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Intergenerational Precautionary Savings in Europe*

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Abstract

In this paper, we study whether precautionary saving motives have an intergenerational component; namely whether and to what extent the income uncertainty of younger generations affects the savings of their parents. To this end, we exploit a cross-country European longitudinal household dataset collecting information on parents and their offspring, augmented with indicators for their offspring's income risk. We find that savings significantly respond to changes in income risk, also across generations. This finding is robust to several checks and displays heterogeneity across countries, which is consistent with substitutability between private and public insurance tools.

I. Introduction

A thorough understanding of household and aggregate savings' determinants is a key issue for policymakers in designing and implementing actions aimed at increasing individual welfare and overall income and wealth. Household expenditure is typically around two-thirds of GDP (OECD, 2021); therefore, knowledge of the determinants of household consumption and saving choices is essential for the economic analysis of

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aggregate demand. Consumption is also a key determinant of individuals' welfare and, from a microeconomic perspective, contributes to the general level of well-being, as much as to its distribution in the population.

In this paper, we study the link between savings and income risk from an intergenerational perspective. In particular, we investigate whether and to what extent the income uncertainty of younger generations impacts the savings of their parents. Theories of intertemporal choice posit an incentive for the intertemporal smoothing of expected income changes. When the strong assumptions that lead to certainty equivalence are relaxed, theory predicts that risk-averse and prudent individuals also respond to higher moments of the distribution of future income, namely in regard to income uncertainty (Caballero, 1990; Kimball, 1990). We extend this channel by considering the intergenerational transmission of income risk. Is there an intergenerational precautionary motive for saving?

The reason we believe this topic deserves attention is twofold. On the one hand, since the wave of labour market reforms experienced during the 1980s and 1990s in most European countries, labour markets have become more uncertain overall. Indeed, successive waves of reforms reduced the employment protection across Europe (see, for instance, Boeri, 2011; Barbieri and Cutuli, 2015), even more so for younger workers (Cazes and Tonin, 2010), making expectations on future income more uncertain. Moreover, the financial and economic crises contributed to worsening the labour market for younger individuals relative to their elderly cohorts.

On the other hand, the literature on the potential interplay between precautionary saving and altruistic reasons for saving is rather scant, and this study contributes to two main strands of literature.[1] First, it relates to research focusing on the role of the extended family as insurance. Instead of focusing on insurance ex-post, namely on the effect of the realization of income shocks, as in Attanasio, Meghir and Mommaerts (2018) and Kaplan (2012), we investigate the ex-ante response of parents' behaviour to a change in offspring's income risk. Second, we contribute to the literature analysing the determinants of consumption and saving.

We test whether a change in the offspring's income risk affects the savings of parents. By doing so, we differ from the previous literature, which analyses the bequest motive for saving, where intergenerational transfers can only manifest in the form of an end-of-life bequest and are typically determined by a 'warm glow' motivation and are independent of the offspring's characteristics (De Nardi, 2004). On the contrary, we allow parents' consumption to be affected by a change in the riskiness of their offspring's income and we do not restrict transfers to take the form of an end-of-life bequest.

We use a cross-country European household panel dataset targeted towards individuals older than 50 years in order to investigate their behaviour, and making it possible to identify a causal relationship between income uncertainty of younger individuals and the savings decisions of their parents' households. The Survey of Health, Ageing and Retirement in Europe (SHARE) collects information on individuals

[1]See section II for a review of the related literature.

and their behaviour, along with the characteristics of their offspring. We identify the 'type' of offspring as a function of predetermined characteristics, such as gender, age, education level and country.

To capture the offspring's income risk, we augment this dataset with measures of uncertainty based on a rich cross-country dataset on individual income: The European Union Statistics on Income and Living Conditions (EU-SILC). More precisely, for each 'type' of offspring, we measure income risk as the standard deviation in the residual component of income, which is unexplained by observed covariates. For identification purposes, we exploit the different exposure of offspring to income risk. The longitudinal dimension of the dataset makes it possible to control for unobservable time-invariant characteristics, including country and family fixed effects, along with time fixed effect.

The main results of our analysis show that if the income uncertainty of the offspring most exposed to income risk increases by 1%, the savings of the parents rises by about 0.44%. We find some evidence that this channel is stronger under weaker welfare systems, suggesting some substitutability between public and private insurance tools. These findings add to the literature on consumption and saving, and to the research on the role of the extended family as an insurance tool against adverse events. Indeed, we document a new channel for saving, namely the effect of uncertainty in the offspring's income on parental savings.

From a policy perspective, our results suggest the relevance of policy instruments aimed at mitigating the market income shocks among younger workers or insuring against it. These policies may reduce the intergenerational precautionary savings of parents, inducing positive spill-overs in terms of both individual welfare and aggregate saving.

The paper is organized as follows: section II presents the theoretical framework (developed in more detail in Appendix A) and the contribution of this work. We discuss the data and measurement issues in section III and illustrate the estimation strategy in section IV. The main results are provided in sections V and VI documents their robustness to different specifications and measures. Section VII concludes.

II. Theoretical framework and contribution

Standard theories of intertemporal consumption choices predict that savings and consumption depend on expectations about future income. In the more general case of incomplete markets and prudent individuals, the optimal consumption profile depends on income uncertainty along with its expected value. If prudent parents are also altruistic, namely they derive utility from their offspring's well-being, they may increase their savings in response to an increase in the income uncertainty of their offspring.

We illustrate this relationship more formally in a simple three-periods and two-generations setting, the details of which are reported in Appendix A. More precisely, we analyse the optimal savings of parents who are prudent (exponential utility function) and altruistic, namely value future resources of children facing income risk (equations A.1 and A.5). The optimal savings of parents are summarized by equation A.6. The determinants of savings are consumption smoothing and precautionary saving motives.

We show that savings respond to future income uncertainty of the offspring: the higher the income risk faced by offspring, the higher the current savings of their parents. In short, the income risk faced by offspring results in fostering the savings of parents who are prudent and altruistic. We bring this theoretical prediction to the data by analysing to what extent parental savings respond to their offspring's income risk. The strength of this relationship depends on parents' prudence, as shown in the theoretical framework, and on institutional factors, such as the welfare system, labour and credit markets, which affect the availability of other sources of insurance against income risk.

In the empirical analysis, we estimate a 'reduced model', whereby we explore whether heterogeneity across countries is connected with family ties and with complementarity between risk insurance provided by the extended family and the welfare system.

The role of the family as an insurance tool, particularly between extended family members, has been analysed in previous literature.[2] A series of papers investigate whether extended families can be viewed as collective units sharing resources and risk efficiently in the United States, and they reject this hypothesis (Altonji, Hayashi and Kotlikoff, 1997; Hayashi, Altonji and Kotlikoff, 1996; Choi, McGarry and Schoeni, 2016). The recent contribution by Attanasio *et al*. (2018) extends these works and shows that, despite a relevant fraction of income uncertainty being potentially insurable within the extended family, there is little evidence that the extended family provides insurance for such idiosyncratic shocks.

All of these studies examine whether the extended family provides *ex-post* insurance to smooth consumption after the realization of income shocks. We depart from this approach by investigating the *ex-ante* response of parental behaviour to a change in their offspring's income risk. Indeed, our analysis abstracts from observing income shocks, as it illustrates how an increase in the actual uncertainty about the expected offspring's income results in higher savings by parents.

The literature identifies different tools to provide insurance across generations: in-kind transfers, cash transfers and labour supply. Kaplan (2012) illustrates how the option to move in and out of the parental home is a valuable insurance channel against labour market risks: labour market shocks affect the timing of offspring moving in and out of their parents' homes. Two studies by McGarry (1999, 2016) examine intergenerational transfers, showing that the probability of receiving monetary transfers from parents correlates with the changes in the offspring's income, permanent income and life events.

Similarly, Edwards and Wenger (2019) find evidence of financial support from parents to unemployed offspring, which also alters parental consumption, income and savings. Finally, Baldini, Torricelli and Brancati (2018) illustrate the labour responses

[2]Other studies examine insurance within a couple. For instance, the recent contribution by Blundell, Pistaferri and Saporta-Eksten (2016) examines insurance in two-earner households and highlights the role of family labour supply as a smoothing device against income shocks.

of members of the extended family to a negative employment shock suffered by another household member. In our paper, we remain agnostic about which tool is used to provide insurance, since we focus on parents' behaviour *before* the shock realizations. Therefore, we do not focus on any specific insurance mechanism.

In principle, indeed, if the negative shock does not realize, rational parents should not transfer any resources to their offspring, even if they had saved part of their income in the previous periods. This makes our analysis more robust to possible endogeneity, since we do not need to observe the actual realization of the shock in order to observe the behaviour of altruistic parents. Another innovative aspect of our analysis derives from its cross-country approach. By investigating cross-country heterogeneity within the strength of this channel, we are able to comment on how the insurance within extended family members varies across different institutional and cultural frameworks.

This paper also contributes to the literature analysing the determinants of consumption and savings over the life cycle by focusing on a new channel: the intergenerational precautionary motive for savings. Starting from the seminal papers by Kimball (1990) and Caballero (1990), several studies have examined the precautionary motive for saving (e.g. Lusardi, 1997; Meghir and Pistaferri, 2004; Low, Meghir and Pistaferri, 2010; Mastrogiacomo and Alessie, 2014): risk-averse and prudent consumers optimally decide to save more and consume less if the downside risk to future income increases. We extend the precautionary savings motive by allowing consumers to respond to their offspring's uncertainty and not only to their own income risk.

Another reason for saving, particularly later in life, is the bequest motive. De Nardi (2004) and De Nardi and Yang (2014) model voluntary bequests in the form of 'warm glow', where parents derive utility from leaving a bequest to their offspring, irrespective of their characteristics. In this paper, we allow intergenerational transfers to depend on offspring's characteristics, income and income risk, and we do not restrict them to take place only at the end-of-life. By doing so, we examine whether there is an interaction between altruism and the precautionary motive for saving. Do parents revise their consumption and saving choices if their offspring's income uncertainty changes?

The study by Boar (2021) on parental consumption in the United States represents the paper closest to our work, however, there are several notable differences between the two studies. First, the identification strategy in Boar (2021) is based on the differences in uncertainty across age and sector (notably, the latter is a choice variable potentially related to other individual characteristics), and does not allow to control for unobserved heterogeneity.

Our approach and identification strategy exploits the variations in income risk within groups identified by less problematic variables. More importantly, it does not impose any restriction between unobserved individual characteristics and the explanatory variables. Second, the dependent variable in her study is consumption, while we focus on savings. Even if they are clearly correlated, savings – as opposed to consumption – are a more direct measure of the dynastic-intergenerational precautionary saving channel. In addition, since savings are collected in the SHARE dataset, we do not need to impute them from external sources, while Boar (2021) has to augment PSID data with imputations from CEX.

A third difference regards the geographical coverage and the sample size. While we use cross-country European data from SHARE and EU-SILC, the author exploits the longer time span of PSID. This choice has pros and cons. On the one hand, she is able to focus on permanent income uncertainty, defined as the standard deviation of the forecast error of lifetime earnings, which hinges on strong assumptions about the way individuals form their expectations about future income.

On the other hand, we explore differences across countries, depending on cultural, social and institutional heterogeneity. Moreover, the sample size in SHARE/SILC is three times larger than PSID/CEX. Finally, the two independent studies – even if taking very different approaches – reach the same conclusions, reinforcing each other and shedding light on an important economic mechanism not yet investigated.

III. Data and measurement issues

The empirical analysis aims to test whether parental savings respond to their offspring's income risk. For this purpose, we exploit the SHARE dataset, which collects detailed information on the parental generation and – key to our purpose – their offspring's characteristics. SHARE is a cross-national longitudinal survey of a representative sample of the non-institutionalized European population aged 50 or more. Data are collected bi-annually. We focus on 13 European countries, and use five waves of the survey: wave 1 (interview years 2004–05), wave 2 (2006–07), wave 4 (2011–12), wave 5 (2013) and wave 6 (2015).[3] Table 1 summarizes the distribution of our sample over time and across countries. We exclude from our analysis offspring aged 55 or older, who are approaching retirement age. We also restrict the sample to offspring who are not cohabiting with their parents. This is to isolate the intergenerational precautionary savings channel from choices related to resources allocation and risk sharing within the household.

The survey gathers information about several socio-economic variables, employment status, income and household composition, either at the personal or household level.[4] In our analysis, we measure family characteristics by the covariates of the *household respondent*; namely, the person who answers questions on household composition. A key set of variables in our analysis refers to the characteristics of the offspring. More precisely, for every single offspring, SHARE provides socio-demographic information such as gender, education level, marital status, household size and composition, job status and living distance from parental residence. Table 2 reports the descriptive statistics of all variables included in the baseline model and in all robustness checks.

[3]We select 13 European countries that participated in SHARE and EU-SILC in at least two consecutive waves. We exclude data from wave 3 (SHARELIFE), which collects information that is not comparable to that in other waves.

[4]The list and a detailed definition of variables is reported in Appendix B.

TABLE 1

Sample size by country and wave

Country	*Wave*				*Total*
	2007	*2011*	*2013*	*2015*	
Austria	226	220	869	806	2,121
Belgium	550	611	1,022	861	3,044
Czech Republic	.	354	1,099	1,001	2,454
Denmark	324	570	612	486	1,992
Estonia	.	.	1,183	1,183	2,366
France	370	512	917	756	2,555
Germany	289	339	332	202	1,162
Italy	344	482	589	434	1,849
Netherlands	342	489	423	.	1,254
Slovenia	.	.	470	470	940
Spain	250	271	435	351	1,307
Sweden	494	585	497	347	1,923
Switzerland	163	306	727	634	1,830
Total	3,352	4,739	9,175	7,531	24,797

The dependent variable in our analysis is the (inverse hyperbolic sine of) financial net worth, defined as the sum of financial assets minus liabilities. We exclude real estate from the measure of wealth, because it is less liquid than financial wealth and hence less likely to respond to income risk (see Hurd, Michaud and Rohwedder, 2012; Alessie, Angelini and van Santen, 2013). Since SHARE has detailed wealth and income data, but only limited information on consumption (Jappelli and Padula, 2013), we follow previous literature and we examine accumulated savings (Alessie *et al.*, 2013; Jappelli and Padula, 2013; Cobb-Clark, Kassenboehmer and Sinning, 2016).

Measuring income risk. To measure income risk, we rely on a rich cross- country dataset on individual earnings: EU-SILC.[5] The main indicator measures income risk and is specific to each type and year.[6] We combine each wave of SHARE with two waves of the EU-SILC; namely, the 2 years when SHARE is run. We then match offspring in the SHARE dataset with the indices measuring the uncertainty of the individual of the same type in the same year. We use the same method to compute income risk for parents.

More specifically, we estimate an equation for income (y) separately for each country and wave. Income depends on age, gender, educational level and their full set of interactions, and year, in a specific country and wave:

[5]EU-SILC is a European cross-country panel collected yearly and coordinated by Eurostat to provide comparability across countries and over time. We rely on cross-sectional waves for the 2004–15 period.

[6]We define a 'type' as the part of the sample that includes all respondents with the same gender, age (in 5-year brackets from 21–25 to 51–55), and education level (primary or less, secondary or tertiary), surveyed in the same year and in the same country, so that the total number of partitions is 42 for each country-year.

TABLE 2

Summary statistics

Variable	*Obs*	*Mean*	*Std. Dev.*
Net financial assets (ihs)	24719	8.168	5.72
Child income risk (ihs)	24719	10.458	0.647
Child income risk (ihs), net of transfers	24719	10.49	0.639
Child income risk (ihs), unemployment	24719	0.087	0.073
Child income risk (ihs): least	24719	10.153	0.598
Child income risk (ihs): mean	24719	10.327	0.602
Child income risk (ihs): oldest	24719	10.349	0.649
Parents income risk (ihs)	24719	9.972	0.956
Child income (ihs)	24719	10.834	0.668
Parents income (ihs)	24719	10.159	1.528
Parents income (ihs, SILC)	24719	10.417	0.797
Gift/inheritance (dummy)	24719	0.123	0.329
Lump-sum transfers (ihs)	24719	1.16	2.723
Home ownership (lag)	24719	0.795	0.404
Home ownership (lag) × 2011	24719	0.151	0.358
Home ownership (lag) × 2013	24719	0.295	0.456
Home ownership (lag) × 2015	24719	0.242	0.428
Risky assets ownership (lag)	24719	0.284	0.451
Risky assets ownership (lag) × 2011	24719	0.071	0.258
Risky assets ownership (lag) × 2013	24719	0.098	0.298
Risky assets ownership (lag) × 2015	24719	0.066	0.249
Parents: household size	24719	1.856	0.854
Parents: unemployed	24719	0.021	0.144
Parents: retired	24719	0.635	0.481
Parents: couple	24719	0.572	0.495
Parents: poor health	24719	0.344	0.475
Parents: n. children	24719	2.472	1.145
Parents: n. grand-children	24719	3.194	2.829
Child: full-time	24719	0.815	0.388
Child: part-time	24719	0.067	0.251
Child: unemployed	24719	0.04	0.196
Child: married	24719	0.618	0.486
Child: disabled	24719	0.011	0.103
Child–parents: frequent contacts	24719	0.78	0.414
Child–parents: distance < 25 km	24709	0.614	0.487
Child: only child	24719	0.302	0.459
Siblings income (ihs)	24719	7.394	4.895
Siblings income risk (ihs)	24719	7.098	4.693
Year 2007	24719	0.135	0.342
Year 2011	24719	0.191	0.393
Year 2013	24719	0.37	0.483
Year 2015	24719	0.304	0.46

$$\begin{aligned} y = \; & \beta_0 + \beta_1 age + \beta_2 gend + \beta_3 educ \\ & + \beta_4 age \cdot gend + \beta_5 age \cdot educ + \beta_6 gend \cdot educ + \\ & + \beta_7 age \cdot gend \cdot educ + \beta_8 year + \varepsilon. \end{aligned} \tag{1}$$

We compute offspring's income uncertainty as the standard deviation of the residuals, $sd(\hat{\varepsilon})$, among all individuals of the same type.[7] This measure is in line with the literature, which uses standard deviation or variance of residuals as the benchmark indicator for income risk (see for instance Lusardi, 1997; Meghir and Pistaferri, 2004; Low *et al*., 2010; Mastrogiacomo and Alessie, 2014). We then match the measure of income uncertainty to the children in SHARE according to their type. Notably, since income risk is measured by homogeneous groups (which is similar in spirit to the approach by Meghir and Pistaferri, 2004), using a complementary data source does not represent a limitation to our analysis.

Moreover, this measure of risk does not suffer from the reverse causality issue that would arise if an individual measure on income risk was available in the dataset for each respondent. This would be due to the selection of individuals into riskier jobs depending on parental saving choices. We postpone the discussion of income risk indicators to after the description of the empirical analysis in section IV.

We calculate the indicator for uncertainty described above using two alternative income variables. First, in line with Banks, Blundell and Brugiavini (2001), we refer to a broad definition that includes all sources of non-asset income, including benefit income. By considering the dynamics of income rather than wages or earnings, we implicitly consider uncertainty at the level of earnings, as well as the unemployment risk. Therefore, we include benefits in our income definition to account for the income attached to the non-participation state, whatever its source.

We base the second measure of risk on labour earnings only. The cross-country heterogeneity in welfare schemes mainly affects the difference between these two measures. Indeed, the response to a change in income risk may (or may not) depend on the income source that is affected. Analysing the effect of income risk based on this measure allows us to examine the role of the welfare state and other non-labour sources of income in order to explain the response of parental choice to their offspring's income risk. We also check the impact of unemployment risk, measured as the observed share of unemployed individuals by type.

We plot some examples of the estimated age profile of income and income risk in Figure 1. The average predicted income in our sample for the second generation is almost 31,000 Euros, while the average indicator for income risk is about 21,500 Euros. Both expected income and its uncertainty are higher for older, more educated and male respondents. While this may seem counter-intuitive, it is in line with Meghir and Pistaferri (2004, p. 10), who state that 'the higher returns emanating from increased education come at the cost of higher income risk.' All measures of monetary

[7]We exclude the types with less than 50 individuals from the analysis.

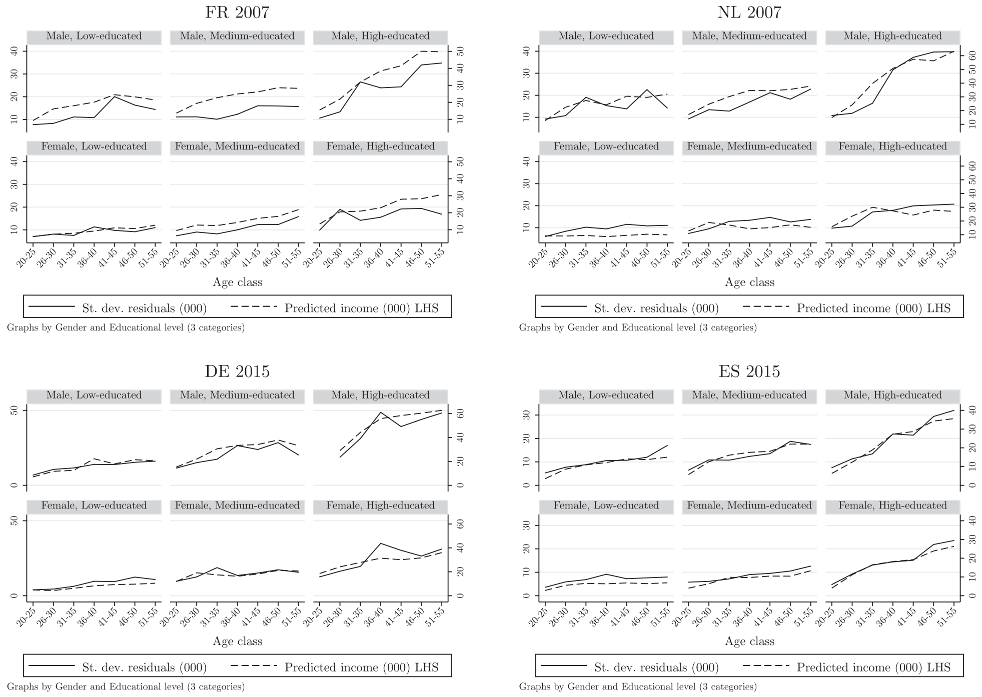

Figure 1. Estimate of predicted income and standard deviation of residuals: Selected years and countries

variables are expressed in Euro 2005 in Germany, using PPP indices provided by SHARE, and made equivalent to account for household size[8] when appropriate.

IV. Empirical strategy

To test whether parents respond to their offspring's income uncertainty, we estimate the following equation:

$$w_{pt} = \alpha + \gamma_o \sigma_{ot} + \gamma_p \sigma_{pt} + \zeta_o y_{ot} + \zeta_p y_{pt} + X'_{ot}\beta_o + X'_{pt}\beta_p + d_t + c_p + \varepsilon_{pt}, \quad (2)$$

where the subscripts p and o denote the parent and offspring generations, respectively, and t is the time period. The dependent variable, w_{pt}, is the (inverse hyperbolic sine of) net financial worth of parents. The main coefficient of interest is γ_o, which measures its response to (inverse hyperbolic sine of) income risk (σ_{ot}). Other control variables are (inverse hyperbolic sine of) parental risk (σ_{pt}), parental family characteristics (X'_{pt}) and child's socio- economic features (X'_{ot}).[9] We include time dummies (d_t) to allow changes in consumption to have some common time pattern. Finally, the error components c_p and ε_{pt} denote, respectively, unobserved heterogeneity and the idiosyncratic error term. Notably, equation (2) also includes, as control variables, the

[8]We use the widespread squared-root equivalence scale.
[9]The full list of variables and their definition is reported in Appendix B.

parent's and offspring's income: y_{pt} and y_{ot} respectively.[10] This allows us to identify the effect of income risk net of the average income, which could be correlated with its variance if income shocks are not independent of the level of earnings (Arellano, Blundell and Bonhomme, 2017). In the baseline specification, in households with more than one offspring, we measure income risk as the risk faced by the offspring with the highest risk.[11]

We estimate equation (2) using a fixed effects model, which is robust to correlation between the covariates and the unobserved heterogeneity. Family fixed effect embeds time-invariant unobservables at different levels of aggregation. First, it contains country features, such as the economic, cultural and institutional differences that persist over time and influence savings. Moreover, it includes time-invariant family characteristics, such as birth cohort of family members, intertemporal preferences, the degree of the parents' altruism, the offspring's ability and risk aversion. Finally, family fixed effect encompasses the time-invariant factors that identify the 'type' of offspring; namely, gender, education and country of residence.

In short, equation (2) is estimated using information available at the household level. Data on parental accumulated savings (w_{pt}) are gathered from the SHARE dataset, along with parents' and offspring's characteristics. The offspring's variables allow us to attribute to each child a measure of income risk (σ_{ot}) which is specific for her type and is recovered from EU-SILC data. Therefore, identification is achieved at the household level. Our identification strategy exploits the variation in the offspring's income risk over time and within family. This variation stems from heterogeneous dynamics in income risk across different 'types' of offspring, net of individual and time fixed effects.[12]

A source of concern relates to time-varying factors – such as the receipt of a monetary gift and inheritance or wealth shocks – which may affect asset accumulation but do not reflect household savings. If these events are correlated with an offspring's income risk, we might attribute to the offspring's income risk an impact it does not have. First, all of the specifications include time dummies, capturing the business cycle and, in particular, the aggregate effect of changes in asset prices and uncertainty. Second, we include as the control a dummy variable for the receipt of an inheritance or monetary gift.

Moreover, we construct two indicators capturing the ownership of, respectively, real estate and risky financial assets in the previous wave. We interact each of these

[10] y_{pt} is (inverse hyperbolic sine of) household-equivalent parental income, while y_{ot} is the (inverse hyperbolic sine of) average predicted income for individuals of the same type (recovered from EU-SILC data; see section III for more details).

[11] We explore alternative measures in case of more than one offspring. Results are discussed in section VI.

[12] We can consider, as an example, two different types of offspring with a comparable level of income risk. In 2011, a woman aged 31 with a tertiary education living in Italy and a woman with the same level of education, aged 36 and living in Belgium face the same income risk, equal to 10.47. In the following wave, that is, 2013, the first woman experiences a reduction in income risk to 10.30, while the one belonging to the second type sees her income risk increasing to 10.64. In the same period, a man aged 31 with tertiary education living in Italy experiences an increase in income risk from 10.64 to 10.72. We exploit this type of heterogeneity in the dynamics of income risk across groups for identification, after controlling for family (including country) unobserved heterogeneity and time dummies.

indicators with year dummies to allow the effect of dynamics in stocks and housing prices to depend on household's ownership of the specific asset. We show that our findings are robust when we do not include wealth controls.

We turn to the discussion of the measurement of income risk, based on the variable σ_{ot}, which we illustrate in the previous section. The identification of its effect hinges on two main assumptions. First, the relevant reference group to evaluate income risk is defined by individuals with the same gender, age, education level and country.[13] One concern could relate to different sectors of employment of individuals belonging to the same type. Our implicit assumption in this context is that workers do not form their expectations based on workers in the same sector, but, instead, they are mobile across sectors. In addition, the sector of employment is a choice variable, and including it in the income equation (1) would give rise to endogeneity.

Second, as pointed out by Banks *et al*. (2001), what matters when assessing the precautionary motive for saving is the conditional variance of the income shock, namely the expected value of the variance of income innovation. We argue that within-household dynamics in the dispersion of the unexplained component of income is a good proxy for the update in the information set used to make predictions about the variance of innovations. In other words, a larger dispersion of the unexplained income component within the reference group reflects in a higher expected uncertainty of the offspring's future income.

This assumption hinges, in turn, on Meghir and Pistaferri (2004), who show strong evidence of state dependence in the conditional variance of income shocks.[14] Since the first and second moment of income distribution may be correlated, particularly in recession periods, we also control for the average income within the same type. Another regressor is the job status of the offspring (unemployed, full-time or part-time worker). Therefore, the estimated impact of income risk is net of major shocks to job conditions experienced by the offspring.

According to the simplest version of the permanent income hypothesis, only permanent income shocks should induce substantial changes in savings, while temporary income shocks should not alter savings significantly. Unfortunately, limitation to the panel dimension of our data does not allow us to disentangle permanent and transitory shocks (for instance, using the method in Meghir and Pistaferri, 2004). Since the indicator for income risk is estimated from the income equation (1), we compute unclustered and unweighted bootstrapped robust standard errors, based on 500 replications.

[13]The geographical size of the labour market that individuals consider when forming their expectations is not straightforward. We calculate the dispersion of the income residual at the *national* level for several reasons. First, within-country migration may weaken the relevance of local labour market conditions, while language and institutional factors make the country's labour market the natural geographical unit. In addition, there are data limitations. Information about the region of residence (NUTS regions) is not available in the EU-SILC dataset for all years and countries we consider. Moreover, the sample size of the cells delimited by gender, age, education *and* region is often too small to provide a reliable measure of income dispersion.

[14]They estimate an ARCH process for the conditional variance of permanent and transitory shocks. The persistence parameter is up to 0.9 for the permanent shock of high school graduates.

V. Results

The baseline results are reported in Table 3,[15] which includes all three measures of risk described in the section III: first, the standard deviation of the residuals of disposable income (Panel a); second, the same measure excluding transfers from the notion of income (Panel b); and third, the risk of unemployment (Panel c). In all panels, the most parsimonious specification (Column 1) includes only the inverse hyperbolic sine of the self-reported equivalent income of parents, the predicted income of the offspring (from EU-SILC), the standard deviation of the residuals of parental income, and the year dummies as controls.

Parental savings respond significantly to the offspring's income risk, as the theoretical model predicts. A 1% rise in offspring's income risk reflects in an increase in savings by 0.4–0.5%, depending on the measure income risk (Panels a and b). The coefficient associated with unemployment risk (Panel c) is positive but not significant at standard statistical levels. This result is robust to additional control variables; that is, wealth controls in Column (2), offspring and parent covariates in Columns (3) and (4) respectively. The specification in Column (4), with the largest set of control variables, is our preferred specification, which is used as a benchmark for robustness analysis.

When we include the offspring's controls (Column (4)), we also detect a significant response of parental savings to the offspring's income. A 1% rise in the offspring's income reduces parents' net financial wealth by 0.47%. These key findings support the implications of the theoretical model in Appendix A. First, we find evidence of altruism among parents, who care about their offspring's income. Moreover, intergenerational response to uncertainty is relevant in our sample: we find a significant link between the income risk of the offspring and parental savings.

As expected, parental savings are increasing with their own family income, while they do not react to increasing uncertainty. This is possibly specific to our sample, where respondents are older than 50 and, thus, close to retirement or are retired. The impact of labour income risk is negligible in the late stage of the life cycle, when human capital represents a minor component of permanent income.[16] In this vein, the estimated coefficients are almost identical when excluding parental income risk (Column 5). This specification also controls for the potential high correlation between the parents' and the offspring's income risk, which may hamper the correct estimation of both coefficients and standard errors. However, once we drop parental income risk, the coefficient for the offspring risk is virtually unchanged, confirming the absence of collinearity.

Finally, a possible threat to the causal interpretation of our results is related to reverse causality: respondents who save more could be more willing to work more, which a higher income could reflect. This reverse causality, along with the presence of unobserved shocks that can affect both savings and labour supply, may determine

[15]Tables C.1, C.2, and C.3 in the Appendix report all of the coefficients relative to the control variables.

[16]On the one hand, the life-cycle model predicts human capital – defined as the sum of current and future labour income – to decline with age. On the other hand, consumers are predicted to accumulate savings during their working life. Therefore, the relative weight of human capital with respect to other forms of wealth is declining with age.

TABLE 3

Fixed effects regressions with the ihs of household total savings as the dependent variable

	(1) *b/se*	*(2)* *b/se*	*(3)* *b/se*	*(4)* *b/se*	*(5)* *b/se*	*(6)* *b/se*
Panel a						
Child income risk (ihs)	0.432**	0.441**	0.443**	0.451**	0.453**	0.445***
	(0.182)	(0.183)	(0.177)	(0.180)	(0.179)	(0.169)
Child income (ihs)	−0.419	−0.368	−0.387	−0.471*	−0.462*	−0.471*
	(0.268)	(0.262)	(0.274)	(0.265)	(0.262)	(0.258)
Parents income risk (ihs)	0.099	0.097	0.099	0.104	.	0.105
	(0.150)	(0.157)	(0.151)	(0.163)	.	(0.155)
Parents income (ihs)	0.119***	0.117***	0.115***	0.115***	0.115***	.
	(0.031)	(0.031)	(0.030)	(0.031)	(0.033)	.
Parents income (ihs, SILC)	.	.	.	.	.	0.017
	.	.	.	.	.	(0.215)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Wealth controls	No	Yes	Yes	Yes	Yes	Yes
Parental controls	No	No	Yes	Yes	Yes	Yes
Child controls	No	No	No	Yes	Yes	Yes
Obs.	24797	24797	24797	24797	24797	24797
Panel b						
Child income risk (ihs), net of transfers	0.468***	0.472***	0.473**	0.481***	0.481***	0.475***
	(0.181)	(0.181)	(0.192)	(0.184)	(0.187)	(0.175)
Child income (ihs)	−0.408	−0.348	−0.367	−0.438	−0.428	−0.440
	(0.250)	(0.290)	(0.273)	(0.290)	(0.283)	(0.278)
Parents income risk (ihs)	0.099	0.098	0.099	0.104	.	0.105
	(0.156)	(0.157)	(0.169)	(0.153)	.	(0.159)
Parents income (ihs)	0.119***	0.117***	0.115***	0.115***	0.115***	.
	(0.031)	(0.031)	(0.030)	(0.031)	(0.029)	.
Parents income (ihs, SILC)	.	.	.	.	.	0.014
	.	.	.	.	.	(0.216)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

(*Continued*)

TABLE 3
(*Continued*)

	(1) *b/se*	*(2)* *b/se*	*(3)* *b/se*	*(4)* *b/se*	*(5)* *b/se*	*(6)* *b/se*
Wealth controls	No	Yes	Yes	Yes	Yes	Yes
Parental controls	No	No	Yes	Yes	Yes	Yes
Child controls	No	No	No	Yes	Yes	Yes
Obs.	24797	24797	24797	24797	24797	24797
Panel c						
Child income risk (ihs), unemployment	1.362	1.015	0.902	0.796	0.803	0.795
	(1.193)	(1.300)	(1.224)	(1.188)	(1.227)	(1.306)
Child income (ihs)	0.027	0.013	0.016	−0.059	−0.051	−0.061
	(0.177)	(0.184)	(0.179)	(0.186)	(0.192)	(0.191)
Parents income risk (ihs)	0.102	0.102	0.102	0.106	.	0.106
	(0.154)	(0.155)	(0.164)	(0.159)	.	(0.154)
Parents income (ihs)	0.119***	0.117***	0.114***	0.115***	0.115***	.
	(0.030)	(0.030)	(0.031)	(0.030)	(0.030)	.
Parents income (ihs, SILC)	.	.	.	.	.	0.012
	.	.	.	.	.	(0.224)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Wealth controls	No	Yes	Yes	Yes	Yes	Yes
Parental controls	No	No	Yes	Yes	Yes	Yes
Child controls	No	No	No	Yes	Yes	Yes
Obs.	24797	24797	24797	24797	24797	24797

*$P < 0.1$, **$P < 0.05$, ***$P < 0.01$. Monetary values expressed in PPP real values (thousand Euros, Germany, 2005). Bootstrapped standard errors in parenthesis. The list of variables included in each specification and the associated coefficients are in Tables, and for panels a, b and c respectively.

endogeneity. To address this issue, we substitute self-reported parental household income from SHARE with predicted household income from EU-SILC. Being determined only by age, gender and educational status, this predicted income should be significantly less affected, if at all, by reverse causality. We report the results in Column (6) and corroborate the hypothesis of no reverse causality: the coefficient for the offspring's uncertainty is almost unchanged, while the effect of parental income remains positive and significant.

VI. Robustness checks

Falsification test. Even if we control for a wide set of individual and family covariates, the fixed effects approach allows us to rule out any time-invariant personal and household characteristics. While the time fixed effect captures time trends common to all individuals, one may suspect that the source of variability we identify is correlated with some other (unobservable and time-varying) feature that may affect parental savings. We verify that this is not the case by using a falsification test that randomizes the offspring's risk across households. The comparison between the baseline results (Table 3) and the modified model (Table 4) shows that the random measure of the offspring's income risk is not significantly associated with parental savings. These results support the interpretation of our main coefficient of interest as the intergenerational precautionary motive for saving.

Offspring's characteristics. In the baseline model, we consider the income of the offspring with the highest risk. However, the parents might be also affected by the income risk of their other offspring according to the uncertainty of their income. We address this issue in Table 5, by replacing the income risk of the riskiest offspring with the same measure for an average of all offspring up to the fifth (Column 1), for the less risky offspring (Column 2) and the oldest offspring (Column 3).[17]

We find that parents mainly respond to the risk faced by the offspring who is the most exposed to uncertainty. Parental savings do not significantly respond to the riskiness of the oldest offspring nor of the least exposed to risk. The effect of the average risk has a magnitude comparable to the baseline results, albeit it is not significant at standard levels. In the last column of Table 5, we use the baseline risk measure and control for siblings' variables. More precisely, we add a dummy variable capturing whether the offspring is an only child and, if there are siblings, we also control for their average risk and income. The estimated effect of these variables not significantly different from zero and the main results concerning the riskiest offspring are confirmed. This finding further supports that intergenerational precautionary savings channel refers to the offspring most exposed to uncertainty.

Other relevant aspects that may affect the strength of the intergenerational precautionary saving channel are the geographical distance and the frequency of contacts between parents and their offspring. Even if we control for the frequency of contact between parents and offspring in Table 3, we replicate the baseline model for

[17]Note that the offspring considered need not be the same over time.

TABLE 4

Robustness. Fixed effects regressions with the ihs of household total savings as the dependent variable. Random assignment of children risk and income

	(1) *b/se*	*(2)* *b/se*	*(3)* *b/se*	*(4)* *b/se*	*(5)* *b/se*	*(6)* *b/se*
Child income risk (ihs): randomized	0.048	0.045	0.040	0.043	0.044	0.045
	(0.115)	(0.124)	(0.123)	(0.133)	(0.124)	(0.127)
Child income (ihs): randomized	0.017	0.018	0.023	0.020	0.018	0.018
	(0.114)	(0.119)	(0.116)	(0.128)	(0.119)	(0.120)
Parents income risk (ihs)	0.101	0.102	0.103	0.104	.	0.104
	(0.142)	(0.152)	(0.157)	(0.157)	.	(0.158)
Parents income (ihs)	0.119***	0.117***	0.114***	0.114***	0.114***	.
	(0.030)	(0.030)	(0.031)	(0.030)	(0.031)	.
Parents income (ihs, SILC)	.	.	.	.	.	0.018
	.	.	.	.	.	(0.210)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Wealth controls	No	Yes	Yes	Yes	Yes	Yes
Parental controls	No	No	Yes	Yes	Yes	Yes
Child controls	No	No	No	Yes	Yes	Yes
Obs.	24797	24797	24797	24797	24797	24797

*$P < 0.1$, **$P < 0.05$, ***$P < 0.01$. Monetary values expressed in PPP real values (thousand Euros, Germany, 2005). Bootstrapped standard errors in parenthesis.

TABLE 5

Robustness. Fixed effects regressions with the ihs of household total savings as the dependent variable. Children other than the riskiest and siblings

	(1) b/se	(2) b/se	(3) b/se	(4) b/se
	Mean risk	Min risk	Oldest child	Siblings
Child income risk	0.324	.	.	.
(ihs): mean	(0.226)	.	.	.
Child income	−0.367	.	.	.
(ihs): mean	(0.367)	.	.	.
Child income risk	.	−0.217	.	.
(ihs): least	.	(0.211)	.	.
Child income (ihs): least	.	0.213	.	.
	.	(0.261)	.	.
Child income risk	.	.	0.150	.
(ihs): oldest	.	.	(0.193)	.
Child income (ihs): oldest	.	.	0.041	.
	.	.	(0.277)	.
Child income risk (ihs)	.	.	.	0.421**
	.	.	.	(0.185)
Child income (ihs)	.	.	.	−0.501*
	.	.	.	(0.288)
Parents income risk (ihs)	0.105	0.128	0.117	0.106
	(0.153)	(0.162)	(0.155)	(0.153)
Parents income (ihs)	0.114***	0.116***	0.117***	0.114***
	(0.028)	(0.029)	(0.029)	(0.031)
Only child	.	.	.	1.507
	.	.	.	(1.911)
Siblings income (ihs)	.	.	.	0.320
	.	.	.	(0.296)
Siblings income risk (ihs)	.	.	.	−0.160
	.	.	.	(0.320)
Year dummies	Yes	Yes	Yes	Yes
Wealth controls	Yes	Yes	Yes	Yes
Parental controls	Yes	Yes	Yes	Yes
Child controls	Yes	Yes	Yes	Yes
Obs.	24797	24697	24747	24797

*$P < 0.1$, **$P < 0.05$, ***$P < 0.01$. Monetary values expressed in PPP real values (thousand Euros, Germany, 2005). Bootstrapped standard errors in parenthesis.

different samples in Table 6.[18] We distinguish between offspring living within less (Column 1) or more (Column 2) than 25 km of their parents, and those who have contact with their parents more than once a week (Column 3) or less often (Column 4). The results show how the effect of the offspring's income risk is significant only for those who live close to their parents and who are in frequent contact with them.

[18]Since this sample selection is not completely exogenous, we must be cautious when interpreting the results.

TABLE 6

Robustness. Fixed effects regressions with the ihs of household total savings as the dependent variable. Distance from the child and contacts

	(1) *b/se*	*(2)* *b/se*	*(3)* *b/se*	*(4)* *b/se*
	Less than 25 km	More than 25 km	Frequent contacts	No contacts
Child income risk (ihs)	0.790***	−0.297	0.440**	−0.161
	(0.234)	(0.327)	(0.215)	(0.480)
Child income (ihs)	−0.883**	0.840	−0.616*	−0.335
	(0.346)	(0.551)	(0.315)	(0.803)
Parents income risk (ihs)	0.112	0.160	−0.005	0.584
	(0.214)	(0.268)	(0.177)	(0.432)
Parents income (ihs)	0.141***	0.092	0.129***	−0.028
	(0.038)	(0.059)	(0.035)	(0.098)
Year dummies	Yes	Yes	Yes	Yes
Wealth controls	Yes	Yes	Yes	Yes
Parental controls	Yes	Yes	Yes	Yes
Child controls	Yes	Yes	Yes	Yes
Obs.	15200	9587	19333	5464

$^*P < 0.1$, $^{**}P < 0.05$, $^{***}P < 0.01$. Monetary values expressed in PPP real values (thousand Euros, Germany, 2005). Bootstrapped standard errors in parenthesis. In columns (3) and (4), the control variable relative to the frequency of contacts between parents and child has been used to split the sample and therefore not included in the regression.

Cross-country comparison and time dynamics. Different degrees of generosity of the welfare systems, social norms and family ties may determine heterogeneity in the strength of the intergenerational precautionary motive for saving. To explore this aspect, we investigate the heterogeneity of our findings across countries characterized by different welfare states. We follow the categories of welfare system proposed by Ferrera (1996) and exploited by Kammer, Niehues and Peichl (2012) and we identify four groups of countries: Scandinavian countries (Denmark and Sweden), Continental countries (Austria, Belgium, France, Germany, the Netherlands and Switzerland), Mediterranean countries (Italy and Spain) and Eastern European countries (Czeck Republic, Estonia and Slovenia).

In Table 7, we report estimate results obtained using these four subsamples of countries (Columns 1–4) and by allowing the effect of the offspring's income risk to vary across groups (Column 5). Estimate results suggest a stronger intergenerational precautionary saving motives in Mediterranean and Eastern European countries, while this mechanism is not evident in Scandinavian countries. Continental countries are in line with average effects.

Two possible reasons for these findings might be either that in Scandinavian countries, the offspring's income risk is not a major determinant of the parental savings decision, or that the welfare state in these countries is a good substitute for informal parental and family support. On the contrary, a weaker welfare system and the importance of family ties in Italy and Spain (Alesina and Giuliano, 2014) may contribute to explaining the relevance of the intergenerational precautionary savings motive in these countries. Family ties and the features of the welfare system are strictly

TABLE 7

Heterogeneity by country group. Fixed effects regressions with the ihs of household total savings as the dependent variable

	(1) b/se	(2) b/se	(3) b/se	(4) b/se	(5) b/se
	Scand.	Cont.	Medit.	East.	All
Child income risk (ihs),	−0.056	0.471**	1.112	0.980*	.
net of transfers	(0.453)	(0.215)	(0.693)	(0.508)	.
Child income (ihs)	0.355	−0.704*	−1.138	−0.109	.
	(0.813)	(0.363)	(0.930)	(0.618)	.
Parents income risk (ihs)	0.001	0.236	0.009	−0.197	0.056
	(0.357)	(0.209)	(0.582)	(0.336)	(0.154)
Parents income (ihs)	0.151	0.104**	0.081	0.146**	0.114***
	(0.121)	(0.050)	(0.054)	(0.069)	(0.032)
Scandinavian × Child income risk	.	.	.	.	0.072
(ihs), net of transfers	.	.	.	.	(0.432)
Continental × Child income	.	.	.	.	0.443**
risk (ihs), net of transfers	.	.	.	.	(0.208)
Mediterranean × Child income	.	.	.	.	1.152*
risk (ihs), net of transfers	.	.	.	.	(0.619)
Eastern × Child income risk	.	.	.	.	0.718
(ihs), net of transfers	.	.	.	.	(0.510)
Year dummies	Yes	Yes	Yes	Yes	Yes
Wealth controls	Yes	Yes	Yes	Yes	Yes
Parental controls	Yes	Yes	Yes	Yes	Yes
Child controls	Yes	Yes	Yes	Yes	Yes
Obs.	3915	11966	3156	5760	24797

$^{*}P < 0.1$, $^{**}P < 0.05$, $^{***}P < 0.01$. Monetary values expressed in PPP real values (thousand Euros, Germany, 2005). Bootstrapped standard errors in parenthesis. Scandinavian countries: Denmark and Sweden; Continental countries: Austria, Belgium, France, Germany, Netherlands, Switzerland; Mediterranean countries: Italy and Spain; Eastern European countries: Czech Republic, Estonia, Slovenia.

intertwined (see, e.g. Ferrera, 1996; Alesina *et al.*, 2015), and it is therefore difficult to identify the role of these two channels separately.

We also explore the heterogeneity of our findings over time by distinguishing between pre- and postrecession periods. More precisely, we examine whether the effect of offspring's income risk and income is different in the years before and after the 2008–09 Great Recession. To this end, we augment our baseline specification with the interaction of both the offspring's income and income risk with a dummy variable capturing postcrisis waves (2011, 2013 and 2015). Results are reported in Table 8. The intergenerational precautionary saving channel is significant at the 1% level, and is larger after 2009. A 1% raise in the offspring's income risk boosts parental net financial wealth by 1.6%. We also find a significant response of parental savings to the offspring's income. A 1% drop in offspring's income increases net financial worth by 1.7%. These channels are, instead, not significant before the crisis.[19] The magnitude of

[19]Note that we observe families only once before the Great Recession, while there are three waves available after it.

TABLE 8

Dynamics over time. Fixed effects regressions with the ihs of household total savings as the dependent variable

	(1) b/se
Pre-2009 × Child income risk (ihs)	−0.621
	(0.891)
Post-2009 × Child income risk (ihs)	1.559***
	(0.478)
Pre-2009 × Child income (ihs)	−0.210
	(1.073)
Post-2009 × Child income (ihs)	−1.689**
	(0.680)
Parents income risk (ihs)	−0.222
	(0.421)
Parents income (ihs)	0.225***
	(0.067)
Year dummies	Yes
Wealth controls	Yes
Parental controls	Yes
Child controls	Yes
Obs.	24797

*$P < 0.1$, **$P < 0.05$, ***$P < 0.01$. Monetary values expressed in PPP real values (thousand Euros, Germany, 2005). Bootstrapped standard errors in parenthesis.

the coefficients may depend on the fact that income shocks experienced shortly after the crisis are perceived as long-lasting, even more for younger generations. This is in line with findings by Kovacs, Rondinelli and Trucchi (2019), who show that income shocks were largely perceived to be permanent during the 2011–13 Sovereign Debt Crisis.

Heterogeneity by income class. We explore another dimension of heterogeneity, namely whether the effect of uncertainty on precautionary savings is constant across the income distribution, or whether it is stronger among the poorest (possibly due to the stronger precautionary motive) or the richest (possibly because their demand for consumption is more elastic). Table 9 reports the baseline specification for households above and below the median.[20] We find that the effect for the rich is twice as great as for the poor, and that it is significant only for high-income parents. On the contrary, the savings of low-income parents increase when their offspring experiences an income loss.

VII. Conclusion

In this paper, we document the relevance of the intergenerational precautionary motive for saving, which reflects in a positive linkage between the offspring's income risk and

[20]Given the panel structure of the data, we computed the medians by country and wave; that is, we split the sample for every country and every wave in the final sample. Due to the relatively low sample size, we did not disaggregate at the lower level, nor did we split the sample into quartiles.

TABLE 9

Fixed effects regressions with the ihs of household total savings as the dependent variable. Sample split according to the median household income by country and wave

	(1) b/se	(2) b/se
	Below median	Above median
Child income risk (ihs)	0.387	0.666**
	(0.264)	(0.319)
Child income (ihs)	−0.942**	−0.117
	(0.454)	(0.442)
Parents income risk (ihs)	−0.042	0.123
	(0.258)	(0.241)
Parents income (ihs)	0.110**	0.318**
	(0.045)	(0.145)
Year dummies	Yes	Yes
Wealth controls	Yes	Yes
Parental controls	Yes	Yes
Child controls	Yes	Yes
Obs.	12413	12384

*$P < 0.1$, **$P < 0.05$, ***$P < 0.01$. Monetary values expressed in PPP real values (thousand Euros, Germany, 2005). Bootstrapped standard errors in parenthesis.

parental savings. This channel may contribute to explain wealth and saving trajectories of individuals in the late stage of the life cycle, namely retirees or workers approaching retirement age, and their heterogeneity across individuals and across countries. Future income uncertainty fosters savings, not only by the individuals affected by it but also by their parents or other people supporting their income. This mechanism may be particularly relevant in the Great Recession as well as during the Covid-19 pandemic, which has determined a rise in uncertainty.

Our findings point out a significant heterogeneity in the strength of the intergenerational precautionary motive for saving across countries, which is consistent with some degree of substitutability between (intergenerational) private and public insurance to income risk. This result has relevant policy implications. Public welfare policies, such as unemployment benefits and income support, may substitute for family ties and informal networks, generating a positive spillover beyond the target of the policies.

One key prediction of the life-cycle models for consumption and savings is that individuals respond differently to permanent rather that transitory income shocks. However, the analysis of this aspect requires more detailed individual information that is not available in the dataset we use and is thus left for future research.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix A. Theoretical framework.
Appendix B. Definition of variables.
Appendix C. Additional Tables.