				Husband			
	Probability of Employment		Paid Working Hours		Probability of Employment		Paid Working Hours	
	Low household income (1)	High household income (2)	Low household income (3)	High household income (4)	Low household income (5)	High household income (6)	Low household income (7)	High household income (8)
Four years before the policy implementation	-0.034	0.081	-0.961	-0.912	-0.014	0.030	0.624	-4.516
	(0.021)	(0.050)	(1.902)	(1.639)	(0.032)	(0.019)	(1.130)	(2.823)
Two years before the policy implementation	-0.047	0.071	-2.669	1.681	0.011	0.054**	-0.701	-4.025*
	(0.033)	(0.062)	(1.936)	(1.088)	(0.025)	(0.023)	(1.711)	(2.089)
Policy implementation	-0.060*	0.038	0.158	4.089**	0.018	0.054**	0.986	-3.559*
	(0.027)	(0.062)	(1.823)	(1.637)	(0.028)	(0.021)	(2.079)	(1.868)
Two years after the policy implementation	-0.094***	0.075	-2.269	2.977***	-0.050	0.069*	-1.385	-4.059**
	(0.025)	(0.070)	(1.801)	(0.931)	(0.042)	(0.034)	(1.131)	(1.393)
Four years after the policy implementation	-0.004	0.010	-2.297	-2.744	-0.024	0.119***	-0.947	-3.471
	(0.038)	(0.050)	(2.885)	(2.531)	(0.038)	(0.032)	(1.782)	(2.654)
Six years after the policy implementation	0.080	0.096	-0.317	-0.847	0.049	0.094**	-3.752*	-4.556**
	(0.051)	(0.062)	(3.625)	(2.458)	(0.064)	(0.031)	(1.840)	(1.691)
Age	0.075***	0.048***	0.087	-0.450	0.026**	0.014	0.360	-0.409
	(0.010)	(0.008)	(0.622)	(0.740)	(0.009)	(0.011)	(0.508)	(0.715)
Age squared	-0.001***	-0.001***	-0.006	0.003	-0.000***	-0.000	-0.005	0.006
	(0.000)	(0.000)	(0.008)	(0.009)	(0.000)	(0.000)	(0.006)	(0.009)
Hukou	0.066**	0.014	3.731**	0.428	-0.027	0.026	2.769*	0.705
	(0.023)	(0.022)	(1.652)	(1.484)	(0.039)	(0.031)	(1.335)	(2.652)
Lower middle school degree	-0.001	0.016	3.710**	5.293**	-0.015	0.002	1.212	2.303
	(0.019)	(0.025)	(1.534)	(1.773)	(0.032)	(0.028)	(1.123)	(1.654)
Upper middle school degree	0.036	0.053	4.038**	5.403**	-0.005	0.034	1.498	2.143
	(0.028)	(0.046)	(1.565)	(2.331)	(0.035)	(0.056)	(1.182)	(1.870)
Technical or vocational degree	0.150***	0.159***	1.514	2.186	0.085	0.065	0.763	0.724
	(0.032)	(0.038)	(1.545)	(2.221)	(0.049)	(0.048)	(1.653)	(2.138)
University or college degree or higher	0.161***	0.181***	2.418	1.209	0.109*	0.072*	-0.401	-0.290
	(0.027)	(0.029)	(1.646)	(2.291)	(0.060)	(0.040)	(1.499)	(1.962)
Health	-0.007	0.026	-0.353	-1.059	0.027	0.012	-0.438	-1.187
	(0.028)	(0.022)	(0.613)	(1.692)	(0.032)	(0.024)	(1.056)	(0.742)
Spouse's second occupation	0.176***	0.164***	-6.589***	-1.996	0.172***	0.095**	-2.674	-3.145
	(0.039)	(0.029)	(1.199)	(2.064)	(0.048)	(0.035)	(2.715)	(2.562)
Household size	-0.001	0.005	-0.374	-0.942*	-0.021***	0.003	-0.165	-0.241
	(0.010)	(0.004)	(0.316)	(0.452)	(0.005)	(0.006)	(0.566)	(0.548)
Household total gross income	0.017***	-0.053***	-0.025	0.760	0.032***	0.005	-0.040	1.272*
	(0.004)	(0.012)	(0.738)	(0.893)	(0.009)	(0.018)	(0.333)	(0.596)
Childcare	-0.041	-0.058**	-3.415***	-3.361*	0.011	-0.021	-1.150	-1.290
	(0.023)	(0.019)	(0.931)	(1.849)	(0.016)	(0.019)	(1.415)	(1.612)
Spouse's monthly labour wage	0.047***	0.034***	-0.208	-0.512	0.010*	0.008	0.194	0.144
	(0.004)	(0.005)	(0.157)	(0.351)	(0.005)	(0.005)	(0.115)	(0.178)
High-skilled occupation			0.058	-0.451			-0.472	0.342
			(0.702)	(0.921)			(1.305)	(1.011)
Permanent contract			-1.079	0.740			-0.703	-1.523
			(0.703)	(0.960)			(1.080)	(1.259)
State-owned firm			-6.129***	-5.191***			-6.235***	-6.471***
			(1.407)	(1.107)			(1.101)	(1.192)
Constant	-0.977***	0.262	52.563***	55.161***	0.102	0.467	41.314***	44.019***
	(0.152)	(0.266)	(10.665)	(17.562)	(0.226)	(0.345)	(9.696)	(13.311)
Year Fixed Effects								
Province Fixed Effects								
Number of observations	3735	1824	1966	968	2960	1452	2216	1062
Adjusted R^2	0.319	0.283	0.107	0.138	0.129	0.123	0.082	0.100

** p < 0.1, ** p < 0.05, *** p < 0.01, Standard errors clustered at province level.*

Table P. 6 Parallel trend test on education heterogeneity analysis

	Wives				Husbands			
	Probability of Employment		Paid Working Hours		Probability of Employment		Paid Working Hours	
	Low educated (1)	High educated (2)	Low educated (3)	High educated (4)	Low educated (5)	High educated (6)	Low educated (7)	High educated (8)
Four years before the policy implementation	-0.015	0.017	-1.185	2.746	-0.000	0.006	-0.100	-0.414
	(0.023)	(0.019)	(1.787)	(1.891)	(0.030)	(0.038)	(1.380)	(0.610)
Two years before the policy implementation	-0.033	0.002	-1.615	-0.027	0.029	0.031	-1.380	1.236
	(0.034)	(0.024)	(1.739)	(1.378)	(0.023)	(0.027)	(1.912)	(1.386)
Policy implementation	-0.059*	-0.018	0.436	0.136	0.029	-0.008	0.003	1.161
	(0.027)	(0.016)	(1.803)	(1.321)	(0.025)	(0.028)	(2.138)	(1.479)
Two years after the policy implementation	-0.070*	-0.019	-1.880	0.395	-0.017	-0.017	-2.181	-0.534
	(0.038)	(0.030)	(1.261)	(2.101)	(0.033)	(0.026)	(1.275)	(1.061)
Four years after the policy implementation	-0.015	0.065*	-3.716	2.151	0.030	0.071*	-2.039	2.604
	(0.048)	(0.033)	(2.411)	(1.819)	(0.028)	(0.033)	(1.833)	(2.449)
Six years after the policy implementation	0.085	0.049	-3.651	2.265	0.059	0.032	-3.590*	-3.545*
	(0.069)	(0.040)	(3.419)	(1.967)	(0.044)	(0.033)	(1.980)	(1.667)
Age	0.069***	0.051**	-0.251	-0.136	0.019**	0.048**	0.187	0.090
	(0.008)	(0.020)	(0.748)	(0.422)	(0.008)	(0.019)	(0.489)	(0.608)
Age squared	-0.001***	-0.001**	-0.001	0.001	-0.000**	-0.001**	-0.003	-0.001
	(0.000)	(0.000)	(0.010)	(0.006)	(0.000)	(0.000)	(0.006)	(0.007)
Hukou	0.056**	0.005	3.214*	-2.388	-0.010	0.057	2.425	-1.138
	(0.021)	(0.023)	(1.512)	(1.446)	(0.037)	(0.065)	(1.680)	(2.190)
Lower middle school degree	-0.002		4.138***		-0.012		1.529*	
	(0.014)		(1.030)		(0.024)		(0.809)	
Upper middle school degree	0.030		4.263**		0.006		1.519	
	(0.020)		(1.499)		(0.034)		(1.104)	
Technical or vocational degree	0.133***		1.510		0.075*		0.299	
	(0.024)		(1.271)		(0.042)		(1.453)	
University or college degree or higher		0.000		0.000		0.000		0.000
		(.)		(.)		(.)		(.)
Health	0.010	-0.014	-0.568	-0.739	0.022	0.025	-0.410	-1.900
	(0.026)	(0.008)	(1.143)	(0.871)	(0.035)	(0.019)	(0.900)	(1.225)
Spouse's second occupation	0.175***	-0.060	-4.993***	-1.026	0.137***	0.018	-2.748*	-1.068
	(0.026)	(0.084)	(0.974)	(1.498)	(0.042)	(0.031)	(1.473)	(1.506)
Household size	-0.002	-0.014	-0.590*	-0.233	-0.008*	-0.015	-0.181	-0.354
	(0.007)	(0.008)	(0.270)	(0.285)	(0.004)	(0.010)	(0.577)	(0.265)
Household total gross income	0.011*	0.018	1.114	-1.959***	0.037***	0.050***	0.221	-0.029
	(0.005)	(0.019)	(0.713)	(0.513)	(0.009)	(0.015)	(0.253)	(0.381)
Childcare	-0.045**	-0.001	-4.036***	0.152	-0.003	0.011	-0.923	-1.474
	(0.017)	(0.019)	(0.971)	(1.020)	(0.015)	(0.018)	(1.328)	(0.968)
Spouse's monthly labour wage	0.046***	0.011**	-0.356**	0.152	0.012**	-0.004	0.211*	-0.153
	(0.004)	(0.004)	(0.157)	(0.219)	(0.004)	(0.003)	(0.114)	(0.114)
High-skilled occupation			-0.141	-0.460			0.282	-0.276
			(0.921)	(0.850)			(1.612)	(0.730)
Permanent contract			-0.735	0.284			-0.745	-1.961
			(0.636)	(0.752)			(1.078)	(1.594)
State-owned firm			-6.539***	-3.961***			-6.653***	-4.728***
			(1.207)	(1.043)			(1.214)	(1.069)
Constant	-0.809***	-0.169	49.380***	71.808***	0.103	-0.481	42.340***	51.799***
	(0.135)	(0.449)	(15.118)	(7.763)	(0.210)	(0.418)	(8.842)	(12.054)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	4694	865	2360	574	3674	738	2616	662
Adjusted R^2	0.290	0.163	0.103	0.162	0.126	0.137	0.071	0.152

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table P.7 Table A.25. Parallel trend test on age heterogeneity analysis

	Wives						Husbands					
	Probability of Employment			Paid Working Hours			Probability of Employment			Paid Working Hours		
	18-34 years old	35-44 years old	45-51 years old	18-34 years old	35-44 years old	45-51 years old	18-34 years old	35-44 years old	45-51 years old	18-34 years old	35-44 years old	45-51 years old
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Four years before the policy implementation	0.004	0.032	-0.072**	3.032	-2.474	-2.006	-0.016	-0.063	0.096**	0.867	-2.002	0.800
	(0.022)	(0.032)	(0.033)	(2.597)	(1.833)	(1.440)	(0.048)	(0.037)	(0.040)	(1.441)	(1.319)	(3.908)
Two years before the policy implementation	-0.015	-0.030	-0.007	-0.397	-1.771	-1.987	0.038	-0.037	0.106**	-1.823	-2.579	0.678
	(0.025)	(0.036)	(0.060)	(2.734)	(1.615)	(2.472)	(0.033)	(0.031)	(0.046)	(2.967)	(1.750)	(2.019)
Policy implementation	-0.029	-0.046	-0.050	-2.600	1.427	0.816	0.011	-0.001	0.069	-4.143	0.214	5.575*
	(0.041)	(0.030)	(0.037)	(2.434)	(1.786)	(3.139)	(0.039)	(0.027)	(0.070)	(2.700)	(1.427)	(2.622)
Two years after the policy implementation	-0.047	-0.035	-0.066	-2.275	-3.410*	2.592	-0.090*	0.010	0.011	-1.283	-4.523**	0.350
	(0.035)	(0.037)	(0.044)	(2.542)	(1.857)	(2.787)	(0.042)	(0.054)	(0.065)	(1.703)	(1.554)	(2.901)
Four years after the policy implementation	0.042	-0.016	-0.014	-0.166	-3.421	-2.682	-0.017	-0.029	0.165*	-0.978	-3.979**	-1.741
	(0.041)	(0.062)	(0.043)	(2.927)	(2.242)	(4.799)	(0.040)	(0.038)	(0.089)	(2.305)	(1.350)	(3.646)
Six years after the policy implementation	0.100*	0.057	0.128	2.934	-8.292**	0.387	-0.062	0.052	0.167	-3.311*	-4.644**	-2.803
	(0.051)	(0.079)	(0.076)	(3.186)	(3.514)	(5.599)	(0.066)	(0.047)	(0.118)	(1.688)	(1.866)	(3.458)
Age	0.086*	0.080	0.530	1.743	-6.873	-8.849	0.065***	0.050**	0.108	1.082	-2.891*	-1.411
	(0.040)	(0.056)	(0.327)	(3.358)	(4.181)	(22.256)	(0.016)	(0.019)	(0.070)	(0.833)	(1.473)	(2.084)
Age squared	-0.001*	-0.001	-0.006	-0.033	0.083	0.083	-0.001***	-0.001***	-0.001	-0.016	0.034*	0.013
	(0.001)	(0.001)	(0.003)	(0.058)	(0.053)	(0.232)	(0.000)	(0.000)	(0.001)	(0.014)	(0.018)	(0.022)
Hukou	0.061**	0.110***	-0.012	0.666	3.089	6.419**	0.010	0.010	-0.059	2.643	1.078	1.792
	(0.023)	(0.026)	(0.034)	(0.944)	(1.907)	(2.403)	(0.034)	(0.047)	(0.037)	(1.881)	(1.833)	(2.131)
Lower middle school degree	0.047	0.014	-0.019	7.550**	4.958***	-0.278	-0.086**	-0.001	0.025	-0.715	3.168*	2.916*
	(0.036)	(0.027)	(0.022)	(2.755)	(1.548)	(2.226)	(0.030)	(0.038)	(0.040)	(1.878)	(1.506)	(1.428)
Upper middle school degree	0.119**	0.022	0.045	6.639*	5.499**	1.450	-0.046	-0.016	0.064	2.165	2.696	1.081
	(0.049)	(0.034)	(0.040)	(3.045)	(2.009)	(1.633)	(0.030)	(0.052)	(0.056)	(2.105)	(1.647)	(1.296)
Technical or vocational degree	0.170***	0.110***	0.219***	4.656	0.784	0.828	-0.051	0.082	0.270***	-0.901	2.198	0.785
	(0.052)	(0.030)	(0.037)	(2.654)	(1.228)	(1.819)	(0.046)	(0.049)	(0.054)	(2.454)	(1.635)	(2.038)
University or college degree or higher	0.167***	0.082**	0.246***	4.355	0.490	1.897	0.006	0.080	0.209***	-3.014	0.918	1.138
	(0.047)	(0.032)	(0.024)	(2.629)	(1.812)	(2.284)	(0.053)	(0.048)	(0.052)	(2.455)	(1.385)	(2.031)
Health	0.037	0.005	-0.021	-0.197	-0.453	-2.052	0.008	0.007	0.019	-3.000*	0.733	-0.747
	(0.022)	(0.033)	(0.039)	(1.150)	(1.828)	(2.065)	(0.045)	(0.033)	(0.042)	(1.438)	(0.786)	(1.940)
Husband's second occupation	0.075	0.177***	0.239***	-10.030**	-2.753*	-4.847	0.118***	0.133***	0.116	1.284	-5.515**	-1.952
	(0.048)	(0.032)	(0.041)	(3.553)	(1.309)	(3.013)	(0.027)	(0.035)	(0.094)	(3.571)	(1.931)	(1.595)
Household size	-0.006	-0.007	0.016	0.028	-1.253*	-0.468	-0.009	-0.006	-0.018	0.085	0.095	-0.610
	(0.005)	(0.009)	(0.011)	(0.404)	(0.648)	(0.673)	(0.007)	(0.007)	(0.012)	(0.576)	(0.569)	(0.769)
Household total gross income	0.019*	0.016*	0.002	-0.246	2.088**	0.066	0.038**	0.036***	0.035**	-0.792**	0.500	0.861
	(0.009)	(0.008)	(0.009)	(0.555)	(0.805)	(1.122)	(0.012)	(0.010)	(0.015)	(0.341)	(0.495)	(0.482)
Childcare	-0.042**	-0.046	-0.051	-2.086*	-4.563**	-6.341**	-0.006	-0.047*	0.087	-0.892	-1.336	-4.015*
	(0.016)	(0.028)	(0.044)	(1.022)	(1.621)	(2.866)	(0.014)	(0.025)	(0.068)	(1.185)	(2.094)	(2.233)
Husband's monthly labour wage	0.054***	0.042***	0.036***	-0.325**	-0.287	-0.340	0.010**	0.012**	0.009*	-0.030	0.318**	0.176
	(0.005)	(0.005)	(0.006)	(0.147)	(0.207)	(0.265)	(0.004)	(0.005)	(0.004)	(0.176)	(0.125)	(0.158)
High-skilled occupation				-0.574	-0.313	0.909				0.142	-0.381	0.119
				(0.874)	(0.904)	(2.230)				(0.996)	(1.776)	(0.979)
Permanent contract				-1.784	0.722	-0.834				0.878	-1.629	-2.824
				(1.214)	(1.147)	(0.792)				(1.055)	(1.056)	(1.992)
State-owned firm				-5.824***	-5.584***	-7.220***				-5.554***	-7.063***	-5.921***
				(1.632)	(1.372)	(1.646)				(1.058)	(0.995)	(1.500)
Constant	-1.173*	-1.113	-11.219	26.784	169.257*	278.108	-0.450	-0.438	-2.151	41.142***	102.281***	76.007
	(0.562)	(1.142)	(7.844)	(44.756)	(79.647)	(528.796)	(0.301)	(0.369)	(1.635)	(11.260)	(32.236)	(50.155)
Wave Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1490	2322	1747	984	1291	659	1589	1689	1134	1214	1288	776
Adjusted R^2	0.403	0.324	0.277	0.131	0.113	0.146	0.142	0.156	0.183	0.090	0.117	0.116

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table P.8 Parallel trend test on mechanism analysis

	Elderly Care Provision				Elderly care hours			Early Retirement		
	All Observations	18-34 years old	35-44 years old	45-51 years old	All Observations	35-44 years old	45-51 years old	All observations	35-44 years old	45-51 years old
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Four years before the policy implementation	-0.028	-0.024	-0.039	-0.044	1.138	-5.283	4.291	-0.002	-0.009**	0.000
	(0.022)	(0.034)	(0.030)	(0.046)	(4.069)	(6.691)	(7.234)	(0.009)	(0.004)	(0.029)
Two years before the policy implementation	0.003	0.006	-0.000	-0.026	2.763	3.112	3.593	0.000	-0.003	-0.013
	(0.031)	(0.053)	(0.021)	(0.049)	(4.796)	(7.025)	(2.594)	(0.013)	(0.005)	(0.048)
Policy implementation	-0.025	-0.008	-0.032	-0.035	-2.059	-10.490	7.264	0.027**	0.006	0.055
	(0.034)	(0.046)	(0.038)	(0.031)	(3.335)	(7.999)	(4.345)	(0.011)	(0.004)	(0.036)
Two years after the policy implementation	0.001	-0.011	-0.011	0.020	5.039*	6.459	15.487***	0.019*	0.009	0.035
	(0.024)	(0.030)	(0.040)	(0.055)	(2.618)	(7.301)	(4.693)	(0.011)	(0.008)	(0.029)
Four years after the policy implementation	0.006	-0.007	-0.029	0.039	1.726	5.246	0.765	-0.003	-0.006	-0.006
	(0.041)	(0.067)	(0.037)	(0.052)	(6.746)	(13.382)	(5.248)	(0.009)	(0.005)	(0.026)
Six years after the policy implementation	-0.043	-0.037	-0.076	-0.029	-7.057	-8.190	-4.777	-0.013	0.001	-0.059
	(0.045)	(0.074)	(0.048)	(0.067)	(4.886)	(13.949)	(6.678)	(0.018)	(0.004)	(0.037)
Age	-0.022*	-0.021	0.065	-0.002	-1.685	-20.391	-18.943	-0.052***	0.008	-0.670***
	(0.011)	(0.086)	(0.074)	(0.221)	(1.315)	(19.491)	(24.624)	(0.007)	(0.023)	(0.167)
Age squared	0.000**	0.000	-0.001	0.000	0.017	0.250	0.201	0.001***	-0.000	0.007***
	(0.000)	(0.001)	(0.001)	(0.002)	(0.018)	(0.249)	(0.255)	(0.000)	(0.000)	(0.002)
Hukou	0.017	0.048**	0.020	-0.003	-0.012	2.809	0.811	0.071***	0.007**	0.188***
	(0.019)	(0.020)	(0.021)	(0.034)	(1.835)	(3.185)	(4.135)	(0.012)	(0.003)	(0.028)
Lower middle school degree	0.013	-0.001	-0.007	0.030	-1.594	-7.850	6.132	0.020***	0.004**	0.028**
	(0.016)	(0.038)	(0.026)	(0.031)	(2.849)	(5.830)	(4.280)	(0.005)	(0.002)	(0.012)
Upper middle school degree	0.059*	0.014	0.015	0.120**	-2.335	-4.768	2.053	0.029**	0.005	0.022
	(0.028)	(0.065)	(0.036)	(0.053)	(2.816)	(9.469)	(5.353)	(0.013)	(0.005)	(0.030)
Technical or vocational degree	0.057**	0.031	0.021	0.119**	-5.037	-8.415	2.497	-0.012	0.002	-0.087**
	(0.026)	(0.054)	(0.042)	(0.050)	(3.959)	(10.243)	(4.241)	(0.012)	(0.006)	(0.032)
University or college degree or higher	0.052*	0.025	0.027	0.125**	-2.281	-8.047	-2.717	-0.032***	-0.000	-0.142***
	(0.027)	(0.059)	(0.039)	(0.047)	(2.625)	(7.915)	(3.984)	(0.009)	(0.003)	(0.023)
Health	-0.048***	-0.101**	-0.025	-0.032	8.391***	8.533*	10.213**	0.004	-0.000	0.015
	(0.012)	(0.037)	(0.043)	(0.037)	(2.114)	(3.961)	(3.705)	(0.009)	(0.005)	(0.020)
Spouse's monthly labour wage	-0.000	-0.000	-0.005*	0.004	-0.272	-0.197	-0.137	-0.001	-0.000	-0.003
	(0.002)	(0.004)	(0.003)	(0.003)	(0.301)	(0.321)	(0.512)	(0.002)	(0.001)	(0.004)
Spouse's second occupation	-0.018	0.004	-0.051	-0.005	-4.016*	-4.500	2.720	-0.007	-0.002	-0.023
	(0.024)	(0.032)	(0.031)	(0.052)	(2.163)	(7.314)	(6.122)	(0.007)	(0.002)	(0.017)
Child Care	-0.009	-0.029	0.015	0.025	-3.991	0.044	-0.026	0.001	0.001	-0.042*
	(0.020)	(0.025)	(0.035)	(0.047)	(2.993)	(8.395)	(8.737)	(0.005)	(0.001)	(0.019)
Household size	0.008	-0.001	0.014	0.010	-0.743	-1.360	-0.230	-0.005**	-0.002*	-0.019**
	(0.005)	(0.005)	(0.012)	(0.008)	(0.746)	(0.967)	(1.123)	(0.002)	(0.001)	(0.007)
Household total gross income	-0.003	0.002	-0.003	-0.006	0.814	1.320	-0.305	0.002	0.000	0.003
	(0.004)	(0.006)	(0.006)	(0.008)	(0.915)	(1.349)	(2.024)	(0.002)	(0.001)	(0.005)
Constant	0.576**	0.727	-1.141	-0.022	47.972	421.201	450.162	0.814***	-0.174	15.068***
	(0.195)	(1.258)	(1.478)	(5.331)	(31.882)	(368.951)	(598.614)	(0.108)	(0.444)	(3.962)
Wave Fixed Effects										
Province Fixed Effects										
Number of observations	5123	1229	2214	1680	975	412	375	5291	2225	1651
Adjusted R^2	0.042	0.057	0.037	0.070	0.047	0.077	0.105	0.169	0.022	0.234

** p < 0.1, ** p < 0.05, *** p < 0.01, Standard errors clustered at province level.*

Appendix Q: TWFE and Event Study Estimates of Married Adult Children's Labour Supply with Policy Introduction Year

Table Q.1 TWFE estimates of married adult children's labour supply with policy introduction year

	Wife		Husband	
	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours
	(1)	(2)	(3)	(4)
DiD coefficient	-0.045	-0.966	0.014	-0.486
	(0.044)	(1.804)	(0.036)	(1.455)
Age	0.067***	-0.145	0.022***	0.142
	(0.007)	(0.661)	(0.007)	(0.468)
Age squared	-0.001***	-0.002	-0.000***	-0.002
	(0.000)	(0.009)	(0.000)	(0.006)
Hukou	0.053**	2.811*	-0.009	2.182
	(0.021)	(1.376)	(0.035)	(1.542)
Lower middle school degree	0.002	4.393***	-0.012	1.717**
	(0.014)	(1.095)	(0.024)	(0.746)
Upper middle school degree	0.035	4.595**	0.005	1.836
	(0.020)	(1.529)	(0.035)	(1.058)
Technical or vocational degree	0.147***	1.845	0.081*	0.773
	(0.025)	(1.259)	(0.042)	(1.371)
University or college degree or higher	0.143***	1.652	0.092*	-0.500
	(0.026)	(1.414)	(0.042)	(1.274)
Health	0.009	-0.550	0.023	-0.658
	(0.021)	(0.914)	(0.030)	(0.739)
Spouse's monthly labour wage	0.043***	-0.260	0.010**	0.165
	(0.004)	(0.147)	(0.004)	(0.105)
Spouse's second occupation	0.178***	-5.118***	0.138***	-2.685*
	(0.025)	(0.931)	(0.041)	(1.435)
Child Care	-0.046**	-3.397***	-0.004	-1.154
	(0.016)	(0.813)	(0.011)	(1.099)
Household size	-0.003	-0.558**	-0.009**	-0.179
	(0.006)	(0.250)	(0.004)	(0.491)
Household total gross income	0.012**	0.681	0.038***	0.198
	(0.005)	(0.584)	(0.008)	(0.271)
High-skilled occupation		0.121		-0.147
		(0.692)		(1.061)
Permanent contract		-0.556		-0.959
		(0.541)		(0.940)
State-owned firm		-6.082***		-6.327***
		(1.119)		(0.994)
Constant	-0.757***	49.246***	0.059	42.851***
	(0.097)	(12.350)	(0.177)	(8.143)
Wave Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	5559	2934	4412	3278
Adjusted R^2	0.311	0.098	0.141	0.078

** p < 0.1, ** p < 0.05, *** p < 0.01, Standard errors clustered at province level.*

Table Q. 2 Event study design estimates of married adult children's labour supply with policy introduction year

	Wife		Husband	
	Probability of Employment	Paid Working Hours	Probability of Employment	Paid Working Hours
	(1)	(2)	(3)	(4)
Four years before the policy implementation	-0.005	2.550**	-0.008	-2.030
	(0.037)	(1.076)	(0.029)	(1.315)
Two years before the policy implementation	-0.017	-0.132	-0.009	-1.078
	(0.022)	(0.973)	(0.028)	(1.639)
Policy implementation	-0.027	-2.813**	0.004	-1.752
	(0.032)	(1.256)	(0.010)	(1.714)
Two years after the policy implementation	-0.035	-0.446	0.004	-2.913**
	(0.032)	(1.172)	(0.037)	(1.299)
Four years after the policy implementation	-0.042**	-2.411**	-0.002	-1.157
	(0.017)	(1.062)	(0.017)	(1.157)
Six years after the policy implementation	0.001	-4.349**	-0.002	-2.785
	(0.032)	(1.584)	(0.031)	(1.777)
Age	0.067***	-0.108	0.022***	0.140
	(0.007)	(0.658)	(0.007)	(0.469)
Age squared	-0.001***	-0.003	-0.000***	-0.002
	(0.000)	(0.008)	(0.000)	(0.006)
Hukou	0.053**	2.825*	-0.009	2.218
	(0.020)	(1.362)	(0.035)	(1.562)
Lower middle school degree	0.001	4.395***	-0.012	1.608*
	(0.014)	(1.075)	(0.024)	(0.747)
Upper middle school degree	0.035	4.536**	0.005	1.818
	(0.020)	(1.463)	(0.035)	(1.060)
Technical or vocational degree	0.145***	1.926	0.081*	0.716
	(0.024)	(1.263)	(0.042)	(1.368)
University or college degree or higher	0.142***	1.630	0.092*	-0.529
	(0.025)	(1.377)	(0.043)	(1.256)
Health	0.009	-0.567	0.023	-0.505
	(0.021)	(0.941)	(0.030)	(0.779)
Spouse's monthly labour wage	0.177***	-5.100***	0.138***	-2.757*
	(0.026)	(0.952)	(0.042)	(1.412)
Spouse's second occupation	-0.003	-0.551**	-0.009**	-0.201
	(0.006)	(0.242)	(0.004)	(0.479)
Child Care	0.012**	0.700	0.038***	0.212
	(0.005)	(0.597)	(0.008)	(0.260)
Household size	-0.046**	-3.443***	-0.004	-1.159
	(0.016)	(0.825)	(0.012)	(1.094)
Household total gross income	0.043***	-0.265*	0.010**	0.168
	(0.004)	(0.145)	(0.004)	(0.104)
High-skilled occupation		0.090		-0.216
		(0.705)		(1.048)
Permanent contract		-0.517		-0.990
		(0.509)		(0.924)
State-owned firm		-6.005***		-6.348***
		(1.133)		(1.016)
Constant	-0.768***	48.876***	0.070	43.920***
	(0.101)	(12.872)	(0.182)	(8.742)
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Number of observations	5559	2934	4412	3278
Adjusted R^2	0.312	0.101	0.141	0.081

** p < 0.1, ** p < 0.05, *** p < 0.01, Standard errors clustered at province level.*

Appendix R: TWFE Estimates of Labour Supply by Education (Technical or Vocational degree)

Table R. 1 TWFE estimates of labour supply by education (technical or vocational degree)

	Wives				Husbands			
	Probability of Employment		Paid Working Hours		Probability of Employment		Paid Working Hours	
	Low educated (1)	High educated (2)	Low educated (3)	High educated (4)	Low educated (5)	High educated (6)	Low educated (7)	High educated (8)
DiD Coefficient	-0.094**	-0.035	0.493	-0.167	-0.055*	-0.003	0.664	1.977
	(0.035)	(0.028)	(1.860)	(1.072)	(0.030)	(0.025)	(1.638)	(1.140)
Age	0.074***	0.049***	-0.003	-0.519	0.018*	0.038**	0.232	0.210
	(0.009)	(0.014)	(0.827)	(0.531)	(0.009)	(0.013)	(0.599)	(0.278)
Age squared	-0.001***	-0.001***	-0.005	0.006	-0.000**	-0.000**	-0.003	-0.003
	(0.000)	(0.000)	(0.011)	(0.007)	(0.000)	(0.000)	(0.007)	(0.004)
Hukou	0.061**	0.004	3.974**	-2.785*	-0.011	0.027	2.465	0.001
	(0.022)	(0.026)	(1.692)	(1.356)	(0.037)	(0.034)	(1.710)	(1.273)
Lower middle school degree	-0.004		3.902***		-0.016		1.197	
	(0.013)		(1.032)		(0.024)		(0.819)	
Upper middle school degree	0.027		3.969**		0.006		0.870	
	(0.019)		(1.485)		(0.034)		(1.155)	
Technical or vocational degree		0.000		0.000		0.000		0.000
		(.)		(.)		(.)		(.)
University or college degree or higher		0.038**		0.635		0.005		-0.450
		(0.014)		(0.677)		(0.017)		(0.690)
Health	0.024	-0.045**	-0.894	-0.139	0.026	0.011	-0.507	-1.010
	(0.029)	(0.015)	(1.061)	(1.117)	(0.038)	(0.026)	(1.023)	(1.193)
Spouse's monthly labour wage	0.047***	0.020***	-0.335*	-0.052	0.014**	-0.000	0.288**	-0.078
	(0.004)	(0.005)	(0.180)	(0.142)	(0.005)	(0.002)	(0.122)	(0.109)
Spouse's second occupation	0.186***	-0.067	-5.229***	2.334	0.142***	0.033*	-3.124*	0.703
	(0.029)	(0.042)	(0.926)	(2.433)	(0.043)	(0.018)	(1.450)	(3.404)
Child Care	-0.047**	-0.030	-4.923***	-0.030	-0.010	0.025	-0.448	-1.812*
	(0.018)	(0.025)	(1.129)	(0.639)	(0.020)	(0.019)	(1.458)	(0.991)
Household size	-0.002	-0.008	-0.680*	-0.084	-0.007*	-0.020**	-0.272	-0.013
	(0.008)	(0.005)	(0.311)	(0.295)	(0.004)	(0.007)	(0.651)	(0.231)
Household total gross income	0.010*	0.021**	1.178	-0.990**	0.033***	0.071***	0.160	-0.193
	(0.005)	(0.007)	(0.732)	(0.421)	(0.009)	(0.012)	(0.265)	(0.313)
High-skilled occupation			-1.649	0.360			-0.242	0.098
			(1.570)	(0.541)			(1.543)	(0.823)
Permanent contract			-1.078	-0.168			-0.413	-2.610**
			(0.683)	(0.728)			(1.083)	(1.119)
State-owned firm			-6.839***	-4.715***			-5.711***	-6.511***
			(1.305)	(0.964)			(1.186)	(0.980)
Constant	-0.854***	-0.181	44.752**	69.419***	0.213	-0.538	41.024***	49.214***
	(0.132)	(0.282)	(15.569)	(10.781)	(0.238)	(0.306)	(11.228)	(4.886)
Year Fixed Effects								
Province Fixed Effects								
Number of observations	4090	1469	1931	1003	3147	1265	2161	1117
Adjusted R^2	0.274	0.196	0.105	0.149	0.120	0.132	0.059	0.185

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Appendix S: 2SLS Estimates for Sample Selection

Table S. 1 2SLS estimates for married women labour supply (extensive margins)

	Elderly Care	Age & Age square	Hukou	Education	Health	Husband monthly income	Husband monthly income*	Husband's second occupation	Child Care	Household size	Household total gross income
	(1)	(2)	(3)	(4)	(5)	(6)	(6*)	(7)	(8)	(9)	(10)
Elderly Care	-0.014	-0.001	0.001	0.013	0.015	0.044*	0.008	0.040*	0.078**	0.077***	0.086***
	(0.026)	(0.025)	(0.026)	(0.025)	(0.024)	(0.025)	(0.026)	(0.024)	(0.018)	(0.022)	(0.022)
Age		0.076***	0.076***	0.078***	0.078***	0.070***	0.083***	0.068***	0.064***	0.068***	0.069***
		(0.008)	(0.008)	(0.009)	(0.009)	(0.011)	(0.012)	(0.011)	(0.010)	(0.009)	(0.010)
Age square		-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou			-0.023	-0.099***	-0.099***	0.029**	0.046*	0.046***	0.038**	0.043***	0.043***
			(0.022)	(0.012)	(0.012)	(0.013)	(0.025)	(0.014)	(0.013)	(0.014)	(0.014)
Lower middle school degree				-0.032***	-0.032***	0.015	0.026*	0.019	0.000	0.001	-0.000
				(0.011)	(0.010)	(0.013)	(0.015)	(0.013)	(0.019)	(0.019)	(0.020)
Upper middle school degree				-0.002	-0.002	0.038***	0.075***	0.046***	0.035**	0.041***	0.039***
				(0.018)	(0.018)	(0.012)	(0.019)	(0.012)	(0.013)	(0.013)	(0.012)
Technical or vocational degree				0.187***	0.186***	0.164***	0.256***	0.174***	0.167**	0.167***	0.162***
				(0.027)	(0.027)	(0.019)	(0.027)	(0.019)	(0.024)	(0.025)	(0.026)
University or college degree or higher				0.295***	0.295***	0.156***	0.285***	0.164***	0.151**	0.152***	0.144***
				(0.030)	(0.030)	(0.021)	(0.029)	(0.021)	(0.022)	(0.024)	(0.024)
Health					0.015	0.006	0.005	0.009	-0.001	0.002	0.002
					(0.018)	(0.020)	(0.022)	(0.021)	(0.026)	(0.025)	(0.026)
Husband monthly income						0.050***		0.049***	0.056**	0.053***	0.051***
						(0.003)		(0.003)	(0.003)	(0.003)	(0.004)
Husband's second occupation								0.186***	0.143**	0.143***	0.143***
								(0.020)	(0.019)	(0.019)	(0.019)
Child Care									-0.024	-0.024	-0.024
									(0.021)	(0.020)	(0.020)
Household size										0.002	0.000
										(0.007)	(0.007)
Household total gross income											0.012*
											(0.006)

Constant	0.788***	-0.568**	-0.558**	-0.732***	-0.745**	-0.826***	-0.835***	-0.807***	-0.735**	-0.805***	-0.921***
	(0.027)	(0.157)	(0.159)	(0.169)	(0.171)	(0.182)	(0.216)	(0.184)	(0.155)	(0.138)	(0.150)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	12209	12209	12209	12191	12177	5844	5844	5837	4382	4310	4296
Adjusted R^2	0.043	0.061	0.061	0.096	0.096	0.321	0.187	0.330	0.367	0.354	0.350

** p < 0.1, ** p < 0.05, *** p < 0.01*
Standard errors clustered at province level.

In this table, I sequentially introduced control variables into the regression equation, which led to a gradual reduction in the number of observations. This reduction occurs because some respondents did not provide information for certain variables, resulting in missing values. This process reflects the key data restrictions in my study. Column 6* presents the 2SLS regression results obtained by excluding the control variable for the husband's monthly income while keeping the sample size of Column 6 unchanged. This adjustment was made because we observed that after including the husband's monthly income as a control variable, the effect of elderly care on employment probability became statistically significant.

To further investigate whether this change in estimation results was driven by the inclusion of the husband's monthly income or by the reduction in sample size, I conducted an additional analysis in Column 6*, where I controlled the sample size. The results indicate that after holding the sample size constant, the effect of elderly care on the wife's employment probability was not significant.

Therefore, the observed change in the estimation results is primarily attributable to the inclusion of the husband's monthly income rather than the reduction in sample size.

Table S. 2 2SLS estimates for married women labour supply (intensive margin)

	Elderly Care	**Age & Age square**	**Hukou**	**Education**	**Health**	**Husband monthly income**	**Husband's second occupation**	**Child Care**	**Household size**	**Household total gross income**	**High-skilled occupation**	**Permanent contract**	**State-owned firm**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**
Elderly Care	-4.105*	-3.793*	-4.381**	-4.483**	-4.540**	-3.494***	-3.705***	-5.334***	-5.432***	-5.171***	-5.141***	-5.077***	-4.964***
	(2.415)	(2.236)	(2.050)	(1.981)	(2.007)	(1.349)	(1.373)	(1.761)	(1.831)	(1.756)	(1.745)	(1.790)	(1.800)
Age		0.990**	0.804**	0.797**	0.793**	-0.033	0.007	-0.491	-0.501	-0.498	-0.504	-0.503	-0.414
		(0.400)	(0.404)	(0.381)	(0.381)	(0.326)	(0.299)	(0.468)	(0.471)	(0.464)	(0.459)	(0.461)	(0.436)
Age square		-0.014	-0.012	-0.011*	-0.011	-0.001	-0.002	0.003	0.003	0.003	0.003	0.003	0.002

	***	**	*	**								
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Hukou		6.571***	6.449**	6.452***	2.633**	1.951*	2.311*	2.154*	2.185*	2.222*	2.282*	3.284**
		(1.201)	(1.221)	(1.220)	(1.106)	(1.136)	(1.192)	(1.198)	(1.220)	(1.202)	(1.245)	(1.395)
Lower middle school degree			3.865**	3.883***	4.206***	3.958**	3.721***	3.682**	3.489**	3.577**	3.719**	3.834***
			(1.030)	(1.039)	(1.239)	(1.164)	(0.811)	(0.814)	(0.769)	(0.776)	(0.783)	(0.719)
Upper middle school degree			4.436**	4.445***	3.811**	3.415**	3.674***	3.595**	3.294**	3.424**	3.566**	4.113***
			(1.394)	(1.394)	(1.726)	(1.655)	(1.320)	(1.329)	(1.288)	(1.342)	(1.331)	(1.343)
Technical or vocational degree			1.725*	1.741*	1.055	0.626	0.203	0.161	-0.232	-0.062	0.355	1.885*
			(0.999)	(1.003)	(1.148)	(1.039)	(0.914)	(0.917)	(0.921)	(0.958)	(0.981)	(0.969)
University or college degree or higher			-0.881	-0.879	-0.477	-0.772	-0.513	-0.630	-1.176	-0.890	-0.363	1.407
			(0.896)	(0.894)	(1.386)	(1.298)	(1.053)	(1.044)	(1.031)	(1.166)	(1.183)	(1.229)
Health				-0.573	-0.830	-0.938	-0.589	-0.522	-0.441	-0.458	-0.469	-0.711
				(0.742)	(0.891)	(0.904)	(0.931)	(0.909)	(0.886)	(0.874)	(0.879)	(0.861)
Husband monthly income					-0.084	-0.056	-0.153	-0.160	-0.274*	-0.274*	-0.246*	-0.229*
					(0.085)	(0.089)	(0.108)	(0.109)	(0.147)	(0.147)	(0.145)	(0.131)
Husband's second occupation						-5.646***	-5.474***	-5.557***	-5.509***	-5.480***	-5.490***	-5.587***
						(1.385)	(1.278)	(1.250)	(1.232)	(1.220)	(1.206)	(1.107)
Child Care							-3.295***	-3.154**	-3.214**	-3.199**	-3.297**	-3.377***
							(1.052)	(0.995)	(0.995)	(0.999)	(1.006)	(0.979)
Household size								-0.406	-0.489*	-0.499*	-0.474*	-0.588**
								(0.252)	(0.273)	(0.272)	(0.262)	(0.242)
Household total gross income									0.858	0.863	0.614	0.675
									(0.573)	(0.577)	(0.506)	(0.493)
High-skilled occupation										-0.655	-0.450	-0.106
										(0.886)	(0.794)	(0.732)
Permanent											0.835	-0.801

contract												(0.694)	(0.506)
State-owned firm													-5.602***
													(0.980)
Constant	41.055***	24.303***	22.637***	21.905***	22.478***	42.845***	42.780***	54.718***	56.657***	48.953***	48.966***	50.473***	50.862***
	(1.517)	(7.431)	(7.414)	(6.457)	(6.540)	(5.355)	(5.065)	(8.769)	(9.108)	(9.616)	(9.601)	(8.623)	(8.292)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	7945	7945	7945	7935	7930	4004	3999	2998	2998	2998	2997	2988	2881
Adjusted R^2	0.032	0.037	0.064	0.077	0.077	0.050	0.058	0.060	0.060	0.064	0.064	0.063	0.080

** p < 0.1, ** p < 0.05, *** p < 0.01*

Standard errors clustered at province level.

Table S. 3 2SLS estimates for married men labour supply (extensive margin)

	Elderly Care	**Age & Age square**	**Hukou**	**Education**	**Health**	**Child Care**	**Wife's Secondary Occupation**	**Wife's Monthly Income**	**Wife's Monthly Income**	**Household Size**	**Household Total Gross Income**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(8*)**	**(9)**	**(10)**
Elderly Care	-0.065*	-0.049	-0.043	-0.032	-0.027	-0.033	-0.039	-0.063**	-0.064**	-0.063*	-0.053*
	(0.034)	(0.036)	(0.037)	(0.036)	(0.034)	(0.045)	(0.044)	(0.032)	(0.030)	(0.033)	(0.031)
Age		0.033**	0.034**	0.035***	0.035**	0.036**	0.034***	0.027**	0.028***	0.027***	0.026***
		(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.007)
Age square		-0.000**	-0.000**	-0.000***	-0.000**	-0.000**	-0.000***	-0.000**	-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou			-0.029	-0.077***	-0.077**	-0.101**	-0.092***	-0.066**	-0.099***	-0.066***	-0.064***
			(0.019)	(0.018)	(0.018)	(0.022)	(0.021)	(0.018)	(0.018)	(0.018)	(0.018)
Lower middle school degree				-0.016	-0.017	-0.012	-0.012	0.002	-0.004	0.001	-0.004
				(0.014)	(0.013)	(0.016)	(0.016)	(0.007)	(0.008)	(0.007)	(0.006)
Upper middle school degree				0.015	0.015	0.009	0.010	0.028**	0.017	0.028**	0.015
				(0.019)	(0.019)	(0.025)	(0.024)	(0.013)	(0.013)	(0.013)	(0.013)
Technical or vocational degree				0.106***	0.104**	0.113**	0.114***	0.108**	0.090***	0.108***	0.093***
				(0.025)	(0.024)	(0.034)	(0.034)	(0.018)	(0.018)	(0.018)	(0.020)
University or college degree or higher				0.161***	0.160**	0.157**	0.158***	0.132**	0.105***	0.132***	0.107***
				(0.024)	(0.024)	(0.032)	(0.032)	(0.019)	(0.018)	(0.019)	(0.020)
Health					0.043**	0.033*	0.033**	0.018	0.020	0.019	0.020
					(0.015	(0.015	(0.015)	(0.014)	(0.013)	(0.013)	(0.013)

					)	)					
Child Care						-0.005 (0.013)	-0.003 (0.012)	0.002 (0.011)	0.003 (0.011)	0.002 (0.010)	0.000 (0.010)
Wife's Secondary Occupation							0.117***	0.040**	0.038**	0.040***	0.031**
							(0.031)	(0.016)	(0.015)	(0.016)	(0.014)
Wife's Monthly Income								-0.011***		-0.011***	-0.013***
								(0.002)		(0.002)	(0.002)
Household Size										-0.001	-0.005
										(0.005)	(0.005)
Household Total Gross Income											0.039***
											(0.006)
Constant	0.917***	0.349**	0.365**	0.270	0.238	0.207	0.238	0.458**	0.416***	0.466***	0.117
	(0.016)	(0.149)	(0.152)	(0.173)	(0.174)	(0.184)	(0.185)	(0.145)	(0.160)	(0.151)	(0.143)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	10140	10139	10130	10119	10093	6887	6873	4788	4788	4788	4788
Adjusted R^2	0.035	0.055	0.057	0.077	0.078	0.087	0.092	0.063	0.049	0.063	0.090

In this table, I sequentially introduced control variables into the regression equation, which led to a gradual reduction in the number of observations. This reduction occurs because some respondents did not provide information for certain variables, resulting in missing values. This process reflects the key data restrictions in my study. Column 8* presents the 2SLS regression results obtained by excluding the control variable for the wife's monthly income while keeping the sample size of Column 8 unchanged. This adjustment was made because we observed that after including the wife's monthly income as a control variable, the effect of elderly care on employment probability became statistically significant and in line with the estimation results based on original sample.

To further investigate whether this change in estimation results was driven by the inclusion of the wife's monthly income or by the reduction in sample size, I conducted an additional analysis in Column 8*, where I controlled the sample size. The results indicate that after holding the sample size constant, the effect of elderly care on the wife's employment probability was still significant.

Table S. 4 2SLS estimates for Sample Selection (intensive margin)

	Elderly Care	**Age & Age square**	**Hukou**	**Education**	**Health**	**Child Care**	**Wife's Secondary Occupation**	**Wife's Monthly Income**	**Household Size**	**Household Total Gross Income**	**High-skilled occupation**	**Permanent contract**	**State-owned firm**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Elderly Care	0.051	0.448	0.278	-0.111	-0.126	-1.010	-0.850	-3.192	-3.181	-2.966	-2.720	-2.593	-3.253

	(1.489)	(1.375)	(1.345)	(1.322)	(1.323)	(2.180)	(2.241)	(2.945)	(2.954)	(2.968)	(2.872)	(2.857)	(2.696)
Age		0.176	0.141	0.102	0.102	-0.210	-0.176	0.062	0.056	0.056	-0.032	0.011	0.069
		(0.275)	(0.264)	(0.245)	(0.245)	(0.316)	(0.317)	(0.332)	(0.329)	(0.330)	(0.321)	(0.319)	(0.318)
Age square		-0.003	-0.003	-0.003	-0.003	0.001	0.001	-0.002	-0.002	-0.002	-0.001	-0.001	-0.002
		(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Hukou			2.307**	3.474**	3.488***	4.049***	3.829**	2.693**	2.671**	2.660**	2.233**	2.852**	3.979***
			(1.015)	(0.928)	(0.927)	(1.112)	(1.104)	(1.075)	(1.065)	(1.063)	(1.110)	(1.208)	(1.114)
Lower middle school degree				1.747*	1.739**	2.379***	2.435**	2.562**	2.555**	2.403**	2.293*	2.446*	2.300*
				(0.700)	(0.693)	(0.729)	(0.765)	(1.117)	(1.102)	(1.140)	(1.304)	(1.319)	(1.261)
Upper middle school degree				1.102*	1.067*	1.913***	1.901**	1.845*	1.846*	1.524	1.603	1.899	2.330*
				(0.619)	(0.629)	(0.598)	(0.606)	(1.012)	(1.017)	(1.032)	(1.187)	(1.217)	(1.244)
Technical or vocational degree				-0.243	-0.252	0.181	0.176	-0.261	-0.266	-0.645	-0.596	0.172	1.627
				(0.890)	(0.881)	(1.224)	(1.220)	(1.260)	(1.263)	(1.284)	(1.488)	(1.480)	(1.362)
University or college degree or higher				-3.820**	-3.837***	-2.788***	-2.759**	-3.807***	-3.818**	-4.404**	-4.297**	-3.480**	-1.244
				(0.614)	(0.631)	(0.793)	(0.815)	(1.095)	(1.103)	(1.126)	(1.299)	(1.288)	(1.137)
Health					-0.558	-0.820	-0.849	-0.612	-0.607	-0.518	-0.416	-0.456	-0.486
					(0.471)	(0.548)	(0.539)	(0.595)	(0.596)	(0.604)	(0.595)	(0.592)	(0.584)
Child Care						-1.015	-1.087	-1.014	-0.988	-1.055	-1.188**	-1.250**	-1.524***
						(0.746)	(0.735)	(0.638)	(0.649)	(0.648)	(0.599)	(0.589)	(0.592)
Wife's Secondary Occupation							-3.068**	-2.913**	-2.917**	-3.142**	-3.357**	-3.481**	-3.654***
							(1.144)	(1.184)	(1.186)	(1.188)	(1.185)	(1.176)	(0.982)
Wife's Monthly Income								0.471***	0.470**	0.399**	0.481**	0.599**	0.678***
								(0.127)	(0.126)	(0.121)	(0.113)	(0.114)	(0.113)
Household Size									-0.058	-0.163	-0.194	-0.233	-0.273
									(0.262)	(0.256)	(0.274)	(0.259)	(0.258)
Household Total Gross Income										1.029**	1.038**	0.958**	0.974***
										(0.332)	(0.365)	(0.325)	(0.330)
High-skilled occupation											-0.280	0.477	0.762
											(0.887)	(0.849)	(0.638)
Permanent contract												-3.250**	-0.129
												(1.487)	(1.056)
State-owned													-8.004

firm													*** (0.864)
Constant	43.991*** (1.263)	42.402*** (6.030)	41.404*** (5.830)	43.207*** (5.512)	43.693*** (5.467)	48.548*** (7.557)	48.023** (7.525)	41.669*** (7.366)	42.011*** (7.064)	32.417*** (7.188)	34.089*** (7.110)	33.981*** (6.406)	33.075*** (6.329)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	8656	8656	8654	8645	8625	5960	5950	4513	4513	4513	4258	4215	4114
Adjusted R^2	0.028	0.030	0.034	0.042	0.042	0.044	0.046	0.053	0.053	0.057	0.060	0.064	0.082

Table S. 5 TEFE estimates for sample selection (wife-extensive margin)

	Elderly Care	**Age & Age square**	**Hukou**	**Education**	**Health**	**Husband monthly income**	**Husband's second occupation**	**Child Care**	**Household size**	**Household total gross income**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
DiD Coefficient	-0.086**	-0.086**	-0.086**	-0.086**	-0.086**	-0.085**	-0.079**	-0.077**	-0.079**	-0.080**
	(0.031)	(0.032)	(0.032)	(0.033)	(0.033)	(0.037)	(0.034)	(0.035)	(0.032)	(0.031)
Age		0.084**	0.084**	0.082***	0.082**	0.069***	0.068***	0.062**	0.065***	0.067***
		(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
Age square		-0.001**	-0.001**	-0.001***	-0.001**	-0.001***	-0.001***	-0.001**	-0.001***	-0.001***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou			-0.004	-0.075***	-0.075**	0.036*	0.052**	0.048**	0.053**	0.052**
			(0.021)	(0.012)	(0.012)	(0.017)	(0.018)	(0.019)	(0.021)	(0.021)
Lower middle school degree				-0.039***	-0.039**	0.003	0.007	0.005	0.004	0.002
				(0.009)	(0.009)	(0.012)	(0.013)	(0.013)	(0.013)	(0.014)
Upper middle school degree				-0.014	-0.015	0.029	0.037*	0.034	0.037*	0.036
				(0.021)	(0.021)	(0.019)	(0.019)	(0.020)	(0.020)	(0.021)
Technical or vocational degree				0.153***	0.152**	0.146***	0.155***	0.156**	0.152***	0.146***
				(0.032)	(0.032)	(0.021)	(0.021)	(0.023)	(0.023)	(0.024)
University or college degree or higher				0.273***	0.273**	0.145***	0.153***	0.153**	0.150***	0.142***
				(0.032)	(0.032)	(0.023)	(0.024)	(0.024)	(0.024)	(0.026)
Health					0.011	0.004	0.007	0.005	0.006	0.007
					(0.014)	(0.020)	(0.020)	(0.021)	(0.020)	(0.021)
Husband monthly income						0.049***	0.048***	0.048**	0.045***	0.042***
						(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Husband's second occupation							0.182***	0.182**	0.179***	0.176***
							(0.025)	(0.025)	(0.026)	(0.025)
Child Care								-0.046**	-0.045**	-0.045**
								(0.018)	(0.017)	(0.016)
Household size									0.000	-0.002
									(0.006)	(0.006)
Household total gross income										0.012**
										(0.005)
Constants	0.727**	-0.772**	-0.773**	-0.775***	-0.786**	-0.710***	-0.703***	-0.570**	-0.603***	-0.737***
	(0.014)	(0.116)	(0.115)	(0.118)	(0.125)	(0.128)	(0.125)	(0.095)	(0.086)	(0.093)
Year fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

effects										
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	12131	12131	12131	12113	12095	5782	5775	5674	5582	5559
Adjusted R^2	0.043	0.066	0.066	0.099	0.099	0.320	0.329	0.329	0.315	0.313

Table S. 6 TWFE estimates for sample selection (wife-intensive margin)

	Elderly Care	Age & Age square	Hukou	Education	Health	Husband monthly income	Husband's second occupation	Child Care	Household size	Household total gross income	High-skilled occupation	Permanent contract	State-owned firm
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
DiD Coeffici ent	-0.185	-0.258	-0.393	-0.396	-0.406	-0.439	-0.627	-0.157	-0.164	-0.048	-0.001	0.058	0.314
	(1.282)	(1.277)	(1.262)	(1.240)	(1.227)	(1.121)	(1.034)	(1.142)	(1.137)	(1.191)	(1.170)	(1.190)	(1.327)
Age		0.758	0.572	0.623	0.627	0.116	0.142	-0.203	-0.218	-0.227	-0.243	-0.229	-0.148
		(0.427)	(0.423)	(0.414)	(0.416)	(0.426)	(0.401)	(0.654)	(0.655)	(0.645)	(0.640)	(0.655)	(0.671)
Age square		-0.012*	-0.009	-0.010	-0.010	-0.004	-0.004	-0.002	-0.002	-0.002	-0.001	-0.001	-0.002
		(0.006)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Hukou			5.951***	5.879**	5.877***	2.310*	1.804	1.708	1.578	1.629	1.679	1.789	2.829*
			(1.126)	(1.222)	(1.219)	(1.199)	(1.214)	(1.223)	(1.189)	(1.213)	(1.194)	(1.238)	(1.387)
Lower middle school degree				4.666**	4.683***	4.367**	4.206**	4.316***	4.286**	4.085**	4.150**	4.303**	4.373***
				(1.279)	(1.292)	(1.488)	(1.410)	(1.213)	(1.226)	(1.171)	(1.176)	(1.194)	(1.088)
Upper middle school degree				5.047**	5.060***	3.864*	3.598*	4.204**	4.123**	3.817**	3.904**	4.081**	4.585**
				(1.303)	(1.308)	(1.871)	(1.817)	(1.528)	(1.552)	(1.494)	(1.539)	(1.534)	(1.505)
Technical or vocational degree				2.004	2.034	0.545	0.267	0.096	0.050	-0.322	-0.209	0.312	1.828
				(1.287)	(1.296)	(1.453)	(1.376)	(1.162)	(1.180)	(1.206)	(1.235)	(1.306)	(1.262)
University or college degree or higher				-0.546	-0.553	-0.792	-1.006	-0.482	-0.598	-1.138	-0.978	-0.319	1.625
				(1.134)	(1.136)	(1.580)	(1.507)	(1.244)	(1.266)	(1.178)	(1.296)	(1.374)	(1.419)
Health					-0.664	-0.925	-1.010	-0.533	-0.458	-0.371	-0.389	-0.382	-0.540
					(0.781)	(0.828)	(0.824)	(1.023)	(0.990)	(0.982)	(0.972)	(0.974)	(0.907)
Husband monthly income						-0.179	-0.161	-0.189	-0.193	-0.310*	-0.307*	-0.283*	-0.258
						(0.100)	(0.104)	(0.116)	(0.117)	(0.156)	(0.154)	(0.156)	(0.148)
Husband's second occupation							-4.325***	-4.440***	-4.520***	-4.492***	-4.452***	-4.473***	-5.086***
							(0.973)	(1.092)	(1.049)	(1.037)	(1.036)	(1.009)	(0.938)
Child Care								-3.287***	-3.151**	-3.196**	-3.174**	-3.280**	-3.391***
								(0.957)	(0.904)	(0.900)	(0.897)	(0.894)	(0.816)

Household size									-0.360	-0.445	-0.448	-0.432	-0.553*
									(0.246)	(0.269)	(0.267)	(0.262)	(0.255)
Household total gross income										0.862	0.861	0.656	0.693
										(0.634)	(0.635)	(0.581)	(0.591)
High-skilled occupation											-0.322	-0.082	0.112
											(0.908)	(0.826)	(0.686)
Permanent contract												1.235*	-0.551
												(0.675)	(0.555)
State-owned firm													-6.091***
													(1.118)
Constant	41.280***	29.961***	30.910***	27.288***	27.838***	44.399***	44.556***	53.610***	55.674***	47.797***	47.921***	48.513***	48.428***
	(0.594)	(8.057)	(7.808)	(6.962)	(7.173)	(7.418)	(7.103)	(12.361)	(13.095)	(12.685)	(12.668)	(12.365)	(12.657)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	7928	7928	7928	7918	7908	4065	4060	3058	3058	3058	3056	3046	2934
Adjusted R^2	0.038	0.042	0.065	0.081	0.081	0.060	0.065	0.076	0.076	0.078	0.078	0.077	0.097

Table S. 7 TWFE estimates for sample selection (husband-extensive margin)

	Elderly Care	**Age & Age square**	**Hukou**	**Education**	**Health**	**Child Care**	**Wife's Secondary Occupation**	**Wife's Monthly Income**	**Household Size**	**Household Total Gross Income**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
DiD Coefficient	-0.057**	-0.057**	-0.056**	-0.055***	-0.054**	-0.043**	-0.041**	-0.039	-0.040*	-0.039
	(0.015)	(0.016)	(0.017)	(0.016)	(0.016)	(0.019)	(0.018)	(0.024)	(0.021)	(0.023)
Age		0.032**	0.032**	0.032***	0.032**	0.031**	0.029***	0.018**	0.020**	0.022***
		(0.008)	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
Age square		-0.000**	-0.000**	-0.000***	-0.000**	-0.000**	-0.000***	-0.000**	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hukou			-0.023	-0.065***	-0.065**	-0.083**	-0.074***	-0.015	-0.008	-0.009
			(0.017)	(0.018)	(0.018)	(0.022)	(0.022)	(0.032)	(0.033)	(0.035)
Lower middle school degree				-0.021*	-0.022*	-0.014	-0.014	-0.009	-0.006	-0.011
				(0.012)	(0.011)	(0.012)	(0.012)	(0.023)	(0.023)	(0.024)
Upper middle school degree				0.007	0.006	0.004	0.005	0.016	0.015	0.005
				(0.017)	(0.016)	(0.020)	(0.020)	(0.029)	(0.031)	(0.034)
Technical or vocational degree				0.083***	0.081**	0.088**	0.089***	0.103**	0.097**	0.081*
				(0.022)	(0.022)	(0.029)	(0.028)	(0.039)	(0.040)	(0.042)
University or college degree or higher				0.137***	0.136**	0.138**	0.138***	0.123**	0.117**	0.093**

				(0.024)	(0.023)	(0.032)	(0.032)	(0.043)	(0.042)	(0.042)
Health					0.033	0.023	0.023	0.021	0.024	0.021
					(0.020)	(0.022)	(0.022)	(0.031)	(0.029)	(0.030)
Child Care						-0.012	-0.010	-0.004	-0.002	-0.004
						(0.010)	(0.009)	(0.013)	(0.012)	(0.012)
Wife's Secondary Occupation							0.126***	0.150***	0.149***	0.137***
							(0.030)	(0.040)	(0.040)	(0.041)
Wife's Monthly Income								0.017***	0.014***	0.010**
								(0.003)	(0.003)	(0.004)
Household Size									-0.005	-0.009**
									(0.004)	(0.004)
Household Total Gross Income										0.038***
										(0.008)
Constant	0.872***	0.351**	0.349**	0.336*	0.307*	0.354**	0.384**	0.462**	0.469**	0.088
	(0.007)	(0.143)	(0.144)	(0.156)	(0.159)	(0.136)	(0.135)	(0.164)	(0.159)	(0.179)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	10025	10024	10013	10002	9976	6853	6838	4478	4422	4412
Adjusted R^2	0.040	0.055	0.056	0.072	0.073	0.077	0.083	0.134	0.127	0.142

Table S. 8 TWFE estimates for sample selection (husband-intensive margin)

	Elderly Care	**Age & Age square**	**Hukou**	**Education**	**Health**	**Child Care**	**Wife's Secondary Occupation**	**Wife's Monthly Income**	**Household Size**	**Household Total Gross Income**	**High-skilled occupation**	**Permanent contract**	**State-owned firm**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**
did	0.829	0.833	0.780	0.771	0.736	1.014	0.983	0.999	0.999	1.023	1.262	1.256	1.128
	(1.352)	(1.337)	(1.341)	(1.334)	(1.332)	(1.733)	(1.723)	(1.103)	(1.093)	(1.087)	(1.153)	(1.117)	(1.151)
Age		0.109	0.055	0.079	0.077	-0.130	-0.089	0.142	0.141	0.160	0.126	0.164	0.131
		(0.335)	(0.331)	(0.324)	(0.325)	(0.363)	(0.367)	(0.442)	(0.438)	(0.437)	(0.471)	(0.474)	(0.465)
Age square		-0.002	0.002	-0.002	0.002	0.000	-0.000	0.003	-0.003	-0.003	-0.003	-0.003	0.002
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)
Hukou			2.038*	3.181**	3.194***	3.737***	3.522**	-0.049	-0.050	-0.075	0.048	0.763	2.190
			(1.012)	(0.938)	(0.935)	(1.193)	(1.183)	(1.188)	(1.207)	(1.207)	(1.247)	(1.360)	(1.554)
Lower middle school degree				2.050*	2.011**	2.626**	2.696**	1.768**	1.767**	1.760**	1.497	1.782**	1.658*
				(0.828)	(0.819)	(0.891)	(0.934)	(0.735)	(0.731)	(0.738)	(0.850)	(0.776)	(0.764)
Upper middle school degree				1.477*	1.410	2.294**	2.288**	1.457	1.457	1.410	1.166	1.421	1.804
				(0.794)	(0.790)	(0.933)	(0.944)	(1.158)	(1.154)	(1.170)	(1.129)	(1.146)	(1.081)
Technical or vocational degree				-0.015	-0.067	0.449	0.437	-0.964	-0.964	-1.036	-0.861	-0.092	0.753
				(0.896)	(0.891)	(1.214)	(1.212)	(1.712)	(1.698)	(1.700)	(1.573)	(1.526)	(1.405)
University or college degree or higher				-3.470**	-3.513***	-2.314**	-2.297*	-2.947*	-2.947*	-3.072*	-3.280**	-2.138	-0.538
				(0.846)	(0.856)	(1.047)	(1.074)	(1.496)	(1.484)	(1.514)	(1.328)	(1.297)	(1.280)
Health					-	-	-0.272	-	-0.790	-0.767	-0.966	-0.987	-

				0.229 (0.673)	0.231 (0.659)	(0.654)	0.790 (0.882)	(0.881)	(0.870)	(0.909)	(0.830)	0.597 (0.753)
Child Care					-0.474 (0.855)	-0.543 (0.846)	-1.024 (0.981)	-1.023 (1.042)	-1.023 (1.054)	-1.025 (1.117)	-1.232 (1.089)	-1.169 (1.105)
Wife's Secondary Occupation						-3.253** (1.151)	-1.414 (1.385)	-1.415 (1.419)	-1.493 (1.455)	-1.679 (1.635)	-2.104 (1.580)	-2.633* (1.465)
Wife's Monthly Income							0.096 (0.066)	0.096 (0.069)	0.071 (0.064)	0.082 (0.073)	0.110 (0.088)	0.164 (0.106)
Household Size								-0.002 (0.491)	-0.034 (0.501)	0.003 (0.523)	-0.034 (0.493)	-0.178 (0.497)
Household Total Gross Income									0.275 (0.194)	0.294 (0.195)	0.243 (0.205)	0.203 (0.268)
High-skilled occupation										-0.696 (1.321)	-0.193 (1.283)	-0.169 (1.064)
Permanent contract											-3.204** (1.244)	-0.928 (0.931)
State-owned firm												-6.350*** (1.006)
Constant	43.873*** (0.610)	43.191*** (6.974)	43.557*** (6.807)	42.307*** (6.469)	42.583*** (7.137)	45.280*** (7.161)	44.778** (8.596)	44.514*** (8.890)	44.529*** (8.571)	41.498*** (9.180)	41.604*** (8.929)	41.630*** (8.654)	42.171***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	8615	8615	8612	8604	8582	5954	5943	3643	3643	3643	3415	3375	3278
Adjusted R^2	0.029	0.029	0.032	0.041	0.041	0.043	0.046	0.043	0.043	0.043	0.048	0.057	0.078

Appendix T: Variable Definitions for Chapter 7

Table T. 1 Variable definitions

Variable Name		CHNS Question	Definition	Variable Type
Dependent variable	Employment status	Are you presently working? * If retired but rehired, record 1. 0 No 1 Yes	The employment status of the respondents: Employed Non-employed (unemployed or out of labour force)	Dummy variable
	Weekly working hours	How many hours do you work on average per day? How many days do you work on average per week?	Weekly working hours of the respondents	Continuous variable
Dependent variable	Policy implementation status	(not from CHNS questions) Whether the province of residence of the individual i observed in wave t implement policy.	The policy implementation status of the respondents' province at the time of survey	Dummy variable
Control variables	Age	Age (years): * Record 018 if 18.00-18.99 years, 019 if 19.00-19.99 years, etc.	Age of the respondents	Continuous variable

	Age squared	Age (years): * Record 018 if 18.00-18.99 years, 019 if 19.00-19.99 years, etc.	Age squared = Age ^{2}	Continuous variable
	Education	What is the highest level of education you have attained? 1 primary school or below 2 lower middle school degree 3 upper middle school degree 4 technical or vocational degree 5 university or college degree or higher	Highest education level of the respondent	Categorical variable (included in the regression as 4 dummies leaving category primary school or below as the reference category)
	Hukou	To which type of household registration do you belong? 1 urban 2 rural	Respondent's household registration statues: 0- rural 1 - urban	Dummy variable
	Health	During the past 4 weeks, have you been sick or injured? Have you suffered from a chronic or acute disease? 0 no 1 yes	Respondent's health status: 0- unhealthy (answer "yes") 1- healthy (answer "no")	Dummy variable
	Childcare	During the past week, did you take care of children under 6 in your household? 0 no	Whether the respondent provides childcare: 1-Yes 0-No	Dummy variable
	Spouse's secondary occupation	Do you have a secondary occupation? 0 no 1 yes	Whether the respondent's spouse have secondary occupation: 1-Yes 0-No	Dummy variable
	High-skilled occupation	What is your primary occupation? 1 Senior professional/technical worker (doctor, professor, lawyer, architect, engineer) 2 Junior professional/technical worker (midwife, nurse, teacher, editor, photographer) 3 Administrator/executive/manager (working proprietor, government official, section chief, department or bureau director, administrative cadre, village leader) 4 Office staff (secretary, office helper) 5 Farmer, fisherman, hunter 6 Skilled worker (foreman, group leader, craftsman) 7 Non-skilled worker (ordinary labourer, logger) 8 Army officer, police officer 9 Ordinary soldier, policeman 10 Driver 11 Service worker (housekeeper, cook, waiter, doorkeeper, hairdresser, counter salesperson, launderer, child care worker) 12 Athlete, actor, musician	Primary occupation of the respondent 0-General Workers (categories 2,4, 5, 6, 7, 8,9,10,11 and 12) 1-Senior technician or manager (categories 1 and 3)	Dummy variable
	Permanent contract	What is your employment position in this occupation? 1 self-employed, owner-manager with employees 2 self-employed, independent operator with no employees (includes farmer) 3 works for another person or enterprise (includes small-, medium-, and large-scale collective enterprise, farm, and private enterprise) as a permanent employee 4 contractor with other people or enterprise 5 temporary worker 6 paid family worker	Primary position of the respondents 0-Short-term contract with the work unit or temporary work (categories 1, 2, 4, 5 and 6) 1-Long-term contract with the work unit (categories is 3)	Dummy variable
	State-owned company	What type of work unit is this? 1 government department 2 state service/institute 3 state-owned enterprise 4 small collective enterprise (such as township-owned) 5 large collective enterprise (such as owned by county, city, province) 6 family contract farming 7 private, individual enterprise 8 three-capital enterprise (owned by foreigners, overseas Chinese and joint venture)	Work unit type of the respondent 0-Not government departments or state-owned (categories 4, 5, 6, 7 and 8) 1-Government departments or state-owned (categories 1, 2 and 3)	Dummy variable
	Spouse's monthly labour income	On the average, what was your monthly retirement wage/salary in the past year, including subsidies and bonuses? (yuan)	Logarithm of the spouse's monthly wage (in 2015 price)	Continuous variable
	Household yearly total gross income	CHNS official website supplementary information	Logarithm of total gross household income (in 2015 price)	Continuous variable
	Household size	CHNS official website supplementary information	Number of family members	Continuous variable
	Province	City code 11= Beijing* 21 = Liaoning 23 = Heilongjiang 31 = Shanghai 32 = Jiangsu 37 = Shandong 41 = Henan 42 = Hubei 43 = Hunan 45 = Guangxi 52 = Guizhou 55 = Chongqing	Current residence of the respondents	Categorical variable (included in the regression as 11 dummies leaving category Beijing as the reference category)

Note: Information comes from the CHNS individual questionnaire in 2004, 2006, 2009, 2011 and 201