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The gender pay gap: what can we learn from Northern Ireland?

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Abstract

Northern Ireland (NI) forms an important outlier to the established international pattern of a pronounced gender pay gap (GPG) in favour of men. Using contemporary data from the Quarterly Labour Force Survey we provide a comprehensive analysis of the GPG in NI and make comparisons to the rest of the UK. Despite the relatively common institutional and policy context, the GPG in NI is found to be far smaller than in the rest of the UK. This can largely be attributed to the superior productivity-related characteristics of women relative to men in NI, which partially offset the influence of gender differences in the returns to these characteristics. Our analysis highlights the importance of occupation—both in terms of occupational allocation and the returns to occupations—in explaining the cross-country differential. This is reinforced by the impact of lower earnings inequality in NI.

JEL classifications: J71, J31, J24.

1. Introduction

The well-developed international literature on the gender pay gap (hereinafter, GPG), while exhibiting variation across time and countries, documents a persistent, and typically sizeable, GPG (see Blau and Kahn, 2017 for a recent review). The majority of this evidence applies well-established decomposition methods in an attempt to understand the drivers of the raw gap and particularly to identify that part which is not explained by observable personal and employment-related characteristics. Comparisons across countries (Blau and Kahn, 1992, 1996) have proved insightful in highlighting the importance of the national wage structure, as well as cross-country gender differences in characteristics and the return to these characteristics, as determinants of the magnitude of the GPG. While narrowing trends over time have been identified across most developed countries (Kaya, 2014), a substantial raw gap typically remains, including in the UK where the contemporary GPG is about 17% (Office for National Statistics [ONS], 2019). Indeed, the persistence of the GPG has prompted significant policy attention, including in the UK, where in 2015, the then Prime Minister David Cameron announced his aim to 'end the GPG in a generation' and

subsequently introduced GPG transparency among large employers as a step towards achieving this.[1]

We make a novel contribution to this literature by considering an overlooked outlier in this international pattern, often obscured by the aggregation of UK data (e.g., Jones *et al.*, 2018) or by omission as a consequence of data being collected specifically for Great Britain (e.g., Mumford and Smith, 2009). Headline estimates suggest the GPG in Northern Ireland (hereinafter, NI) is much smaller than comparable measures for the UK and, using median gross hourly pay among full-time employees it is reversed, with women on average earning 2.8% *more* than men in NI (ONS, 2019). This contrasts starkly to the three other UK countries (which we collectively refer to as the rest of the UK, hereinafter, RUK) where the GPG indicates 6–10% higher average earnings for men.[2] While documented in National Statistics and highlighted by the media, this pattern, to our knowledge, has not been recognized or explored within the academic literature.[3] Yet the distinctly narrower GPG in NI provides an opportunity to enhance our understanding of the drivers of the contemporary GPG of particular relevance to policy given renewed emphasis on narrowing the GPG. Further, by exploring stark cross-country variation within the relatively common institutional, economic, and policy context of the UK, this analysis provides a novel contribution to the international literature that is not plagued by the complexity and unobserved heterogeneity typically affecting cross-country comparisons, or issues relating to consistency of data collection.[4]

Using directly comparable information from the largest UK Household Survey—the Quarterly Labour Force Survey (hereinafter, QLFS)—this paper applies established regression and decomposition methods to explore the determinants of the contemporary GPG in NI and how this compares to the RUK. First, by applying the Oaxaca–Blinder (hereinafter, OB) decomposition method (Oaxaca, 1973; Blinder, 1973) we separate the role of differences in personal and employment-related characteristics from that part of the GPG in NI that is unexplained and reflects gender differences in the return to characteristics, our proxy for pay inequality. We perform the same analysis for the RUK as a comparator. This enables us, for example, to understand whether the narrower GPG in NI reflects female advantage in terms of characteristics such as educational attainment and/or, greater pay equality. Second, we investigate why the GPG in NI differs so substantially from the RUK by undertaking a decomposition of the cross-country difference using a method by Juhn *et al.* (1991) (hereinafter, JMP), which has been widely applied in the international literature (see, e.g., Blau and Kahn, 1992, 1996; Kaya, 2014). Here, we separate the influence of observable characteristics, for

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1   See: https://www.gov.uk/government/news/prime-minister-my-one-nation-government-will-close-the-gender-pay-gap. The guidance on re-using this information is at: Open Government Licence (nationalarchives.gov.uk) which confirms we can re-use this information as long as we acknowledge the source.

2   Using the same definition, the GPG is 10.0%, 6.4%, and 7.1% in England, Wales, and Scotland, respectively (ONS, 2019). While the negative GPG in NI is a feature of this specific measure, NI consistently exhibits a narrower GPG than other UK countries across measures, including for all workers and at the mean. As is typical within the literature we focus on the mean full-time GPG but explore the sensitivity of our findings to using the median and including all workers.

3   See for example: https://www.bbc.co.uk/news/uk-northern-ireland-37166043.

4   We nevertheless recognize that there are also likely to be valuable insights from a comparison between NI and the Republic of Ireland given the geographic border and potential cultural similarities which is not possible using UK data.

example, cross-country gender differences in industrial and occupational segregation, and cross-country differences in returns to these characteristics, from unobserved factors, such as differences in the national wage structure, culture, and/or labour market conditions.[5]

Our results show that, regardless of the precise measure, the GPG in NI is far smaller than in the RUK. The relatively narrow (5.2 log %) full-time mean GPG in NI can be largely attributed to the influence of superior productivity-related characteristics of women relative to men, which partially offset the effect of gender differences in the returns to characteristics that give rise to relative pay advantage for men. Indeed, that the contribution of the latter is more similar between NI and the RUK (at about 10 log %) reinforces the critical distinction between the concepts of the GPG and inequality, and suggests that, despite its narrow GPG, NI is not an exemplar in terms of gender pay equality. A decomposition of the sizeable 9.4 log percentage point GPG difference between NI and RUK highlights the importance of occupation, in terms of both gender differences in occupational allocation and the returns to occupation, in determining the narrower GPG in NI. Lower earnings inequality within NI reinforces this effect. Therefore, despite the similar institutional and policy context, factors well-established to determine international variation in the GPG are also found to have an important role in generating considerable variation within the UK.

The remainder of this paper is structured as follows: Section 2 provides a brief overview of evidence from within and between country comparisons of the GPG and considers potential drivers of the GPG differential between NI and RUK. Section 3 provides an outline of the QLFS and the measures applied in this analysis. Descriptive evidence on the difference in the GPG between NI and RUK is provided in Section 4. We outline the decomposition methods and present the results relating to the within and between country GPG comparisons in Sections 5 and 6, respectively. Finally, Section 7 concludes.

2. Background

The core theme within the vast international GPG literature has been an attempt to estimate wage discrimination against women. The traditional approach, building on Becker's (1957) theory of labour market discrimination, entails applying versions of the OB decomposition methodology in order to separate the GPG into an explained and unexplained component. The former arises due to gender differences in human capital and other productivity-related characteristics, whereas the latter is that part of the GPG arising from gender differences in the rewards to these characteristics, or what might be thought of the GPG that exists for otherwise comparable men and women. While the latter is widely recognized to be an imperfect measure of wage discrimination, this division is nonetheless insightful in understanding the drivers of the GPG, including in the UK (see, e.g., Manning and Swaffield, 2008; Mumford and Smith, 2009; Chzhen and Mumford, 2011; Jones *et al.*, 2018; Jewell *et al.*, 2020).

2.1 GPG across countries
Despite its complexity, cross-country comparisons have been central to enhancing our understanding of the sources of the GPG within countries, particularly in terms of institutions, policies, and gender differences in employment rates. For example, studies often use the JMP decomposition, an extension to the OB method proposed by Juhn *et al.* (1991), to

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5   Although modest, there are also some relevant differences in government policy (see Section 2).

separate the influence of cross-country gender differences in workforce composition from national wage structures to identify additional institutional drivers. In particular, the GPG is typically found to be wider in countries with greater earnings inequality such as the USA (Blau and Kahn, 1992, 1996) and consistent with this, a role for centralized wage setting, such as through unions and collective bargaining, has been suggested in narrowing the GPG (Blau and Kahn, 1996).[6]

Olivetti and Petrongolo (2008) demonstrate the critical role played by female labour force participation in explaining variation in the GPG between Anglo-Saxon countries and Southern Europe, with national GPGs being negatively correlated with gender gaps in employment, consistent with the positive selection of females into work. However, in countries with relatively high female employment rates, including the UK, they find limited impact of selection (see also Christofides *et al.*, 2013).

2.2 GPG in the UK

By international standards, the UK has a relatively large GPG, above the EU and OECD average, but similar to countries such as the USA and Germany. Despite previous analysis using comprehensive data on personal and employment-related characteristics and, accounting for selection into work (Chzhen and Mumford, 2011), firm characteristics (Mumford and Smith, 2009) and firm-fixed effects (Jewell *et al.*, 2020), and attempting to adjust for typically unobservable characteristics such as personality (Manning and Swaffield, 2008), much of the UK GPG typically remains unexplained.

Unlike the majority of cross-country GPG comparisons including the UK, which are relative to the USA (Blau and Kahn, 1992, 1996) or other EU countries (Christofides *et al.*, 2013; Kaya, 2014) there has been far less analysis within the UK, perhaps as a consequence of the four constituent countries sharing a largely common institutional and policy environment.[7] Indeed, to our knowledge there has been no previous study of the GPG in NI with the few labour market studies focused on NI tending to explore disparities by religion in light of the conflict (see, e.g., Rowland *et al.*, 2018). The only exception is Mac Flynn (2014), who provides a descriptive picture of the GPG in NI and attributes the relatively low GPG to the concentration of public sector employment, something we later explore.

Given the complexity of cross-country comparisons, and difficulty in harmonizing international data, there is growing recognition of the potential insights from spatial comparisons of the GPG within countries (see Huertas *et al.*, 2017, for Spain; Fuchs *et al.*, 2019, for Germany). Consistent with the theoretical predictions of the spatial monopsony model, which suggest a lower unexplained GPG in more competitive regions (Hirsch *et al.*, 2013), urban/rural differences have been identified in the UK (Phimister, 2005). In contrast, however, Stewart (2014) documents a wider GPG in London albeit, except within the top third of the earnings distribution, the difference is largely explained by gender differences in characteristics. The latter aligns to recent evidence on a disaggregate spatial scale in Germany,

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6   The evidence relating to the impact of family friendly policies is less clear. Blau and Kahn (1996) suggest they have ambiguous effects by raising the relative costs of hiring women and/or encouraging extended family leave. In Europe, however, with the exception of maternity leave, family friendly policies are found to be associated with a lower GPG (see, e.g., Christofides *et al.*, 2013).

7   Key labour market policies, such as in relation to the minimum wage and the tax credit system, apply universally. Although devolved and religiously segregated in NI, the education system is also broadly similar.

where Fuchs *et al.* (2019) find that the GPG is related to local area development, with greater sensitivity of male earnings serving to widen the GPG in more prosperous areas. Further, gender differences in observable characteristics are found to be more important when the GPG is larger, resulting in the unexplained GPG being relatively similar across areas. In contrast, however, although less pronounced than the variation in the raw GPG, the unexplained GPG is found to differ across Spanish regions (Huertas *et al.*, 2017).

2.2.1 NI labour market and institutional context   Before turning to our analysis, in Table 1, we provide a brief overview of the GPG in NI and RUK and differences in key labour market and demographic characteristics across countries which might explain the cross-country GPG differential. The upper panel provides average hourly earnings by gender and for all, full-time and part-time employees. Average hourly pay is lower in NI compared

Table 1. Key labour market and demographic indicators by country and gender

	NI				RUK			
	All	Male	Female	Gender gap (%)	All	Male	Female	Gender gap (%)
Average hourly earnings (£)								
All employees	13.00	13.70	12.39	9.6	15.03	16.69	13.47	19.3
Full-time employees	13.51	13.88	13.02	6.2	15.93	17.05	14.38	15.7
Part-time employees	11.31	11.37	11.30	0.6	11.94	12.22	11.89	2.7
Other labour market indicators								
Employment (%)	75.7	78.3	73.0	6.8	80.4	83.7	77.0	8.0
Employee (%)	84.3	78.2	90.9	−16.2	85.1	81.0	89.6	−10.6
Full-time employment (%)	77.3	92.3	63.6	31.1	77.9	92.0	63.8	30.7
Public sector employment (%)	32.3	21.4	42.2	−97.2	25.6	17.0	34.3	−101.8
Occupational dissimilarity index		0.36				0.30		
Industrial dissimilarity index		0.34				0.30		
Earnings inequality								
Standard deviation	0.46	0.47	0.46	2.9	0.55	0.56	0.52	7.5
1.53	1.54	1.54		0.3	1.66		1.62	3.3
Ratio 90–50 percentile	1.24	1.27	1.22	3.2	1.29	1.29	1.27	1.6
Ratio 50–10 percentile	1.23	1.22	1.26	−3.1	1.29	1.29	1.27	1.8
Key demographics								
Married	55.2	57.3	53.2	7.2	51.7	52.9	50.6	4.3
Number of dependent children	0.76	0.66	0.86	−30.3	0.70	0.62	0.77	−24.2
Number of young children	0.23	0.19	0.26	−36.8	0.21	0.19	0.24	−26.3
No religious belief	12.5	14.0	11.0	21.4	43.6	46.3	40.9	11.7

Notes: (i) All figures are based on the working-age population and exclude full-time students. (ii) Employees are measured as a percentage of those in employment. (iii) Full-time and public sector employment are measured as a percentage of employees. (iv) Average hourly earnings relate to the respective estimation sample. (v) Occupational and industrial dissimilarity are based on the Duncan and Duncan (1955) index and SOC 2010 major occupations and SIC 2007 sectors, respectively. (vi) Earnings inequality measures use the log of hourly earnings and relate to the main full-time pay sample. (vii) Dependent children are aged under 16 and young children are aged 4 or under. See Online Appendix Table A.1 for a definition of religion. (viii) The within country gender gap is measured as a percentage of the relevant male figure in each case.
Source: Authors calculations based on the QLFS 2016–2019.

with the RUK. Confirming the headline ONS finding, the overall GPG in NI (9.6%) is less than half the corresponding figure for the RUK (19.3%). The cross-country differential in the GPG is also pronounced for full-time employees and, although evident, the cross-country GPG differential for part-time employees is far narrower.

In terms of broader labour market indicators, compared with the RUK, NI is characterized by relatively low employment rates, but the gender differential is similar (at less than 10%), and of considerably smaller magnitude than international variation highlighted by Olivetti and Petrongolo (2008).[8] The proportion of those in employment who are employees is similar across countries, although the gender differential is greater in NI, where a greater proportion of males are self-employed. The proportion of employees working full-time is also similar between NI and RUK and confirms the concentration of females in part-time work in each country. Consistent with a more pronounced decline in manufacturing in NI since the 1970s, there is a greater concentration of employees in the public sector relative to the RUK, and females are disproportionately employed in this sector, which is often associated with a lower GPG (Jones *et al.*, 2018). Again, however, the gender differential in public sector employment is similar in NI and RUK. In contrast to what might be expected given their well-established influence on the GPG, NI has slightly greater occupational and industrial gender dissimilarity. The earnings distribution in NI is, however, more compressed, consistent with a narrowing influence on the GPG.[9] We return to these features of the labour market more formally in what follows, but before doing so, some distinct country features are worth noting.

Although there has been convergence in many aspects over time, NI has a unique historical setting stemming from religious conflict. The potential implications for gender equality have been explored by Ackah and Heaton (1996) and Heaton *et al.* (1997), who highlight a more traditional and conservative culture in NI, higher rates of fertility, and relatively poor childcare provision as potential drivers of greater gender inequality in the labour market, but note the opposite influence of closer extended family ties in providing childcare and facilitating female participation. The evidence in the final panel of Table 1 confirms that some of these features remain evident. People in NI are considerably more likely than those in the RUK to hold religious beliefs, be married, and have more children on average.[10] It should also be noted that some elements of policy, including employment law and equality, are devolved under the Northern Ireland Act of 1998, which was enacted as a result of the Good Friday Agreement in 1998.[11] In practice, however, these differences are likely to have a limited effect since in both countries work of equal value is

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8 We nevertheless explore the sensitivity of our estimates to accounting for selection into employment in Section 5.

9 This might be a consequence of the higher bite of the minimum wage in NI. Further investigation, however, also suggests a higher rate of union membership in NI (and a higher rate among females in particular), something we explore in sensitivity analysis since information on union membership is only available in selected quarters of the QLFS (see Section 5).

10   We consider the influence of children on female employment in our analysis of selection in Section 5.

11 For example, there is no direct equivalent legislation in RUK for the Fair Employment and Treatment (NI) Order 1998 (amended in 2003) which replaced the Fair Employment Acts of 1976 and 1989 and outlaws discrimination in employment on grounds of religious belief and political opinion. In terms of gender equality, NI did not adopt the 2010 Equality Act or 2017 GPG Reporting Regulations as per the RUK, but instead retains separate equality legislation for different protected characteristics, including the Equal Pay Act (NI) (1970) and the Sex Discrimination (NI) Order (1976). These are, however, broadly comparable to the UK Equal Pay Act 1970 and Sex Discrimination Act 1976.

entitled to equal pay and discrimination on the basis of gender is illegal. Overall, therefore, it is difficult to identify the features of the NI labour market that drive such a stark GPG differential with RUK.

3. The QLFS

We use data from the QLFS (ONS, 2020), the largest nationally representative household survey in the UK, which contains comprehensive information on individual earnings, and personal and employment-related characteristics consistently across UK countries, and has been extensively used, including in previous analysis of the GPG (e.g., Jones *et al.*, 2018) and regional comparisons (e.g., Blackaby *et al.*, 2018).[12] We pool data on individuals in the first wave of the survey to create a contemporary cross-sectional dataset, covering four complete years, 2016–2019.[13],[14] Our main sample is restricted to full-time employees of working age (defined, given the changing state pension age over this period, as 16–64 and 16–59 for males and females, respectively), and excludes full-time students.[15] Our key variable, hourly earnings, is derived from gross weekly pay in the respondent's main job in the last pay period on the basis of total usual hours worked (including overtime) and the standard ONS LFS filter is applied (which eliminates hourly pay above £99) to reduce measurement error.[16] We define country in terms of location of work and separate employees in NI from those in the RUK.[17],[18] After removing individuals with missing values on any of our

12   While the QLFS is administered separately in NI, it is designed to be comparable to the RUK.

13   The QLFS has a rotational panel design such that, in every quarter, 20% of individuals are in their first wave and 20% are in their fifth and final wave. We pool observations across time to enhance the NI sample. Although the Annual Population Survey has a larger RUK sample, it does not include an enhanced sample for NI.

14   Trends in the QLFS from 1997 suggest that the cross-country GPG differential is not a feature of the period selected.

15   Self-employed workers are also excluded since they do not provide information on earnings.

16   This measure includes additions to basic pay received in the last pay period such as overtime and performance-related pay. Unfortunately it is not possible to separate these from basic pay in the QLFS to construct a measure of the GPG excluding overtime, which is the ONS preferred measure. If men work more overtime than women on average then the existence of an overtime premium would bias upwards of our measure of the GPG. We therefore consider the robustness of our findings to excluding those who received overtime pay in the last pay period in Sections 5 and 6. The QLFS also contains an hourly rate for those whose who are paid by the hour. This applies to a sample less than a quarter the size of our preferred derived measure, but we also explore the sensitivity of our findings to this measure in Sections 5 and 6.

17   In practice since 98% of employees who live in NI also work in NI the results are not sensitive. We exclude individuals who work outside the UK (less than 0.5% of employees). Of course, country of work is potentially endogenous to the extent that individuals are able to migrate in response to labour market differences. Further, this might differ by gender. While this is not unique to NI, we explore the robustness of our findings using comparisons with the North RUK, where there are likely to be similar incentives to move to a higher wage region (see Sections 5 and 6) and on the basis of a sample of 'stayers' where country of work and birth coincide (see Section 5) (see Hirsch *et al.*, 2013 for a similar strategy).

18   Some more detailed analysis is undertaken distinguishing between region of work (see Section 4) but since the findings are robust, our main results refer to RUK.

variables of interest (see below) the sample for NI is 2,870 employees (about 4.5% of the total sample), compared with 61,810 for the RUK.

The QLFS also contains detailed information on personal and employment-related characteristics found to determine the GPG and widely used in cross-country comparisons. In our analyses, we control for the following personal characteristics: years of potential experience (and experience squared), marital status, highest qualification, disability, and ethnicity.[19] Employment-related characteristics include months tenure with current employer (and tenure squared), temporary employment contract, workplace size, occupation (Standard Occupational Classification (SOC 2010) major occupations), industry (Standard Industry Classification (SIC 2007) industry sectors), and public/private sector.[20] Further details of all explanatory variables and their means by gender and country are included in Online Appendix Table A.1. The descriptive statistics largely indicate common patterns across countries and confirm some well-established differences by gender within each country. However, they also highlight some important features and cross-country differences. For example, residents in NI are more likely to be white, and in terms of work, employees in NI have longer average job tenure, are more likely to be union members, and work in smaller workplaces. In terms of gender, consistent with international improvements in female productivity-enhancing characteristics (Blau and Kahn, 2017), females are more highly qualified than males in both NI and RUK and are considerably more likely to work in professional occupations than men, particularly in NI. In terms of employment-related characteristics, while females have shorter average job tenure than males in RUK, the reverse is true in NI. Consistent with their concentration in public sector employment, females are more likely than males to work in industries such as public administration, education, and health in both countries, while there is no evidence of cross-country gender differences in temporary employment or workplace size.

4. Preliminary evidence on the GPGs

We first investigate differences in the raw GPG between NI and RUK on the basis of estimates from a simple earnings equation which pools individuals across gender and country. We extend this analysis to explore how the inclusion of control variables affects the GPG, and how the residual or adjusted GPG varies across countries. More formally, the ordinary least squares (hereinafter, OLS) earnings equation takes the form:

19 Religion is collected separately in NI and RUK (see Online Appendix Table A.1). In an additional specification (see Section 5), we include religion given its importance in NI and because there might be differential impacts by gender, for example, through generating differences in gender norms (Fuchs *et al.*, 2019).

20 We explore the robustness of our findings in relation to model specification in Section 5. This includes the inclusion of more detailed controls for occupation and industry, and the exclusion of controls for occupation, industry, and sector given decisions relating to these variables might be the outcome of actual or anticipated labour market discrimination, which affects the interpretation of the unexplained component. Our purpose is not, however, to provide an accurate measure of discrimination but to explore the potential drivers of the GPG in NI and its difference with RUK. Since union membership is only available within a single quarter each year it is excluded from the main specification, but we similarly examine the robustness of our findings to its inclusion.

Table 2. Comparisons of the adjusted full-time GPG by country

	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.052^{**}	-0.106^{***}	-0.113^{***}	-0.098^{***}	-0.064^{***}	-0.063^{***}
	(0.017)	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)
RUK	0.167^{***}	0.164^{***}	0.161^{***}	0.128^{***}	0.119^{***}	0.118^{***}
	(0.012)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)
Female × RUK	-0.095^{***}	-0.065^{***}	-0.055^{***}	-0.048^{***}	-0.049^{***}	-0.050^{***}
	(0.018)	(0.015)	(0.014)	(0.013)	(0.013)	(0.014)
Personal characteristics	No	Yes	Yes	Yes	Yes	Yes
Employment-related characteristics	No	No	Yes	Yes	Yes	Yes
Occupation	No	No	No	Yes	Yes	Yes
Industry	No	No	No	No	Yes	Yes
Sector	No	No	No	No	No	Yes
Adjusted R^2	0.02	0.29	0.33	0.43	0.45	0.45

Notes: (i) Estimates are based on a pooled OLS earnings equation. (ii) Males and NI are the reference categories. (iii) Robust standard errors in parentheses. (iv) *p < 0.05, **p < 0.01, ***p < 0.001. (v) All models include a constant term, year, quarter, and year–quarter interactions. (vi) The number of observations is 64,680 across all specifications (of which 2,870 are from NI).
Source: Authors calculations based on the QLFS 2016–2019.

$$\ln E_{ij} = \alpha + \mu F_{ij} + \gamma C_{ij} + \delta F_{ij} C_{ij} + \varepsilon_{ij}, \tag{1}$$

where the natural logarithm of gross hourly earnings of individual i in country $j (\ln E_{ij})$ is regressed on a (female) gender indicator (F_{ij}), a (RUK) country indicator (C_{ij}) and their interaction, and ε_{ij} is the random error term.[21] The GPG in NI is given by μ, the cross-country difference in male hourly earnings is given by γ, and δ measures the difference in the GPG between NI and the RUK.

Although we perform sensitivity analysis relating to all employees in Sections 5 and 6, we focus on the full-time GPG in Table 2 in order to make comparisons between males and females with a more similar labour market commitment (Blau and Kahn, 2017).[22] Column (1) provides the raw or unadjusted figures and confirms that full-time male hourly earnings are on average 0.167 log points (or 16.7 log %) lower in NI than the RUK. Consistent with the earlier descriptive statistics, the GPG for full-time employees is considerably lower in NI than the RUK at 5.2 log % and 14.7 log %, respectively, with a statistically significant difference of 9.5 log percentage points. The corresponding regional comparisons (which separate the RUK into 11 standard regions) are provided in Online Appendix Table A.2, predominantly to rule out the potential influence of London and the South East and, that the GPG in NI is therefore similar to other more deprived regions in the 'North' of the RUK. These results confirm that the pattern in NI is also significantly different from any other standard region, including those that are more similar in terms of prosperity and

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21　We omit the time subscript and pool individuals across 2016–2019, but control for year, quarter, and their interaction throughout.

22　For comparable estimates for all workers see Online Appendix Table A.2.

industrial structure. The descriptive pattern therefore confirms NI as an outlier in the UK, including relative to the other two devolved nations, Wales and Scotland.

We then successively add the personal and employment-related characteristics described above to explore their role on the cross-country difference in the GPG. The inclusion of personal characteristics (column (2)) widens the GPG in NI substantially, from 5.2 to 10.6 log %, suggesting gender differences in personal characteristics act to narrow the GPG in NI. In contrast, the cross-country GPG differential narrows once personal characteristics are controlled for. The inclusion of other employment-related characteristics (excluding occupation, industry, and sector) (column (3)) has a limited influence. While the inclusion of controls for occupation narrow the GPG in NI slightly (column (4)), industry appears to have a more important narrowing role (column (5)). The subsequent inclusion of sector (column (6)) has a minimal influence, in contrast to the suggestion of Mac Flynn (2014).[23] In the most comprehensive specification, the adjusted GPG in NI at 6.3 log % remains slightly larger than the raw GPG. While the cross-country differential narrows substantially to 5.0 log %, consistent with an important role for cross-country gender differences in characteristics, it remains large in magnitude and is statistically significant; NI has both a narrower adjusted, as well as raw, GPG compared with RUK.

5. Decomposing the GPG within NI

To explore the drivers of the GPG *within* NI and the RUK, we estimate the following earnings equation:

$$\ln E_{g,j} = x_{g,j}\beta_{g,j} + \varepsilon_{g,j}, \tag{2}$$

where the vector of returns to characteristics $\beta_{g,j}$ is estimated separately by gender g (male (M) and female (F)) and for each country j (NI and RUK).[24] The explanatory variables included in $x_{g,j}$ are the same across specifications and relate to the most comprehensive specification (6) in the pooled model above, with personal and employment-related characteristics, including occupation, industry, and sector.

This approach, which allows the return to characteristics to vary by gender and country, facilitates an OB decomposition of the raw GPG in country j into its explained and unexplained components as follows:

$$\overline{\ln E}_{M,j} - \overline{\ln E}_{F,j} = \underbrace{(\overline{x}_{M,j} - \overline{x}_{F,j})\hat{\beta}_{M,j}}_{\text{explained}} + \underbrace{\overline{x}_{F,j}(\hat{\beta}_{M,j} - \hat{\beta}_{F,j})}_{\text{unexplained}}, \tag{3}$$

where the bar above a variable denotes the mean value and $\hat{\beta}_{g,j}$ is the OLS estimate of $\beta_{g,j}$. In Equation (3), the explained component measures that part of the GPG due to gender differences in the observable characteristics while the unexplained component reflects that part due to gender differences in the return to those attributes. The latter is typically interpreted as a measure of wage discrimination, albeit the limitations of this are

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23 Sector also has a modest influence when included prior to industry (results available upon request). Nevertheless, we explore the role of sector further in Sections 5 and 6.

24 We suppress subscript *i* for notational simplicity.

Table 3. Decomposition of the full-time GPG within NI and RUK

	NI		RUK	
Raw GPG	0.052**	[100%]	0.146***	[100%]
Explained	−0.044**	[−85%]	0.042***	[29%]
Unexplained	0.096***	[185%]	0.104***	[71%]
N	2,870		61,810	
Explained	−0.044**	[−85%]	0.042***	[29%]
Year/quarter	−0.000	[0%]	−0.001	[−1%]
Experience	0.015***	[29%]	0.012***	[8%]
Disabled	0.002	[4%]	0.003***	[2%]
Married	0.004*	[8%]	0.009***	[6%]
Qualifications	−0.043***	[−83%]	−0.030***	[−21%]
Ethnicity	−0.000	[0%]	0.000**	[0%]
Temporary	0.001	[2%]	0.001***	[1%]
Occupation	−0.042***	[−81%]	0.002	[1%]
Tenure	−0.003	[−6%]	0.005***	[3%]
Industry	0.024*	[46%]	0.032***	[22%]
Sector	−0.002	[−4%]	0.010***	[7%]
Workplace size	−0.001	[−2%]	−0.002*	[−1%]

Notes: (i) OB method is used to decompose the mean GPG using relevant male coefficients as the baseline. (ii) Specification includes personal and employment-related characteristics (including occupation, industry, and sector). (iii) Figures in [] are proportions of the raw GPG. (iv) *p < 0.05, **p < 0.01, *** p < 0.001.
Source: Authors calculations based on the QLFS 2016–2019.

well-established (see, e.g., Neumark, 2018), particularly in the presence of unobservable personal and employment-related characteristics.[25]

These results are presented in Table 3 for the GPG in NI and RUK, respectively.[26] Within the upper panel, the raw GPG within each country is separated into its explained and unexplained components. In contrast with previous UK evidence, but consistent with the findings from the pooled model, the explained component of the GPG is negative in NI, suggesting that women have more productivity-enhancing personal and employment-related characteristics than men, such as higher educational attainment.[27] At −4.4 log %, the explained gap is of similar absolute magnitude to the raw GPG (5.2 log %) leaving an

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25 Following Blau and Kahn (2017), Equation (3) uses as the counterfactual the earnings of an average woman at the male returns ($\overline{x}_{F,j}\hat{\beta}_{M,j}$), which assumes the latter represent competitive prices and, as they describe, can be interpreted as reflecting 'a real-life scenario' in which an employer is required to pay women in the same manner as men. While Blau and Kahn (2017) are critical of the interpretation of the alternative approaches, given their use in the literature we nevertheless explore the sensitivity of the findings to weighting the difference in characteristics by the female returns and returns estimated using a pooled model with a gender dummy variable following Fortin (2008) (see Section 5).

26 A full set of coefficient estimates from each earnings equation is available upon request but conforms to expected patterns.

27 Christofides *et al.* (2013) provide similar evidence for EU countries with relatively low GPGs such as Belgium, Poland, Portugal, and Italy.

unexplained GPG of 9.6 log %, nearly double the raw GPG.[28] The narrow raw GPG in NI is thus not a reflection of gender pay equality. Corresponding figures for the RUK conform to more established patterns, with a positive explained component that contributes a modest proportion (less than one-third) of the overall GPG. The unexplained GPG in the RUK is therefore smaller than the raw GPG, but interestingly is of similar magnitude to that in NI. When interpreted cautiously as a measure of gender pay inequality, this suggests similar gender pay inequality between NI and the RUK.

The lower panel of Table 3 presents the detailed decomposition of the explained gap evaluated at the male coefficients, where that part attributed to different groups of personal and employment-related characteristics is identified. This suggests that gender differences in education and occupation make the largest (negative) contributions to the explained GPG in NI, consistent with women having higher qualifications and a more highly rewarded occupational allocation compared with men.[29] Gender differences in industry and experience, however, partly offset these effects and serve to widen the GPG in NI. Comparisons between the decompositions within NI and RUK highlight occupation as a source of the differential explained gap, with occupation having a minimal role in explaining the GPG in the RUK.

In Table 4, we present extensions to the main model, motivated by the previous evidence of Ackah and Heaton (1996) and Heaton et al. (1997), and Mac Flynn (2014), in relation to the potential role of labour force participation and sector, respectively, on the cross-country GPG differential. In Panel A, we explore how our decomposition results vary when we account for selection into employment, and in Panel B, we present results for the public and private sector separately. The selection-adjusted GPG is estimated using a Heckman selection model (Heckman, 1979) where, selection into our sample (relative to non-employment), is modelled using a probit model separately by gender and country with the following personal characteristics: age band, highest qualification, disability, ethnicity, and marital status and the number of dependent children under 4 and their interaction.[30] Following Mulligan and Rubinstein (2008) young dependent children and their interaction with marital status are excluded from the earnings equation to provide identification. As in previous studies (Olivetti and Petrongolo, 2008; Christofides et al., 2013), selection is found to have a limited role on the GPG in the RUK. In NI, the selection-adjusted GPG is, however, narrower than the raw GPG and is not statistically significantly different from zero. However, the cross-country differential in the explained gap remains similar to the original estimates and this reduces the cross-country differential in the unexplained relative

28   This is consistent with evidence from Caraballo-Cueto and Segarra-Almestica (2019), who find a positive unexplained GPG despite a negative raw GPG in Puerto Rico, and Fuchs et al. (2019), who find a relatively similar unexplained GPG across local areas within Germany despite considerable variation in the raw GPG.

29   While the former is now well-established in the international literature (see Blau and Kahn, 2017), the latter is more unusual but, in part, is likely to reflect the focus on full-time employees (see Mumford and Smith, 2009).

30   Our focus on non-employment is for consistency with the existing literature and ease of interpretation, as such, part-time workers are excluded from the sample. However, we explore the robustness of our findings to (1) retaining them in the censored sample and (2) correcting for selection among all employees (see below).

Table 4. Decomposition of the full-time GPG within NI and RUK, extensions

	Panel A Selection		Panel B Public		Private	
	NI	RUK	NI	RUK	NI	RUK
Raw GPG	0.005 [100%]	0.138*** [100%]	0.036 [100%]	0.156*** [100%]	0.137*** [100%]	0.177*** [100%]
Explained	-0.044** [-931%]	0.042*** [30%]	-0.058* [-160%]	0.040*** [26%]	0.035 [26%]	0.077*** [43%]
Unexplained	0.049 [1031%]	0.096*** [70%]	0.094*** [260%]	0.115*** [74%]	0.102*** [74%]	0.101*** [57%]
N	2,870	61,810	979	16,050	1,891	45,760
Explained	-0.044** [-931%]	0.042*** [30%]	-0.058* [-160%]	0.040*** [26%]	0.035 [26%]	0.077*** [43%]
Year/quarter	-0.000 [0%]	-0.001 [-1%]	-0.002 [-6%]	0.000 [0%]	0.002 [1%]	-0.001* [-1%]
Experience	0.015** [315%]	0.013*** [9%]	0.009 [25%]	0.005** [3%]	0.024** [18%]	0.020*** [11%]
Disabled	0.002 [42%]	0.002*** [1%]	0.000 [0%]	0.002** [1%]	0.003 [2%]	0.003*** [2%]
Married	0.005 [105%]	0.008*** [6%]	0.007 [19%]	0.007*** [4%]	0.007 [5%]	0.011*** [6%]
Qualifications	-0.043*** [-903%]	-0.030*** [-22%]	-0.029** [-80%]	-0.009*** [-6%]	-0.031*** [-23%]	-0.020*** [-11%]
Ethnicity	-0.000 [0%]	0.000** [0%]	0.003 [8%]	0.000 [0%]	0.001 [1%]	0.001** [1%]
Temporary	0.001 [21%]	0.001*** [1%]	0.001 [3%]	0.000 [0%]	0.000 [0%]	0.001** [1%]
Occupation	-0.042*** [-882%]	0.002 [1%]	-0.054** [-150%]	0.015*** [10%]	-0.003 [-2%]	0.018*** [10%]
Tenure	-0.003 [-63%]	0.005*** [4%]	-0.003 [-8%]	0.010*** [6%]	0.003 [2%]	0.008*** [5%]
Industry	0.024* [504%]	0.032*** [23%]	0.003 [8%]	0.004* [3%]	0.024** [18%]	0.029*** [16%]
Sector	-0.002 [-41%]	0.010*** [7%]	–	–	–	–
Workplace size	-0.001 [-21%]	-0.002* [-1%]	0.007 [19%]	0.007*** [4%]	0.007* [5%]	0.008*** [5%]

Notes: (i) OB method is used to decompose the mean GPG using relevant male coefficients as the baseline. (ii) Specification includes personal and employment-related characteristics (including occupation, industry, and sector (except when estimated by sector)). (iii) Figures in [] are proportions of the raw GPG. (iv) *p < 0.05, **p < 0.01, ***p < 0.001. (iv) Where the selection-adjusted GPG is decomposed, first-stage estimates from the Heckman selection model are available upon request. The selection term is only significant for females in RUK.
Source: Authors calculations based on the QLFS 2016–2019.

to the raw selection-adjusted GPG.[31] The patterns within each sector (see Panel B) are common in the RUK, with a slightly greater raw but not unexplained GPG in the private sector. In contrast, the GPG in NI is considerably larger in the private relative to the public sector. However, since the negative explained gap is only evident in the latter the cross-country differential in the unexplained gap is limited within each sector, consistent with the overall model. It is the negative explained differential in the public sector in NI that appears to drive the cross-country GPG differential in this sector, with results from the detailed decomposition suggesting that, as for the overall model, this is driven by qualifications and particularly occupation having a more important narrowing influence in NI compared with the RUK.

In Online Appendix Table A.3, we explore the sensitivity of our main results to performing the decomposition at the pooled and female coefficients. The overall patterns are robust, with a negative explained GPG in NI and greater similarity in the unexplained relative to raw GPG between NI and the RUK. The explained gap in the RUK is, however, smaller when using the female coefficients.[32] In Online Appendix Table A.4, we present a range of further sensitivity analysis using alternative samples and model specifications to: (1) extend the sample to all employees, (2) consider the median GPG, include additional controls such as (3) union membership, (4) religion, and more detailed controls for (5) industry and (6) occupation, (7) exclude occupation, industry, and sector, explore differences in the definition of country such as by (8) residence and (9) birth, (10) undertake comparisons with the 'North' of the RUK (given greater similarity in industrial structure and economic prosperity to NI), explore alternative measures of hourly pay including (11) an hourly rate and (12) excluding those working overtime. We also explore the specification of the selection correction by including part-time employees in the (censored) sample (13) and, focusing on the GPG among all employees where we retain full and part-time employees in the (uncensored) sample (14). The key patterns are robust, with a small or negative explained GPG in NI and greater similarity in the unexplained relative to raw GPG between NI and the RUK.[33]

6. Decomposing the GPG between NI and the RUK

Using the JMP decomposition, applied widely in cross-country comparisons of the GPG, this section explores the difference in the raw GPG *between* NI and the RUK.

31   The results are not sensitive to additionally controlling for housing tenure as a proxy for household income in the selection equation or, to alternatively including the number of dependent children under 16 (results available upon request). Although a likely determinant of employment we did not use religion as an exclusion restriction given it has previously been found to influence the GPG (see Fuchs *et al.*, 2019) and was found to be a determinant of female hourly wages in our analysis.

32   The lower panel of Online Appendix Table A.3 presents the components of the explained gap. While the patterns are similar when using the pooled coefficients, when using the female coefficients, occupation is not an important determinant of the GPG in NI but becomes important in the RUK (with a narrowing influence). Qualifications remain an important explanation for the narrower GPG in NI in all specifications.

33   While not unique internationally (see, Caraballo-Cueto and Segarra-Almestica, 2019, for evidence on Puerto Rico), in complete contrast to most developed countries, the median GPG in NI is not significantly different from zero and thus provides an additional motivation for the analysis.

For this purpose, suppose that we rewrite Equation (2) as follows:

$$\ln E_{g,j} = \boldsymbol{x_{g,j}}\boldsymbol{\beta_{g,j}} + \sigma_{g,j}\theta_{g,j}, \tag{4}$$

where the component of log hourly earnings accounted by unobservable characteristics is expressed in terms of the residual standard deviation $\sigma_{g,j}$ and the standardized residual $\theta_{g,j}$ (i.e., $\theta_{g,j} = \varepsilon_{g,j}/\sigma_{g,j}$). Using OLS estimates of Equation (4) for the male return to observable characteristics $\boldsymbol{\hat{\beta}_{M,j}}$, and the male residual standard deviation $\hat{\sigma}_{M,j}$, the GPG in country j then can be expressed as

$$\Delta\overline{\ln E}_j = \overline{\ln E}_{M,j} - \overline{\ln E}_{F,j} = \underbrace{\Delta\overline{\boldsymbol{x}}_j\boldsymbol{\hat{\beta}_{M,j}}}_{\text{predicted gap}} + \underbrace{\hat{\sigma}_{M,j}\Delta - \theta_j}_{\text{residual gap}}, \tag{5}$$

where Δ represents the gender difference in the mean of the variable directly following. The predicted gap in Equation (5) is equivalent to the explained gap in the OB decomposition (Equation (3)). The analogy between the residual gap and unexplained gap in Equations (5) and (3) is also worth noting. In the OB decomposition, the unexplained component represents the difference in earnings an average woman would have received at the male returns and her actual earnings. In JMP, this is interpreted in terms of (minus) the mean value of the (hypothetical) female residuals, that are derived by taking the difference between actual female earnings and the earnings each female would receive if rewarded according to the male earnings equation ($-\hat{\sigma}_{M,j}\overline{\theta}_{F,j}$). In Equation (5), this term is written as $\hat{\sigma}_{M,j}\Delta\overline{\theta}_j$, as when OLS is applied, the mean standardized residual for males is zero.[34]

Finally using Equation (5), the difference in the GPG between NI and RUK can be decomposed into the following four components:

$$\underbrace{\Delta\overline{\ln E}_{NI} - \Delta\overline{\ln E}_{RUK}}_{\text{difference in observed GPGs}} = \underbrace{(\Delta\overline{\boldsymbol{x}}_{NI} - \Delta\overline{\boldsymbol{x}}_{RUK})\boldsymbol{\hat{\beta}}_{M,RUK}}_{\text{observed characteristics effect}} + \underbrace{\Delta\overline{\boldsymbol{x}}_{NI}(\boldsymbol{\hat{\beta}}_{M,NI} - \boldsymbol{\hat{\beta}}_{M,RUK})}_{\text{observed prices effect}}$$

$$+ \underbrace{(\Delta\overline{\theta}_{NI} - \Delta\overline{\theta}_{RUK})\hat{\sigma}_{M,RUK}}_{\text{gap effect}} + \underbrace{\Delta\overline{\theta}_{NI}(\hat{\sigma}_{M,NI} - \hat{\sigma}_{M,RUK})}_{\text{unobserved prices effect}}. \tag{6}$$

The first term in Equation (6) is the 'observed characteristics effect' and measures the impact of cross-country differences in the gender gap in productivity-related characteristics. The second term, 'observed prices effect', captures the effect of cross-country differences in male returns to these characteristics. The sum of these two effects is that part of the cross-country differential which can be explained by observable characteristics and prices. The third term, the 'gap effect' is the cross-country differences in the percentile ranking of men

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34 The decomposition only requires estimation of the male earnings equation under the assumption that this is equivalent to competitive prices (as per OB above). While not free of criticism (see Yun, 2009), this is a standard approach (see, e.g., Blau and Kahn, 1996; Kaya, 2014) and preferable if the male coefficients are less sensitive to differences in gender discrimination across countries. It is for this reason the female coefficients are rarely applied but we nevertheless explore the sensitivity of our findings to this assumption (see below).

and women in the male residual earnings distribution after controlling for productivity-related characteristics and holding residual male earnings inequality constant. In other words, it captures the impact of cross-country differences in unobserved characteristics. The final term, the 'unobserved prices effect', measures the impact of the cross-country difference in male residual inequality, assuming that females maintain the same percentile ranking in the residual earnings distribution of men. The cross-country difference in the unexplained GPG is the sum of the 'gap' and 'unobserved prices' effects.[35]

The upper panel of Table 5 provides the four components of the JMP decomposition and further details of the observed characteristics and observed prices effects are provided in the panels below. The cross-country difference in the raw GPG between NI and RUK is −9.4 log percentage points, nearly double the absolute GPG in NI. Of this, 'observed characteristics', or cross-country gender differences in characteristics account for nearly half. This is consistent with the female characteristic advantage in NI identified above also being a driver of the cross-country differential. Indeed, the cross-country gap would narrow to 5.2 log percentage points in the absence of cross-country gender differences in characteristics. However, 'observed prices' account for a similar proportion of the differential, suggesting differences in characteristics are reinforced by a relatively advantageous (male) return to these characteristics in NI compared with the RUK. Consistent with the OB decomposition, the explained cross-country gap (i.e., in terms of observed prices and quantities) thus accounts for the majority of the cross-country differential. However, the fairly modest total unexplained cross-country GPG conceals two important but largely offsetting effects. Unobserved prices, typically interpreted as the influence of residual earnings inequality, further account for about a third of the cross-country differential and more than offset a 'gap effect' which acts to widen the GPG in NI relative to the RUK. The narrowing influence of residual earnings inequality on the cross-country differential is consistent with the compressed earnings distribution in NI disproportionately benefitting women relative to men and aligns to international evidence of the importance of national wage structure for the GPG. It is interesting since NI and the RUK share a largely common policy and institutional environment, including for example, the National Living Wage, suggesting international drivers of the GPG may also be important determinants of spatial variation in the GPG within countries.

Further separation of the observed components serves to identify the influence of individual personal and employment-related characteristics to the cross-country differential. In terms of characteristics, occupation, education, and tenure make an important contribution, with the occupational allocation narrowing the GPG in NI relative to RUK as suggested by the OB decomposition above. Interestingly, cross-country differences in (male) returns to occupations also reinforce this and serve to further explain the country

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35 To estimate the unexplained terms, the 'gap' and 'unobserved prices' effects, we follow a non-parametric approach proposed by Juhn *et al.* (1991) that uses the entire distribution of male and female residuals from the male earnings equation for each country. The decomposition of the residual differential, however, has been subject to criticism arising from the potential dependence between the standard deviation of the earnings residual and the percentile ranking (see Suen, 1997), albeit this is not always evident empirically (Kaya, 2014). Nevertheless, our results confirm the importance of the explained component of the cross-country differential and it is this on which we focus.

Table 5. Decomposition of the full-time GPG between NI and RUK

Difference in GPG (NI-RUK)	−0.094
GPG in RUK	0.146
GPG in NI	0.052

	Decomposition of the difference in GPG	
(1) Observed characteristics	−0.042	[45%]
(2) Observed prices	−0.044	[47%]
(3) Gap effect	0.022	[−23%]
(4) Unobserved prices	−0.030	[32%]
(1) Observed characteristics	−0.042	[45%]
Year/quarter	0.001	[−1%]
Experience	0.001	[−1%]
Qualifications	−0.014	[15%]
Occupation	−0.021	[22%]
Tenure	−0.009	[10%]
Industry	0.001	[−1%]
Workplace size	−0.000	[0%]
Disabled	−0.002	[2%]
Married	−0.001	[1%]
Ethnicity	−0.000	[0%]
Temporary	0.000	[0%]
Sector	0.003	[−3%]
(2) Observed prices	−0.044	[47%]
Year/quarter	−0.000	[0%]
Experience	0.002	[−2%]
Qualifications	0.001	[−1%]
Occupation	−0.023	[24%]
Tenure	0.001	[−1%]
Industry	−0.010	[11%]
Workplace size	0.001	[−1%]
Disabled	0.000	[0%]
Married	−0.003	[3%]
Ethnicity	0.000	[0%]
Temporary	0.000	[0%]
Sector	−0.014	[15%]

Notes: (i) JMP method is used to decompose the cross-country GPG differential using the male coefficients as reference and RUK as benchmark. (ii) Specification includes personal and employment-related characteristics (including occupation, industry, and sector). (iii) Figures in [] are proportions of the difference in the raw GPG between NI and RUK. (iv) The number of observations is 64,680 (of which 2,870 are from NI).
Source: Authors calculations based on the QLFS 2016–2019.

differential.[36] Indeed, the combined influence of occupational allocation and (male) returns to occupations accounts for nearly half of the cross-country GPG differential.

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36   This is in contrast to US evidence exploring the narrowing GPG where improvements in the occupational distribution have been offset by changes in the returns to occupation (Blau and Kahn, 2017), but is consistent with Kaya (2014) who finds that changing returns to occupational skills contributed to narrowing the UK GPG (1994–2009).

Cross-country differences in the (male) returns to industry and sector play a further, although more minor, role.

In Online Appendix Table A.5, we show that extending the sample to all employees (Panel A), undertaking comparisons with the 'North' of the RUK (Panel B), or using NI benchmark coefficients (Panel C) makes no difference to our key findings. The 'gap effect' is eliminated, and the magnitude of the 'observed prices effect' is reduced when using the female reference coefficients (Panel D), although the majority of the cross-country differential remains explained in line with our original estimates.[37] While, consistent with the within country findings, the raw cross-country differential is considerably larger in the public (Panel E) relative to the private sector (Panel F), it is similarly predominately explained within each sector. The results are also not sensitive to measuring hourly pay using the hourly rate (Panel G) or restricting the sample to those who do not work overtime (Panel H).

7. Conclusion

The surprisingly narrow GPG in NI, especially in comparison to the RUK given the relatively homogenous policy and institutional context, provides an interesting case study from which to explore the drivers of the contemporary GPG. Using data from the largest household survey in the UK which contains comprehensive and directly comparable information across constituent countries, we explore the role of personal and employment-related characteristics in determining the GPG in NI, and its difference relative to the RUK. Our analysis is performed in two stages. We seek to understand and compare the drivers of the GPG within each country, and then explore the cross-country differential. The findings contribute to the international literature on the GPG and integrate this into the emerging analysis of spatial variation within countries, with NI providing particular insights for contemporary policy aimed at narrowing the GPG.

Regardless of the precise measure of the GPG we find that it is far narrower in NI than in the RUK and all other UK standard regions, including other devolved nations. Within country decompositions indicate that the relatively low mean full-time GPG in NI is a consequence of women having superior productivity-related characteristics relative to men. As a result, the unexplained GPG in NI is larger than the raw GPG, and of a more comparable magnitude to the RUK. The pattern is not a result of country differences in selection into employment and it is not confined to the public or private sector. NI is not therefore an exemplar of gender pay equality and instead serves to illustrate the important distinction between the GPG and pay inequality. In this respect, this cross-country comparison shares similarities with UK evidence exploring the narrowing GPG over time, which finds a relatively stable unexplained GPG (Jones et al., 2018). Indeed, as in international evidence exploring trends in the GPG (Kaya, 2014), local variation (Fuchs et al., 2019), and exceptions to the international pattern of male pay advantage (Caraballo-Cueto and

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37 Regardless of the choice of reference coefficients occupation, education, and tenure make an important contribution in terms of observed characteristics. The findings for observed prices are, however, more sensitive. While the role of sector is robust, at the female coefficients industry has an important narrowing influence which acts to offset the influence of occupation. Indeed, consistent with the OB decomposition, in combination occupation does not explain the narrower GPG in NI relative to the RUK when evaluated at the female returns (results available upon request).

Segarra-Alméstica, 2019), NI highlights the critical role of gender differences in productivity-related characteristics. This is particularly important in the UK policy context where, unlike in some countries (e.g., Switzerland) the legislation requires firms to report only their raw GPG. If there are positive lessons for policy from NI, they are in terms of highlighting the potential of productivity-related characteristics for women as a determinant of pay. However, in focusing on relative measures, the risk is that what appears to be female advantage might simply reflect male disadvantage, particularly in less prosperous areas (see Fuchs *et al.*, 2019).

Our comparison between NI and RUK confirms the importance of gender differences in occupational allocation as a driver of the substantial cross-country GPG differential. This is reinforced by cross-country differences in the (male) returns to occupations, which benefit women in NI relative to the RUK. Together these influences narrow the cross-country differential by nearly half. This is perhaps surprising in the context of the relatively homogenous contemporary policy, education, and institutional environment and, in the absence of a clear explanation, deserves further attention. It may, for example, suggest further scrutiny of the historical context as a driver of cultural norms, potentially affecting both occupational preferences and employer attitudes, is warranted. In this respect, a natural extension to this analysis would be to consider how the GPG in NI, and the cross-country differential, has changed over time. Consistent with previous international evidence, however, we also find an important role for non-gender specific factors, with lower earnings inequality in NI narrowing the GPG and accounting for a further third of the cross-country differential. Again, this is perhaps unexpected, and would seem to suggest that earnings inequality deserves future attention as a determinant of within country variation in the GPG, particularly in countries where wage bargaining is decentralized.

Supplementary material

Supplementary material is available online at the OUP website.

Acknowledgements

References

Ackah, C. and Heaton, N. (1996) Women's labour market participation in Northern Ireland: a re-examination of the 'traditionalism' argument, *International Journal of Social Economics*, **23**, 58–74.

Becker, G. (1957) *The Economics of Discrimination*, The University of Chicago Press, Chicago.

Blackaby, D., Murphy, P., O'Leary, N., and Staneva, A. (2018) Regional pay? The public/private sector pay differential, *Regional Studies*, **52**, 477–89.

Blau, F. and Kahn, L. (1992) Gender earnings gap: learning from international comparisons, *American Economic Review*, **82**, 533–8.

Blau, F. and Kahn, L. (1996) Wage structure and gender earnings differentials: an international comparison, *Economica*, **63**, S29–S62.

Blau, F. and Kahn, L. (2017) The gender wage gap: extent, trends, and explanations, *Journal of Economic Literature*, **55**, 789–865.

Blinder, A.S. (1973) Wage discrimination: reduced form and structural variables, *The Journal of Human Resources*, **8**, 436–55.

Caraballo-Cueto, J. and Segarra-Alméstica, E. (2019) Do gender disparities exist despite a negative gender earnings gap?, *Economía*, **19**, 101–25.

Chzhen, Y. and Mumford, K. (2011) Gender gaps across the earnings distribution for full-time employees in Britain: Allowing for sample selection, *Labour Economics*, **18**, 837–44.

Christofides, L., Polycarpou, A., and Vrachimis, K. (2013) Gender wage gaps, 'sticky floors' and 'glass ceilings' in, *Labour Economics*, **21**, 86–102.

Duncan, O.D. and Duncan, B. (1955) A methodological analysis of segregation indexes, *American Sociological Review*, **20**, 210–7.

Fortin, N.M. (2008) The gender wage gap among young adults in the United States: the importance of money versus people, *Journal of Human Resources*, **43**, 884–918.

Fuchs, M., Rossen, A., Weyh, A., and Wydra-Somaggio, G. (2019) Why do women earn more than men in some regions? Explaining regional differences in the gender pay gap in Germany, IAB-Discussion Paper No. 11|2019.

Heaton, N., Robinson, G., Davies, C., and McWilliams, M. (1997) 'The differences between women are more marginal' ... catholic and protestant women in the Northern Ireland labour market, *Work, Employment and Society*, **11**, 237–61.

Heckman, J.J. (1979) Sample selection bias as a specification error, *Econometrica*, **47**, 153–62.

Hirsch, B., Konig, M., and Moller, J. (2013) Is there a gap in the gap? Regional differences in the gender pay gap, *Scottish Journal of Political Economy*, **60**, 412–39.

Huertas, I.P.M., Ramos, R., and Simon, H. (2017) Regional differences in the gender wage gap in Spain, *Social Indicators Research*, **134**, 981–1008.

Jewell, S., Razzu, G., and Singleton, C. (2020) Who works for whom and the UK gender pay gap, *British Journal of Industrial Relations*, **58**, 50–81.

Jones, M., Makepeace, G., and Wass, V. (2018) The UK gender pay gap 1997–2015: What is the role of the public sector?, *Industrial Relations: A Journal of Economy and Society*, **57**, 296–319.

Juhn, C., Murphy, K.M., and Pierce, B. (1991) Accounting for the slowdown in black-white wage convergence, in M. H.) Koster (ed. *Workers and Their Wages*. Washington, DC: AEI Press, pp. 107–143.

Kaya, E. (2014) Gender wage gap trends in Europe: The role of occupational allocation and changing skill prices. Cardiff Economics Working Papers No: E2014/23.

Mac Flynn, P. (2014) The gender pay gap: how does Northern Ireland compare? NERI Research in Brief.

Manning, A. and Swaffield, J. (2008) The gender gap in early-career wage growth, *The Economic Journal*, **118**, 983–1024.

Mulligan, C. and Rubinstein, Y. (2008) Selection, investment and women's relative wages over time, *Quarterly Journal of Economics*, **123**, 1061–110.

Mumford, K. and Smith, P.N. (2009) What determines the part-time and gender earnings gaps in Britain: evidence from the workplace, *Oxford Economic Papers*, **61**, i56–75.

Neumark, D. (2018) Experimental research on labor market discrimination, *Journal of Economic Literature*, **56**, 799–866.

Oaxaca, R.L. (1973) Male–female wage differentials in urban labor markets, *International Economic Review*, **14**, 693–709.

Office for National Statistics [ONS]. (2019) *Gender Pay Gap in the UK: 2019*, Statistical Bulletin.

Office for National Statistics [ONS]. (2020) Quarterly Labour Force Survey, from January–March 2016 to October–December 2019 (inclusive). **Social Survey Division, Northern Ireland Statistics and Research Agency. Central Survey Unit.** UK Data Service. SN: 7985–8614.

Olivetti, C. and Petrongolo, B. (2008) Unequal pay or unequal employment? A cross-country analysis of gender gaps, *Journal of Labor Economics*, **26**, 621–54.

Phimister, E. (2005) Urban effects on participation and wages: Are there gender differences?, *Journal of Urban Economics*, **58**, 513–36.

Rowland, N., McVicar, D., and Shuttleworth, I. (2018) The evolution of Catholic–Protestant labour market inequality in Northern Ireland, 1983–2014. IZA Discussion Paper no. 11633, Bonn.

Stewart, M. (2014) The London difference in gender pay gaps, mimeo University of Warwick.

Suen, W. (1997) Decomposing wage residuals: unmeasured skill or statistical artifact?, *Journal of Labor Economics*, **15**, 555–66.

Yun, M.-S. (2009) Wage differentials, discrimination and inequality: a cautionary note on the Juhn, Murphy and Pierce decomposition method, *Scottish Journal of Political Economy*, **56**, 114–37.