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DISCUSSION PAPER SERIES

IZA DP No. 14177

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ISSN: 2365-9793

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ABSTRACT

The Gender Pay Gap in UK Medicine*

In this study we quantify the size and drivers of the contemporary gender pay gap among medical doctors employed in the UK public sector. In using nationally representative data from the Annual Survey of Hours and Earnings, we make comparisons to doctors employed in the private sector, as well as to other public sector medical professionals. We find that the substantial 20 per cent hourly gender pay gap among public sector doctors is far larger than in either of these comparator occupations. Decomposing the mean gender pay gap for public sector doctors, we find that it is largely unexplained by personal and work-related characteristics, consistent with evidence of potential substantial gender inequality in rewards. It is at the top end of the wage distribution where this is most pronounced indicating the presence of a 'glass ceiling' in UK medicine.

JEL Classification: J24, J31, J45, J71

Keywords: gender pay gap, medicine, public sector, Annual Survey of Hours and Earnings, wage decompositions, wage distribution

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* This work is based on data from the Annual Survey of Hours and Earnings, produced by the Office for National Statistics (ONS) and supplied by the UK Data Archive. It is accessed via the Secure Data Service (SDS) and we are grateful for their support. These data are Crown Copyright and have been used by permission. The use of these data in this work does not imply the endorsement of ONS or the SDS in relation to the interpretation or analysis of the data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

1. Introduction

In May 2018 Jeremy Hunt, as secretary of state for Health, announced that he was determined to eliminate the gender pay gap (hereinafter, GPG) among doctors in the UK National Health Service (hereinafter, NHS). This was in light of evidence of a mean annual GPG of £10,000 or 15 per cent, identified using administrative (payroll) data, which was viewed as inconsistent with the principle of equality enshrined in the NHS and prompted a comprehensive review.[1] Using nationally representative data from the Annual Survey of Hours and Earnings (hereinafter, ASHE), we provide new evidence on the GPG and gender pay equality among public sector medical doctors in Britain.[2] To our knowledge, we are the first to use national survey data to examine the GPG among this highly skilled occupation and, in using these data we are able to make comparisons of the size and drivers of the GPG with comparator occupations. We do this both at the mean and across the wage distribution. In doing so, we contribute important evidence from the UK public sector healthcare context to the international literature on the GPG among physicians, which is dominated by studies from the US private sector. The findings are also complementary to the evidence provided by the recent GPG review (see Department of Health and Social Care, 2020) and directly relevant to contemporary UK government policy.

There has been interest in the GPG among physicians in the US for several decades with evidence suggesting a sizeable and persistent GPG among often self-employed physicians within this largely private healthcare system that is only partly explained by gender differences in observable characteristics, consistent with evidence of wage inequality (Ohsfeldt and Culler, 1986; Bashaw and Heywood, 2001; Esteves-Sorenson and Snyder, 2012). By exploring the GPG among physicians in the Austrian province of Tyrol where, in

[1] See: https://www.independent.co.uk/news/uk/politics/jeremy-hunt-nhs-doctors-gender-pay-gap-inquiry-health-a8372701.html.

[2] We do not have access to comparable information for Northern Ireland.

the public health insurance system self-employed physicians do not control the price of services, Theurl and Winner (2010) provide important evidence from a different institutional context. Nevertheless, they similarly find a pronounced unexplained GPG of comparable magnitude to that reported in the US. More closely related to our study given the focus on employees, Magnusson (2016) explores the GPG for a sample of public and private sector physicians in Sweden and find the vast majority of the GPG is unexplained even after accounting for speciality and parenthood. While sectoral differences in the GPG are not explored in this context, Gaiaschi (2019) provides evidence from Italy, where the unexplained hourly GPG among hospital doctors is found to be larger in the private than the public sector. To our knowledge, however, the limited analysis within the UK has been restricted to General Practitioners (hereinafter, GPs) in the NHS, who are typically self-employed, and where, in England, Gravelle *et al*. (2011) find a sizeable unexplained gender gap in income, but limited evidence of gender discrimination in profit sharing arrangements *within* practices.

Our analysis therefore provides a distinct contribution to the international literature in focusing exclusively on doctors employed in the public sector in Britain. In doing so, it provides new evidence of gender inequality within this profession that aligns to the focus on employer discrimination within labour economics. It serves as a particularly useful contrast given the distinct institutional features, including the presence of national and transparent salary scales which are typical in the UK public sector, and coverage of pay recommendations by the independent Review Body on Doctors' and Dentists' Remuneration (hereinafter, DDRB) whose remit includes due regard for legal obligations, including those under the 2010 Equality Act and Public Sector Equality Duty (hereinafter, PSED).[3] In this

[3] For information about the DDRB see: https://www.gov.uk/government/organisations/review-body-on-doctors-and-dentists-remuneration.

respect greater gender pay equality might be expected and has perhaps hereinto limited academic scrutiny.[4,5]

The focus on doctors is also consistent with increasing recognition of the importance of GPGs within rather than between occupations to the national GPG and insights provided by occupation specific analysis, especially for highly skilled professionals (see, for example, Azmat and Ferrer, 2017 for lawyers, and Goldin and Katz, 2016 for pharmacists). In the UK, existing studies have provided evidence relating to law (McNabb and Wass, 2006) and higher education (McNabb and Wass, 1997), including academic economists (Mumford and Sechel, 2020), where, due to the more homogeneous nature of workers and their jobs, it is argued that the bias arising from the unobserved characteristics is more limited. As such, consideration of a prestigious, highly skilled and highly paid occupation *within* the public sector, which is fairly unique in being characterised by broadly equal representation by gender, provides further insights into the UK public sector GPG (see, for example, Jones *et al*., 2018; Jones and Kaya, 2019) and GPG among high skilled workers (see, for example, Chzhen and Mumford, 2011).

To our knowledge, the only other study to consider the GPG in this context is the recent review of the GPG in medicine (Department of Health and Social Care, 2020) which utilise administrative data on hospital doctors in England.[6] Unlike the existing literature they find the majority (92 per cent) of the 20 per cent GPG in basic pay is explained by observable characteristics including seniority, work experience and hours of work.[7] Our evidence is

[4] McNabb and Wass (1997) note a similar dearth of analysis on UK universities relative to that in the US, which they argue is a consequence of the assumption of limited discrimination in formalised salary structures. However, they find evidence of a significant unexplained GPG in UK academia.
[5] See, Jones *et al*. (2018) for a discussion in relation to the UK GPG.
[6] The review also considers self-employed GPs and clinical academics separately. Appleby and Schlepper (2019) consider the GPG in the NHS more generally and find evidence of a far larger GPG among employees outside the Agenda for Change job evaluation system, which includes doctors. Consistent with this, Jones and Kaya (2019) find a larger raw and unexplained GPG among workers covered by the DDRB than the NHS Pay Review Body.
[7] They find a smaller, although still dominant role for characteristics (70 per cent) when using total pay.

complementary, but in utilising nationally representative data we extend the focus across occupations to explore the relative situation of public sector doctors and, in doing so, set the findings into the broader UK context. Following the literature on public-private sector GPG comparisons, we first make a within occupation comparison between sectors, that is, we compare doctors employed in the public and private sector.[8] Second, we make a comparison within the public sector but across closely related occupations, by considering doctors relative to the other public sector 'Health Professionals'. Finally, we provide a well-established benchmark, comparing doctors to all other employees in the public sector.[9] Unlike the majority of the evidence focusing on the mean GPG among doctors (for exceptions see Shih and Konrad, 2007 and Magnusson, 2016), we also perform our analysis across the wage distribution. The former is well-established to be important in understanding the GPG (see, for example, Albrecht *et al*., 2003) and in comparisons of the GPG across sectors (see Arulampalam *et al*., 2007; Jones and Kaya, 2019).

We find a substantial hourly GPG among public sector doctors of 20 log per cent, which is about three times as large as among either private sector doctors or other public sector health professionals. Indeed, despite the more homogeneous workforce, the within occupation GPG among public sector doctors is larger than comparable estimates for the entire economy. Moreover, the vast majority (over 90 per cent) of the mean GPG is unexplained by traditional personal and work-related characteristics and, as such, the unexplained GPG also far exceeds that in the comparator occupations. This is particularly true at the upper end of the wage distribution where we find that the GPG among public sector doctors exhibits a pronounced 'glass ceiling'.

[8] Public-private sector GPG comparisons are typically considered in aggregate, despite pronounced differences in occupational and industrial structure (see, Arulampalam *et al*., 2007; Jones *et al*., 2018).
[9] For simplicity we refer to these groups as comparator occupations throughout the paper, noting however, that the public sector comparator in particular contains a diverse set of occupations.

The remainder of the paper is structured as follows. Section 2 provides an overview of our data and measures analysed. A brief outline of the decomposition methods applied to explore the GPG at the mean and across the wage distribution is provided in Section 3. Section 4 presents the results and Section 5 concludes.

2. Data

The analysis is based on data from ASHE, the main source of earnings data in the UK (ONS, 2020), which contain detailed and reliable information on pay, occupation and sector, and for a large enough sample (1 per cent sample of employee jobs) to explore the GPG among doctors. We provide contemporary evidence, based on the latest year of these data, April 2018.[10] Unlike much of the literature on the GPG in medicine, where pay is self-reported via occupation specific surveys (and often in bands), the ASHE is based on employer payroll records.[11] It also has several advantages in this context as these data are nationally representative and provide information using established measures that are comparable across occupations, and across Britain.[12] Moreover, the sample is sufficiently large to explore specific occupational groups. The trade-off, however, is that ASHE contains a fairly limited set of personal characteristics and does not allow us to explore occupation specific work-related characteristics.[13]

The sample is restricted to working-age individuals who are paid an adult rate, and whose earnings are not affected by absence.[14] Calibration weights are applied so the estimates are representative of the respective population, but we also report the unweighted number of

[10] 2018 is the latest year of confirmed data available at the time of writing. The findings are, however, robust to alternatively using data from 2017 or provisional data from 2019. The analysis is therefore prior to the implementation of the 2020 junior doctor contract in England.
[11] For a criticism of self-reported information for physicians see Theurl and Winner (2010) who argue that gender differences in response rates and self-reported income bias estimation of the GPG.
[12] This is unlike occupation specific payroll data (e.g. from NHS digital in England).
[13] In order to address the former we explored the possibility of using the UK Quarterly Labour Force Survey (hereinafter, QLFS) but the sample size is far smaller than ASHE and precludes the analysis of private sector doctors.
[14] About 6 per cent of public sector doctors hold more than one job. We explore the robustness of our analysis to second job holding in Section 4.

observations (denoted *N*). After excluding individuals with missing values for any of the variables used in the analysis we are left with 160,115 employees.

Public sector doctors

As is typical in the literature on the GPG, but not the existing international evidence relating to physicians (see, for example, Theurl and Winner, 2010), our focus is employees where information is provided via employer PAYE tax records.[15] We define medical doctors as employees whose occupation is 'Medical Practitioners' (i.e. Standard Occupational Classification (hereinafter, SOC) (2010) code 2211). We further separate doctors employed in the public sector based on the legal status of the enterprise from the Inter-Departmental Business Register.[16] Doctors in the public sector will include hospital doctors across all grades and medical specialities, and some salaried GPs. We acknowledge private sector doctors are a relatively small group in the UK, however, given the similarity in training and job responsibilities, they form an interesting within occupation comparator with a distinct employer, operating in a different institutional and legal framework.[17] We construct two further between occupation comparators operating within the public sector institutional framework. The first includes employees in 'similar' highly skilled medical occupations, as defined as all other occupations within the broader minor SOC 221 group (i.e. Health Professionals) which includes doctors.[18] The second provides a broader national benchmark and includes all other public sector employees. As noted above, we refer to these as

[15] Self-employed workers are excluded from the ASHE. Data from the 2018 QLFS suggests that only 15 per cent of medical doctors in Britain are self-employed and this does not differ by gender.
[16] The public sector is defined as public corporations and nationalised industries, central government or local authorities. While the vast majority of doctors work in the NHS, this definition also includes doctors working elsewhere in the public sector e.g. in the Armed Forces. Our definition of private sector includes those working in the voluntary sector but our results are not sensitive to this (available upon request).
[17] Private sector doctors would not, for example, be covered by the DDRB or PSED.
[18] Health professionals included in this definition include the following 4-digit SOC occupations: 2212 (Psychologists), 2213 (Pharmacists), 2214 (Ophthalmic opticians), 2215 (Dental practitioners), 2216 (Veterinarians), 2217 (Medical radiographers), 2218 (Podiatrists) and 2219 (Health professionals n.e.c.). Full details and job duties are provided within the SOC classification but all these occupations require degree level qualifications recognised by the appropriate professional body. The contribution of each occupation to public sector health professionals is provided in Appendix Table A1.

comparator occupations but recognise the public sector in particular contains a diverse set of occupations.

The final sample includes 1,099 public sector doctors, who account for 0.8 per cent of all employees and 3.6 per cent of public sector employees (see Table 1). Our sample for private sector doctors and the rest of public sector health professionals is 243 and 604 respectively. Consistent with previous evidence, there is a relatively equal gender representation among doctors in Britain with females accounting for 44 and 54 per cent in the public and private sector respectively. Although women represent about half of all employees, they represent more than two thirds of employees in the rest of the public sector and 70 per cent of the rest of public sector health professionals.

[Table 1 here]

Hourly pay

In line with the established GPG literature, and our focus on employees, our main dependent variable is (log) gross hourly pay, which adjusts pay during the reference period for hours of work.[19] This measure is based on the ONS recommended definition, excluding overtime, but including performance-related pay (hereinafter, PRP) paid within the reference period.[20,21,22]

[19] This is appropriate given public sector doctors are paid an annual salary on the basis of standard weekly working hours and salaries are calculated pro rata for those working part-time. Nevertheless, given the concerns raised by Bashaw and Heywood (2001), albeit in the US context, we also explore the sensitivity of the estimates with respect to an annual measure of pay (see Section 4). Additional payments are available for public sector doctors working overtime and antisocial hours and there is also an element of performance-related pay. These are all considered here. Additional payments for shortage specialities cannot, however, be explored.

[20] Gross hourly pay is calculated as gross weekly earnings (basic weekly earnings + incentive pay + additional premium payments for shift work and night or weekend work not treated as overtime + pay received for other reasons) excluding overtime for the reference period divided by basic weekly paid hours. Premium payments and paid overtime are more important for public sector doctors than the comparator occupations. The gender gaps in these additional payments are, however, less pronounced than for the comparator occupations (further details available upon request).

[21] We remove wage outliers defined as above ten times the 99th percentile and below half the 1st percentile (120 observations).

[22] Gender equality in PRP is a policy concern (see DDRB, 2020) and, consistent with this, the GPG in medicine review find the gap in total pay is greater than that in basic pay (Department for Health and Social Care, 2020) and that Clinical Excellence Awards make an important contribution to the unexplained GPG among consultants. We explore the role of PRP when considering annual pay (see Section 4).

Unlike data from occupation specific surveys or administrative records our well-established measure of pay facilitates comparisons to national measures and across occupations. The mean log hourly pay is reported by gender in Table 2 and confirms the relatively high hourly pay among doctors, which is about 0.11 log points (or 11 log per cent) higher in the public sector than the private sector on average, and 76 log per cent higher among public sector doctors than the rest of the public sector. The figures also confirm a substantial hourly GPG among public sector doctors of 20 log per cent, which is actually larger than the economy wide GPG (17 log per cent) despite the within occupation and sector focus. Our estimate of the hourly GPG is of comparable magnitude to the full-time equivalent GPG among hospital doctors in England at between 20 and 23 per cent, depending on the specific pay measure used (Department of Health and Social Care, 2020). Comparisons across occupations indicate the GPG among public sector doctors is far wider than among private sector doctors (6 log per cent) and the rest of public sector health professionals (7 log per cent). It is actually more comparable to the rest of the public sector (17 log per cent), despite the diversity in occupational composition. The wider GPG among doctors in the public relative to private sector is particularly surprising given previous evidence of a lower GPG in the public relative to private sector as a whole (Jones *et al*., 2018).[23]

[Table 2 here]

Explanatory variables

ASHE contains detailed information about the nature of the job and employer, and our control variables for work-related characteristics include firm size (log of number of employees), tenure (measured by the number of years employed in the present organisation) (and tenure-squared), an indicator for the coverage of collective agreements, a permanent

[23] Worth noting is that the relatively wide pay distribution among public sector doctors (as measured by the standard deviation), which might be thought to contribute to the wide within-occupation GPG, is also evident in the private sector.

contract indicator and a full-time employment dummy which are all well-established determinants of earnings (see, for example, Blau and Kahn, 2017).[24] For the rest of the public sector, we additionally control for occupation using the SOC unit group and, for other health professionals, we control for more detailed SOC codes.[25] We also control for industry for the rest of the public sector using the Standard Industrial Classification (SIC) 2007 sections.[26] In terms of personal characteristics, information in ASHE is restricted to age (and age-squared), which is used as a proxy for work experience, and work region.[27,28,29]

A full set of summary statistics for the explanatory variables by gender and occupation are included in Appendix Table A1. They confirm a number of distinct features of doctors, particularly lower average job tenure and, in the public sector, a lower proportion with permanent contracts and higher rates of full-time employment. Private sector doctors are more likely to work in London, far less likely to work full-time, work in smaller organisations and are less likely to be covered by collective agreements than those in the public sector. While some established patterns by gender are evident across all occupations, for example, females have shorter average job tenure than men, there are also some distinct occupational patterns. For instance, while females are less likely to work full-time in all

[24] ASHE defines full-time employees as those who work more than 30 hours per week (or 25 for those in teaching professions).

[25] We group SOC 2010 code 2219 Health Professionals n.e.c together with 2214 Ophthalmic opticians and 2216 Veterinarians due to small sample size in these categories.

[26] Despite the range of occupations, most public sector workers are clustered into a relatively small number of industries. We distinguish between the following four groups: O Public administration and defence; compulsory social security; P Education; Q Human health and social work activities and Other (which contains anything outside these three groups).

[27] Controls for work region capture variation in wages arising from health being devolved in Wales and Scotland. Due to the small samples, however, Wales is aggregated with the West of England, but the results are robust to this choice (available upon request).

[28] Our attention on individual and organisation characteristics (as defined by Shih and Konrad, 2007) is aligned to the focus on employees (where market forces are less relevant).

[29] Having a relatively restricted set of personal characteristics is not unusual when using payroll data but a potentially important omission is a control for dependent children. Among young US physicians, however, Sasser (2005) highlights the role of marriage and children as an important driver of the gender income gap via an impact on hours rather than hourly pay. Nevertheless, this may still have implications for hourly pay over the life-cycle due to lower human capital accumulation.

occupations, the gender gap is much narrower for public sector doctors than the comparator occupations.

Despite the strengths of these data, particularly the accuracy of data on earnings, and ability to compare across occupations using a specification comparable to the literature on the national GPG, since the survey is not collected specifically for the profession we are not able to control for within occupation characteristics such as medical specialism or seniority. Previous international studies have generally found modest effects of specialisation (see Theurl and Winner, 2011; Magnusson, 2016) and this was also found to be relatively unimportant in explaining the GPG among hospital doctors in England (Department of Health and Social Care, 2020). In contrast, and as might be expected, seniority or vertical segregation has been found to be important internationally given the underrepresentation of females in senior roles (Gaiaschi, 2019) and, in the recent GPG review seniority, as measured by grade (a direct determinant of pay), was found to be the most important component of the explained GPG (Department of Health and Social Care, 2020). When seniority is directly related to pay, we argue their joint determination precludes including seniority as an explanation for the GPG (see Albrecht *et al*., 2003 for a discussion in relation to occupation). More, generally, in a similar manner to the debate about the inclusion of occupation when decomposing the national GPG (see Blau and Kahn, 2017), if vertical segregation among doctors is partly due to discrimination, the unexplained GPG will understate discrimination when controls for seniority are included.[30] For example, in the extreme, after accounting for differences in seniority there might be no unexplained within occupation GPG but there might be substantial and neglected gender inequality in promotion. In contrast, however, if seniority is determined by individual preferences (see, for example, Rizzo and Zeckhauser,

[30] See McNabb and Wass (1997) for similar concerns in relation to higher education.

2007), including the ability to combine work with family commitments, its exclusion, as in our analysis, will mean the unexplained GPG likely overstates discrimination.

3. Econometric method

To explore the mean GPG, we apply established decomposition methods (Oaxaca, 1973; Blinder, 1973), widely used in the analysis of the national GPG, and the international GPG among physicians, to public sector doctors in Britain. Consistent with the literature, our focus is on isolating the contribution of gender differences in observable characteristics from unobserved influences on the GPG, where the latter is typically interpreted as an upper bound measure of discrimination since it will include gender differences in productivity or preferences, albeit the influence of these are likely to be reduced in a within occupation context.

To explore the drivers of the mean GPG within each of the comparator occupations (*j*) we estimate the following earnings equations:

$$lnE_{g,j} = \boldsymbol{x_{g,j}} \boldsymbol{\beta_{g,j}} + \varepsilon_{g,j} \tag{1}$$

where the natural logarithm of gross hourly earnings of individual of gender g in occupation j ($ln\ E_{g,j}$) is regressed on a set of explanatory variables $(\boldsymbol{x_{g,j}})$ and $\varepsilon_{g,j}$ is a random error term. The vector of returns to characteristics $\boldsymbol{\beta_{g,j}}$ is estimated separately by gender g (male (*m*) and female (*f*)) and for each comparator j. With the exception of occupation and industry (see above discussion), the explanatory variables in $\boldsymbol{x_{g,j}}$ are common across specifications and include the personal and work-related characteristics described above.

This approach, which allows the return to characteristics to vary by gender, facilitates an Oaxaca-Blinder decomposition of the raw GPG into its explained and unexplained components within each occupation as follows:

$$\overline{ln\,E}_{m,j} - \overline{ln\,E}_{f,j} = (\overline{\boldsymbol{x}}_{\boldsymbol{m,j}} - \overline{\boldsymbol{x}}_{\boldsymbol{f,j}})\widehat{\boldsymbol{\beta}}_{\boldsymbol{m,j}} + \overline{\boldsymbol{x}}_{\boldsymbol{f,j}}(\widehat{\boldsymbol{\beta}}_{\boldsymbol{m,j}} - \widehat{\boldsymbol{\beta}}_{\boldsymbol{f,j}}) \tag{2}$$

where the bar above a variable denotes the mean value and $\widehat{\boldsymbol{\beta}}_{\boldsymbol{g,j}}$ is the Ordinary Least Squares (OLS) estimate of $\boldsymbol{\beta}_{\boldsymbol{g,j}}$. In equation (2), the first component is the 'explained GPG' and measures that part of the GPG due to gender differences in the observable characteristics while the second component, referred as the 'unexplained GPG', reflects gender differences in the return to those attributes. The latter is typically interpreted as a measure of wage discrimination, albeit the limitations are well-established in the presence of unobservable characteristics (see, for example, Neumark, 2018).[31]

To explore the GPG across distribution, we specify the θ^{th} $(0 < \theta < 1)$ conditional quantile of the log of hourly pay distribution linear in the set of covariates $\boldsymbol{x}_{\boldsymbol{g,j}}$, that is, $q_\theta(ln\,E_{g,j} |\, \boldsymbol{x}_{\boldsymbol{g,j}}) = \boldsymbol{x}_{\boldsymbol{g,j}}\boldsymbol{\beta}_{\boldsymbol{g,j}}(\boldsymbol{\theta})$ implying:

$$ln\,E_{g,j} = \boldsymbol{x}_{\boldsymbol{g,j}}\boldsymbol{\beta}_{\boldsymbol{g,j}}(\boldsymbol{\theta}) + \varepsilon_{\theta g,j} \tag{3}$$

where $\varepsilon_{\theta g,j}$ satisfies $q_\theta(\varepsilon_{\theta g,j} |\, \boldsymbol{x}_{\boldsymbol{g,j}}) = 0$. Equation (3) can be estimated using the optimisation techniques described in Koenker and Bassett (1978) and the estimated vector of quantile regression coefficients, $\widehat{\boldsymbol{\beta}}_{\boldsymbol{g,j}}(\boldsymbol{\theta})$, can be used to decompose the difference between males and females at different points of the log hourly pay distributions into an explained and unexplained component using a suitably adapted version of the decomposition method in equation (2) by Machado and Mata (2005). The GPG in occupation j at θ^{th} quantile can therefore be decomposed as:

$$\boldsymbol{x}_{\boldsymbol{m,j}}\widehat{\boldsymbol{\beta}}_{\boldsymbol{m,j}}(\boldsymbol{\theta}) - \boldsymbol{x}_{\boldsymbol{f,j}}\widehat{\boldsymbol{\beta}}_{\boldsymbol{f,j}}(\boldsymbol{\theta}) = (\boldsymbol{x}_{\boldsymbol{m,j}} - \boldsymbol{x}_{\boldsymbol{f,j}})\widehat{\boldsymbol{\beta}}_{\boldsymbol{m,j}}(\boldsymbol{\theta}) + \boldsymbol{x}_{\boldsymbol{f,j}}(\widehat{\boldsymbol{\beta}}_{\boldsymbol{m,j}}(\boldsymbol{\theta}) - \widehat{\boldsymbol{\beta}}_{\boldsymbol{f,j}}(\boldsymbol{\theta})) \tag{4}$$

[31] Following Blau and Kahn (2017), equation (2) uses as the counterfactual the earnings of an average woman at the male returns ($\overline{\boldsymbol{x}}_{\boldsymbol{f,j}}\widehat{\boldsymbol{\beta}}_{\boldsymbol{m,j}}$), which assumes the latter represent competitive prices. 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 4).

where the first component is the contribution of differences in observable characteristics and the second component is the contribution of differences in the coefficients to the difference between the θ^{th} quantile of the male and female pay distributions.[32] In this way we can compare the unexplained GPG across the wage distribution and identify the presence of ‘sticky floors’ or ‘glass ceilings’, where the unexplained GPG is higher at the bottom or top of the wage distribution respectively (see, Albrecht *et al*. 2003; Arulampalam *et al*., 2007).

4. Results

Mean Hourly GPG

Table 3 presents the mean hourly GPG decomposition results for the four occupations.[33] In the upper panel the raw GPG is separated into its explained and unexplained components. For public sector doctors, only a small (9.3 per cent) and statistically insignificant part of the 19.9 log per cent raw hourly GPG is explained by personal and work-related characteristics. The remaining 18.0 log per cent GPG is therefore unexplained and forms our upper bound estimate of gender wage inequality among doctors in the public sector in Britain. Albeit in different contexts and therefore using different specifications, our estimate of the unexplained hourly GPG is of comparable magnitude to international estimates for physicians (see, for example, Bashaw and Heywood, 2001 for the US (20 per cent), Theurl and Winner, 2010 for Austria (15 per cent) and Gaiaschi, 2019 for Italy (17 per cent)) but is smaller than for annual income among self-employed GPs in Britain (Gravelle *et al*., 2011 (30 per cent)).

The results for public sector doctors are, however, in stark contrast to doctors in the private sector, where we find a small (3 log per cent) and statistically insignificant unexplained GPG. While the majority of the GPG among the rest of public sector medical

[32] The decomposition of differences in wage distributions is applied using the approach proposed by Melly (2006), which estimates the raw GPG by using the conditional quantile regression model and then by integrating over the covariates. Melly (2006) shows that this procedure is numerically identical to the Machado-Mata decomposition method when the number of simulations used in Machado-Mata procedure goes to infinity.

[33] A full set of coefficient estimates for the wage equations by gender and occupation is available upon request.

professionals is also unexplained, the absolute unexplained GPG at 6 log per cent is considerably smaller than among public sector doctors and not statistically significant. Therefore, we find no evidence of gender pay inequality in either of these two comparator occupations. Within the rest of the public sector, where gender differences in occupational and industrial distribution contribute to the explained gap, the unexplained gap of 12 log per cent is also below that among public sector doctors.[34] In the context of nationally agreed salary scales and limited scope for individual bargaining, our findings therefore point to a surprisingly large within occupation and sector unexplained GPG.

[Table 3 here]

While the explained gap among public sector doctors is relatively small, we further separate its potentially offsetting drivers in the lower panel of Table 3. We find an important role for age in explaining the GPG, with a widening influence as a consequence of a relatively steep age-earnings profile among public sector doctors, combined with males being older than females on average. This is consistent with recent evidence from the GPG in medicine review (Department of Health and Social Care, 2020) and underpins their concerns relating to long pay scales that reward time served among doctors. Consistent with this, public sector doctors are the only occupation we consider where age significantly widens the GPG.[35] In contrast, gender differences in full-time employment have a negative (narrowing) effect on the GPG and act to largely offset the influence of age. This is surprising, although the importance of hours as a determinant of the GPG in literature on medicine at least in part

[34] Controlling for more detailed occupational and industrial categories is likely to increase the explained component and therefore our estimate of the unexplained public sector GPG represents an upper bound. Consistent with this, controlling for SOC unit group narrows the unexplained public sector GPG to 9.8 log per cent (results available upon request).

[35] In contrast to evidence from the US (see Lo Sasso *et al*., 2011) analysis by age group shows no significant GPG among public sector doctors aged under 30, consistent with the GPG developing over the life course rather than being evident on entry to the profession. These results are available upon request.

reflects the extensive use of annual pay.[36] Consistent with broader evidence, male doctors are more likely to work full-time than women. However, in contrast to the well-established literature on the part-time pay penalty, we find a penalty for full-time work among doctors.[37] Bashaw and Heywood (2001) argue the negative relationship between hourly pay and hours is a function of diminishing marginal productivity in the US, where (self-employed) physicians might be able to select more profitable work. However, this does not appear to be a plausible explanation for our findings given the nature of public sector pay scales. A more likely explanation seems to be an income effect whereby high earners have an incentive to reduce hours, particularly given limits on earnings imposed by pension taxation rules affecting highly paid doctors. Nevertheless, and in contrast to expectations, in the absence of the higher rate of part-time employment among female relative to male doctors the GPG among public sector doctors would be even larger.[38]

Sensitivity Analysis

We explore the robustness of these findings to changes to the decomposition methodology, measurement of hourly pay, model specification and year of data in Appendix Table A2. More specifically, we explore the sensitivity of our benchmark results to the decomposition method using female coefficient estimates as the baseline (Panel A) and then using coefficients from a pooled model following Fortin (2008) (Panel B). The change in reference coefficients make little difference to the estimates for public sector doctors, the rest of the public sector health professionals or the rest of the public sector. The estimates are more sensitive for private sector doctors, likely reflecting the small sample size, but the main

[36] Gaiaschi (2019), for example, find that while hours narrow the annual GPG among physicians in Italy they act to widen the hourly GPG.

[37] This is evident for both males and females, albeit it is larger for males in the public sector. Manning and Petrongolo (2008) find the part-time pay penalty in Britain to largely be a function of occupational segregation and this provides a likely explanation for the difference in findings. Indeed, they find a premium within some occupations.

[38] A similar effect is evident among the public sector as whole where, as expected, gender differences in occupation and industry both explain part of the GPG.

patterns remain consistent, that is, the unexplained gap is significant for public sector doctors and larger than for the other three occupations.

In relation to the measurement of hourly pay we explore the robustness of our results to the inclusion of overtime (Panel C) and exclusion of additional premium payments (Panel D). Neither change affects the results, suggesting the GPG among public sector doctors is not a function of overtime or additional earnings, albeit the GPG is slightly wider than when using our preferred measure of hourly pay.

Given the importance of full-time employment as a driver of the GPG among public sector doctors we also explore the GPG among full-time employees (Panel E) and full-time, full-year employees (where the latter is defined as 40 weeks following Goldin and Katz (2016)) (Panel F), where males and females are likely to have similar levels of labour market commitment (Blau and Kahn, 2017). While the raw GPG for public sector doctors is similar for all and full-time workers, the explained component of the GPG increases (consistent with the negative role of full-time work identified above). As a result, the unexplained GPG narrows relative to among all public sector doctors. In contrast, the estimates for full-time, full-year workers look more similar to all doctors. Regardless of the choice, the unexplained GPG among public sector doctors remains larger than among the rest of the public sector health professionals and the rest of the public sector. A far smaller proportion of private sector doctors work full-time, which restricts the sample size further, meaning these results should be interpreted with caution. While the unexplained GPG widens among full-time private sector doctors the patterns for full-time, full-year doctors are more similar to that for all private sector doctors, and in both cases the unexplained GPG remains insignificantly different from zero.

We also adapt the specification of our wage equation to explore the influence of weighting (Panel G) and controlling for, and alternatively excluding, second job holders

(Panels H and I respectively). None of these changes affect our main results. We also explore the robustness of the findings to the year of analysis by using data from 2017 (Panel J) and provisional data from 2019 (Panel K). Again, while the precise estimates for private sector doctors vary, the pattern of results is robust.

Mean Annual GPG

Given the concerns of Bashaw and Heywood (2001) and Gravelle *et al*. (2011) we also decompose the log of annual rather than hourly pay and these results are presented in Table 4, where our measure includes and excludes PRP in Panel A and Panel B, respectively. In both specifications we include additional controls for hours per week and weeks worked per year. As might be expected given the higher prevalence of part-time work among females, the annual GPG is consistently larger than the hourly GPG. However, the extent of this difference varies considerably across occupations. The annual GPG for public sector doctors is nearly double that of the hourly GPG but for private sector doctors the increase is nearly six times. For all occupations a greater proportion of the annual GPG is explained, reflecting the importance of gender differences in hours and weeks worked. Indeed, for most occupations the absolute unexplained GPG is similar to that based on hourly pay.[39] The exception is private sector doctors, where the unexplained GPG in annual pay is much larger than for hourly pay. Nevertheless, this remains insignificantly different from zero and smaller than among public sector doctors, consistent with our benchmark results. The findings are also similar when PRP, which is more accurately measured on an annual basis, is excluded from pay suggesting that, despite policy concerns, PRP is not a key driver of the GPG among public sector doctors.

[Table 4 here]

[39] For public sector doctors this is largely due to gender differences in weeks worked per year contributing to the explained GPG. Results from the detailed decompositions for annual pay are available upon request.

GPG across the distribution

Figure 1 presents a corresponding hourly GPG decomposition across the entire pay distribution for each of the four occupations.[40] For public sector doctors, the raw GPG, which is given by the solid line, is evident throughout the distribution and increases from about 10 log per cent at the 10th percentile to 22 log per cent at the median. Beyond this there is a levelling off until the 80th percentile after which the GPG continues to rise until it reaches about 30 log per cent at the top end of the distribution. Characteristics play a more important role in the middle of the distribution but the GPG is nevertheless largely unexplained across the distribution. Indeed, it is virtually entirely unexplained at the bottom end of the distribution and is more than 100 per cent explained above the 80th percentile. The 31 log per cent unexplained GPG at the 90th percentile substantially exceeds that at other parts of the distribution consistent with the presence of a 'glass ceiling', or greater wage inequality among high earners.[41] As such, our findings are consistent with Magnusson (2016) who finds a 'glass ceiling' among physicians in Sweden but contrast with Shih and Konrad (2007) who, as part of a broader analysis across the distribution, provide evidence of 'sticky floors' among physicians in the US in the 1990's, albeit both studies identify the GPG from a pooled model rather than using the decomposition methods applied here.[42] In the context of clearly defined salary scales such findings are likely reflect gender differences in the probability of promotion, consistent with previous evidence of unexplained gender differences in promotion to consultant in Scotland (Mavromaras and Scott, 2006).

[Figure 1 here]

[40] The corresponding results relating to selected points of the distribution are reported in Appendix Table A3.
[41] This exceeds the criteria set out by Arulampalam *et al*. (2007) who define a 'glass ceiling' as an unexplained GPG 2 percentage points larger at the 90th percentile relative to at other points (e.g. the 50th or 75th percentiles) of the wage distribution.
[42] Evidence of a 'glass ceiling' is also consistent with previous evidence relating to high skilled, white collar workers in Britain (Chzhen and Mumford, 2011) and within the public sector (Arulampalam *et al*., 2007; Jones and Kaya, 2019).

In terms of the comparator occupations, analysis at the median confirms our benchmark findings. The GPG for private sector doctors is more pronounced at the upper and lower tails of the distribution but, as with the mean, it is not statistically significantly different from zero at most points of the distribution. There is also evidence of a 'glass ceiling' among public sector health professionals, and the public sector but the unexplained GPG in both these comparator occupations remains well below public sector doctors.[43] In short, the unexplained hourly GPG for public doctors is greater than in the comparator occupations not only at the mean but across the earnings distribution.

In a similar manner to the mean hourly GPG, we explore the sensitivity of our findings to performing the decomposition using the female coefficients as the baseline, different measures of pay (including annual pay), a subsample of full-time workers, different model specifications including weighting and second job holding, and to using different years of ASHE. We observe evidence of an unexplained GPG throughout the wage distribution for public sector doctors and a pronounced 'glass ceiling' consistent with the benchmark estimates.[44]

5. Conclusion

Prompted by a ministerial commitment to end the GPG among doctors in the NHS, this paper uses nationally representative data to investigate the contemporary GPG among doctors employed in the public sector in Britain. In doing so, we are able to put our findings into context by making comparisons with other related occupations. Despite the selection of a relatively narrow and high skilled occupation, with broadly equal representation by gender and, the focus on public sector employment we find evidence of a sizeable hourly GPG

[43] This is true at most points of the distribution for the rest of the public sector.
[44] These results are not reported for brevity, but all estimates are available upon request.

among medical doctors, at 20 log per cent, which exceeds corresponding national GPG, estimated for all employees.

While the substantial GPG among public sector doctors in Britain is surprising given the institutional and policy context, it is consistent with international studies based on predominately private healthcare systems, where doctors are often self-employed and there is evidence of a substantial and persistent GPG. In this respect our findings reinforce and extend the suggestion by Theurl and Winner (2010) that the pronounced GPG among physicians is not a feature of the country specific healthcare system and, in doing so, raise further questions about the role of gender differences in preferences relating to income and work-life balance as possible drivers (see Rizzo and Zeckhauser, 2007), albeit these preferences may be determined by discrimination and social norms. In contrast, however, the comparison with other occupations within Britain reinforces the distinct nature of the GPG among public sector doctors and questions the above interpretation, with the GPG nearly three times as large than among private sector doctors (6 log per cent) or public sector health professionals (7 log per cent). The larger GPG relative to private sector doctors is particularly surprising in the context of a narrower GPG in the public relative to the private sector in Britain (Jones *et al*., 2018) and among public relative to private sector doctors in Italy (Gaiaschi, 2019). Given the potential differences in the nature of public and private sector healthcare in Britain, these findings highlight the need for further investigation, which is able to control for selection into, and heterogeneity in the composition of doctors within, each sector.

We investigate the drivers of the substantial mean GPG among public sector doctors and find that it is predominately unexplained by personal and work-related characteristics typically used to explore the GPG. As a result, and albeit an upper bound measure, the evidence suggests a potentially large role for wage inequality (18 log per cent) among doctors in the public sector in Britain, despite the existence of transparent salary scales and requirements of the PSED. Moreover, this finding is robust to a range of sensitivity analysis, including to the sample, model specification, year of data and measure of pay. In relation to the latter, our findings are not driven by the focus on hourly as opposed to annual pay, or the precise measure of pay adopted, suggesting the GPG is not predominately a function of additional payments, overtime or PRP.

In addition to providing an important contribution to the international literature on physicians from the predominately public UK healthcare system, the evidence is clearly important to the government ambition to eliminate the GPG among doctors in the UK NHS. While our evidence supports the role of age, as a proxy for experience, in explaining the GPG, consistent with the existence of long salary scales that reward time served (see Department of Health and Social Care, 2020) and advantage the historical representation of men in the profession, the relatively minor role of gender differences in observable personal and work-related characteristics should be of particular concern. Indeed, this points to the need for more explicit consideration of the GPG within the profession, including by the DDRB as it makes annual pay recommendations in an era of growing GPG transparency.

Unlike the majority of the literature on physicians, we extend our analysis of the mean GPG and find evidence of gender pay inequality among public sector doctors across the earnings distribution. Moreover, we find that wage inequality is exacerbated among high earners consistent with a 'glass ceiling' effect, suggesting particular scrutiny at the top end of the wage distribution is required. Indeed, despite being based on different data and a different sample, a likely explanation for the contrast between our findings and the predominately explained nature of the mean GPG among hospital doctors in England (Department of Health and Social Care, 2020) is the exclusion of controls for vertical segregation in our analysis. The extent to which such direct controls for seniority should be included in the analysis of the GPG can be debated and we are unable to explore this further in the absence of occupation specific measures in the ASHE. However, the implications for future policy and practice appear profound and point to the urgent need for analysis of gender differences in earnings growth (see Esteves-Sorenson and Sydner, 2012), promotion and progression among public sector doctors in Britain.

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Tables and Figures

Table 1. Number of observations and percentage female across occupations

	Public sector doctors	Private sector doctors	Rest of public sector health professionals	Rest of public sector employees	All employees
% female	44.30	54.03	70.13	68.61	49.54
Population size	205,838	45,359	107,218	5,520,052	24,390,290
	(0.84)	(0.19)	(0.44)	(22.63)	(100)
	[3.60]	-	[1.87]	[96.41]	-
N	1,099	243	604	35,560	160,115

Notes: Figures in ( ) are the percentage of all employees. Figures in [ ] are the percentage of public sector employees.

Table 2. Mean log gross hourly pay by gender across occupations

	Public sector doctors	Private sector doctors	Rest of public sector health professionals	Rest of public sector employees	All employees
All	3.486	3.377	3.002	2.731	2.643
	[0.520]	[0.592]	[0.367]	[0.430]	[0.521]
Males	3.574	3.410	3.053	2.849	2.728
	[0.528]	[0.589]	[0.403]	[0.431]	[0.547]
Females	3.375	3.350	2.981	2.677	2.557
	[0.487]	[0.596]	[0.349]	[0.418]	[0.478]
GPG (log points)	0.199	0.060	0.072	0.172	0.171

Notes: Figures in [ ] are standard deviations.

Table 3. Decomposition of the mean hourly GPG across occupations

	Public sector doctors	Private sector doctors	Rest of public sector health professionals	Rest of public sector employees
Observed GPG	0.199***	0.060	0.072*	0.172***
Explained GPG	0.018	0.031	0.012	0.052***
	[9.3]	[51.2]	[16.7]	[30.3]
Unexplained GPG	0.180***	0.030	0.060	0.120***
	[90.7]	[48.8]	[83.3]	[69.7]
Components of the explained GPG				
Age	0.036*	0.013	0.010	-0.002
	[18.3]	[21.8]	[13.4]	[-1.1]
Work region	-0.004	0.014	-0.010	0.011***
	[-2.0]	[23.3]	[-13.8]	[6.4]
Tenure	0.014	-0.017	0.016	0.006***
	[6.8]	[-28.7]	[22.3]	[3.4]
Full-time	-0.031**	-0.069	-0.018	-0.029***
	[-15.6]	[-115.3]	[-25.5]	[-16.8]
Permanent contract	0.003	0.001	0.002	0.002***
	[1.7]	[2.2]	[2.3]	[1.1]
Firm size	-0.000	0.089*	-0.003	-0.000
	[-0.0]	[147.7]	[-3.8]	[-0.1]
Collective bargaining	0.000	0.000	-0.001	-0.000
	[0.0]	[0.5]	[-1.0]	[-0.1]
Occupation	-	-	0.017	0.040***
			[23.0]	[23.1]
Industry	-	-	-	0.025***
				[14.4]
Population size	205,838	45,359	107,218	5,520,053
N	1,099	243	604	35,560

Notes: (i) Oaxaca-Blinder decomposition is performed using a model which includes personal and work-related characteristics. Rest of the public sector also includes SOC 2010 major groups (nine categories) and SIC sections (four categories). Rest of public sector health professionals also include occupation dummies for detailed SOC 2010, where 2219 Health Professionals n.e.c are grouped with 2214 Ophthalmic opticians and 2216 Veterinarians due to small sample size in these categories. (ii) Decompositions are calculated using the relevant male coefficients as the baseline. (iii) Figures in [ ] are proportions of observed GPG. (iv) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4. Decomposition of the mean annual GPG across occupations

	Public sector doctors	Private sector doctors	Rest of public sector health professionals	Rest of public sector employees
Panel A. Dependent variable log annual pay				
Observed GPG	0.372***	0.357***	0.196**	0.446***
Explained GPG	0.191***	0.243**	0.157*	0.329***
	[51.3]	[68.1]	[79.8]	[73.7]
Unexplained GPG	0.181***	0.114	0.040	0.117***
	[48.7]	[31.9]	[20.2]	[26.3]
Population size	205,838	45,359	107,218	5,520,053
N	1,099	243	604	35,560
Panel B. Dependent variable log annual pay excluding PRP				
Observed GPG	0.376***	0.329**	0.194**	0.443***
Explained GPG	0.190***	0.224**	0.155*	0.329***
	[50.5]	[68.3]	[79.9]	[74.4]
Unexplained GPG	0.186***	0.104	0.039	0.114***
	[49.5]	[0.104]	[20.1]	[25.6]
Population size	205,838	45,359	107,218	5,520,053
N	1,099	243	604	35,560

Notes: (i) Oaxaca-Blinder decomposition is performed using a model which includes personal and work-related characteristics plus controls for log hours per week and log total annual weeks worked. Rest of the public sector also includes SOC 2010 major groups (nine categories) and SIC sections (four categories). Rest of public sector health professionals also include occupation dummies for detailed SOC 2010, where 2219 Health Professionals n.e.c are grouped with 2214 Ophthalmic opticians and 2216 Veterinarians due to small sample size in these categories. (ii) Decompositions are calculated using the relevant male coefficients as the baseline. (iii) Figures in [ ] are proportions of observed GPG. (iv) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

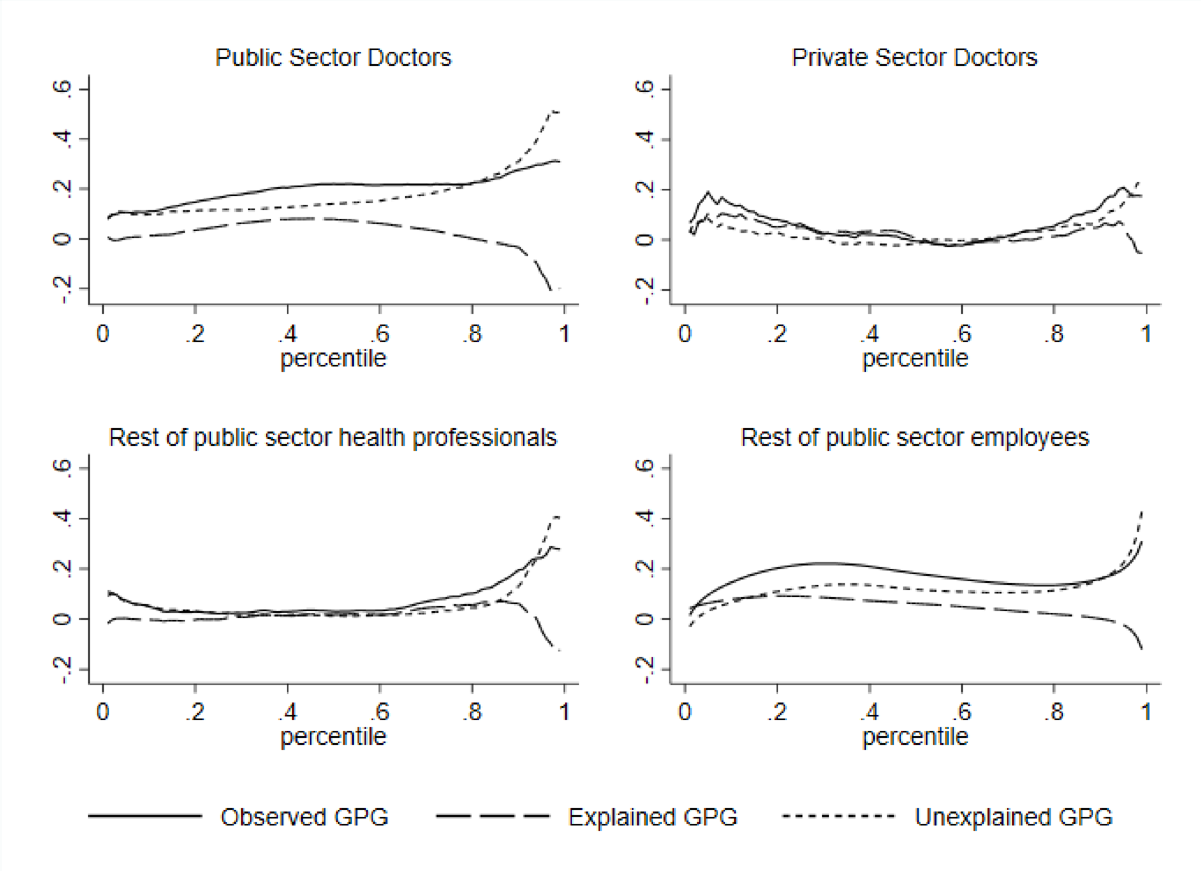

Figure 1. Decomposition of the hourly GPG across the distribution, across occupations

Notes: (i) Machado-Mata decomposition is performed using a model which includes personal and work-related characteristics. Rest of public sector employees include SOC 2010 major groups (nine categories) and SIC sections (four categories). Rest of public sector health professionals also include occupation dummies for detailed SOC 2010, where 2219 Health Professionals n.e.c are grouped with 2214 Ophthalmic opticians and 2216 Veterinarians due to small sample size in these categories. Observed GPG is estimated using the conditional quantile model. (ii) Decompositions are calculated using the relevant male coefficients as the baseline.

APPENDIX A

Table A1. Sample means for explanatory variables by gender and occupation

	Public sector doctors			Private sector doctors			Rest of the public sector health professionals			Rest of the public sector		
	All	Male	Female	All	Male	Female	All	Male	Female	All	Male	Female
Age	39.83	41.17	38.15	40.75	41.58	40.05	40.64	42.67	39.77	43.12	42.68	43.33
Work region[a] (%)												
North England	27.16	28.85	25.03	20.32	16.91	23.23	27.72	31.18	26.25	25.45	24.10	26.06
East England	22.08	20.94	23.51	29.56	26.82	31.89	24.10	26.11	23.25	25.78	23.61	26.78
West England and Wales	19.15	19.13	19.19	12.02	12.23	11.85	20.05	17.14	21.29	21.29	20.55	21.63
London	16.09	16.58	15.48	26.58	34.59	19.76	15.36	12.19	16.71	14.50	18.46	12.69
Scotland	15.52	14.50	16.80	11.52	9.45	13.27	12.77	13.38	12.50	12.98	13.29	12.83
Tenure (years)	5.49	5.73	5.18	4.84	5.32	4.44	8.87	9.89	8.43	9.76	10.58	9.39
Contract type (%)												
Permanent employment	60.26	62.42	57.55	80.10	80.48	79.77	93.14	92.04	93.60	92.15	93.83	91.38
Full-time	84.98	88.06	81.10	60.56	70.83	51.82	70.22	84.11	64.30	69.38	88.56	60.60
Firm-size (employees)	11,249	11,267	11,226	2,828	3,625	2,149	10,807	10,803	10,808	11,676	13,052	11,048
Collective agreement (%)	88.03	88.07	87.98	35.24	34.13	36.18	85.67	86.37	85.38	89.14	89.72	88.87
Detailed occupation (%)												
Psychologists	-	-	-	-	-	-	20.95	19.87	21.41	-	-	-
Pharmacists	-	-	-	-	-	-	14.47	12.53	15.29	-	-	-
Dental practitioners	-	-	-	-	-	-	5.11	8.36	3.73	-	-	-
Medical radiographers	-	-	-	-	-	-	28.60	27.53	29.06	-	-	-
Podiatrists	-	-		-	-	-	5.57	7.61	4.70	-	-	-
Health professionals	-	-	-	-	-	-	25.30	24.09	25.81	-	-	-

n.e.c.[b]												
Population size	205,838	114,653	91,185	45,359	20,852	24,507	107,218	32,026	75,192	5,520,052	1,732,597	3,787,454
N	1,099	558	541	243	98	145	604	156	448	35,560	10,189	25,371

Notes: [a]Due to small sample sizes in region in some specifications, we group NUTS administrative regions in the UK as follows: 1. North England: North West, North East, Yorkshire and The Humber; 2. East England: East Midlands, East, South East, 3. West England and Wales: West Midlands, South West, Wales, 4. London, 5. Scotland. [b]We group SOC 2010 code 2219 Health Professionals n.e.c with 2214 Ophthalmic opticians and 2216 Veterinarians due to small sample size in these categories. Broad occupation and industry are also included in specification for the rest of the public sector. Summary statistics for these are not reported here but are available upon request.

Table A2. Decomposition of the mean hourly GPG across occupations, sensitivity analysis

	Public sector doctors	Private sector doctors	Rest of public sector health professionals	Rest of public sector employees
Panel A. Using female coefficients as the baseline				
GPG	0.199***	0.060	0.072*	0.172***
Explained GPG	0.039	-0.074	0.026	0.075***
	[19.5]	[-121.9]	[35.3]	[43.9]
Unexplained GPG	0.160***	0.134	0.047	0.097***
	[80.5]	[221.9]	[64.7]	[56.1]
Population size	205,838	45,359	107,218	5,520,053
N	1,099	243	604	35,560
Panel B. Using pooled coefficients as the baseline				
Observed GPG	0.199***	0.060	0.072*	0.172***
Explained GPG	0.032	-0.024	0.024	0.077***
	[16.1]	[-40.0]	[33.5]	[44.8]
Unexplained GPG	0.167***	0.084	0.048	0.095***
	[83.9]	[140.0]	[66.5]	[55.2]
Population size	205,838	45,359	107,218	5,520,053
N	1,099	243	604	35,560
Panel C. Dependent variable log hourly pay including overtime				
Observed GPG	0.210***	0.064	0.079*	0.175***
Explained GPG	0.019	0.028	0.022	0.055***
	[9.3]	[44.2]	[27.5]	[31.4]
Unexplained GPG	0.191***	0.036	0.057	0.120***
	[90.7]	[55.8]	[72.5]	[68.6]
Population size	205,838	45,359	107,218	5,520,053
N	1,099	243	604	35,560
Panel D. Dependent variable log hourly pay excluding additional premium payments				
Observed GPG	0.210***	0.061	0.065	0.180***
Explained GPG	0.019	0.028	0.013	0.064***
	[9.0]	[45.7]	[20.5]	[35.5]
Unexplained GPG	0.191***	0.033	0.052	0.116***
	[91.0]	[54.3]	[79.5]	[64.5]
Population size	205,838	45,359	107,218	5,520,053
N	1,099	243	604	35,560
Panel E. Only full-time employees				
Observed GPG	0.196***	0.177	0.101**	0.107***
Explained GPG	0.079**	0.056	0.056	0.036***
	[40.5]	[31.7]	[56.0]	[33.2]
Unexplained GPG	0.116***	0.121	0.044	0.072***
	[59.5]	[68.3]	[44.0]	[66.8]
Population size	174,923	27,470	75,286	3,829,814
N	930	144	417	23,816
Panel F. Only full-time and full-year employees (employed 40 or more weeks per year)				
Observed GPG	0.255***	0.073	0.091**	0.109***
Explained GPG	0.061*	0.028	0.039	0.037***
	[27.0]	[37.9]	[42.3]	[33.7]
Unexplained GPG	0.164***	0.045	0.053	0.073***
	[73.0]	[62.1]	[57.7]	[66.3]

Population size	116,838	21,807	64,615	3,296,256
N	622	115	359	20,534
Panel G. Unweighted				
Observed GPG	0.196***	0.048	0.076*	0.160***
Explained GPG	0.020	0.028	0.011	0.041***
	[10.2]	[58.0]	[14.2]	[25.7]
Unexplained GPG	0.176***	0.020	0.065	0.119***
	[89.8]	[42.0]	[85.8]	[74.3]
Population size	-	-	-	-
N	1,099	243	604	35,560
Panel H. Controlling for holding more than one job				
Observed GPG	0.199***	0.060	0.072*	0.172***
Explained GPG	0.018	0.038	0.032	0.052***
	[9.1]	[62.9]	[43.6]	[30.1]
Unexplained GPG	0.181***	0.022	0.041	0.120***
	[90.9]	[37.1]	[56.4]	[69.9]
Population size	205,838	45,359	107,218	5,520,053
N	1,099	243	604	35,560
Panel I. Excluding employees who hold more than one job				
Observed GPG	0.204***	0.073	0.069	0.165***
Explained GPG	0.035	0.035	0.045	0.048***
	[17.2]	[47.6]	[64.3]	[29.0]
Unexplained GPG	0.169***	0.038	0.025	0.117***
	[82.8]	[52.4]	[35.7]	[71.0]
Population size	194,275	41,794	100,684	5,124,973
N	1,038	224	568	32,877
Panel J. ASHE 2017				
Observed GPG	0.204***	0.028	0.033	0.176***
Explained GPG	0.009	0.095	0.033	0.066***
	[4.5]	[343.4]	[99.0]	[37.7]
Unexplained GPG	0.194***	-0.067	0.000	0.110***
	[95.5]	[-243.4]	[1.0]	[62.3]
Population size	194,927	45,733	107,128	5,590,044
N	1,072	243	616	37,232
Panel K. ASHE 2019 provisional				
Observed GPG	0.202***	0.009	0.054	0.151***
Explained GPG	0.003	-0.068	0.038	0.044***
	[1.3]	[-716.9]	[70.9]	[28.8]
Unexplained GPG	0.200***	0.077	0.016	0.108***
	[98.7]	[816.9]	[29.1]	[71.2]
Population size	195,045	44,578	110,314	5,306,098
N	1,054	229	627	34,314

Notes: (i) Oaxaca-Blinder decomposition is performed using a model which includes personal and work-related characteristics. Specification in Panel B includes a gender dummy variable following Fortin (2008). The full-time indicator is excluded in Panels E and F. Rest of the public sector also includes SOC 2010 major groups (nine categories) and SIC sections (four categories). Rest of public sector health professionals also include occupation dummies for detailed SOC 2010, where 2219 Health Professionals n.e.c are grouped together with 2214 Ophthalmic opticians and 2216 Veterinarians due to small sample size in these categories. (ii) Decompositions are calculated using the relevant male coefficients as the baseline unless stated otherwise. (iii) Figures in [ ] are proportions of observed GPG. (iv) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A3. Decomposition of the hourly GPG at selected percentiles, across occupations

	Percentile of the conditional pay distribution						
	5th	10th	25th	50th	75th	90th	95th
Public sector doctors							
Observed GPG	0.107***	0.111***	0.165***	0.220***	0.219***	0.277***	0.298***
Explained GPG	0.004	0.013	0.049	0.079**	0.020	-0.033	-0.138**
	[4.0]	[11.3]	[29.5]	[35.9]	[9.2]	[-12.0]	[-46.3]
Unexplained GPG	0.103***	0.099***	0.117***	0.141***	0.199***	0.311***	0.436***
	[96.0]	[88.7]	[70.5]	[64.1]	[90.8]	[112.0]	[146.3]
Population size				205,838			
N				1,099			
Private sector doctors							
Observed GPG	0.192	0.144	0.066	-0.005	0.037	0.134*	0.209
Explained GPG	0.106	0.096	0.052	0.008	-0.001	0.054	0.061
	[55.2]	[66.8]	[79.1]	[-173.0]	[-1.6]	[40.1]	[29.3]
Unexplained GPG	0.086	0.048	0.014	-0.013	0.037	0.080	0.148
	[44.8]	[33.2]	[20.9]	[273]	[101.6]	[59.9]	[70.7]
Population size				45,359			
N				243			
Rest of public sector health professionals							
Observed GPG	0.075**	0.050*	0.022	0.031	0.088***	0.196***	0.244***
Explained GPG	0.004	-0.002	-0.002	0.019	0.054	0.063	-0.043
	[5.3]	[-4.5]	[-8.8]	[59.2]	[61.5]	[32.3]	[-17.8]
Unexplained	0.071	0.052	0.024	0.013	0.034	0.132*	0.287***
GPG	[94.7]	[104.5]	[108.8]	[40.8]	[38.5]	[67.7]	[117.8]
Population size				107,218			
N				604			
Rest of public sector employees							
Observed GPG	0.097***	0.146***	0.217***	0.182***	0.136***	0.161***	0.201***
Explained GPG	0.064***	0.079***	0.092***	0.063***	0.028***	0.002	-0.022*
	[66.2]	[54.1]	[42.3]	[34.4]	[20.5]	[1.0]	[-11.1]
Unexplained	0.033***	0.067***	0.125***	0.119***	0.108***	0.159***	0.224***
GPG	[33.8]	[45.9]	[57.7]	[65.6]	[79.5]	[99.0]	[111.1]
Population size				5,520,053			
N				35,560			

Notes: (i) Machado-Mata decomposition is performed using a model which includes personal characteristics and work-related characteristics. Rest of public sector employees include SOC 2010 major groups (nine categories) and SIC sections (four categories). Rest of public sector health professionals also include occupation dummies for detailed SOC 2010, where 2219 Health Professionals n.e.c are grouped with 2214 Ophthalmic opticians and 2216 Veterinarians due to small sample size in these categories. Observed GPG is estimated using the conditional quantile model. (ii) Decompositions are calculated using the relevant male coefficients as the baseline. (iii) Figures in [ ] are proportions of observed GPG. (iv) Standard errors are bootstrapped with 100 replications.* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.