Research Report for the Office of Manpower Economics (OME)

Understanding Ethnicity Pay Gaps in the UK Public Sector

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Context

In common with many other advanced economies, ethnic pay gaps (EPGs) have been a persistent feature of the UK's labour market. This is in part due to the pervasiveness of racial discrimination, either in its direct or indirect forms. However, the issue of pay gaps according to an individual's ethnic background is more complex than many other pay gaps such as those observed between men and women. This is because the size and composition of ethnic groups can be somewhat permeable and change over time, especially due to international migration flows. Immigration to the UK has generally risen over recent decades, and this has increased both ethnic diversity and the size of certain ethnic groups. Immigration can also influence the labour market outcomes of ethnic groups in a variety of ways – including if migrants are only recently arrived in the UK, their English language proficiency and whether their human capital was obtained from overseas. Such considerations are discussed in the literature review.

The existence of EPGs can produce a range of adverse consequences. These include higher rates of in-work poverty and lower levels of job satisfaction among ethnic groups. Whilst specifically in relation to the occupations covered by Pay Review Bodies (PRBs), the presence of significant (and unexplainable) EPGs is further likely to impact upon the recruitment, retention and productivity of staff from ethnic groups. This is especially pertinent in sectors that have experienced skill shortages and have high levels of job vacancies, such as the National Health Service (NHS). Moreover, the NHS has seen a fairly large expansion in its workforce in recent years, with a large proportion of workers joining the NHS having been born outside the UK. Therefore, it is important to establish whether EPGs exist using appropriate data and methods, as well as to quantify and understand their drivers.

Data and Methods

The empirical evidence that is presented in this report is based on data obtained from the Annual Population Survey (APS) 2017-2019. The APS provides socio-economic and labour market information on a representative sample of respondents across the UK. Although each year of APS data contains a relatively large number of observations (each annual dataset generally includes around 300,000 people), the size of some ethnic groups in any given year is rather small. For example, UK-born Whites accounted for just under 84 per cent of the approximately 73,700 employees in the 2019 APS with information on their hourly earnings. Therefore, all other ethnic groups, including the largest (Non-UK born Whites), cumulatively accounted for about 16 percent. This means that there is a need to pool APS data over several years to achieve sufficient observations to undertake robust analysis. In addition, the small sample sizes for some ethnic groups means that when conducting analysis on the PRBs, these are generally reported in aggregate. The exception to this is the NHS,

where the samples sizes are large enough to enable separate analysis. Relevant statistics are mainly reported separately by gender but are combined when considering the PRBs.

In terms of geography, our analysis focuses on the UK as a whole. This has implications for decisions regarding how to define ethnic groups given that slightly different ethnicity classifications are used in different countries in the UK. As a result, the ethnic groups that are reported in the majority of the analysis are UK-Born White, Non-UK born White, Black, Indian, Pakistani/Bangladeshi, Chinese/Other Asian and Other. However, further aggregation is required when comparing pay in the PRBs.

The statistical/econometric analysis in the report consists of a series of descriptive statistics, wage regressions and decompositions. The latter technique is a commonly used approach (applied by economists) to give an indication of the degree of wage discrimination experienced by disadvantaged groups. This is because the method splits the difference in gross hourly wages between a component that can be explained (by the variables included in the regression models) and an amount that remains unexplained (that can then be viewed as a measure of discrimination). In addition to presenting decompositions of the unweighted differences in (log) mean wages between whites and ethnic minority groups, some decompositions have also been presented for different parts of the wage distribution such as at the 10th and 90th percentiles. This has been done because there may be varying differentials (as well as unexplained/explained components) at particular points in the wage distribution.

Key Findings

In terms of the overall UK labour market, the findings confirm that substantial raw EPGs exist for several ethnic groups both for males and females across all sectors, with the most substantial deficits being observed for the Pakistani/Bangladeshi and Black ethnic groups. The decomposition analysis provides consistent evidence of unexplained EPGs, that is pay gaps based on comparable characteristics or pay inequality. Further, EPGs tend to be less substantial for native-born ethnicities and to increase as earnings increase. The latter is consistent with a 'glass ceiling' or particular pay inequality among higher earners.

Our sectoral analysis further uncovers:

- Larger (more negative) pay gaps observed in the private sector than the public sector for <u>males</u> in all ethnic groups relative to UK-born Whites:
  - significantly lower mean pay for Non-UK born White, Black, Pakistani/ Bangladeshi and Other ethnic groups in the private sector;
  - in contrast, mean pay is not significantly lower for any of the groups in the public sector - whilst pay is significantly higher for Non-UK born Whites and Chinese/Other Asians;

- o a greater relative pay advantage for Indians in the public compared to the private sector (21 per cent versus 11 per cent);
- o this pay advantage can mainly be explained by the greater productivity enhancing characteristics of Indians, especially occupation and education.

- The relative EPGs between the public and private sectors are generally smaller for <u>females</u>:
    - o pay differentials compared to UK-born Whites are typically not statistically significant;
    - o exceptions are the significantly lower earnings of Pakistanis/Bangladeshis in the private sector and the significantly higher earnings of Non-UK born Whites and Indians in both sectors.

- For the <u>PRBs</u> as a whole, there are small pay premiums for non-UK born White and combined Non-White Ethnic (NWE) groups relative to UK-born White workers:
    - o but these are outweighed by the explained (endowment) effects for both groups, resulting in no significant overall unexplained pay deficits.

- Average earnings are significantly lower for Non-UK born White and NWE groups in occupations covered by the <u>NHS PRB</u>:
    - o pay differentials are due to the educational and occupational structure of the groups;
    - o Non-UK born White, Indian, Pakistani/Bangladeshi and Other groups in the NHS experience the highest pay advantages at the upper percentiles (75th and 90th);
    - o whilst the lower pay received by Black workers in the NHS is found to exist at each point across the distribution.

Implications and Limitations

Overall, these findings point to smaller EPGs in the public compared to the private sector, with some groups (especially Indians) having higher average earnings than the UK-born White group. In this respect, they are consistent with suggestions that the public sector leads the private sector in pay equality and would support government policy targeting EPGs in the private sector. In the PRBs, there are small EPGs, with any pay deficits relative to UK-born Whites driven by educational and occupational differences. Indeed, it would be expected that the earnings of non-UK born White and NWE groups would be even higher based on their levels of educational and occupational attainment.

Despite containing information on a wide-ranging set of determinants of wages, the APS does not capture some influences. For example, as with the majority of large-scale sample surveys, variables that are difficult to measure such as ability and

motivation are not included. There are also some missing variables connected to ethnicity and immigration such as English language proficiency. The (un)availability of such variables will impact on the precision of the unexplained component of the decompositions and thus their accuracy in relation to providing measures of wage discrimination.

The availability of detailed administrative data should provide more accurate information than surveys - including on wages. Moreover, administrative data containing the population of workers will not be subject to sampling variations, and this should enable analysis using finer ethnic categories. Although regional controls have been included in the econometric models, no specific analysis has been undertaken below the UK level. Future research that focuses on sub-national analysis using appropriate data should therefore be quite revealing given that there are likely to be variations across the UK (e.g., in London compared to other areas). This is partly because of the concentration of some ethnic groups in urban centres. Some of these - especially London - have average higher wages but also considerably greater living costs. Future work could also usefully consider the complex selection processes that determine employment, sector and PRB and how this differs by ethnicity. This is not only important for analysis of EPGs but in understanding differences in workforce composition by ethnicity. However, despite its limitations, the APS is particularly useful in enabling comparisons across a range of sectors and industries.

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1: Introduction

The remit for this report is to scope the possibility of providing meaningful estimates of ethnic pay gaps (EPGs) in the public sector and occupations covered by the Pay Review Bodies (PRBs).

In common with many other advanced economies, EPGs have been a persistent feature of the UK's labour market, perhaps in part due to the pervasiveness of discrimination, either directly or indirectly. In the context of the UK, such pay gaps (and unexplained pay differentials) are complex and will be influenced by ethnic group compositions and these will inevitably have changed over time. These will produce a number of adverse consequences, which may include a higher incidence of in-work poverty and lower levels of job satisfaction for disadvantaged groups, which in themselves can have emotional, psychological, and health implications in addition to the obvious economic impacts. Quite aside from these direct impacts and any moral considerations, there is also the additional consideration upon the recruitment and retention of staff in the occupations covered by the PRBs and consequences for public sector adherence to the Equality Act.

While there is an existing literature that looks at the existence and determinants of an EPG in the UK and internationally, sectoral breakdowns are not common, and an in-depth analysis within the public sector even less so. As an empirical question, this is in no small part due to the existence of appropriate data. To mitigate this, a large-scale government data source is used, the Annual Population Survey (APS), pooled over the period 2017-2019.[1] This report will provide empirical estimates of the EPG across various definitions of ethnicity in both the private and public sectors in the aggregate, and (where possible) within the public sector for those occupations that fall within the remit of the PRBs. To provide consistency with existing investigations of comparable issues, the methodological approach within which this has been couched is the Blinder-Oaxaca decomposition framework which facilitates the separation of pay differentials which can be explained on the basis of differences in observable characteristics from unexplained pay differentials which come closer to measuring discrimination.

To preface these empirical estimates, the following sections of this report will provide an overview of the existing associated literature (Chapter 2), before setting out the statistical framework that will be employed in Chapter 3. Some background discussion of the sample from the APS that is used is provided in Chapter 4, before the empirical results, and presentation of EPGs and their explained and unexplained

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[1] The end date was chosen to mitigate against conflating findings with the effects of lockdown in 2020. Meanwhile, the start date was chosen to provide a sufficiently large sample for the empirical analysis while guarding against pooling over too long a time frame.

components are given in Chapter 5. Concluding comments and opportunities for future investigation are given in Chapter 6.

2: A Review of the Existing Literature

Introduction

It is over half a century since Britain passed legislation to combat racial discrimination. Despite this, Britain's non-white ethnic minorities still do not appear to face a level playing field in the labour market. An independent UK government review in February 2017 highlighted the continued disadvantage people from ethnic minority backgrounds face in the labour market compared to their white British counterparts (McGregor-Smith, 2017). While this review notes that 1 in 8 (12.5 per cent) of the working age population were from black, Asian, and minority ethnic backgrounds in 2015, such individuals made up only 10 per cent of the workforce and held only 6 per cent of top management positions. Similarly, the employment rate for ethnic minorities was only 62.8 per cent compared with an employment rate for white workers of 75.6 per cent[2], and an underemployment rate of 15.3 per cent compared with 11.5 per cent for white workers (meaning these people would like to work more hours than they currently do). And all ethnic minority groups were more likely to be overqualified than white ethnic groups, with White employees more likely to be promoted than all other groups.

This *McGregor-Smith Review* was the second piece of substantial government policy to follow the *Ethnic Minority Employment Task Force* (EMETF) which was instituted by the New Labour Government in 2003, and it proposes 26 policy recommendations which focus on employers and their affirmative actions to support ethnic minority groups and address ethnic inequalities in the workplace. Despite this, it has been suggested that these key pieces of public policy "have had, at best, limited success to date" (Clark and Shankley, 2020, p.128). Furthermore, the recent report by the *Commission on Race and Ethnic Disparities* (CRED, 2021) tellingly concludes that "[o]utright racism still exists in the UK" and that "the UK is not yet a post-racial society which has completed the long journey to equality of opportunity". Set within the context of a Black Lives Matter movement and the growing body of evidence that deaths from COVID-19 were not equally distributed across the population which has exposed existing inequalities between ethnic groups (Platt and Warwick, 2020), these facts are concerning. Indeed, Hu (2020) reports that during the COVID-19 lockdown, ethnic minority migrants to the UK were more likely to have experienced job loss than UK-born white British, and that UK-born ethnic minorities were less likely to have been afforded employment protection such as furloughing.[3] These findings resonate with Blundell *et al.* (2020), who find that the impact of COVID-19 will be to exacerbate existing inequalities within the UK, including those along the lines of ethnicity.

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[2] This gap was even more stark for some ethnic groups. For instance, the employment rate for those from a Pakistani or Bangladeshi background was only 54.9 per cent.

[3] While Hu (2020) did control for several individual characteristics in arriving at these estimates, this did not include industrial sector and it might be expected that sectoral attachment has an important role to play in these findings.

In addition to being economically inefficient, discrimination undermines the beliefs that are central to a fair and democratic society and places a high penalty on those ethnic minorities whose life chances are constrained. As well as the moral and legal implications of racial labour market discrimination, with many of the Pay Review Bodies (PRBs) remits specifically mentioning protected characteristics under the Equality Act 2010, it further impacts on their remit which requires them, "when making recommendations to consider, the need to recruit and motivate suitably able and qualified people". Labour market discrimination will reduce recruitment, morale, and motivation of ethnic groups, the latter two leading to higher turnover and so increasing recruitment costs. This is particularly important in the context of existing and future labour shortages in occupations within the PRBs. By failing to attract and retain the most talented it will also reduce the ability of the Government to provide the highest levels of service to the public.

The ethnic minority population represents an ever-growing proportion of the overall UK population. In 2019, 11.9 per cent of the UK working age population identified themselves as being of an ethnic minority, while in contrast the 1971 Census of Population put this figure at approximately 2 per cent. While there is substantial heterogeneity in this population, it is one that in the aggregate faces several distinct disadvantages relative to the white majority (see Race Disparity Audit, 2018). Ethnic minorities are for example more likely to have poor English language proficiency, more likely to be poor and more likely to be living in persistent poverty. They also have lower employment rates and have a greater tendency to be living in social housing and to exhibit traits such as obesity which are related to poor health. Furthermore, Amadxarif *et al.* (2020) also show that ethnic minority workers receive lower wages (the so-called *unconditional* pay gap)[4], both at the mean and the upper and lower ends of the pay distribution.

Around this expanding group, an extensive academic literature has emerged that has documented and explored the labour market outcomes of ethnic minorities (and by extension, their disadvantages), building upon a much wider and long-established literature from the US (see Darity and Mason, 1998 for a very useful overview of this voluminous literature). This UK-based research of labour market disadvantage faced by ethnic minorities has fallen into two broad groups. Much of the earlier work, centred around the four important Policy Studies Institute surveys, tended to be largely descriptive (Daniel, 1968; Smith, 1977; Brown, 1984; and Modood *et al.*, 1997). The other strand has attempted to explore the issue econometrically, with Chiswick (1980), Stewart (1983), Dex (1986) and McCormick (1986) being examples of the earlier and foundational literature. As this literature has developed and broadened, sources of pay gaps have typically been explained by: regression

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[4] This is the raw pay gap that does not account for inherent differences between workers and their characteristics. This contrasts with the *conditional* pay gap that will be discussed later that accounts for characteristic differences i.e., the difference in pay conditional on characteristics.

techniques that control for various characteristics of the individual or job (see *inter alia* Goldin, 2014, Brynin and Guveli, 2012); experiments to assess bias in hiring, promotion and bargaining between groups (see Neumark, 2018); and Oaxaca-Blinder decompositions that account for differences in pay between groups using an independent set of factors, which is particularly relevant for capturing differences when there are compositional differences in the characteristics of groups. Such estimation strategies are synonymous with what is commonly referred to as the unexplained ethnic pay gap or the *conditional* pay gap i.e., the difference in pay after accounting for characteristic and compositional differences. It should be noted, though, that the unexplained EPG is not synonymous with discrimination. Within the Blinder-Oaxaca framework, a component of the wage difference can be explained by differences in workforce composition and a component that is left unexplained. The unexplained gap represents a differential return to observed characteristics in the labour market but also encompass differences in tastes, preferences, motivation, ability etc. (all traits that are unobservable) and may also include discrimination.[5] As such, the oft used and well-established statistical technique which identifies the unexplained EPG would likely provide an over-estimation of discriminatory practices. For this reason, it is sometimes considered as an upper bound measure of wage discrimination.

Set against comparable investigations along the lines of gender, there is much less of a literature on EPGs in the UK, and much of the empirical evidence has tended to focus upon immigrants rather than ethnic minorities *per se* (Longhi and Platt, 2008). However, research has clearly shown that a pay gap exists for most ethnic minorities compared with the White majority (see *inter alia* Blackaby *et al*. 1994, 1998, Metcalf, 2009; Longhi and Platt, 2008; Brynin and Güveli, 2012; Longhi and Brynin, 2017), with the Low Pay Commission (LPC) putting this gap at 5.9 per cent in 2013/14 (LPC, 2015). In a comprehensive study, Longhi and Brynin (2017) also suggest that EPGs for women are much smaller than those for men, with some groups – Black African British women in particular – having a substantial pay advantage over comparable White women. Henehan and Rose (2018) likewise suggest that pay gaps were smaller for women than for men. More recently, ONS (2019) suggest that the difference in average earnings between White British and ethnic minority groups is currently lower in England and Wales than at any point since 2012, although the difference was larger for men than women, was larger for those aged 30 and over, and varied substantially across regions.[6] Interesting within this literature are the subsequent conclusions drawn

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[5] Indeed, in a far-reaching report that looked at much more than the narrowly focused EPG examined here, the *Commission on Race and Ethnic Disparities* conclude that they "found that most of the disparities we examined, which some attribute to racial discrimination, often do not have their origins in racism".

[6] While ONS (2019) also provide detailed breakdowns of the EPG i.e., average difference adjusted for earnings-determining characteristics, these should be treated with caution. Estimates are pooled over male and female workers and different employment types, and this is likely to skew the results in a way not accounted for by individual controls in their underlying regression. Controls for occupational status are also included, which in themselves may be part of the discriminatory process that ethnic minority workers face, and as such the estimates are likely to under-represent the true scale of the unexplained EPG.

by Forth *et al.* (2023) in their examination of the workplace in accounting for ethnic wage differentials. While the authors conclude that substantial segregation does exist across private sector workplaces in Britain, with around three fifths of workplaces in Britain employing no ethnic minority workers, this segregation does not contribute to the aggregate wage gap between ethnic minority and White employees.

However, there is substantial variation in this context across disparate ethnic groups, with Black African, Caribbean, Pakistani and Bangladeshi men experiencing the greatest disadvantages. Moreover, these groups have also tended to have higher-than-average representation in routine or semi-routine occupations (i.e., National Statistics Socio-economic classification categories 6 and 7), and higher unemployment rates than the White British population (Heath and Cheung, 2006). And for all ethnic groups, pay gaps also tend to be larger for first generation migrants than for those born in the UK (see Blackaby *et al.*, 2002 *inter alia*). Moreover, such a body of evidence has also shown that the EPG had been increasing over time and that employment opportunities appear to be more of a problem than earnings disadvantage (Blackaby *et al.*, 1994, Blackaby *et al.*, 2002), although these employment rate gaps have been narrowing more recently (Clark and Shankley, 2020).

The analysis of the EPG is of itself not without a number of empirical issues that affect estimated magnitudes. At the heart of the majority of the empirical estimates is neoclassical theory within an economic framework that uses an underlying earnings equation to capture the relationship between reported pay and known (and observed) productivity-related determinants of these earnings. Britain's ethnic minority population is a highly diverse group, distinguished by a number of cultural differences such as nationality, language and religion, and early studies (*inter alia* McCormick, 1986, Blackaby *et al.*, 1994) tended to focus upon ethnic minorities as a broad aggregate because of small sample sizes available within survey data. Indeed, the recently concluded report by the *Commission on Race and Ethnic Disparities* noted that "the Commission found the BAME [Black, Asian and minority ethnic] acronym unhelpfully masking a complex picture".

Studies attempting to measure ethnic disadvantage have also not always drawn a distinction between domestic schooling and experience, and foreign schooling and experience. This has probably led to an over-estimation of the degree of labour market disadvantage faced by ethnic minority workers. One way of mitigating such problems is to focus upon the experiences of members of the ethnic minority population who were born in the UK (see Blackaby *et al.*, 2002) as they are likely to be more familiar with customs, institutions and language which might otherwise provide a disadvantage. *A priori*, though, it is difficult to predict the exact direction in which such effects will operate. Although immigrants may be faced with disadvantages in the labour market as a result of deficiencies in their command of the English language, cultural isolation, foreign schooling and work experience, or even outright discrimination, they may also possess a number of advantages. Studies have

consistently shown that immigrants have higher relative abilities and are more highly motivated in comparison to both indigenous and non-migrant populations (see Borjas, 1994 for an early survey) and, compared with second generation migrants, the majority of ethnic minority immigrants arrived in the UK when the demand for labour was relatively high (due to prevailing economic conditions). And while second (and later) generation immigrants may have benefitted from domestic schooling and from increasing government anti-discrimination legislation, these groups may have regressed towards the mean in terms of motivation and ability and may not have derived the full benefits of a domestic education.[7] Such groups are also more likely to live in poorer areas and to have attended schools in inner city education priority areas where facilities are poorest.

To mitigate some of the problems highlighted, a number of studies have analysed the labour market experiences of the ethnic minority population who were born in the UK. An explanation for the lower earnings experienced by Britain's ethnic minorities relative to the white majority is that the ethnic minority group as a whole may be less familiar with customs and institutions due to a larger proportion being migrants, and this may disadvantage them in the labour market. It follows that as the proportion born in the UK increases, so their labour market position should improve.

Ethnic Clustering

There is a distinct clustering of ethnic minorities in the UK around geographic locations (see Peach, 1996 for a detailed overview), and much of this can be linked back to labour demand conditions at times in the UK's recent history which saw large scale migrant settlement around large conurbations. Subsequent immigration has also followed similar settlement patterns, where migrants have moved to areas where their own ethnic communities exist, and this has exacerbated ethnic clustering. However, in addition to providing cultural support for ethnic communities and migrants into them, such enclaves also give rise to distinct problems in themselves. One key issue is that areas of minority group concentration are also typically more deprived areas (Musterd, 2005), meaning that the oft-observed negative impacts of neighbourhood deprivation on individual outcomes may be confounded with effects of ethnicity (Wilson, 1987). In a direct test of this, Zuccotti and Platt (2017) use a longitudinal data over a 40-year period to assess the impact of neighbourhood co-ethnic concentration (i.e., concentration of respondents' own ethnic group) in childhood on subsequent adult labour market outcomes. They find that greater concentration of co-ethnics in the neighbourhood results in substantially lower labour market participation and lower occupational attainment for Pakistani and Bangladeshi women, but better occupational outcomes for Indian men. These are ascribed to cultural maintenance of

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[7] After all, these second-generation migrants would no longer be the self-selected and highly driven group that their parents had been that made them leave their home countries in the first place and relocate to the UK.

more traditional norms and the positive role that high levels of ethnic capital (such as the drive from parents for their children to succeed both within and outside of their own communities) can play respectively. Longhi (2020) investigates how ethnic wage gaps vary across British local labour markets and concludes that across group gaps are higher in areas with greater levels of occupational segregation and ethnic diversity.

Language Proficiency

Similarly, the existence of ethnic enclaves, or areas of high co-ethnic concentration, can reduce the incentive for ethnic minorities to fully assimilate within the majority culture (see Borjas, 2000 *inter alia*) or become proficient in the use of the English language. This is perhaps most pertinent for first generation migrants. In the US, language skills have been shown to be an important indicator of labour market success (see Chiswick and Miller, 1992 *inter alia*) but comparable research in the UK has been hampered by a lack of appropriate data (O'Leary *et al.*, 2001). But the limited evidence that is available has shown that a lack of English language fluency can have a detrimental impact upon labour market outcomes. Using data from the 1994 Fourth National Survey of Ethnic Minorities, O'Leary *et al.* (2001) show that a lack of language fluency has a role to play in accounting for the lower earnings of male ethnic minority employees in comparison to the white majority, although they do note that the concentration of ethnic minorities in local enclaves with high levels of unemployment has a greater influence over ethnic earnings deficits. Similar conclusions are drawn by Leslie and Lindley (2001), in that language is shown to contribute in part to inferior ethnic minority outcomes, but after language effects are removed non-white males still have higher unemployment rates and lower earnings. Using the same data source as the two previously cited studies, Shields and Wheatley-Price (2002) also find that fluency is associated with significantly higher occupational wages for immigrant men. Similarly, Lindley (2003) shows that a lack of fluency has a (statistically) significant impact on the earnings of ethnic minorities, although the language penalty is much greater for women than it is for men. Further, this earnings penalty for non-white female is clearly identified as arising directly through a lack of language fluency rather than ethnicity. Dustmann and Fabri (2003) also show that a lack of English language fluency reduced the earnings of ethnic minority immigrants by around 20 per cent in the mid-1990s UK.

Relatedly, there is also a literature that looks at language proficiency and how this affects the propensity for self-employment. Clark and Drinkwater (2000) for example find that those with low English fluency, and recent immigrants (even after accounting for English language fluency), are less likely than other members of the ethnic minorities community to be self-employed. They also note that this is also true of individuals living in 'enclaves' i.e., areas with a high percentage of their own ethnic group. Similarly, Clark et al (2017) also find that in addition to certain socio-economic characteristics, migration-related influences such as English language proficiency form an important link in the relationship between self-employment and immigration for some migrant ethnic groups.

Language proficiency quite naturally resonates with several associated issues around country-specific skills/education and familiarisation with customs and practices and integration into the majority population. At the heart of this is the seminal work around migrants carried out by Chiswick (1978), who hypothesised that recent migrants would have lower earnings initially caused by a relative lack of country-specific skills upon arrival. These include not only poorer knowledge of a host country's language, but also inferior knowledge of customs, less idea about job opportunities, less firm-specific training, and being less likely to have a relevant occupational licence or be a member of a trade union. He also argues that due to the highly motivated self-selecting nature of immigrants, their subsequent earnings would surpass those of natives as they acquired these country-specific skills. Applied to a UK setting, Chiswick (1980) suggests that while the earnings of recent white immigrants were similar to those of the native born, those of non-white immigrants were about 25 per cent lower and showed no tendency to increase with time spent in the UK. Similarly, Bell (1997) also finds that recent non-white immigrants earned substantially less than the UK-born in the period soon after migration, even if white migrants enjoyed a wage premium. Comparable findings of a mean earnings advantage for immigrants over the period 1993-2009 are also reported by Hunt (2012), although this work did not condition upon ethnicity.

Native-born Versus Migrants

A limited number of studies have looked at the issue of the EPG across first and second-generation migrants. Heath *et al*. (2000) find that ethnic pay penalties are in general of similar magnitude among the second generation to those among the first generation, despite the substantial equalisation of educational experience that has taken place. Likewise, Blackaby *et al*. (2002), also controlling for time spent in the UK, find that the relative position of ethnic minorities had not improved since the 1970s when anti-discrimination policies first came into force, and that native ethnic minorities appeared to be faring little better than their parents. Similarly, Longhi *et al*. (2013) report that while second-generation migrants for all the ethnic-religious groups that they analysed achieved higher wages than the first generation, the EPG within subsequent generations showed no signs of being any smaller. In contrast, Longhi and Brynin (2017) find that ethnicity pay gaps are much smaller for those men born in the UK than for immigrant ethnic minority men. For females, the same was true only for those from a Pakistani or Bangladeshi background. Algan *et al*. (2010) also come to a similar conclusion in a comparative study of the UK with France and Germany, finding that net earnings (conditional on education, experience, and region) were higher for second-generation migrants than for first generation. In contrast, there was less clear-cut evidence of a generational improvement in both France and Germany. And in a related but not directly comparable investigation, Dustmann *et al*. (2011) also find that despite second-generation immigrants being better educated than their parents' generation (and this being far greater for ethnic minorities), and better educated than their white native peers, they are less likely to have jobs. Further, when

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in work, they earn lower wages on average than their otherwise identical White British counterparts. It is also interesting to note that Kesler and Safi (2018) find the scale of the earnings inequality faced by immigrants of disadvantaged minority origin to be of remarkably similar magnitudes in a comparison between the UK and France.

Education

A key factor that influences the labour market performance of new immigrants is the extent to which existing human capital (education, experience, and training) are valued in the destination country, with Friedberg (2000) arguing that it is imperfectly portable across countries. In addition to considerations about the quality of education systems between countries, prior experience and training may also not match the requirements of firms in the host labour market. Using Israeli data, Friedberg finds that following immigration, migrants earn around a quarter less than comparable natives based on measured skill levels. This differential can be fully explained by the lower valuation of human capital obtained overseas. For the UK, evidence of a lower valuation of experience and education obtained abroad with regard to earnings is provided by Shields and Wheatley-Price (1998) and Blackaby *et al.* (2002). Kee (1995) also identifies the same phenomenon for the Netherlands, noting that returns to overseas-acquired education were higher when it was in a country with educational systems more similar to that of the Netherlands.

Ethnic Heterogeneity

By design, much of the earlier work looking at the EPG, and the labour market performance of ethnic minorities more generally, considered a broad ethnic aggregate due to limited sample sizes in survey data. Having said that, some of the earliest empirical work by Dex (1986) and McCormick (1986) did indeed look at specific ethnic groups, with Dex identifying an earnings differential between those of White ethnicity and second-generation West Indians, and McCormick presenting comparable findings for West Indian and Asian workers. In this vein, Blackaby *et al.* (1998) distinguish across the major ethnic groups in the UK and found that EPGs existed for all major ethnic groups in the 1990s and that Indians were faring better than Blacks and Pakistanis. Returning to an updated analysis that took account of differential age structures between minority groups and the white majority, and whether minorities were UK-born, Blackaby *et al.* (2002) find only up to half of ethnic wage differentials were explained by characteristic differences in their empirical framework and that there was substantial heterogeneity in outcomes across the ethnic minority population. Clark and Drinkwater (2007) also arrive at very similar conclusions although they noted that while some groups had improved their earnings position relative to White people over the period of 1991-2001, substantial disadvantage remained. Black African, Pakistani, and Bangladeshi groups were the most disadvantaged, while in terms of earnings within occupations, deficits were reported to be largest for professional/managerial workers for virtually all ethnic minority classifications. In a more recent examination of

local neighbourhood effects, Zuccotti and Platt (2017) also show for both men and women that there are large differences in labour market outcomes across Pakistani, Bangladeshi and Indian subgroups.

A focus has also been placed upon how religion impacts upon wage gaps (and other labour market outcomes), with this being conceptualised by how religion operates through social networks or through religion-based discrimination (see Clark and Drinkwater, 2007, 2009). But given the overlap between religion and ethnicity, it is hard to interpret analyses based upon religion alone. Indeed, in evidence discussed by Longhi *et al.* (2013) it is noted that the majority of Hindus in the UK are Indian, but less than half of UK Indians are Hindu; 30 per cent are Sikhs and 13 per cent Muslim. And yet virtually all of UK Pakistanis and Bangladeshis identify with Islam, making up nearly two thirds of UK Muslims. This leads Longhi *et al.* (2013) to examine the experiences of specific ethno-religious groups. Identifying Indian Hindus, Indian Muslims, and Pakistani Muslims, and differentiating between first- and second-generation migrants, significant wage gaps are found for most groups around the middle of the wage distribution but there is little evidence of wage gaps at the extremes of the distribution. Occupational sorting is also found to account for part of these pay gaps, with the advantage enjoyed by Indian Hindus partly explained by sorting into highly paid professional occupations, and the disadvantage experienced by Indian Muslims and Pakistani Muslims partly accounted for by their over-representation in lower paid sales and customer service occupations. Such findings are consistent with the earlier work of Lindley (2002), which identifies substantial ethnic labour market disadvantage after controlling for religion. Over and above a significant employment penalty to British-born and foreign-born non-white males, a significant wage gap was also identified for foreign-born non-white males. A substantial disadvantage was also identified for Muslims relative to all other ethnic minorities, approximately half of which could be explained by lower productivity-related characteristics. The residual is interpreted by the author as a pure Islamic penalty. This accords with the conclusions of Longhi and Brynin (2017) who find that Muslims are on average paid less than those who do not affiliate to any religion. They also note, however, that being Muslim cannot be considered a standalone explanation of pay gaps given the strong association between religion and certain ethnic groups e.g., Pakistani, and Bangladeshi people.

Commenting specifically upon the gender pay gap and how this intersects with ethnicity, Breach and Li (2017) conclude that racial inequality shaped the gender pay gap in Britain over the past two decades. Women working full-time from almost every ethnic minority group experienced a pay gap with White British women, ranging from a 5.6 per cent advantage for Chinese women to a 19.6 per cent deficit for Black African women. However, it should be noted that these conclusions were arrived at by comparing average wage differences as opposed to a definition of the pay gap adjusted for compositional differences as used elsewhere.

Occupation crowding

While studies have incorporated occupational crowding into explanations of the gender pay gap (with Brown, Moon and Zoloth, 1980 being a seminal example), comparable studies in relation to ethnicity are generally absent. The published work that is available predominantly provides aggregate measures of segregation (see Stewart, 1983, Heath *et al.*, 2000 and Blackwell, 2003 as examples of a very limited literature) and wage-based estimates in a UK context are sparse. However, in explicit recognition of this, Brynin and Güveli (2012) pool Labour Force Survey (LFS) data over the period 1993-2008 to show that much of the EPG is explained by occupational segregation, while within occupations the EPG is far less substantial. Further, they also suggest that while occupational segregation has strong negative effects, there is also a 'protective' element to segregation if minorities are over-represented in occupations with a positive wage gap. In their extensive review of the EPG, Longhi and Brynin (2017) also highlight that the occupational pay gap i.e., the average pay gap within individual occupations within which people do broadly similar work, favours White British men over their ethnic minority counterparts. For women, the picture is less clear, with some ethnic minority groups outperforming White women, although those of Pakistani or Bangladeshi heritage had experienced a large and growing occupational pay gap over time.

While not incorporating a wage gap analysis, there is also a somewhat larger literature that has looked explicitly at occupational attainment. Heath and Yu (2005), for example, find that earlier cohorts of first-generation Black, Indian, and Pakistani migrants into the UK were disadvantaged in their access to professional/managerial jobs due to a lack of UK-acquired qualifications and language skills. While subsequent generations have invested heavily in increasing their skills, significant labour market disadvantage still exists. Likewise, Platt (2005a) considers the intergenerational social mobility of ethnic minorities over time and argued that, starting from a very different occupational structure in 1971, this and subsequent migration patterns shaped the achievement of ethnic minority groups 20 years later. In particular, higher occupational attainment in the first generation meant that Indians were able to maintain their achievements in the next generation. In contrast, the relative occupational position of Caribbeans slipped. It was also noted that the occupational position of women from the ethnic minority communities was more dependent upon their origins than it was for men. Updating to include data from the 2001 Census, Platt (2005b) finds that Caribbeans, Black Africans, Indians and Chinese experienced upward occupational mobility relative to the White UK-born, after origins had been taken into account. However, the Pakistani and Bangladeshi groups performed less well in terms of occupational achievement.

Pan-Distributional Considerations

While much of the empirical literature around EPG has focussed upon mean estimates of the EPG and average workers, there is some limited work that has considered how the wage gap varies along the earnings distribution. Focussing upon performance pay rather than a broader measure of remuneration, Green, Heywood and Theodoropoulos (2014) find that the EPG is larger amongst time rate jobs (i.e., where employees are paid for the amount of time spent at work) than amongst performance pay jobs (i.e., where employees are paid according to how well they perform). The smaller performance pay EPG is driven by bonus payments in the upper middle portion of the earnings distribution, where the authors note that this stands in marked contrast to the available US evidence (see, for example, Heywood and Parent, 2012) where performance pay has been associated with larger EPGs, especially at the top of the earnings distribution. In a related study that investigates the issue of immigration and not ethnicity explicitly, Hunt (2012) decomposes the immigrant-native wage gap for male workers across the wage distribution over the period 1993 to 2009. It is found that although immigrants earn more on average than natives, the unexplained component of the wage gap (i.e., the native earnings advantage) is greater at the bottom of the distribution and has shifted towards the centre of the distribution. In contrast, Longhi *et al.* (2013) find significant wage gaps for ethno-religious groups at central points of the wage distribution but little evidence at more extreme points either above or below the median of the wage distribution.

More recently, cutting across the themes of ethnic heterogeneity and pan-distributional considerations for male workers in the UK, Clark and Nolan (2021) find that while Indian workers have a better endowment of characteristics that enhance pay than White workers, there has been increasing inequality within the Indian pay distribution over the period 1997-2019.[8] This partly reflects a reduction in the extent to which the characteristics of Indian men are less well rewarded at the top of the pay distribution. This contrasts with what has happened for Pakistani workers, whose pay gap has remained largely explained by the differential reward to their characteristics, particularly at high pay levels. Bangladeshi workers, though, have seen substantial improvements in their earnings relative to White workers, particularly at the bottom of the pay distribution. Such an outcome is driven by both an improvement in the relative characteristics of Bangladeshis and in the way in which they are rewarded in the labour market. Indeed, increasing education is a key component in reducing the wage gap for all ethnic minority groups except for Black Caribbeans.[9] These educational

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[8] Using LFS data over the period 1997-2019 prevents a more detailed disaggregation of the White category into White British and White Other categories as used elsewhere in the literature.
[9] This also accords with the conclusion that "[e]ducation is the single most emphatic success story of the British ethnic minority experience" drawn by the *Commission on Race and Ethnic Disparities* (CRED, 2021).

increases and their associated impact upon wages are greatest for Black Africans in the higher parts of the wage distribution.

Such findings from Clark and Nolan also resonate with those of Strand (2021) who provides support for an immigrant paradigm (see Kao and Thompson, 2003) that sees recent immigrants devote themselves more to educational attainment than the native population due to a lack of financial capital. This sees them viewing education as a way out of poverty. Noting that most Black Caribbean pupils are third generation, being descendants of some of the longest standing migrant groups in the UK – many from the Windrush generation arriving in the 1950s and early 1960s – Strand attributes such a standard as accounting for differing attainment levels in schools between Black pupils of Caribbean heritage and of African heritage. Phan *et al*. (2022) also examine EPGs across the earnings distribution. They use data from the Annual Survey of Hours and Earnings (ASHE) that is matched to the 2011 Census of the Population for England and Wales to uncover large variations in EPGs between groups at different points in the distribution of earnings. They particularly focus on the role played by the characteristics of organisations such as sector and size in explaining the differentials and argue that these tend to be important explanatory factors.

Public-Private Differentials

With regard to estimating public-private sector wage differentials, an extensive literature exists in the UK and internationally (Bender, 1998, Gregory and Borland, 1999 and Lausev, 2014 provide extensive surveys), although the evidence on how this is differentiated by ethnicity is extremely limited, and how ethnicity intersects across divisions within the public sector virtually non-existent. A number of stylised facts emerge for the UK with respect to the overall public-private sector premium, though, which are often shared by other market-based economies. These include that the public sector pay premium which exists after accounting for other observable personal and work-related characteristics tends to be higher for women than it is for men and varies across the pay distribution, typically being higher at the bottom of the pay distribution than at the top where the male pay premium is often negative. Blackaby *et al*. (2020), when investigating movements in the public sector wage differential over the period 1994 to 2017 provide a further review of UK and international studies. However, as shown by Blackaby *et al*. (2018), the public sector wage premium varies substantially across regions of the UK and the way in which it is measured, and the definition of earnings used, can have profound implications. While little research has been conducted on the ethnic public/private sector wage differential in the UK, Blackaby *et al*. (2002) find a smaller ethnic public/private sector wage differential for many ethnic groups leading to higher levels of relative employment of these groups in the public sector, possibility due to lower perceived levels of discrimination in the public sector. This finding is consistent with the earlier seminal work in the US in this area by Lewis (1990).

Inferences from the Gender Pay Gap

The literature on ethnic minority differences across the public sector is very sparse, and no clear patterns can be drawn from such a limited source. However, the more well-developed literature around the gender pay gap and how this is affected by not only the public sector but also the related dimension of unionisation might give some informative insights as to how these may also cut across the dimension of ethnicity. A consistent finding in this literature has been a greater public sector pay premium for women (see *inter alia* Blackaby *et al.*, 2012, Cribb *et al.*, 2014). Consistent with such findings, analysis of the gender pay gap by sector finds smaller gaps within the public than the private sector (see, for example, Chatterji *et al.*, 2011; Stewart, 2014, Jones *et al.*, 2018). Therefore, in the UK, the public sector makes an important narrowing contribution to the national gender pay gap, particularly through a lower within-sector gender pay gap but also through the presence of a relative concentration of women in the public sector (Jones *et al.*, 2018). However, and in contrast to earlier studies, Jones and Kaya (2019) estimate the unexplained gender pay gap to be at least as large within the public sector as the private sector.[10] In light of this, the authors question "the extent to which, as has previously been claimed, the public sector remains a 'beacon of good practice' in terms of gender equality".

Several arguments have been put forward to explain this lower gender pay gap in the public relative to the private sector (Chatterji *et al.*, 2011). These include the public sector as a 'fair' employer (Beaumont, 1981; Blanchflower and Bryson, 2010) with more developed equality practices (Hoque and Noon, 2004) which may encompass a greater provision of flexible working and family friendly practices (Chatterji *et al.*, 2011), and the distinctive nature of the public sector in embracing cultural values (see Arulampalam *et al.*, 2007 and Cai and Lui, 2011 *inter alia*). There is also the role of unionisation and centralised pay-setting and collective bargaining to consider in compressing the earnings distribution (Grimshaw, 2000), in addition to the influence that unions have over equality practices (Hoque and Bacon, 2014). Stewart (2014) also highlights the role of more transparent and structured pay systems within the public sector.

It is likely then that similar consideration will also apply to the study of the EPG, and in particular the stricter regulatory controls that apply to the public sector. The NHS agenda for Change (2004) and the Single Status Agreement (1997) for example impose common pay structures for employees in the health sector (outside of the top clinical grades) and in local government. Furthermore, additional statutory duties require all public service organisations to take proactive action to redress patterns of

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[10] The authors suggest that this finding perhaps reflects a change over time, but they do not attempt to identify the driver of this. They conclude that "[f]rom the cross-sectional analysis here it is not possible to speculate whether this is a consequence of wage restraint in the public sector arising as a consequence of austerity or it reflects relative improvements within the private sector".

disadvantage, to promote equality and to eliminate discrimination in employment and recruitment practices. However, in contrast to the narrowing trend in the gender pay gap observed in the UK following the Equal Pay Acts of the 1970s, Jones *et al.* (2018) show that the gender pay gap across both sectors has been unchanged since 2010. They further note that the unexplained gap has been stable for two decades and suggest that such policies have not influenced the treatment of women in the public sector.

3: Statistical Methodology

The empirical analysis that will be conducted has two core elements. First, an analysis of EPGs will be undertaken for the entire economy and then between the public and private sector. This will be followed by a more detailed analysis of the drivers of the EPGs *within* the public sector and across PRBs. In both cases, the focus will be on quantifying the determinants of EPGs through an established decomposition approach which isolates the contribution of observable characteristics of workers and their jobs from unobserved influences. The latter measure is a proxy for wage inequality and will include unequal treatment in the labour market.

Single-Equation Approach on Average Earnings

A wage equation can be estimated with varying controls to identify the size and significance of the raw and adjusted EPGs as follows:

$$ln\ E_{it} = G_{it}\mu + \boldsymbol{x_{it}\beta} + \varepsilon_{it} \qquad i = 1,..,N; \tag{3.1}$$

where i indexes the individual and t the time period. The log of hourly pay (E_{it}) is regressed on a set of indicators of ethnic group (G_{it}) and adjusted EPGs are given by μ. The set of control variables $\boldsymbol{x_{it}}$ will vary across specifications but includes a set of earnings-enhancing characteristics that are known to influence earnings. Briefly, this will include personal characteristics such as age (and age squared), marital status, long-term illness, highest educational qualification, date (month) of interview and region of work, and work-related characteristics such as temporary employment, occupation, tenure (and tenure squared) and firm size. [11] A full list of all variables and their definitions is given in Appendix Table A3. This approach identifies EPGs adjusted for productivity related characteristics.[12,13] It can be applied to all workers and separately by gender and sector.

Multi-Equation Decomposition Analysis on Average Earnings

Equation (3.1) assumes that each control variable has the same impact on earnings for each ethnic group. By estimating a version of equation (3.1) separately for each ethnicity:

$$ln\ E_{it} = \boldsymbol{x_{it}\beta_G} + \varepsilon_{it}\ \ G = 0,..,g;\ i = 1,..,N_G; \tag{3.2}$$

decomposition techniques (Oaxaca, 1973, Blinder, 1973) can be used to identify that part of EPGs due to differences in observed characteristics, or what is explained, from

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[11] A constant term is also included in $\boldsymbol{x_{it}}$.
[12] Matrices are denoted in bold.
[13] The squared terms for age and tenure capture non-linear effects on earnings.

an unexplained component which is closer to a measure of pay inequality. The precise decomposition can take alternative forms, but an example is given below:

$$\overline{\ln E_{G1}} - \overline{\ln E_{G0}} = (\overline{x_{G1}} - \overline{x_{G0}})b_{G1} + \overline{x_{G0}}(b_{G1} - b_{G0}) \tag{3.3}$$

where the bar denotes the mean value, and the coefficient b is the ordinary least squares (OLS) estimate of β, the 'return' to characteristics.[14] The decomposition separates the difference in earnings between the average employee in two alternative groups defined by ethnicity, group one ($G1$) and zero ($G0$) respectively, into an explained and unexplained component. For example, $G1$ might be a UK-born White worker, who could then be compared to an Indian worker $G0$. The former component measures that part of the wage differential due to differences in the characteristics of employees by ethnicity, while the latter measures that part due to differences in the return to those attributes due to ethnicity i.e., differences in the wage premium or penalty associated with given characteristics. The unexplained gap is typically interpreted as an upper bound measure of unequal treatment since it will include the influence of unobserved differences in productivity or preferences by ethnicity, in addition to discrimination.

Across the Earnings Distribution – Single-Equation Analysis

The above analysis focuses on mean pay and does not take account differences in the earnings distributions of disparate ethnic groups. Analysis away from more central parts of the earnings distribution e.g., the mean, will identify where the EPGs is most/least pronounced i.e., among low or high paid workers. Such phenomena are known as 'sticky floors' and 'glass ceilings' in the context of the gender pay gap, and the limited existing evidence that is available shows that this can have important and heterogeneous impacts across ethnic groups.

Quantile regression methods (Koenker and Basset, 1978) can be used to estimate the EPGs at different points of the pay distribution (e.g., median, 25th and 75th percentiles). Formally, the θth $(0 < \theta < 1)$ conditional quantile of the log of hourly pay distribution is assumed to be linear in the set of covariates x_{it} along with the set of indicators of ethnicity, that is $q_\theta(\ln E_{it}|G_{it}, x_{it}) = G_{it}\mu(\theta) + x_{it}\beta(\theta)$ implying:

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[14] Equation (3.3) uses the returns (coefficients) for ethnic group 1 from equation (3.2) under the assumption that these are equivalent to competitive returns. In the empirical estimates that follow, ethnic group 1 is consistently defined as the UK-born White group and so this provides a common baseline to all the decomposition results. Under such an approach, this implies that the wage structure for the UK-born White group is that which would persist in the absence of market distortions and any deviation from this would be consistent with pay inequality.

$$ln\ E_{it} = G_{it}\mu(\theta) + \boldsymbol{x_{it}\beta}(\theta) + \varepsilon_{\theta it} \qquad i = 1,..,N; \tag{3.4}$$

where $\varepsilon_{\theta it}$ satisfies $q_\theta(\varepsilon_{\theta it}|G_{it}, \boldsymbol{x_{it}}) = 0$ and the adjusted EPG at θ^{th} quantile is given by $\mu(\theta)$.

Across the Earnings Distribution – Multi-Equation Decomposition Analysis

As identified previously, equation (3.4) will impose the restriction that the return to characteristics in the vector $\boldsymbol{\beta}$ will be constant across ethnic groups. To relax this assumption, separate equations can be estimated for each of the ethnic groups at quantile θ and suitably adapted decomposition methods can be applied to separate the explained and unexplained components in a similar manner to described above. An excellent survey of distribution-based approaches to analysing pay differences is provided by Fortin *et al.* (2011), and among the approaches considered they recommend the use of the regression-based recentred influence function (RIF) method proposed by Firpo *et al.* (2018) which can be summarised as follows.

Let the distribution of hourly earnings (F_{w_G}) for ethnic group G (and dropping the previous *i* and *t* subscripts for expositional convenience) be as follows:

$$w_G = w_G(\boldsymbol{x_G}, \varepsilon_G) \sim F_{w_G} \tag{3.5}$$

where $w_G(.)$ is an unknown wage function determined by workers observable characteristics ($\boldsymbol{x}$) and unobservable characteristics represented by the disturbance term ε. The difference in pay between workers in the ethnic groups $G1$ and $G0$ at the θth percentile (Q_θ) of these distributions is, therefore, given by:

$$D_{Q_\theta} = Q_\theta(F_{w_{G1}}) - Q_\theta(F_{w_{G0}}) \tag{3.6}$$

The difference in pay between the ethnic groups at the θth percentile of the distribution can in turn be decomposed into two separate parts: (a) an *explained* part attributable to differences in the distribution of characteristics between the two groups while keeping the pay structure ($w_{G,S}(.)$) the same, and (b) an *unexplained* part attributable to differences in the pay structure between the two groups.

In distribution terms, this is equivalent to a standard Oaxaca and Blinder decomposition.

$$D_{Q_\theta} = \left[Q_\theta\left(F_{w_{G0}}^c\right) - Q_\theta(F_{w_{G0}})\right] + \left[Q_\theta\left(F_{w_{G1}}\right) - Q_\tau(F_{w_{G0}}^c)\right] = D_{E_{Q_\theta}} + D_{U_{Q_\theta}} \tag{3.7}$$

where $F_{w_{G0}}^c$ is the distribution of pay that would prevail if ethnically defined $G0$ workers were paid according to the pay structure of $G1$ workers. The first term in expression

(3.7), therefore is the part attributable to differences in the distribution of characteristics between the two groups ($D_{E_{Q_\theta}}$, the *explained* composition effect), while the second term is the part of the difference in ethnic pay at the θth percentile attributable to differences in pay structures between ethnic groups ($D_{U_{Q_\theta}}$, the *unexplained* structure effect). The counterfactual distribution and the other conditional distributions can be found by applying the following weights to the data:

$$\omega_1 = \frac{G}{p}, \ \omega_0 = \frac{1-G}{1-p}, \text{ and } \omega_c = \frac{p(x)}{1-p(x)} \cdot \frac{1-G}{p}, \ (G = 1,0) \qquad (3.8)$$

where $p(x)$=prob($G = 1 | x$) estimated from a probit model of ethnic group attachment, and p is the proportion of $G1$ workers.

4: Data and Sample Selection

The data for the empirical analysis are taken from the pooled 2017-2019 Annual Population Survey (APS) which was obtained under secure access from the Office for National Statistics (ONS).[15] The Labour Force Survey (LFS), on which the APS is based, has been extensively used to explore the public sector pay premium (Cribb *et al.*, 2014; Blackaby *et al.*, 2018, 2020) and in recent analysis of the gender pay gap in the public sector (Jones *et al.*, 2018). The sample used here is restricted to UK working age adults (aged 16-64) in paid employment (be that full-time or part time) and full-time students are omitted. Proxy responses are included but controlled for in the wage equations which follow.

Information on sector is self-reported by the employee, where the public sector is defined as that 'owned, funded or run by central or local government' (see Millard and Machin, 2007). Given the self-reported nature of the sector variable, this is adjusted to mirror the National Accounts definition more closely (see Dolton and Makepeace, 2011) and mitigate the misclassification that self-reporting might produce. As such, those who work in the universities as classified as private sector workers, as are those who work through an employment agency. Information is also available to distinguish parts of the public sector (for example, central government from local government, health authorities and armed forces) and detailed information is collected on occupation from which to perform analysis within the public sector and across PRBs (see Dolton *et al.*, 2015). The detailed occupation information (4-digit Standard Occupational Classification (SOC)) contained within these data is used to identify workers covered by PRBs including schoolteachers, doctors and dentists, police officers and prison service staff (see Bryson and Forth, 2017).[16] In the context of the remit of the PRBs, the absence of information on self-employed workers, particularly important for some occupations e.g., general practitioners, will constrain the scope of the analysis. However, information on earnings from the self-employed is well-established to suffer from considerable measurement error and is not typically available in survey data.

Classification of Ethnicity

In the descriptive tables that follow, we present unweighted sample sizes, although the percentages that are presented in parentheses are based upon weighted responses (using person level weights) to make them nationally representative. A prime consideration when looking at the EPG is which categories of ethnicity to use. In the APS, there are several different options for ethnicity, from a simple binary classification up to a 16-category ethnicity definition. Due to the cell sizes becoming

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[15] Office for National Statistics, Social Survey Division. (2021). *Annual Population Survey, 2004-2021: Secure Access*. [data collection]. *20th Edition*. UK Data Service. SN:6721, http://doi.org/10.5255/UKDA-SN-6721-19
[16] See Appendix Table A1 for further details.

smaller with the higher the number of categories, the 9-category ethnicity classification (which splits into White, mixed/multiple ethnic groups, Indian, Pakistani, Bangladeshi, Chinese, any other Asian background, Black/African/Caribbean/Black British, and other ethnicity) is used.[17] Such a split, though, does not allow the identification of a White British category, a category which has often been used in the existing evidence base to provide a baseline to ethnicity analyses. While it is possible to identify White British ethnicity for Great Britain respondents, those in Northern Ireland can only be identified as White, and in the interest of proving an analysis for the whole of the UK an explicit recognition of White British ethnicity is not possible. However, in practice this is unlikely to be problematic as is shown in Table 4.1.

To provide detail on the White category, this is split into three further categories: UK-born, EU-born and Non-EU-born. This is done for the entire UK sample and these results are displayed in the top panel of Table 4.1. In the bottom panel of Table 4.1, a further breakdown of the various categories of White that is available for the GB sample is given, which for simplicity is broken down into White British and White Other.[18] The vast majority of those who respond as White British are UK-born (97.1 per cent), with a fairly even split for the EU-born (1.3 per cent) or Non-EU-born (1.6 per cent). Similarly, only a small proportion of the Other White group are UK-born (6.8 per cent), with the majority being EU-born (74.4 per cent), and a reasonable proportion being Non-EU-born (18.8 per cent). With these proportions as they are, it seems that this split along the lines of born in the UK/EU/Non-EU captures much of the heterogeneity in the White population and that the UK-born White group provides a good proxy for White British ethnicity.

Table 4.1: Breakdown of White Category Split by Country of Birth

		All	UK-born	EU-born	Non-EU-born
UK sample	White	124,761	113,242 (89.1%)	8,379 (7.8%)	3,140 (3.1%)
GB sample	White British	112,050	109,198 (97.1%)	1,325 (1.3%)	1,527 (1.6%)
	Other White	8,935	629 (6.8%)	6,755 (74.4%)	1,550 (18.8%)

Notes: figures in parentheses represent proportion of country of birth responses for each White category based on person-weighted values.

With there being a small number of observations for several of the ethnicity categories, further refinement must take place, with too few observations for the Pakistani, Bangladeshi, Chinese and other Asian categories in isolation to allow for a robust analysis. As such, Pakistani and Bangladeshi have been combined, and

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[17] A 14-category response, which splits the White and Black categories further, is not available for Northern Ireland and would therefore limit the analysis to Great Britain only.
[18] The 14-category ethnicity response available for GB respondents is able to identify over four separate White categories: White British, White Irish, Traveller and Other. These latter three are combined in Table 4.1.

Chinese has been included in the other Asian category. Also, due to the similarity between EU-born and Non-EU-born Whites, as well as a small sample for the latter, these have been combined into a single "Non UK-born White" category. There are now 7 categories: UK-born White, Non UK-born White, Black, Indian, Pakistani/ Bangladeshi, Chinese/Other Asian and Other ethnicity.

Some Background Descriptives

Using these 7 defined categories, Table 4.2 shows various indicators of labour market participation for each ethnicity split by gender. Unlike Table 4.1, and the tables that will follow, the sample for Table 4.2 is constructed to include not only those in employment (i.e., employees and the self-employed) but also those unemployed or not otherwise in the labour market. As before, though, the sample is restricted to working age respondents and all proportions are based upon nationally representative weighted data. The UK-born White category, naturally, makes up the largest proportion of the sample, with 77.8 per cent of males and 76.4 per cent of females identified as this. The Non UK-born White category is the next largest group (9.0 per cent/9.8 per cent for males/females), and except for the Chinese/Other Asian group (1.6 per cent/1.9 per cent for males/females), the remaining ethnicities individually make up approximately 3 per cent of their respective samples.

Activity rates for males are higher than for females (89.6 per cent compared to 80.9 per cent), as are the employment rate (85.7 per cent compared to 77.5 per cent) and the unemployment rate (3.9 per cent as compared to 3.4 per cent). Of those who are employed, the proportion of those who are self-employed is similarly greater for males (17.3 per cent) than females (9.7 per cent). Employment and self-employment rates are also greater for males than females for all ethnicity groups, although there is substantial variation in the magnitude of this difference. For the UK-born White group, the difference in employment rates between males and females is 5.9 percentage points, which is marginally smaller than for the Black group (8.1 percentage points). However, for the Pakistani/Bangladeshi group males have an employment rate 37.1 percentage points greater than that of females, with this finding being very much driven by the appreciably lower rate for female Bangladeshis/Pakistanis. At 40.5 per cent, this rate for females is over 20 percentage points lower than majority of other female ethnicity groups and over 40 percentage points lower than the employment rate of UK-born White females. For the remaining ethnicity groups, gender differences in employment rates are bounded between 11.4 percentage points for Non UK-born Whites and 13.9 percentage points for Indians.

Table 4.2: Labour Market Participation by Ethnicity and Gender

Male		All Aged 16-64	Activity rate	Employment rate	Self employed	Unemployment rate
All		133,273	89.6%	85.7%	17.3%	3.9%
Ethnicity	UK-born White	108,666 (77.8%)	90.3%	86.5%	16.7%	3.8%
	Non UK-born White	10,091 (9.0%)	93.6%	91.0%	19.5%	2.5%
	Black	2,953 (2.8%)	83.1%	76.0%	14.8%	7.0%
	Indian	3,287 (2.8%)	89.4%	86.1%	16.4%	3.2%
	Pakistani/ Bangladeshi	3,466 (3.0%)	83.1%	77.6%	27.2%	5.5%
	Chinese/ Other Asian	1,714 (1.6%)	79.0%	75.0%	18.2%	4.0%
	Other ethnicity	3,096 (3.0%)	81.8%	75.9%	18.7%	5.9%
Female						
All		147,174	80.9%	77.5%	9.7%	3.4%
Ethnicity	UK-born White	117,815 (76.4%)	83.6%	80.6%	9.4%	3.0%
	Non UK-born White	12,428 (9.8%)	83.1%	79.6%	12.7%	3.5%
	Black	3,804 (3.4%)	74.6%	67.9%	6.5%	6.7%
	Indian	3,481 (2.7%)	76.5%	72.2%	9.9%	4.3%
	Pakistani/ Bangladeshi	3,651 (2.8%)	46.2%	40.5%	8.4%	5.7%
	Chinese/ Other Asian	2,391 (1.9%)	65.4%	61.2%	8.5%	4.2%
	UK-born White	3,604 (3.1%)	67.8%	62.6%	11.2%	5.2%

Notes: figures in parentheses represent proportion of each ethnicity in the whole sample based on person-weighted values; the activity rate is defined as those economically active (ILO definition) divided by the population aged 16-64; the employment rate is defined as the number in employment divided by the population aged 16-64; the self-employment rate is defined as the number in self-employment divided by those in employment; the unemployment rate is ILO based and is defined as the number unemployed divided by the sum of those in employment and unemployed;

In a similar way, self-employment rates are higher across all ethnicity groups for males than they are for females, and the percentage point difference between genders is most pronounced for the Pakistani/Bangladeshi group. At 18.8 percentage points, this differential is nearly double the next highest figure (Chinese/Other Asian, 9.7 percentage points) and close to three times higher than the differential for Indians (6.5 percentage points). While the 8.4 per cent self-employment rate for Bangladeshi/Pakistani females is not out of line with that observed for females in other ethnicity categories, the 27.2 per cent for males far exceeds the rates of their

counterparts. It is this figure that drives the marked gender imbalance in self-employment rates.

With regard to unemployment rates, there is substantial variation across the dual dimensions of ethnicity and gender. While rates are higher for men for women in the aggregate, they are decidedly higher (of an order close to one percentage point) for the UK-born White, Non UK-born White , and Other ethnicities. Except for those of Indian ethnicity (where the female unemployment rate is 1.1 percentage points higher than that for males), the remaining ethnicity groups have similar rates of unemployment between genders. Noticeable, though, is how this rate is markedly higher for Black male and females. At 7.0 per cent for males and 6.7 per cent for females, these figures are more than 3 percentage points higher than that for UK-born White counterparts. Also noticeable, is how unemployment rates for Non UK-born White (2.5 per cent) and Indian (3.2 per cent) males are lower than for UK-born Whites, the only groups for which this happens.

Sectoral Employment Patterns

There is little-to-no research performed specifically on the EPG split by gender and sector. There is, however, research into the gender pay gap in the public/private sector, which generally finds that there is a pay premium for women in the public sector. Combined with this, the literature also finds that the gender pay gap is smaller in the public sector than the private sector. This combination of findings highlights the importance of splitting the analysis not only along the lines of gender and sector of employment individually, but both at the same time. These splits can be seen in Table 4.3 which shows the breakdown of workers across the public and private sectors by their ethnicity and gender.

Consistent with the existing empirical literature, females are more likely to be employed in the public sector than males (32.5 per cent for females in the aggregate compares to 16.1 per cent for males), and this is true in the aggregate and across each of the ethnicity classifications. Indeed, for the majority of ethnicities these respective proportions between male and female representation do not differ significantly from these aggregate figures. This is not the case though for Non UK-born White workers, for whom the proportions of both males and females are substantially lower in the public sector (8.2 per cent of such males work in this sector and 18.9 per cent of females), and for Black males for whom there is substantially higher representation. At 22.1 per cent, this is nearly three times greater than the proportion of Non UK-born White males to be found in the public sector.

Table 4.3: Ethnicity Split by Sector and Gender

		Male		Female	
		Private	Public	Private	Public
All		53,564	11,028	47,788	24,814
		(83.9%)	(16.1%)	(67.5%)	(32.5%)
Ethnicity	UK-born White	43,744	9,515	38,460	21,523
		(83.1%)	(16.9%)	(65.7%)	(34.3%)
	Non UK-born White	4,784	470	5,063	1,202
		(91.8%)	(8.2%)	(81.1%)	(18.9%)
	Black	969	287	1,003	615
		(77.9%)	(22.1%)	(62.1%)	(37.9%)
	Indian	1,329	252	1,034	506
		(84.4%)	(15.6%)	(68.8%)	(31.2%)
	Pakistani/Bangladeshi	958	184	502	295
		(83.2%)	(16.8%)	(65.6%)	(34.4%)
	Chinese/Other Asian	652	135	700	290
		(83.4%)	(16.6%)	(71.9%)	(28.1%)
	Other ethnicity	1,128	185	1,026	383
		(85.0%)	(15.0%)	(72.6%)	(27.4%)

Notes: figures in parentheses represent proportion of each ethnicity/gender group in the public and private sectors based on person-weighted values.

Another way of looking at these same figures is shown in Table 4.4, where the proportion of ethnicity groups as a percentage of the total in that sector is shown. If this is cross referenced with the proportion of employees in the population from the various ethnicity groups, this leads to a measure of under and over-representation within sectors. Given the dominance of the UK-born White group within the overall employee stock, it is unsurprising to see the dominant position that this ethnicity group holds in the public sector, with 86.3 per cent of males, and a very similar 86.7 per cent of females, being of this ethnicity. Given that 82.5 per cent (82.6 per cent) of male (female) employees are UK-born White, this represents a marginal over-representation in the public sector. In contrast, while Non UK-born White males (females) make up 8.1 per cent (8.6 per cent) of total employees, only 4.3 per cent (4.8 per cent) of public sector employees are of this ethnicity. Taking these two White groups together, though, they are largely found in the sort of proportions within the public sector as might be expected given their contribution to the employee stock. More or less, the same is also true about the other ethnicity groups too, whose lower numbers in the public sector seem entirely consistent with their lower employee numbers more generally. The only exception is for those of a Black ethnicity, for whom representation in the public sector (at 2.6 per cent for males and 2.5 per cent for females) is higher than might otherwise be expected. Even though this over-representation is small in absolute terms, in relative terms it is more substantial. For example, the 2.6 per cent of Black males employed in the public sector, when compared to their 1.9 per cent of the employee stock, equates to a near 25 per cent over-representation within the public sector.

Table 4.4: Representation of Ethnicity Groups Across Sectors by Gender

| | | Male | | Female | | Employee share | |
		Private	Public	Private	Public	Male	Female
All		53,564	11,028	47,788	24,814		
Ethnicity	UK-born White	43,744	9,515	38,460	21,523		
		(81.7%)	(86.3%)	(80.5%)	(86.7%)	82.5%	82.6%
	Non UK-born White	4,784	470	5,063	1,202		
		(8.9%)	(4.3%)	(10.6%)	(4.8%)	8.1%	8.6%
	Black	969	287	1,003	615		
		(1.8%)	(2.6%)	(2.1%)	(2.5%)	1.9%	2.2%
	Indian	1,329	252	1,034	506		
		(2.5%)	(2.3%)	(2.2%)	(2.0%)	2.5%	2.1%
	Pakistani/Bangladeshi	958	184	502	295		
		(1.8%)	(1.7%)	(1.1%)	(1.2%)	1.8%	1.1%
	Chinese/Other Asian	652	135	700	290		
		(1.2%)	(1.2%)	(1.5%)	(1.2%)	1.2%	1.4%
	Other ethnicity	1,128	185	1,026	383		
		(2.1%)	(1.7%)	(2.1%)	(1.5%)	2.0%	1.9%

*Note*s: figures in parentheses represent proportion of ethnicity and gender in each sector based on person-weighted values.

Ethnicity and Hourly Pay

Information on gross hourly earnings is derived from employee self-reported information. The standard measure of hourly pay is derived from gross weekly pay in the respondent's main job on the basis of total usual hours worked (including paid overtime).[19] This measure, which adjusts for hours work, is recognised as being a reliable source of earnings information and is used widely by ONS and in academic research.

Table 4.5 shows the hourly pay for each ethnic group split by gender across the pay distribution. As might be expected, the median pay (50th percentile) in the aggregate for males is greater than that for females (£13.51 per hour for males compares with £11.00 per hour for females). When splitting by ethnicity, this difference becomes even wider for the UK-born White group (£13.74/£11.04). The group with the highest median hourly pay, regardless of gender, is the Indian group (£16.22 for males and £12.49 for females). The lowest, again regardless of gender, is the Pakistani/Bangladeshi group (£10.50/£9.94 for males/females). These two ethnic groups also have the highest (in the case of Indians) and lowest (in the case of Pakistani/Bangladeshi) hourly pay at all points along their respective distributions.

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[19] The earnings data in the APS is trimmed such that it is bounded between £0 and £80. As many ONS reports use the trimmed variable provided by this dataset, this measure will be used throughout here also.

Table 4.5: Hourly Pay (£) by Ethnicity and Gender

		Male					Female				
Percentile		10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
All		7.55	9.58	13.51	20.24	29.59	6.92	8.25	11.00	16.33	22.76
Ethnicity	UK-born White	7.69	9.65	13.74	20.24	29.11	6.93	8.31	11.04	16.26	22.50
	Non UK-born White	7.38	9.00	12.40	20.24	32.30	6.79	8.03	10.58	16.49	23.74
	Black	7.21	8.67	11.85	17.03	23.92	6.97	8.41	11.42	15.77	21.36
	Indian	7.69	9.83	16.22	25.00	36.05	7.08	8.61	12.49	18.75	26.45
	Pakistani/Bangladeshi	6.68	7.80	10.50	17.05	24.05	6.33	7.70	9.94	13.81	19.25
	Chinese/Other Asian	7.17	8.75	13.38	21.63	32.05	6.73	8.15	11.53	16.69	24.73
	Other ethnicity	7.22	8.75	12.50	19.25	31.59	6.80	8.09	10.87	16.54	24.05

Notes: the underlying sample on which these figures are based are those reported in Table 4.3.

With regard the variation in hourly pay across the pay distribution, this is greatest for the Indian group. This is true for both male and female employees. As such, the difference in earnings between the 10th percentile (£7.69/£7.08 for males/females respectively) and the 90th percentile (£36.05/£26.45) is £28.36 for males and £19.37 for females. Thus, it is not a case that those in the lower parts of the pay distribution are doing particularly poorly, but rather that the highest earners are doing very well, and it is this that is leading to the largest variation in hourly pay. In almost the complete reverse scenario, the least variation across the distribution for Blacks (£16.71) and Pakistani/Bangladeshis (£17.37) for males and for Pakistani/Bangladeshis (£12.92) is principally driven by the poor relative performance over the highest percentile range.

Ethnicity and Hourly Pay by Sector

When splitting hourly pay by sector (Table 4.6), pay is higher in the public sector at the median and all points below this for all males and females across all ethnicities. At points above the median, the story is less clear cut, but certainly for those who are not White (UK-born or Other), the public sector still affords higher pay for all males and females other than Indian. For UK-born Whites and Non UK-born Whites, pay at the 75th and 90th percentiles still favour females in the public sector, although at the 90th percentile any sectoral differences are marginal. For males, the public sector continues to offer higher pay for the Non UK-born White group (and by quite some distance at the 75th percentile), while for the UK-born White group, it is the private sector where hourly pay is highest at the 90th percentile. Indeed, it is at this 90th percentile where perhaps the greatest differences are found for males across ethnicities. For those whose are Non UK-born White, Indian, Pakistani/Bangladeshi, Chinese/Other Asian, and Other ethnicity, hourly pay is greater in the public sector than it is for UK-born Whites in either public or private sector. Thus, there is a clear advantage that comes for these groups in being at the top of the public sector earnings

distribution. For those in the Pakistani/Bangladeshi group, this means that their public sector earnings are £11.18 higher than at a comparable position in the private sector.[20]

Table 4.6: Hourly Pay (£) by Ethnicity, Sector and Gender

Male			Private				Public				
Percentile		10th	25th	50th	75th	90th	10th	25th	50th	75th	90th
All		7.42	9.23	13.11	20.20	30.21	8.90	11.28	15.38	20.66	27.49
Ethnicity	UK-born White	7.50	9.40	13.35	20.20	29.89	8.89	11.22	15.28	20.27	26.76
	Non UK-born White	7.26	8.79	12.03	20.00	32.22	9.13	11.87	16.50	23.09	33.65
	Black	7.00	8.33	11.00	15.94	22.97	8.67	10.81	15.38	19.78	26.32
	Indian	7.50	9.52	15.56	24.36	35.05	9.63	13.00	18.10	28.74	39.90
	Pakistani/Bangladeshi	6.43	7.60	9.63	15.00	22.47	8.87	11.00	16.76	22.83	33.65
	Chinese/Other Asian	6.98	8.21	12.43	20.94	31.25	8.90	11.35	15.88	24.29	36.06
	Other ethnicity	7.02	8.60	12.03	18.87	30.23	8.50	11.00	15.77	23.38	34.95
Female											
All		6.67	7.89	10.10	15.18	22.76	7.67	9.50	12.82	17.94	22.76
Ethnicity	UK-born White	6.67	7.90	10.10	15.00	22.43	7.67	9.44	12.73	17.93	22.62
	Non UK-born White	6.67	7.88	10.00	15.59	23.55	7.67	9.63	13.45	18.70	24.05
	Black	6.46	7.85	10.07	14.44	20.61	8.11	10.00	13.30	17.30	22.53
	Indian	6.92	8.19	11.85	18.97	26.45	7.59	9.50	13.56	18.47	27.02
	Pakistani/Bangladeshi	5.95	7.50	8.86	12.50	17.71	6.88	9.00	11.55	16.56	23.07
	Chinese/Other Asian	6.52	7.83	10.00	15.88	25.00	7.75	10.52	13.89	18.03	24.38
	Other ethnicity	6.57	7.80	10.12	15.40	23.63	7.58	9.61	12.44	18.79	25.25

Notes: the underlying sample on which these figures are based are those reported in Table 4.3.

Immigration and Ethnicity

Different periods in the UK's history have seen largescale immigration from different countries and of different ethnicities. The integration of the migrants into UK society, as well as the job opportunities available at different times, would likely vary and would therefore influence the earnings of these migrants. While not wanting to revisit well-known historical trends, Table 4.7 shows the breakdown of the year of arrival of migrants to the UK by ethnicity. Such figures will therefore be influenced by past migration patterns and the table shows the impact that these have had upon the current employee stock.

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[20] For Pakistani/Bangladeshi females too there is also a clear benefit from public sector employment. For this group, the difference in hourly pay between public and private sectors at the 90th percentile is £5.36, the largest sectoral inter sector differential for any ethnic group at any percentile point.

Table 4.7: Year of Arrival to the UK by Ethnicity

	UK-born White	Non UK-born White	Black	Indian	Pakistani/ Bangladeshi	Chinese/ Other Asian	Other	
UK-born	113,242 (95.5%)	n/a	938 (1.1%)	1,069 (1.1%)	853 (0.8%)	277 (0.3%)	1,099 (1.2%)	(100.0%)
Pre-1970	n/a	596 (67.4%)	57 (7.8%)	124 (16.3%)	27 (3.5%)	20 (2.2%)	23 (2.8%)	(100.0%)
1970-1989	n/a	1,530 (54.6%)	210 (9.1%)	298 (11.8%)	242 (8.7%)	187 (8.1%)	177 (7.8%)	(100.0%)
1990-1999	n/a	1,327 (49.8%)	375 (15.9%)	197 (6.8%)	191 (6.7%)	247 (9.5%)	288 (11.3%)	(100.0%)
2000-2009	n/a	4,258 (53.3%)	943 (12.5%)	896 (11.3%)	387 (5.1%)	738 (9.9%)	624 (7.9%)	(100.0%)
Post-2009	n/a	3,808 (66.9%)	351 (5.6%)	537 (9.0%)	239 (4.1%)	308 (5.3%)	511 (9.2%)	(100.0%)

Notes: figures in parentheses represent proportion in each cohort by ethnicity based on person-weighted values; n/a denotes not applicable.

Measured horizontally along rows, the breakdown of ethnicities within the migrant population is given over various periods of arrival. The top row is given as a benchmark for those non-migrants who were born in the UK, and unsurprisingly over 95% of all non-migrants identify as UK-born White. The Black, Indian and Other ethnic groups have a similar proportion of non-migrants, while the Pakistani/Bangladeshi and Chinese/Other Asian groups have the smallest proportion of non-migrants (at 0.8 per cent and 0.3 per cent respectively). Across all periods, those in the Non UK-born White group make up the majority of migrants, with the lowest proportion being in the 1990-1999 period at just below 50 per cent. Pre-1970s to 1989 the second largest group of migrants were the Indian group, although this was replaced by the Black group from the 1990s onwards. The Black and Indian groups were again both prominent in the 2000-2009 period, although the number of Black migrants fell post-2009. It should be remembered though that these figures are just a snapshot of the contemporary labour market, and the large-scale immigration that occurred before the 1970s in particular (such as formed the Windrush generation) would not show up directly in these figures. Many of these first-generation migrants would by now be retired and it is their children and grandchildren who are now showing up as second- and third-generation UK-born.

Divisions within the Public Sector

The APS allows a further disaggregation of the public sector into 6 distinct categories. These are nationalized industries, central government/civil service, local government/council, NHS/health authority, armed forces and other. However, due to the small sample sizes, this will be recoded as: Central government, Local government, Health authority/NHS and Other. Similarly, a 3-category variable will be used for ethnicity, splitting out UK-born White, Non UK-born White and Non-White Ethnicities (NWE). While small sample sizes in previous more detailed categories for ethnicities may suggest that calculating the EPG along such lines would be unviable,

it is worth considering as there is likely to be some heterogeneity between these categories and so within the public sector itself. This can be seen in Table 4.8 for males, and Table 4.9 for females.

Table 4.8: Ethnicity by Public Sector Division for Males

	All	UK-born White	Non UK-born White	NWE	
Central	2,121 (18.8%)	1,926 (90.8%)	71 (3.3%)	128 (6.0%)	(100.0%)
Local	5,195 (45.7%)	4,723 (90.9%)	163 (3.1%)	309 (5.9%)	(100.0%)
NHS/Health Authorities	2,348 (22.0%)	1,711 (72.9%)	148 (6.3%)	489 (20.8%)	(100.0%)
Other	1,364 (13.5%)	1,159 (85.0%)	88 (6.5%)	117 (8.6%)	(100.0%)
	11,028 (100.0%)				

Notes: figures in parentheses in column 1 (All) represent the proportion of the divisions of the public sector to overall public sector employment; figures in parentheses in columns 2-4 represent proportion of each public sector division by gender and ethnicity based on person-weighted values.

For males, Local Government and the NHS/Health Authorities dominate the public sector (see Table 4.8, column 1), collectively accounting for over two thirds of male employees in the sector. Even within these figures, though, the representation of males (45.7 per cent) in Local Government is the standout feature. With regard to ethnic diversity across these sectors for males, numbers within Central and Local Government, and Other public sector divisions are somewhat indicative of overall employee shares. To put these figures in context of the already discussed figures of Table 4.3/4.4, the UK-born White group makes up 82.5 per cent of male employees, the White Other group 8.1 per cent, and the remaining NWE grouping 9.4 per cent. With typically over 90 per cent being UK-born or Non UK-born White, and significantly less than 1 in ten from a NWE background in these three divisions, this suggests a slight over-representation of White groups. Within the NHS/Health Authorities, though, over one fifth (20.8 per cent) of all employees are NWE.

For females, Local Government and the NHS/Health Authorities again dominate the public sector, collectively accounting for nearly 9 out of every ten females (see Table 4.9, column 1). There is again an over-representation of NWE in the NHS/Health Authorities, although at 11.4 per cent this is well short of the comparable male figure. The Local Government figure (6.5 per cent) also stands as the lowest proportion of NWE employees, just as it did so in the case of males (5.9 per cent). Also striking is how the much greater number of female employees found within the public sector generally, which was first identified in Table 4.3, is driven by their employment in Local Government and NHS/Health Authorities. For the former, their

numbers are 125.5 per cent higher than that of males (12,551 as compared to 5,195). For the latter, numbers are 278.4 per cent higher (8,886 as compared to 2,348).

Table 4.9: Ethnicity Public Sector Division for Females

	All	UK-born White	Non UK-born White	NWE	
Central	2,422 (9.5%)	2,133 (88.1%)	115 (4.7%)	174 (7.2%)	(100.0%)
Local	12,551 (50.0%)	11,225 (89.4%)	514 (4.1%)	812 (6.5%)	(100.0%)
NHS	8,886 (36.3%)	7,368 (82.9%)	501 (5.6%)	1,017 (11.4%)	(100.0%)
Other	955 (4.2%)	797 (83.5%)	72 (7.5%)	86 (9.0%)	(100.0%)
	24,814 (100.0%)				

Notes: figures in parentheses in column 1 (All) represent the proportion of the divisions of the public sector to overall public sector employment; figures in parentheses in columns 2-4 represent proportion of each public sector division by gender and ethnicity based on person-weighted values.

5: Empirical Estimates

Blinder-Oaxaca Decomposition Analysis - An Introduction

Using the sample of working age adults (aged 16-64) that excludes full-time students from the pooled 2017-2019 APS dataset, regression analysis is used to relate the log of gross hourly pay (in main job) to a series of personal and work-related characteristics that are known to influence earnings. Taken from a large body of existing literature, these controls which capture both elements of human capital and job amenities, are for age, education, marital status, region of work, firm size, tenure with current employer, full-time/part-time employment, temporary contract status, and occupation,[21] in addition to controls that identify the public sector (updated to exclude universities and agency workers) and PRB occupations as relevant to the specification.[22] Precise details of these variables and the categories that they define are given in Appendix Table A3. Unlike some of the descriptive figures discussed previously which are constructed to be representative of the UK population, the following regression-based analysis does not make such adjustments.[23]

Analysis of the EPG looks at the difference between the earnings of different ethnicities and the Blinder-Oaxaca (BO) technique has become a standard and well-utilised approach in a wider literature that explores wage gaps more generally. By estimating separate regressions by ethnicity (and subsequently sector), the BO decomposition technique can be used to identify that part of within sector EPGs that are due to differences in observed characteristics (i.e., those controls mentioned above), or what is *explained*, from an *unexplained* component which is closer to a measure of pay inequality. Throughout, as is standard in the literature, we focus on estimates provided separately by gender, to take into account differences in the determinants of earnings between genders across ethnicities. However, estimates are also presented for all workers for completeness.

Blinder-Oaxaca Decomposition Analysis – Some Background Figures

The ability to estimate EPGs for very detailed ethnic classifications is constrained by the number of observations for each ethnic group available within our APS sample. An idea of these constraints is given in Table 5.1, which breaks down the observations

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[21] Occupation is included in the baseline results as this is an important determinant of individual earnings, but occupational sorting may be part of the process behind the EPG and so including occupation controls would ignore this. As a robustness check, and to provide a bound upon the unexplained EPG, such controls are excluded.

[22] For completeness, several dummy variables have also been included to control for year and month of interview, and whether responses are provided by individuals themselves or a proxy respondent. We have retained these latter respondents to maximise sample sizes, but in practice their inclusion or exclusion has no noticeable impact upon estimates of the EPG presented later.

[23] This is a typical approach given the inclusion of control variables. In practice, making the regressions and subsequent decompositions nationally representative would have a negligible effect upon the results presented.

into 11 detailed ethnic classifications across the sample splits which will be used in the empirical analysis that follows.[24] For the sample that is pooled across sectors (i.e., public, and private) and shown in column (1), it would not be viable to separately identify estimates for Black Other individuals (of whom there are only 88/97 males/females in the sample). Moving to column (2) where UK-born ethnic groups are retained, the analysis would only be tenable for Black Caribbean, Indian, Pakistani, and Other groups. Refining the total (UK and non-UK born) sample down to only the private sector (column (3)), calculation of EPGs would likely still be viable for all 11 detailed ethnic groups except for Black Other, but the same cannot be said if the sample is restricted to the public sector (column (4)). In this instance, just a handful of ethnic splits would be possible, with the Non UK-born White, Black African, Indian, and Other groups being the most obvious candidates for both males and females, and the Black Caribbean group additionally for females. A further restriction to PRBs (column (5)), and subsequently the largest PRB, the NHS PRB (column (6)), identifies these same ethnic groups as the largest, but on the margins of being able to support individual analysis.

Subsequently, in what follows, initial investigation will be over a composite of seven ethnic classifications for any sectoral investigation at or broader than the public/private sector. Defined on pragmatic terms, but consistent with classifications used in the existing academic literature, these groups will be: UK-born White; Non UK-born White; Black (formed from a combination of Black African, Black Caribbean, and Black Other groups); Indian; Pakistani/Bangladeshi; Chinese/Other Asian; and Other ethnicities. At subsequent PRB level, outside of the UK-born White and Non UK-born White classifications, the remaining groups will be combined into a much broader aggregate non-white ethnicities (NWE) group. The latter is recognised as aggregating across heterogeneous ethnicities but necessary due to the smaller samples restricting more detailed analysis.

An integral aspect of the mean-based BO decomposition is differences in the mean level of earnings augmenting personal and work-related characteristics across the ethnic classifications. For the seven broad classifications that will be the mainstay of the decomposition results that will follow, these means are given in Tables 5.2 and 5.3 for the sample of males and females respectively. For males, mean hourly earnings (in logged form) are substantially higher for the Indian group (2.782) and the UK-born White group (2.656) than they are for the remaining ethnic groups, particularly so in the case of those of Pakistani/Bangladeshi ethnicity (2.453). Furthermore, of those characteristics included in the analysis that are known to influence earnings, there is substantial heterogeneity by ethnicity. Those in the Black and UK-born White

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[24] These classifications have been chosen to provide as much ethnic detail as possible within the constraints of pragmatism due to sample sizes, but do not provide as much detail around mixed and White ethnicities as given by the 18 recommended categories used by ONS.

groups (both approximately 43 years) tend to be the oldest, while Pakistani/Bangladeshis tend to be the youngest (approximately 38 years).

Table 5.1: Sample Sizes (Unweighted) by Detailed Ethnicity

	(1) All	(2) UK-born	(3) Private	(4) Public	(5) PRBs	(6) NHS
Male sample						
UK-born White	52,564	52,564	43,133	9,431	2,822	1,356
Non UK-born White	5,229	n/a	4,760	469	189	124
Black African	762	104	575	187	98	76
Black Caribbean	361	246	292	69	<20	<20
Black Other	88	38	70	18	<10	<10
Indian	1,573	512	1,321	252	147	121
Pakistani	809	330	672	137	72	52
Bangladeshi	318	85	273	45	<20	<20
Chinese	234	69	204	30	<20	<20
Other Asian (excl. Chinese)	551	62	447	104	<80	67
Other	1,308	490	1,122	186	98	67
Female sample						
UK-born White	59,216	59,216	37,918	21,298	8,563	5,951
Non UK-born White	6,220	n/a	5,025	1,195	590	441
Black African	929	124	589	340	200	181
Black Caribbean	550	367	331	219	99	77
Black Other	97	45	58	39	<20	<20
Indian	1,532	548	1,029	503	261	220
Pakistani	587	343	374	213	78	51
Bangladeshi	201	88	121	80	31	19
Chinese	296	68	241	55	28	18
Other Asian (excl. Chinese)	689	78	455	234	166	149
Other	1,397	599	1,017	380	204	145

Notes: (1) – all sectors; (2) – UK-born only, all sectors; (3) – private sector; (4) – public sector; (5) – PRBs only; (6) – NHS PRB only; n/a – denotes not applicable; primary and secondary disclosure of individuals means that the reporting of some sample sizes have been restricted.

The UK-born White group also has the lowest proportion of those achieving degree level (or equivalent) qualifications (0.312). This stands in marked contrast to the figures of 0.599 and 0.557 reported for the Indian and Chinese/Other Asian group but is still lower than any other ethnic classification. In contrast, the UK-born White groups have a much greater clustering in intermediate qualifications. As such, at 0.272 and 0.205, the proportions achieving A-levels (or equivalent) or GCSEs (or equivalent) as their highest education qualifications are much higher. Indeed, such proportions are virtually double the proportions experienced by any of the other ethnic categories.

While there are not substantial variations across marital states for most ethnic groups, with about one third reporting as being single, and over one-half reporting being married (or living as married), much higher rates of marriage are evident for those of an Asian background. As such, over 8 in 10 Indians are married (0.801), closely followed by Pakistani/Bangladeshis (0.775) and Chinese/Other Asians

(0.712).[25] Accordingly, with a much higher proportion being married, these groups also report much lower proportions of single men, with the rate for Indians in particular being less than the comparable figure for the UK-born White group.

There is also a striking difference in regional work patterns (with this naturally being driven by residential patterns), and nowhere is this more evident than in the high-wage and high cost-of-living London region. While less than 1 in 10 UK-born White men work in this region (0.072), this is less than a third of the next most represented groups (Non UK-born Whites and Pakistani/Bangladeshis at 0.205 and 0.215 respectively) and only one fifth of Black representation (0.353). Given this concentration, it is perhaps unsurprising that a much lower proportion of non-white ethnic groups work in Scotland, Wales, and Northern Ireland. Less than 1 in 20 for the Indian (0.052) and Black (0.054) groups compares to over one quarter for UK-born Whites (0.258). Also evident is the substantially higher proportion of those from the Pakistani/Bangladeshi group who work in the Northwest of England (0.215). This is over double the proportion of any other non-white ethnic group and substantially more than the UK-born White group (0.131).

Partly driven by their greater average age, the mean years of tenure with current employer is higher for those from the UK-born group (approximately 9.7 years) than any other group. Given the enlargement of the EU in 2004 and the more recent arrival of immigrants from these states, this would explain the much lower average for Non UK-born Whites (approximately 5.7 years), but nonetheless lower averages for both the Other (approximately 5.9 years) and Pakistani/Bangladeshi (approximately 6.0 years) groups stand out. In the same way, this Pakistani/Bangladeshi group also stands out as having a much lower proportion employed on a full-time contract (0.801) in comparison to other ethnic groups. Those from the Non UK-born White (0.948), Indian (0.937) UK-born White (0.925) in particular have much higher rates of full-time employment.

With regard to occupational structure, UK-born Whites tend to be more highly concentrated in more skilled (and higher paying) occupations, and by extension feature less prominently in the lowest-skilled of occupations. An obvious exception to this general pattern, though, is with the Indian and Chinese/Other Asian groups. For these, their representation in the most skilled and most senior occupations (0.479 and 0.414 respectively) is higher than for any other group, including the UK-born Whites (0.346). Given such patterns, it is perhaps unsurprising to see the higher representation in elementary occupations of those from Black (0.175), Pakistani/Bangladeshi (0.161) and Non UK-born White (0.155) backgrounds.

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[25] For a dummy variable category (that takes on a value of either 0 or 1), as most of the controls used in the subsequent earnings equations and reported in Tables 5.2 and 5.3 are, the mean value will also equate to the proportion of individuals in that category. For example, the mean valued of 0.801 of the *Married* variable for Indian men equates to 80.1 per cent of Indian men being married.

Table 5.2: Variable Means for All Sectors by Ethnic Group for Males

	UK-born White	Non UK-born White	Black	Indian	Pakistani/ Bangladeshi	Chinese/ Other Asian	Other
Log (hourly earnings)	2.656	2.628	2.513	2.782	2.453	2.642	2.598
Age (years)	42.986	39.321	42.986	40.741	38.257	41.223	39.048
Illness	0.289	0.170	0.199	0.202	0.256	0.201	0.216
Qualifications – degree	0.312	0.400	0.442	0.599	0.481	0.557	0.448
Qualifications – other HE	0.102	0.093	0.094	0.061	0.064	0.068	0.074
Qualifications – A-level	0.272	0.143	0.143	0.104	0.119	0.084	0.150
Qualifications – GCSE	0.205	0.078	0.139	0.092	0.112	0.079	0.102
Qualifications – other	0.063	0.220	0.127	0.087	0.133	0.143	0.161
Qualifications – none	0.047	0.067	0.054	0.057	0.091	0.070	0.066
Single	0.355	0.371	0.335	0.156	0.185	0.236	0.375
Married	0.547	0.556	0.557	0.801	0.775	0.712	0.546
Other marital status	0.096	0.067	0.107	0.043	0.040	0.047	0.073
Work region – NE	0.068	0.028	0.022	0.018	0.031	0.046	0.026
Work region – NW	0.131	0.077	0.106	0.093	0.215	0.085	0.097
Work region – Y/H	0.088	0.066	0.056	0.042	0.097	0.037	0.069
Work region – E Mids	0.052	0.060	0.081	0.110	0.051	0.034	0.045
Work region –W Mids	0.071	0.064	0.103	0.146	0.110	0.059	0.070
Work region – Eastern	0.059	0.084	0.076	0.058	0.092	0.071	0.061
Work region – London	0.072	0.205	0.353	0.293	0.215	0.327	0.300
Work region – SE	0.109	0.144	0.104	0.144	0.111	0.162	0.132
Work region – SW	0.093	0.092	0.045	0.043	0.019	0.065	0.089
Work region – S/W/NI	0.258	0.180	0.054	0.052	0.059	0.113	0.112
Firm size 1-24	0.303	0.259	0.272	0.212	0.400	0.325	0.333
Firm size 25-499	0.496	0.522	0.467	0.465	0.385	0.396	0.439
Firm size 500+	0.201	0.219	0.261	0.323	0.215	0.279	0.228
Tenure (years)	9.670	5.749	6.398	7.431	6.063	6.953	5.917
Full-time employment	0.925	0.948	0.892	0.937	0.801	0.876	0.880
Permanent contract	0.969	0.950	0.914	0.950	0.949	0.954	0.940
Occupation – senior	0.346	0.335	0.279	0.479	0.302	0.414	0.353
Occupation – higher skilled	0.369	0.288	0.290	0.257	0.299	0.279	0.297
Occupation – intermediate	0.195	0.222	0.256	0.158	0.239	0.178	0.203
Occupation – elementary	0.091	0.155	0.175	0.105	0.161	0.129	0.146
Public sector	0.179	0.090	0.229	0.160	0.161	0.171	0.142
Total observations	52,564	5,229	1,243	1,573	1,131	785	1,308

Notes: see Appendix Table A3 for variable definitions.

Finally, public sector employment accounts for a little over 1 in 6 of every UK-born white male employee, and this is on a par with many other ethnic groups. However, such a figure is bounded by a much lower proportion for the Non UK-born White group (0.090) and a much higher proportion for the Black group (0.229).

Table 5.3: Variable Means for All Sectors by Ethnic Group for Females

	UK-born White	Non UK-born White	Black	Indian	Pakistani/ Bangladeshi	Chinese/ Other Asian	Other
Log (hourly earnings)	2.462	2.456	2.460	2.557	2.346	2.481	2.461
Age (years)	43.102	39.485	42.212	40.854	36.475	40.819	38.969
Illness	0.321	0.221	0.252	0.235	0.239	0.210	0.278
Qualifications – degree	0.354	0.487	0.445	0.545	0.463	0.556	0.486
Qualifications – other HE	0.113	0.101	0.131	0.096	0.062	0.068	0.103
Qualifications – A-level	0.213	0.119	0.154	0.104	0.190	0.089	0.122
Qualifications – GCSE	0.234	0.076	0.129	0.111	0.156	0.054	0.130
Qualifications – other	0.044	0.169	0.090	0.100	0.096	0.165	0.113
Qualifications – none	0.042	0.049	0.050	0.044	0.032	0.067	0.046
Single	0.333	0.351	0.409	0.149	0.216	0.215	0.391
Married	0.509	0.515	0.398	0.756	0.650	0.681	0.472
Other marital status	0.154	0.132	0.192	0.095	0.133	0.102	0.135
Work region – NE	0.072	0.026	0.021	0.015	0.032	0.031	0.026
Work region – NW	0.135	0.082	0.080	0.084	0.206	0.085	0.089
Work region – Y/H	0.087	0.068	0.041	0.027	0.084	0.055	0.064
Work region – E Mids	0.049	0.057	0.064	0.120	0.056	0.042	0.059
Work region –W Mids	0.071	0.061	0.123	0.165	0.118	0.062	0.077
Work region – Eastern	0.061	0.083	0.080	0.059	0.067	0.080	0.071
Work region – London	0.055	0.199	0.401	0.273	0.241	0.274	0.297
Work region – SE	0.108	0.151	0.113	0.173	0.128	0.181	0.144
Work region – SW	0.092	0.098	0.035	0.042	0.018	0.076	0.079
Work region – S/W/NI	0.270	0.175	0.044	0.041	0.051	0.115	0.095
Firm size 1-24	0.333	0.292	0.283	0.248	0.349	0.316	0.319
Firm size 25-499	0.476	0.493	0.442	0.450	0.456	0.406	0.451
Firm size 500+	0.191	0.215	0.275	0.302	0.195	0.278	0.230
Tenure (years)	9.247	5.561	6.156	7.351	5.947	6.246	5.440
Full-time employment	0.607	0.711	0.667	0.695	0.544	0.663	0.676
Permanent contract	0.962	0.940	0.921	0.945	0.925	0.944	0.928
Occupation – senior	0.310	0.306	0.329	0.390	0.265	0.357	0.306
Occupation – higher skilled	0.338	0.280	0.237	0.281	0.286	0.245	0.285
Occupation – intermediate	0.269	0.245	0.326	0.237	0.365	0.257	0.277
Occupation – elementary	0.083	0.169	0.108	0.092	0.084	0.141	0.132
Public sector	0.360	0.192	0.380	0.328	0.372	0.293	0.272
Total observations	59,216	6,220	1,605	1,532	788	985	1,397

Notes: see Appendix Table A3 for variable definitions.

For females, many if not all the patterns identified for males are equally apparent (see Table 5.3): the older average age of UK-born Whites, their lower proportion of degree level qualifications, and their higher mean job tenure; the significantly higher rate of marriage within the Indian group, and their higher average hourly earnings than the other ethnic groups; the higher rates of employment in London for non-UK-born Whites, and for the Black group in particular; an appreciably lower rate of full-time employment for the Pakistani/Bangladeshi group in comparison to the other ethnic groups; and a greater proportion of Indian and Chinese/Other Asian workers in more senior occupations, and a greater proportion of Blacks in elementary

occupations. Somewhat unlike their male counterparts, though, the higher proportion of public sector employment across all female ethnic groups is not markedly higher in a relative sense for the Black group. While the proportion here is still higher than for any other group (0.380), this figure is on a par with that for the Pakistani/Bangladeshi (0.372) and UK-born White (0.360) ethnicities.

Blinder-Oaxaca Results Pooled Across Sectors: The Case for Males

Taking a pooled sample across both public and private sectors, results from the decomposition analysis for males is shown in Table 5.4. In all instances, these results reflect the position of the various ethnic groups shown across the columns of Table 5.4 relative to the common baseline of the UK-born white group. So, for example, from column (1) the *Difference* figure of 0.029 suggests that average (log) hourly earnings of UK-born Whites are higher than those of Non UK-born Whites. The differences of 0.029 log points can be interpreted as an approximate percentage change of 2.9 per cent and we will adopt this approach throughout to facilitate direct comparisons between the text and tables.[26] Moreover, this is a statistically significant difference in average earnings between these two groups. This overall component in the decomposition is then able to be ascribed to an *explained* component (which relates to differences in the average level of observed characteristics between the groups) and an *unexplained* component (which relates to differences in the way that these observable characteristics are rewarded in the labour market). For a detailed discussion of the BO methodology see Chapter 3.

Across the subsequent columns of Table 5.4, a similar set of decompositions is provided for the remaining ethnicity groups. Except for the Chinese/Other Asian group (in column (5)), there are statistically significant differences in observed average hourly earnings between the UK-born White baseline and the remaining ethnicity groups. These differences are most pronounced for the Pakistani/Bangladeshi group (0.202 or about 20 per cent, column (4)) but are nonetheless substantial for the Black group (0.143 or about 14 per cent, column (2)) and evident but smaller for the Other ethnicity group (0.060 or about 6 per cent, column (6)). A positive percentage (log point) difference in all instances indicates that UK-born Whites have higher average hourly earnings. In contrast, the negative difference between UK-born Whites and Indians (-0.126, column (3)) implies that the average hourly earnings of Indian are about 13 per cent *higher* than those of UK-born Whites. Regardless of the magnitude of these raw differences, though, there is a common pattern across all ethnicity groups, in that there are statistically significant explained and unexplained EPG components throughout.[27]

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[26] The actual percentage change can be calculated as *exp*(0.029) −1 = 2.9 per cent, and more generally the reported coefficient will approximate the percentage change when the coefficient is relatively small.
[27] These findings are in keeping with those of Longhi and Brynin (2017), which in themselves are consistent with the earlier studies of Blackaby *et al*. (1994, 1998).

Table 5.4: Blinder-Oaxaca Decomposition Analysis Pooled Across Sectors for Males

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	0.029***	0.143***	-0.126***	0.202***	0.016	0.060***
	(0.009)	(0.014)	(0.016)	(0.017)	(0.023)	(0.017)
Explained	-0.029***	-0.073***	-0.228***	-0.013	-0.154***	-0.049***
	(0.006)	(0.011)	(0.010)	(0.012)	(0.015)	(0.012)
Unexplained	0.058***	0.217***	0.103***	0.215***	0.170***	0.109***
	(0.007)	(0.012)	(0.012)	(0.014)	(0.018)	(0.014)
Breakdown of explained component						
Other controls	-0.001**	-0.003***	-0.003***	-0.003***	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	0.002	-0.015***	-0.013***	0.007**	-0.009***	0.009***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Illness	-0.006***	-0.005***	-0.005***	-0.002**	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.002	-0.021***	-0.057***	-0.021***	-0.041***	-0.016***
	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)
Marital status	0.001	-0.002	-0.028***	-0.025***	-0.017***	0.002
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Region of work	-0.049***	-0.092***	-0.077***	-0.048***	-0.089***	-0.078***
	(0.002)	(0.005)	(0.004)	(0.004)	(0.006)	(0.004)
Firm size	-0.008***	-0.011***	-0.026***	0.012***	-0.005	0.001
	(0.001)	(0.003)	(0.002)	(0.003)	(0.004)	(0.003)
Tenure	0.020***	0.016***	0.011***	0.018***	0.013***	0.019***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment	-0.001	0.008***	0.000	0.014***	0.006***	0.007***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Occupation	0.024***	0.047***	-0.029***	0.035***	-0.006	0.015***
	(0.003)	(0.005)	(0.004)	(0.005)	(0.006)	(0.005)
Public sector	-0.008***	0.005***	-0.002**	-0.002*	-0.001	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Total observations	57,630	53,656	53,986	53,546	53,198	53,719
UK-born White	52,415	52,415	52,415	52,415	52,415	52,415
Other ethnicity	5,215	1,241	1,571	1,131	783	1,304

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Explained components which capture the contribution of differences in personal and work-related characteristics have a negative sign across all ethnic groups. This indicates that UK-born Whites have on average *inferior* earnings-enhancing characteristics. In absolute terms, these are largest for the Indian group (-0.228 or about 23 per cent, column (3)) and the Chinese/Other Asian group (-0.154 or about 15 per cent, column (5)). In a similar way, there is uniformity to the unexplained components which are all significantly positive, with the implication that there is consistent inequality in terms of the pay of ethnic groups in favour of UK-born Whites. The unexplained EPGs, which are closer to a measure of wage discrimination, are

also substantial in magnitude. The 6 per cent unexplained EPG for the Non UK-born White group is the lowest of all these, and as such all other unexplained EPGs are greater than this. These range from an approximate 10 per cent for the Indian and Other ethnicity groups, through to 17 per cent for the Chinese/Other Asian group, to nearer 22 per cent for the Black and Pakistani/Bangladeshi groups. A corollary of these results would be that across the entire population, significant unexplained EPGs exist and while always substantial these can differ markedly from average hourly earnings differences. So, for example, while there is no (statistically) significant difference in average hourly pay between the UK-born White group and the Chinese/Other Asian group, a significant unexplained EPG of about 17 per cent exists; similarly, while an average hourly pay differential of about 13 per cent exists in favour of the Indian group relative to the UK-born white group, there is an unexplained EPG of 10 per cent in favour of the UK-born White group; for the Pakistani/Bangladeshi group, though, the average hourly pay difference of 20 per cent is of an order of magnitude that is similar to the unexplained EPG that this group faces. Consistent evidence of unexplained EPG in favour of UK-born Whites is aligned to the earlier literature in the UK.

To get further insight into these decomposition results, a breakdown of explained component is shown in the bottom panel of Table 5.4. Taking the Black group as an exemplar, this means that the approximate 7 per cent explained component in the top panel of Table 5.4 is made up of each of the individual components listed vertically in the lower panel of column (2). The largest of these individual components are Region of work (about 9 per cent) and Qualifications (about 2 per cent), and the fact that these are *negative* means that the distribution of these characteristics across the Black population would lead, *ceteris paribus*, to *higher* Black average hourly pay. Specifically, this is related to a higher level of educational attainment (which we know positively influence hourly pay) for Blacks relative to UK-born Whites, and to Blacks having a higher representation in those regions of work where hourly pay is higher. In contrast, Occupation contributes *positively* to the overall explained component (nearly 5 per cent), implying that the occupational structure for the Black group is inferior to that of the UK-born White group. Inferior in this sense means that Blacks are found in lower proportions in those occupations associated with higher earnings. Interestingly, Public sector employment has only a minor role to play. The positive sign would indicate that the mean level or proportion in public sector employment for the Black group is lower than that for the UK-born White group, with public sector employment being positively correlated with higher hourly pay. However, the net effect of this is to raise average Black hourly pay by less than one percent.

The remaining columns of Table 5.4 present a remarkably consistent story of the breakdown of the explained component as to that already recounted. Region of work and Qualifications components are substantial (and statistically significant) and *negatively* contribute to the hourly pay difference across all groups apart from Non UK-born Whites. Interestingly, the higher proportion of married individuals in the Indian,

Pakistani/Bangladeshi, and Chinese/Other Asian groups also contributes in a similarly negative way i.e., given their higher propensity to be married, we would expect the average earnings of these groups to be about 2-3 per cent higher than they are.

For the Non UK-born White, Pakistani/Bangladeshi and Other ethnicity groups the Occupation component contributes *positively*. However, this is not the case for the Indian group, for which the negative Occupation component would suggest that this group has a superior occupational structure (on average) relative to the UK-born White group and this would work to increase relative Indian hourly pay. This is consistent with the higher proportion of Indians working in senior occupations in Table 5.2. For the Chinese/Other Asian group, differences in occupational structure do not contribute to any average hourly pay difference.

Blinder-Oaxaca Results with the Exclusion of Occupational Controls: The Case for Males

There is debate about whether occupational controls should be included as controls in the BO methodology as the distribution of ethnic minority groups across occupation may not be independent of the very same drivers that lead to the EPG. The inclusion of such controls would assume that a concentration of ethnic minority groups in lower paying occupations for example, or an under-representation in higher paying occupations, was related only to the characteristics of workers and nothing to do with barriers relating to ethnicity. While this is unlikely to be wholly true, it is at least likely to be partly true, and so a true estimate of the EPG is likely to lie somewhere between estimates derived with and without occupational controls within the BO framework. Without presenting the full breakdown of decomposition results as previously (although these are shown in Appendix Table A4 and further breakdowns by private/public sectors in Appendix Tables A5 and A6), Table 5.4.1 shows how the difference in earnings is decomposed across explained and unexplained components.

The effect of removing the occupational controls will be to apportion explained and unexplained components of any given difference differently. Specifically, as there are fewer controls explaining earnings, the explained component will fall, and this will be absorbed into the unexplained component. Given the interpretation that we place upon this latter component, this will mean a rise in our measure of pay inequality. As such, estimates of the unexplained EPG are now even more substantial than previously, ranging from a low of nearly 9 per cent for the Non UK-born White group to about 28 per cent for the Black group (and only marginally lower at about 27 per cent for the Pakistani/Bangladeshi group). Between these, the unexplained EPG is estimated at about 13 per cent for both the Indian and Other ethnicity groups, and 20 per cent for the Chinese/Other Asian group.

Table 5.4.1: Blinder-Oaxaca Decomposition Analysis Pooled Across Sectors for Males With Occupation Controls Excluded

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	0.029***	0.143***	-0.126***	0.202***	0.016	0.060***
	(0.009)	(0.014)	(0.016)	(0.017)	(0.023)	(0.017)
Explained	-0.057***	-0.141***	-0.254***	-0.063***	-0.184***	-0.076***
	(0.006)	(0.011)	(0.009)	(0.012)	(0.014)	(0.011)
Unexplained	0.086***	0.284***	0.128***	0.266***	0.200***	0.136***
	(0.007)	(0.013)	(0.013)	(0.015)	(0.019)	(0.015)
Total observations	57,630	53,656	53,986	53,546	53,198	53,719
UK-born White	52,415	52,415	52,415	52,415	52,415	52,415
Other ethnicity	5,215	1,241	1,571	1,131	783	1,304

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Blinder-Oaxaca Results for UK-Born Ethnic Minorities Only: The Case for Males

An existing body of research has postulated and identified that immigrants and native-born minorities will fare differently in the labour market for a range of factors, including but not restricted to, language skills, ability and motivation, transparency of qualifications, and institutional familiarity. The effect of restricting the analysis to only those born in the UK is shown in Table 5.4.2.

Consistent with previous research (such as Blackaby *et al.*, 2002 inter alia), labour market differentials are much reduced for native-born ethnic minorities but are by no means eliminated. While there is a mixed message across the ethnicity groups on the average difference in log hourly earnings, a consistent message emerges for all ethnicity groups with regard to the unexplained component. As such, relative to UK-born Whites, the difference in average earnings is appreciably smaller for UK-born minorities who are Black, Pakistani/Bangladeshi or an Other ethnicity, but remains in favour of the UK-born White group. For the Indian group there is little movement in the raw (observed) mean earnings difference which still favours Indians by about 13 per cent. For the Chinese/Other Asian group, though, there is quite a marked movement relative to the results previously discussed, and average earnings now favour those from the Chinese/Other Asian group by some 20 per cent.

Meanwhile, the unexplained EPG falls in all instances. While smaller positive unexplained EPGs are identified for UK-born Black (14 per cent), Pakistani/Bangladeshi (11 per cent), Indian (6 per cent), and Other (4 per cent) ethnicities, these are nonetheless substantial and statistically significant in all instances. In contrast, there is no identifiable unexplained EPG for the UK-born Chinese/Other Asian group, standing in marked contrast to the figure of 17 per cent identified previously.[28],[29]

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[28] It should be noted that the size of the UK-born ethnic minority population is substantially smaller than the more general population, such that ethnic sample sizes in Table 5.4.2 are typically less than a third of those reported previously in Table 5.4.

[29] While individual estimates are not presented for those ethnic minorities born outside of the UK, such results can be backed out from the two sets (aggregate and UK-born only) of results that are presented. This would show that the foreign-born ethnic group have even lower average earnings than their native-born counterparts for all but Indians, for whom average earnings are very similar, and that foreign-born ethnicities face a higher unexplained EPG than their native-born counterparts.

Table 5.4.2: Blinder-Oaxaca Decomposition Analysis Pooled Across Sectors for UK-Born Males

	(1) Black	(2) Indian	(3) Pakistani/ Bangladeshi	(4) Chinese/ Other Asian	(5) Other
Difference	0.082***	-0.132***	0.114***	-0.206***	-0.001
	(0.029)	(0.027)	(0.029)	(0.064)	(0.028)
Explained	-0.061***	-0.197***	0.004	-0.193***	-0.045**
	(0.020)	(0.017)	(0.021)	(0.037)	(0.019)
Unexplained	0.143***	0.065***	0.110***	-0.012	0.044**
	(0.024)	(0.021)	(0.024)	(0.048)	(0.022)
Breakdown of explained component					
Other controls	-0.003*	-0.001	-0.001	-0.005	-0.002
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Age	0.000	0.013***	0.055***	0.026**	0.038***
	(0.006)	(0.005)	(0.006)	(0.010)	(0.006)
Illness	-0.002*	-0.005***	-0.003***	-0.004**	-0.003***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Qualifications	-0.008	-0.066***	-0.048***	-0.088***	-0.035***
	(0.006)	(0.005)	(0.006)	(0.010)	(0.006)
Marital status	0.024***	-0.009***	-0.002	0.010*	0.024***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)
Region of work	-0.110***	-0.076***	-0.028***	-0.078***	-0.074***
	(0.008)	(0.007)	(0.006)	(0.013)	(0.007)
Firm size	-0.009**	-0.025***	-0.006	-0.028***	-0.010**
	(0.005)	(0.004)	(0.005)	(0.008)	(0.004)
Tenure	0.013***	0.012***	0.022***	0.018***	0.018***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Employment	0.006***	-0.002	0.007***	0.003	0.004**
	(0.002)	(0.001)	(0.002)	(0.003)	(0.002)
Occupation	0.026***	-0.038***	0.008	-0.047***	-0.006
	(0.008)	(0.007)	(0.008)	(0.013)	(0.008)
Public sector	0.003	0.001	0.001	-0.000	-0.000
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Total observations	52,805	52,927	52,830	52,546	52,905
UK-born White	52,415	52,415	52,415	52,415	52,415
Other ethnicity	390	512	415	131	490

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Blinder-Oaxaca Results Pooled Across Sectors and Across the Earnings Distribution: The Case for Males

Away from the mean of the earnings distribution, as captured by the BO decomposition framework, substantial EPGs are also evident across the entirety of the earnings distribution. This can be seen from the estimates of the quantile RIF decomposition results presented in Table 5.5 at five percentile points (10th-25th-50th-75th-90th). While the principle behind these decompositions is the same as the BO, it should be remembered that central estimates of the EPG from the BO analysis and those at the 50th percentile for the RIF framework will not be identical as the former decomposition

is performed at the mean of the earnings distribution and the latter at the median. See Chapter 3 for a more detailed discussion of the recentred influence function (RIF) decomposition.

Table 5.5: RIF Quantile Decomposition Analysis Pooled Across Sectors for Males

Percentile		(1) 10th	(2) 25th	(3) 50th	(4) 75th	(5) 90th
Non UK-born White (N=61,432)	Difference	0.024***	0.063***	0.100***	-0.013	-0.096***
		(0.008)	(0.008)	(0.011)	(0.015)	(0.019)
	Explained	-0.002	0.011**	-0.005	-0.069***	-0.134***
		(0.005)	(0.005)	(0.007)	(0.008)	(0.009)
	Unexplained	0.026***	0.052***	0.105***	0.056***	0.038**
		(0.008)	(0.007)	(0.009)	(0.012)	(0.018)
Black (N=57,317)	Difference	0.053***	0.106***	0.157***	0.185***	0.226***
		(0.015)	(0.014)	(0.018)	(0.021)	(0.026)
	Explained	-0.004	0.010	-0.028**	-0.113***	-0.220***
		(0.008)	(0.010)	(0.012)	(0.013)	(0.016)
	Unexplained	0.058***	0.096***	0.185***	0.298***	0.446***
		(0.015)	(0.013)	(0.016)	(0.018)	(0.027)
Indian (N=57,568)	Difference	-0.021	-0.028	-0.158***	-0.197***	-0.211***
		(0.016)	(0.019)	(0.024)	(0.022)	(0.024)
	Explained	-0.074***	-0.122***	-0.228***	-0.311***	-0.402***
		(0.007)	(0.009)	(0.012)	(0.012)	(0.015)
	Unexplained	0.053***	0.093***	0.069***	0.114***	0.191***
		(0.015)	(0.016)	(0.019)	(0.020)	(0.025)
Pakistani/ Bangladeshi (N=57,141)	Difference	0.131***	0.198***	0.265***	0.181***	0.196***
		(0.015)	(0.015)	(0.020)	(0.031)	(0.031)
	Explained	0.059***	0.054***	0.006	-0.072***	-0.148***
		(0.009)	(0.011)	(0.014)	(0.014)	(0.016)
	Unexplained	0.072***	0.144***	0.259***	0.253***	0.344***
		(0.016)	(0.014)	(0.017)	(0.026)	(0.030)
Chinese/ Other Asian (N=56,769)	Difference	0.058***	0.099***	0.031	-0.062*	-0.079*
		(0.021)	(0.023)	(0.034)	(0.032)	(0.041)
	Explained	-0.022**	-0.052***	-0.139***	-0.233***	-0.342***
		(0.010)	(0.013)	(0.017)	(0.017)	(0.020)
	Unexplained	0.080***	0.152***	0.169***	0.171***	0.263***
		(0.020)	(0.019)	(0.026)	(0.028)	(0.040)
Other (N=57,333)	Difference	0.064***	0.103***	0.103***	0.039	-0.049
		(0.017)	(0.017)	(0.021)	(0.028)	(0.036)
	Explained	0.038***	0.031***	-0.017	-0.099***	-0.194***
		(0.009)	(0.010)	(0.013)	(0.013)	(0.016)
	Unexplained	0.027*	0.071***	0.120***	0.138***	0.145***
		(0.016)	(0.014)	(0.016)	(0.024)	(0.034)

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Focussing solely upon the unexplained EPG component of the decompositions, results are entirely consistent with the mean-based BO decomposition, in that there are statistically significant unexplained EPGs for each of the ethnicity groups in comparison to UK-born Whites and these are evident at each of the selected

percentiles. As noted earlier, mean and median (50th percentile) estimates do not need to coincide. At the 50th percentile, the largest unexplained EPG is still found for the Pakistani/Bangladeshi group (at 26 per cent), with Black (18 per cent) and Chinese/Other Asian (17 per cent) similarly substantial, although the smallest EPG is for Indian ethnicities (7 per cent). While we are only talking about small differences, at the mean the Indian unexplained EPG was above that of the Non UK-born White group (see Table 5.4), and at the median it is below.

Except for the Non UK-born White group, unexplained EPGs at the 50th percentile are significantly lower than those at the 90th percentile (i.e., at the top decile of the earnings distribution) and significantly higher than those at the 10th percentile or bottom decline of the earnings distribution. In all instances, though, they point to a substantial ethnic earnings disadvantage which reaches a maximum for the Black (45 per cent) and Pakistani/Bangladeshi (34 per cent) groups at the top decile. Even for the least disadvantaged ethnic groups, Indian (19 per cent) and Other ethnicity (14 per cent) groups, though, unexplained EPG estimates at the top end of the distribution are substantial. Overall, the evidence therefore points to a pronounced 'glass ceiling' or growing wage inequality across the wage distribution for Black, Indian, Pakistani/Bangladeshi and Chinese/Other Asian groups relative to the UK-born White group.[30] With reduced unexplained EPGs at the 10th percentile, variability across the ethnicity categories is less pronounced and ranges from about 3 per cent (for the Non UK-born White and Other ethnicity groups) to 8 per cent (for the Chinese/Other Asian group). In this respect, there is no evidence of so-called 'sticky floors' or greater wage inequality among low earners for any of the ethnic groups considered. This is perhaps a feature of wage compression resulting from the National Living Wage, which provides an effective wage floor.

In contrast, unexplained EPGs for the Non UK-born White group are generally less pronounced and invariably smaller across all chosen percentile points. And while they increase in magnitude from the 10th (3 per cent), through the 25th (5 per cent) and up to the 50th (10 per cent) percentiles, it is here that they are at their maximum. Hereafter, they decrease, such that by the 90th percentile the EPG of 4 per cent is less than a third of that for the Other ethnicity group (14 per cent) and less than one tenth of that for the Black group (45 per cent). This heterogeneity across the distribution, and across ethnic groups, is in keeping with the evidence presented by Clark and Nolan (2021).

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[30] It is commonly noted that while ethnic minorities represent a high percentage of the workforce in industrialised countries, they form only a low percentage of senior leadership positions (see Fitzsimmons and Callan, 2020 *inter alia*). Consistent with the evidence presented here, this has led Adamovic and Leibbrandt (2022) to conclude for the US, among a body of similar evidence, that "ethnic discrimination is particularly pronounced in the recruitment of leadership positions".

Blinder-Oaxaca Results Split by Public and Private Sectors: The Case for Males

The decomposition results split separately by private and public sectors for males are given in Tables 5.6 and 5.7 respectively. The observed difference in average hourly earnings is larger in the private sector than in the aggregate for all ethnicities other than for the Indian group. While these differences are minor in the case of the Non UK-born White group, where the gap is about 3 per cent in the private sector and across both sectors, they are much more pronounced for the Black group (18 per cent compared to 14 per cent) and for the Pakistani/Bangladeshi group 25 per cent in comparison to 20 per cent). Consistent with this, the relative position of the Indian group also falls marginally when looking at the private sector. Still enjoying an average earnings advantage over their UK-born White counterparts, this advantage falls to 11 per cent difference as opposed to 13 per cent across sectors.

As before, the major component in accounting for these observed differences is the unexplained component of the decomposition, and the magnitude of this component has also increased in the private sector, but these increases are only marginal.[31] This is most pronounced for the Indian and the Pakistani/Bangladeshi groups, for whom the unexplained EPG increases by 3 and 4 percentage points respectively. For the Non UK-born White and Black groups, this increase is of the order of about one percentage point.

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[31] Similarly, the explained component has a more muted role to play in the decomposition, and of the individual elements of this explained component, differences in average qualification levels and the regional distribution of workers are the major elements.

Table 5.6: Blinder-Oaxaca Decomposition Analysis in the Private Sector for Males

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	0.033***	0.182***	-0.113***	0.254***	0.041	0.073***
	(0.009)	(0.016)	(0.017)	(0.018)	(0.026)	(0.019)
Explained	-0.038***	-0.046***	-0.245***	0.004	-0.149***	-0.050***
	(0.007)	(0.013)	(0.012)	(0.014)	(0.018)	(0.013)
Unexplained	0.071***	0.228***	0.132***	0.251***	0.190***	0.123***
	(0.007)	(0.014)	(0.013)	(0.015)	(0.020)	(0.015)
Breakdown of explained component						
Other controls	-0.001**	-0.004***	-0.004***	-0.003**	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.000	-0.015***	-0.014***	0.006	-0.010**	0.006*
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Illness	-0.006***	-0.005***	-0.005***	-0.002***	-0.005***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.005**	-0.016***	-0.061***	-0.017***	-0.039***	-0.017***
	(0.003)	(0.005)	(0.004)	(0.005)	(0.006)	(0.005)
Marital status	-0.000	-0.000	-0.031***	-0.027***	-0.018***	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Region of work	-0.052***	-0.091***	-0.086***	-0.051***	-0.098***	-0.085***
	(0.002)	(0.006)	(0.005)	(0.005)	(0.006)	(0.005)
Firm size	-0.013***	-0.009***	-0.027***	0.018***	-0.002	0.005
	(0.001)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Tenure	0.016***	0.014***	0.008***	0.016***	0.013***	0.016***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment	-0.000	0.012***	0.001	0.018***	0.008***	0.009***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Occupation	0.024***	0.068***	-0.026***	0.046***	0.003	0.020***
	(0.003)	(0.006)	(0.005)	(0.006)	(0.007)	(0.005)
Total observations	47.747	43,955	44,318	43,948	43,648	44,118
UK-born White	42,999	42,999	42,999	42,999	42,999	42,999
Other ethnicity	4,748	956	1,319	949	649	1,119

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

The comparable decompositions for the public sector are given in Table 5.7. Quite naturally, an increase in observed average hourly pay differences in the private sector can only be matched by reductions in the public sector. Indeed, there is no ethnicity group for which the average hourly pay is statistically lower than for UK-born Whites. Moreover, for those in the Pakistani/Bangladeshi (-8 per cent), Non UK-born White (-10 per cent), Chinese/Other Asian (-11 per cent) and Indian (-21 per cent) groups, average hourly pay is higher than for the UK-born White group. For those in the Black and Other groups, there are no statistically significant differences in average hourly pay. Nonetheless, the unexplained EPG is still statistically significant for the Black (about 15 per cent) group, although this figure is substantially (and statistically significantly) lower than the comparable 23 per cent figure found in the private sector.

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For the remaining ethnicity groups, there are no statistically significant pay penalties i.e., there is no evidence of an unexplained EPG. As such, and consistent with prior evidence relating to gender and arguments that the public sector is more proactive in reducing inequality, the evidence suggests wage inequality against ethnic groups is more limited in the public relative to the private sector. While sectoral evidence of EPGs is lacking in the existing literature, these results are consistent with the smaller ethnic public/private sector wage differentials reported by Blackaby *et al.* (2002).

Table 5.7: Blinder-Oaxaca Decomposition Analysis in the Public Sector for Males

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	-0.099***	0.034	-0.206***	-0.079*	-0.110**	-0.044
	(0.025)	(0.030)	(0.041)	(0.045)	(0.053)	(0.046)
Explained	-0.069***	-0.119***	-0.161***	-0.104***	-0.186***	-0.070***
	(0.015)	(0.019)	(0.018)	(0.023)	(0.026)	(0.024)
Unexplained	-0.031	0.153***	-0.045	0.025	0.075	0.026
	(0.021)	(0.026)	(0.036)	(0.039)	(0.046)	(0.041)
Breakdown of explained component						
Other controls	0.000	0.000	0.001	-0.003	-0.002	-0.001
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Age	-0.002	-0.011***	-0.009**	0.010*	-0.005	0.015**
	(0.003)	(0.003)	(0.004)	(0.006)	(0.005)	(0.006)
Illness	-0.003**	-0.004***	-0.002	0.000	-0.004**	-0.006***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Qualifications	-0.021***	-0.027***	-0.044***	-0.049***	-0.049***	-0.024***
	(0.006)	(0.007)	(0.007)	(0.008)	(0.010)	(0.008)
Marital status	0.000	-0.005*	-0.017***	-0.016***	-0.012***	0.005
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Region of work	-0.034***	-0.082***	-0.038***	-0.032***	-0.048***	-0.043***
	(0.005)	(0.009)	(0.007)	(0.009)	(0.010)	(0.008)
Firm size	-0.008***	-0.007**	-0.022***	-0.011***	0.018***	-0.017***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.005)	(0.004)
Tenure	0.020***	0.033***	0.023***	0.024***	0.009	0.023***
	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)	(0.005)
Employment	-0.002	-0.003*	-0.001	-0.002	0.000	-0.001
	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)	(0.002)
Occupation	-0.019**	-0.015	-0.052***	-0.026**	-0.055***	-0.022*
	(0.008)	(0.010)	(0.010)	(0.012)	(0.014)	(0.012)
Total observations	9,883	9,701	9,668	9,598	9,550	9,601
UK-born White	9,416	9,416	9,416	9,416	9,416	9,416
Other ethnicity	467	285	252	182	134	185

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$

Further Analysis of the Black Ethnic Group: The Case for Males

To shed additional light on the striking unexplained component for the Black group, given the potential heterogeneity inherent within its construction, single equation estimates are provided for a pooled sample of UK-born Whites, and Blacks. While not allowing the returns to earnings-enhancing characteristics to vary across ethnicity as in the BO decomposition framework, such single equation estimates allow for robust estimates to be obtained. These estimates will show how much more or less those from the Black group earn relative to comparable workers from the UK-born White group *ceteris paribus* i.e., once we have accounted for all differences in the characteristics between the two groups. These results are shown in Table 5.8.

Table 5.8: Single Equation Estimates of the Black Ethnic Group for Males

	(1) All Sectors	(2) All Sectors	(3) UK-born	(4) Private	(5) Public
Black	-0.219***	-	-	-	-
	(0.012)	-	-	-	-
Black African	-	-0.258***	-0.204***	-0.277***	-0.133***
	-	(0.015)	(0.050)	(0.018)	(0.029)
Black Caribbean	-	-0.145***	-0.126***	-0.125***	-0.201***
	-	(0.021)	(0.027)	(0.024)	(0.047)
Black Other	-	-0.191***	-0.114**	-0.192***	-0.143
	-	(0.040)	(0.051)	(0.045)	(0.088)
Total observations	53,656	52,106	51,285	42,743	9,363

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$; additional controls included but not reported for age, illness, qualifications, marital status, region of work, firm size, job tenure, employment status, occupation, month, year, and proxy response.

Taking the results of column (1) as an exemplar, the estimated coefficient says that once we have controlled for the characteristics included within the earnings regressions, the earnings of Black workers are an approximately 22 per cent lower than the earnings of comparable (i.e., with identical characteristics) UK-born White workers. This estimated coefficient would compare directly with the unexplained EPG of approximately 22 per cent identified in Table 5.4. The fact that this coefficient is negative would indicate that earnings of Blacks are *lower*, in the same way that a positive unexplained component would indicate that for their characteristics Blacks earn *less* than would be expected on the basis of comparable UK-born Whites. These are just two different ways of expressing the same principle. It should also be noted that while we would expect the coefficient magnitudes from the single equation estimates to approximate the unexplained component from the BO decomposition, there is no reason why they should exactly coincide.

With the estimate in column (1) there as a benchmark, column (2) disaggregates the composite Black group into its constituent identifiable populations of Black African, Black Caribbean, and Black Other groups. There is clear

heterogeneity in this aggregate estimate. Estimates pooled across sectors suggest the hourly earnings disadvantage of those in the Black African group (whose earnings are approximately 26 per cent lower than comparable UK-born Whites) is significantly greater than for either of the Black Caribbean (14 per cent) or Black Other (19 per cent) groups.

A similar pattern also extends to a UK-born only sample (column (3)) and a private sector only sample (column (4)), where the Black African earnings disadvantage (at 20 per cent and 28 per cent respectively) is greater than that of the respective Black Caribbean and Black Other groups. However, it is only between the Black African and Black Caribbean groups that this difference is statistically significant. For a public sector only sample (column (5)), though, the greatest disadvantage is faced by the Black Caribbean group. However, possibly driven by the smaller sample size and higher associated standard errors, there are no statistically significant differences in the disadvantage faced across the various subgroups in this sector. Nevertheless, a significant unexplained EPG exists for the Black African (13 per cent) and Black Caribbean (20 per cent) groups, consistent with the presence of wage inequality relative to their UK-born White counterparts.

A corollary of these results would suggest that outside if the public sector, there is clear evidence that those males in the Black African group face a greater unexplained earnings disadvantage than those from the Black Caribbean group. Within the public sector, while unexplained gaps exist for African and Caribbean subgroups, there is no evidence that leads to the conclusion that the Black African group does any worse.

Blinder-Oaxaca Results Pooled Across Sectors: The Case for Females

The comparable results for females pooled across sectors are shown in Table 5.9, with all the same interpretations on signs and magnitudes of individual coefficients. While there are many similarities to the results for males, there are also subtle and distinct differences. Most notably is that the magnitudes of the observed differences between the UK-born White and the various ethnicity groups are reduced, and to such an extent that there are no significant differences in average earnings between the UK-born White group and the Non UK-born White, Black, Chinese/Other Asian, or Other ethnicity groups.[32] While there are still statistically significant higher average earnings for UK-born White females in comparison to their Pakistani/Bangladeshi counterparts (of about 12 per cent), this is far lower than the 20 per cent difference observed for males. Similarly, the 9 per cent difference in the average hourly earnings of Indian females over UK-born White females is less than the 13 per cent advantage observed for males. However, while it is only these latter two ethnicity groups for whom

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[32] Such findings are consistent with Longhi and Brynin (2017), and Henehan and Rose (2018), who report smaller EPGs for women than for men.

average hourly earnings differences exist, a significant unexplained EPG exists for all, ranging from a minimum of 5 per cent for the Non UK-born White group to a maximum of 13 per cent for Pakistani/Bangladeshi females. In this regard, evidence of unexplained EPGs in favour of the UK-born White group replicates the finding identified for males, although in all instances these pay gaps for females are smaller in magnitude than for comparable male estimates. Also consistent with the male findings discussed previously, the average level of earnings-enhancing characteristics of the various ethnicity groups is superior to that of the UK-born White group, with differences in education attainment and region of work consistently contributing most to the explained component of the decompositions.

Table 5.9: Blinder-Oaxaca Decomposition Analysis Pooled Across Sectors for Females

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	0.006	0.002	-0.095***	0.116***	-0.019	-0.001
	(0.007)	(0.012)	(0.015)	(0.020)	(0.019)	(0.014)
Explained	-0.048***	-0.108***	-0.168***	-0.015	-0.120***	-0.065***
	(0.005)	(0.010)	(0.009)	(0.013)	(0.012)	(0.010)
Unexplained	0.054***	0.110***	0.072***	0.131***	0.100***	0.064***
	(0.006)	(0.011)	(0.012)	(0.018)	(0.016)	(0.012)
Breakdown of explained component						
Other controls	-0.000	0.000	-0.001	-0.002*	-0.001	-0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	0.000	-0.011***	-0.011***	0.013***	-0.009***	0.005**
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Illness	-0.003***	-0.002***	-0.003***	-0.003***	-0.003***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Qualifications	-0.023***	-0.020***	-0.041***	-0.021***	-0.036***	-0.026***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.005)	(0.004)
Marital status	-0.000	0.005***	-0.010***	-0.006***	-0.007***	0.002***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.047***	-0.105***	-0.070***	-0.058***	-0.071***	-0.075***
	(0.002)	(0.005)	(0.004)	(0.005)	(0.005)	(0.004)
Firm size	-0.005***	-0.012***	-0.018***	0.001	-0.010***	-0.005***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Tenure	0.028***	0.023***	0.013***	0.024***	0.022***	0.029***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Employment	-0.004***	-0.001	-0.003***	0.005***	-0.002**	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Occupation	0.017***	0.014***	-0.022***	0.030***	0.002	0.015***
	(0.003)	(0.005)	(0.005)	(0.007)	(0.006)	(0.005)
Public sector	-0.009***	0.001	-0.002**	0.001	-0.004***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Total observations	65,410	60,800	60,727	59,984	60,179	60,592
UK-born White	59,196	59,196	59,196	59,196	59,196	59,196
Other ethnicity	6,214	1,604	1,531	788	983	1,396

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Blinder-Oaxaca Results with the Exclusion of Occupational Controls: The Case for Females

Decomposition results derived with the exclusion of occupational controls are shown in Table 5.9.1, and again the effect of this is to increase the magnitude of the unexplained component relative to the explained component. As such, the unexplained EPG increases in all instances, although the same relativities persist with regard to the male estimates. These increased unexplained EPGs now range from 9 per cent for the Non UK-born White group to 18 per cent for the Pakistani/Bangladeshi

group.[33]

Table 5.9.1: Blinder-Oaxaca Decomposition Analysis Pooled Across Sectors for Females With Occupation Controls Excluded

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/Bangladeshi	(5) Chinese/Other Asian	(6) Other
Difference	0.006	0.002	-0.095***	0.116***	-0.019	-0.001
	(0.007)	(0.012)	(0.015)	(0.020)	(0.019)	(0.014)
Explained	-0.083***	-0.148***	-0.199***	-0.061***	-0.160***	-0.102***
	(0.005)	(0.009)	(0.009)	(0.012)	(0.011)	(0.010)
Unexplained	0.089***	0.150***	0.103***	0.177***	0.141***	0.101***
	(0.006)	(0.012)	(0.013)	(0.019)	(0.017)	(0.012)
Total observations	65,410	60,800	60,727	59,984	60,179	60,592
UK-born White	59,196	59,196	59,196	59,196	59,196	59,196
Other ethnicity	6,214	1,604	1,531	788	983	1,396

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Blinder-Oaxaca Results for UK-Born Ethnic Minorities Only: The Case for Females

BO decomposition results for females that exclude foreign-born ethnicities are shown in Table 5.9.2. Except for the Pakistani/Bangladeshi group (for whom there is no distinguishable change), there is a consistent improvement in the ethnic average earnings position. So much so, that it is only the UK-born Bangladeshi/Pakistani group who have lower average earnings than UK-born Whites.

There is also a consistent reduction in the unexplained EPG. Indeed, the substantial unexplained EPGs consistently seen across all ethnicity groups from Table 5.9, have now disappeared for all groups except for Pakistani/Bangladeshi (12 per cent) and Black (6 per cent) and a 3 per cent EPG identified for the Other ethnicity group is only on the margins of statistical acceptance. Most noticeable is the reduction in the EPG for the Indian group, which has fallen from 7 per cent to zero with the exclusion of foreign-born individuals.

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[33] Full decomposition results with the exclusion of occupational controls pooled across sectors and for individual private/public sectors are given in Appendix Tables A7-A9.

Table 5.9.2: Blinder-Oaxaca Decomposition Analysis Pooled Across Sectors for UK-Born Females

	(1) Black	(2) Indian	(3) Pakistani/ Bangladeshi	(4) Chinese/ Other Asian	(5) Other
Difference	-0.109***	-0.168***	0.098***	-0.152***	-0.023
	(0.022)	(0.024)	(0.028)	(0.056)	(0.022)
Explained	-0.173***	-0.171***	-0.026	-0.211***	-0.054***
	(0.016)	(0.015)	(0.017)	(0.028)	(0.015)
Unexplained	0.064***	0.002	0.124***	0.059	0.032*
	(0.019)	(0.019)	(0.024)	(0.049)	(0.017)
Breakdown of explained component					
Other controls	0.001	-0.002**	-0.001	-0.004*	-0.000
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Age	-0.005*	0.001	0.028***	0.009	0.025***
	(0.003)	(0.003)	(0.004)	(0.006)	(0.004)
Illness	-0.001	-0.003***	-0.004***	-0.002**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.035***	-0.057***	-0.037***	-0.085***	-0.036***
	(0.005)	(0.005)	(0.006)	(0.009)	(0.005)
Marital status	0.010***	-0.004***	-0.002**	0.003*	0.008***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Region of work	-0.123***	-0.063***	-0.045***	-0.088***	-0.057***
	(0.007)	(0.006)	(0.006)	(0.011)	(0.005)
Firm size	-0.014***	-0.014***	-0.003	-0.013**	-0.005**
	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)
Tenure	0.016***	0.018***	0.025***	0.017***	0.026***
	(0.003)	(0.002)	(0.003)	(0.004)	(0.002)
Employment	-0.005***	-0.004***	0.001	-0.004*	-0.003**
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Occupation	-0.020***	-0.042***	0.011	-0.044***	-0.009
	(0.007)	(0.007)	(0.009)	(0.014)	(0.007)
Public sector	0.002*	-0.000	0.002	0.000	-0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Total observations	59,734	59,744	59,627	59,342	59,795
UK-born White	59,196	59,196	59,196	59,196	59,196
Other ethnicity	538	548	431	146	599

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Blinder-Oaxaca Results Pooled Across Sectors and Across the Earnings Distribution: The Case for Females

Estimates of the quantile RIF decomposition results at five percentile points (10th-25th-50th-75th-90th) are presented in Table 5.10. Focussing solely upon estimates of the unexplained EPG, there is a consistent pattern of the substantial estimates at the central parts of the hourly earning distribution being higher at the 90th percentile and lower at the 10th percentile. Indeed, for the Black, Indian and Non UK-born White groups there are no significant unexplained EPGs at any point below the median. This result for the Black group is interesting, as it contrasts with points above the median where some of the very largest estimates of the unexplained EPG are found. At the

75th percentile, the Black unexplained EPG of 19 per cent is similar to the two other highest EPGs: 18 per cent for Chinese/Other Asian, and 20 per cent for Pakistani/Bangladeshi. Meanwhile, at the 90th percentile the Black unexplained EPG of 28 per cent is the largest of any estimate for any ethnicity group at any of the chosen percentile points. The next largest estimate is that for the other consistently disadvantaged group of Pakistani/Bangladeshis, but even this estimate of 22 per cent at the 90th percentile is significantly lower than the figure for Black ethnicities. As with males, there is consistent evidence of a 'glass ceiling' for females from non-UK-born White ethnic groups, i.e., inequality particularly focussed at the upper end of the wage distribution. In terms of magnitude, however, wage inequality at the top of the end of the distribution is greater for male relative to female ethnic groups.

Table 5.10: RIF Quantile Decomposition Analysis Pooled Across Sectors for Females

Percentile		(1) 10th	(2) 25th	(3) 50th	(4) 75th	(5) 90th
Non UK-born White (N=69,671)	Difference	0.007 (0.007)	0.013*** (0.006)	0.027*** (0.009)	-0.020* (0.012)	-0.053*** (0.012)
	Explained	0.015*** (0.004)	0.012*** (0.004)	-0.032*** (0.006)	-0.105*** (0.008)	-0.148*** (0.007)
	Unexplained	-0.008 (0.008)	0.001 (0.005)	0.060*** (0.007)	0.085*** (0.010)	0.095*** (0.012)
Black (N=64,899)	Difference	-0.004 (0.014)	-0.007 (0.012)	-0.015 (0.015)	0.034** (0.017)	0.063*** (0.021)
	Explained	-0.015*** (0.007)	-0.011* (0.006)	-0.062*** (0.011)	-0.152*** (0.013)	-0.220*** (0.012)
	Unexplained	0.011 (0.014)	0.004 (0.011)	0.046*** (0.012)	0.186*** (0.016)	0.283*** (0.021)
Indian (N=64,723)	Difference	-0.029* (0.015)	-0.044*** (0.015)	-0.133*** (0.020)	-0.155*** (0.020)	-0.160*** (0.028)
	Explained	-0.040*** (0.006)	-0.063*** (0.006)	-0.167*** (0.011)	-0.262*** (0.013)	-0.276*** (0.012)
	Unexplained	0.011 (0.015)	0.018 (0.013)	0.035** (0.016)	0.107*** (0.018)	0.117*** (0.027)
Pakistani/ Bangladeshi (N=63,976)	Difference	0.111*** (0.024)	0.079*** (0.017)	0.110*** (0.021)	0.161*** (0.025)	0.127*** (0.034)
	Explained	0.053*** (0.008)	0.032*** (0.008)	0.012 (0.015)	-0.040** (0.018)	-0.089*** (0.015)
	Unexplained	0.058** (0.023)	0.046*** (0.015)	0.099*** (0.018)	0.201*** (0.023)	0.217*** (0.032)
Chinese/ Other Asian (N=64,172)	Difference	0.029 (0.020)	-0.001 (0.017)	-0.025 (0.024)	-0.031 (0.024)	-0.111*** (0.040)
	Explained	-0.004 (0.008)	-0.016** (0.008)	-0.099*** (0.015)	-0.209*** (0.017)	-0.245*** (0.014)
	Unexplained	0.034* (0.019)	0.015 (0.015)	0.075*** (0.018)	0.177*** (0.022)	0.134*** (0.038)
Other (N=64,662)	Difference	0.030** (0.015)	0.039*** (0.013)	0.032* (0.017)	-0.004 (0.023)	-0.056* (0.028)
	Explained	0.037*** (0.007)	0.020*** (0.007)	-0.026** (0.012)	-0.102*** (0.014)	-0.161*** (0.013)
	Unexplained	-0.006 (0.014)	0.019* (0.012)	0.057*** (0.014)	0.097*** (0.020)	0.104*** (0.027)

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Blinder-Oaxaca Results Split by Public and Private Sectors: The Case for Females

The decomposition results for females in the private and public sectors are shown in Tables 5.11 and 5.12 respectively. For the observed average wage differences, two groups stand out, namely Indians and Pakistani/Bangladeshis. As such, while Indian females earn more on average than their UK-born White counterparts in both sectors, this differential is significantly higher in the private sector (about 12 per cent) than it is

in the public sector (about 5 per cent). Similarly, there is also a marked difference in the average earnings position of Pakistani/Bangladeshi females between sectors. While Table 5.9 showed that UK-born White females enjoyed an average earnings advantage over Pakistani/Bangladeshi females of about 12 per cent, this is driven by the private sector. The 15 per cent difference in average hourly pay in this sector compares to a much lower and statistically insignificant difference of 6 per cent in the public sector.

Table 5.11: Blinder-Oaxaca Decomposition Analysis in the Private Sector for Females

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	-0.017**	0.025	-0.124***	0.154***	-0.020	-0.014
	(0.008)	(0.017)	(0.018)	(0.025)	(0.024)	(0.017)
Explained	-0.082***	-0.097***	-0.223***	-0.029*	-0.129***	-0.092***
	(0.006)	(0.013)	(0.012)	(0.016)	(0.015)	(0.013)
Unexplained	0.065***	0.121***	0.099***	0.183***	0.110***	0.078***
	(0.007)	(0.014)	(0.015)	(0.022)	(0.019)	(0.014)
Breakdown of explained component						
Other controls	-0.000	0.001	-0.003**	-0.002	-0.001	-0.001
	(0.000)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Age	-0.005***	-0.014***	-0.013***	0.017***	-0.015***	0.002
	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)
Illness	-0.004***	-0.002***	-0.003***	-0.003***	-0.004***	-0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.029***	-0.015***	-0.053***	-0.026***	-0.036***	-0.033***
	(0.002)	(0.004)	(0.004)	(0.006)	(0.005)	(0.004)
Marital status	-0.001***	0.005***	-0.015***	-0.007***	-0.011***	0.001
	(0.000)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Region of work	-0.053***	-0.117***	-0.093***	-0.071***	-0.083***	-0.088***
	(0.002)	(0.006)	(0.005)	(0.007)	(0.006)	(0.005)
Firm size	-0.015***	-0.008***	-0.024***	0.001	-0.006*	-0.008***
	(0.001)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Tenure	0.018***	0.017***	0.009***	0.021***	0.014***	0.021***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Employment	-0.004***	0.003**	-0.003**	0.005***	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Occupation	0.012***	0.033***	-0.026***	0.037***	0.013*	0.015***
	(0.003)	(0.006)	(0.006)	(0.008)	(0.007)	(0.006)
Total observations	42,922	38,896	38,929	38,396	38,596	38,918
UK-born White	37,901	37,901	37,901	37,901	37,901	37,901
Other ethnicity	5,021	995	1,028	495	695	1,017

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Consistent with the pattern identified for males, the unexplained EPG is also greater in the private sector than it is in the public sector for all ethnicity

classifications.[34] These estimates of the unexplained EPG are greatest for Pakistani/Bangladeshi (18 per cent) and Black (12 per cent) females in the private sector. The unexplained EPG is approximately 4 per cent greater in the private sector than it is in the public sector for most ethnicity groups, but the differential for the Pakistani/Bangladeshi group is a much higher 17 per cent. In short, greater ethnic pay equality also exists in the public relative to the private sector for women, as was the case for men. However, significant unexplained EPG remain nonetheless in the public sector for Non UK-born White (4 per cent), Black (7 per cent), and Chinese/Other Asian (7 per cent) females.

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[34] A test of these estimates shows that the differences in the unexplained EPG between private and public sectors are statistically significant for the Non UK-born White, Black, Indian and Pakistani/Bangladeshi ethnicity groups.

Table 5.12: Blinder-Oaxaca Decomposition Analysis in the Public Sector for Females

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	-0.034**	-0.028	-0.051**	0.056	-0.054	-0.015
	(0.015)	(0.018)	(0.025)	(0.035)	(0.033)	(0.028)
Explained	-0.072***	-0.096***	-0.076***	0.020	-0.123***	-0.048***
	(0.009)	(0.014)	(0.015)	(0.019)	(0.019)	(0.018)
Unexplained	0.039***	0.068***	0.025	0.036	0.070**	0.033
	(0.012)	(0.017)	(0.020)	(0.032)	(0.029)	(0.024)
Breakdown of explained component						
Other controls	-0.001	-0.001	-0.000	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Age	-0.001	-0.005**	-0.008***	0.008*	0.002	0.005
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.003)
Illness	-0.002***	-0.002***	-0.002***	-0.002**	-0.002**	-0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.040***	-0.027***	-0.016***	-0.009	-0.045***	-0.020***
	(0.004)	(0.005)	(0.006)	(0.008)	(0.007)	(0.007)
Marital status	-0.000	0.003***	-0.004***	-0.003**	-0.002***	0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.030***	-0.071***	-0.027***	-0.030***	-0.040***	-0.042***
	(0.003)	(0.007)	(0.005)	(0.006)	(0.006)	(0.006)
Firm size	-0.005***	-0.011***	-0.011***	0.001	-0.017***	-0.007***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Tenure	0.034***	0.035***	0.018***	0.029***	0.032***	0.033***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Employment	-0.001	-0.004***	-0.003***	0.004***	-0.004***	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Occupation	-0.027***	-0.013*	-0.024***	0.023**	-0.045***	-0.013
	(0.005)	(0.008)	(0.008)	(0.011)	(0.011)	(0.010)
Total observations	22,488	21,904	21,798	21,588	21,583	21,674
UK-born White	21,295	21,295	21,295	21,295	21,295	21,295
Other ethnicity	1,193	609	503	293	288	379

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Further Analysis of the Black Ethnic Group: The Case for Females

In the same way as described previously for males, single equation estimates allow for further light to be shed upon the significant unexplained EPG experienced by females in the Black ethnic group. These results are presented in Table 5.13 and show a consistency with the patterns already described for males. As such, the Black African subgroup fares worse than the Black Caribbean group in the aggregate although this is driven by the situation in the private sector. While the same pattern is suggested in the public sector, there is no statistically significant differences in the individual coefficient estimates between the Black subgroups.

Table 5.13: Single Equation Estimates of the Black Ethnic Group for Females

	(1) All Sectors	(2) All Sectors	(3) UK-born	(4) Private	(5) Public
Black	-0.107***	-	-	-	-
	(0.010)	-	-	-	-
Black African	-	-0.132***	-0.045	-0.146***	-0.078***
	-	(0.014)	(0.042)	(0.017)	(0.022)
Black Caribbean	-	-0.068***	-0.072***	-0.062***	-0.044**
	-	(0.017)	(0.020)	(0.023)	(0.022)
Black Other	-	-0.092***	-0.069	-0.088**	-0.060
	-	(0.034)	(0.049)	(0.045)	(0.048)
Total observations	60,800	58,913	57,874	37,761	21,152

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$; additional controls included but not reported for age, illness, qualifications, marital status, region of work, firm size, job tenure, employment status, occupation, month, year, and proxy response.

An Analysis for PRBs

While the preceding investigation has been conducted for males and females separately, the following exploration of the situation within PRBs will be for a pooled sample of male and female workers given PRBs do not typically differentiate by gender and because of the smaller sample sizes. For completeness, though, results for the PRBs split by gender are presented in Appendix Tables A14-A19, and results from the previous analysis pooled over genders in Appendix Tables A10-A13.

Blinder-Oaxaca Results for PRBs

Using detailed 4-digit SOC2010 and 3-digit Standard Industrial Classification (SIC) 2007 codes available within the APS, it is possible to identify six of the PRBs: Doctors' and Dentists' Remuneration; the NHS; Police Remuneration; Prison Service; School Teachers; and Armed Forces (see Appendix Table A1). Taken collectively, a comparison of these PRBs against remaining occupations within the public sector are shown in Table 5.14. However, reduced sample sizes within these PRBs means that it is not possible to undertake the analysis for each of the ethnicity categories used previously, and so the estimates provided in Table 5.14 split ethnicity along the lines of Non UK-born White and an aggregation of all other non-White ethnicities (NWE).

Table 5.14: Blinder-Oaxaca Decomposition Analysis in PRB and Other Public Sector Occupations Pooled Across Genders

| | PRBs | | Other Public Sector | |
| | (1) | (2) | (3) | (4) |
	Non UK-born White	NWE	Non UK-born White	NWE
Difference	-0.021	-0.034**	-0.037**	0.004
	(0.018)	(0.014)	(0.018)	(0.014)
Explained	-0.030***	-0.049***	-0.057***	-0.064***
	(0.010)	(0.008)	(0.012)	(0.010)
Unexplained	0.009	0.015	0.020	0.068***
	(0.016)	(0.013)	(0.014)	(0.011)
Breakdown of explained component				
Gender	0.001	-0.013***	0.003	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Other controls	-0.000	-0.001	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.001	-0.003	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Illness	-0.002***	-0.002***	-0.001***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.023***	-0.019***	-0.034***	-0.022***
	(0.005)	(0.004)	(0.004)	(0.003)
Marital status	0.001	-0.003***	-0.001	-0.001**
	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.022***	-0.028***	-0.038***	-0.066***
	(0.003)	(0.004)	(0.004)	(0.005)
Firm size	-0.000	0.000	-0.003**	-0.005***
	(0.001)	(0.002)	(0.002)	(0.001)
Tenure	0.032***	0.031***	0.028***	0.024***
	(0.003)	(0.003)	(0.002)	(0.002)
Employment	-0.000	0.000	0.000	-0.001
	(0.001)	(0.001)	(0.002)	(0.001)
Occupation	-0.014***	-0.010***	-0.008	0.009**
	(0.005)	(0.003)	(0.006)	(0.005)
Total observations	12,157	13,014	20,214	20,807
UK-born White	11,378	11,378	19,333	19,333
Other ethnicity	779	1,636	881	1,474

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Taken collectively, the findings for the PRBs are striking, in that there is no unexplained EPG for either of the Non UK-born White or NWE groups. Indeed, when considering the Non UK-born White group, parity in outcomes (observed differences in earnings and EPG) is the clear message. And while there is a small average pay advantage for those in the NWE group, this is more than explained by the superior average characteristics possessed by this group.

In contrast, there is a significant unexplained EPG of 7 per cent for the NWE group in those parts of the public sector not covered by the PRBs. Although not conclusive, we may surmise that substantial unexplained EPGs identified for the Black

and Other Asian groups in the public sector generally (as shown in Tables 5.7 and 5.12) are driven by those areas of the public sector not directly covered by PRBs.

Blinder-Oaxaca Results for Individual PRBs

Due to the limited sample sizes within PRBs, it is not possible to estimate the components of the EPG with the BO methodology for all six of the PRBs separately. It is only for the NHS PRB that a viable analysis can be performed, and with this only if the ethnicity classifications are grouped into a reduced number of three categories as outlined previously: UK-born White; Non UK-born White; and NWE. These decomposition results are shown in Table 5.15, where decompositions of the pooled PRBs outside the NHS PRB are also presented.

Within the NHS PRB, the Non UK-born White group and the NWE group earn significantly more on average than their UK-born White counterparts (at nearly 5 and 6 per cent respectively), and a large part of this hourly pay advantage is explained by the superior average level of earnings-enhancing characteristics that they possess. Indeed, differences in mean qualification levels are the prime driver of the explained earnings gap. Nonetheless, for the NWE group there is a small unexplained EPG of close to 3 per cent, although it should be acknowledged that this only borders on statistical significance.

For those PRBs outside of the NHS, the picture is slightly different, but only for those in the NWE group. For the Non UK-born White group, there is parity in average wages and no evidence of an unexplained EPG. For the NWE group, though, their average earnings are nearly 8 per cent higher than UK-born Whites and no discernible part of this is attributable to differences in average characteristic levels. Instead, a *negative* unexplained EPG – or pay *premium* – is received by NWE individuals relative to their UK-born White counterparts.

Table 5.15: Blinder-Oaxaca Decomposition Analysis in NHS and Non-NHS PRBs Pooled Across Genders

	NHS PRB		Non-NHS PRB	
	(1)	(2)	(3)	(4)
	Non UK-born White	NWE	Non UK-born White	NWE
Difference	-0.046**	-0.061***	-0.016	-0.076**
	(0.021)	(0.015)	(0.035)	(0.031)
Explained	-0.054***	-0.089***	-0.023	-0.009
	(0.013)	(0.011)	(0.014)	(0.013)
Unexplained	0.008	0.028*	0.007	-0.068**
	(0.019)	(0.015)	(0.033)	(0.030)
Breakdown of explained component				
Gender	-0.004*	-0.019***	0.006	-0.001
	(0.002)	(0.002)	(0.003)	(0.003)
Other controls	-0.000	-0.000	-0.003	-0.000
	(0.001)	(0.001)	(0.003)	(0.002)
Age	0.006**	0.001	-0.016***	0.000
	(0.003)	(0.003)	(0.005)	(0.005)
Illness	-0.003***	-0.003***	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.038***	-0.036***	-0.002	0.001
	(0.006)	(0.004)	(0.008)	(0.006)
Marital status	0.002	-0.005***	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.025***	-0.033***	-0.014***	-0.016***
	(0.005)	(0.006)	(0.005)	(0.006)
Firm size	-0.002**	-0.004***	-0.004	-0.009***
	(0.001)	(0.001)	(0.003)	(0.003)
Tenure	0.034***	0.031***	0.023***	0.029***
	(0.004)	(0.003)	(0.006)	(0.005)
Employment	0.001	0.002	-0.000	0.000
	(0.001)	(0.002)	(0.001)	(0.001)
Occupation	-0.023***	-0.024***	-0.010**	-0.011***
	(0.006)	(0.004)	(0.004)	(0.003)
Total observations	7,871	8,610	4,286	4,404
UK-born White	7,306	7,306	4,072	4,072
Other ethnicity	565	1,304	214	332

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Further Analysis of the EPG in the NHS PRB

To explore further the EPG across ethnicity categories in the NHS PRB, the more detailed set of ethnicity groupings is combined with quantile regression and the results of this exercise are presented in Table 5.16 at the same five percentile points used previously along the earnings distribution. More specifically, the estimates are the *ceteris paribus* coefficient estimates on a series of ethnicity dummy variables that are measured relative to the baseline of those who are UK-born Whites. As seen previously with the results of Tables 5.8 and 5.13, these estimates are *ceteris paribus*

to the extent that all those other earnings-enhancing characteristics included within the BO framework are also included in the quantile regressions.

Table 5.16: Quantile Regression Analysis in NHS PRB Pooled Across Genders

Percentile	(1) 10th	(2) 25th	(3) 50th	(4) 75th	(5) 90th
Non UK-born White	-0.075***	-0.021	-0.007	0.025	0.069***
	(0.017)	(0.019)	(0.014)	(0.018)	(0.019)
Black	-0.101***	-0.091***	-0.080***	-0.056**	-0.098***
	(0.025)	(0.017)	(0.019)	(0.027)	(0.028)
Indian	-0.014	-0.015	0.034	0.146***	0.234***
	(0.020)	(0.022)	(0.023)	(0.026)	(0.018)
Pakistani/Bangladeshi	-0.038	-0.058	0.055	0.100***	0.172**
	(0.063)	(0.048)	(0.037)	(0.032)	(0.068)
Chinese/Other Asian	-0.110***	-0.106***	-0.074**	-0.037	-0.017
	(0.024)	(0.024)	(0.030)	(0.050)	(0.035)
Other	-0.037	-0.024	-0.027	0.047**	0.148***
	(0.039)	(0.029)	(0.024)	(0.019)	(0.025)
Total observations	9,175	9,175	9,175	9,175	9,175

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$; additional controls included but not reported for age, illness, qualifications, marital status, region of work, firm size, job tenure, employment status, occupation, month, year, and proxy response; total observations composed of 7,306 (UK-born White), 565 (Non UK-born White), 371 (Black), 341 (Indian), 132 (Pakistani/Bangladeshi), 248 (Chinese/Other Asian) and 212 (Other).

There are several key messages that emerge from the results of Table 5.16. The first is that the unexplained EPG identified previously at mean earnings in the BO framework is likely driven by the influence of the Black and Chinese/Other Asian groups. At the median (50th percentile), it is only these two groups where earnings are significantly lower having controlled for other earnings augmenting characteristics i.e., that have a *negative* reported coefficient, and suggest that the earnings of these groups are between 7-8 per cent lower than comparable UK-born Whites.

Blacks and Chinese/Other Asians also earn significantly less than their UK-born White counterparts at points below the median, with this disadvantage stable at between 9-11 percent for both ethnic groups at both the 10th and 25th percentile. It is also interesting to note that unlike all other ethnic groups, the lower earnings faced by Black workers in the NHS does not disappear as we move along the earnings distribution. As such, an earnings penalty of nearly 6 per cent is still evident at the 75th percentile, and a penalty of nearly 10 per cent evident at the 90th percentile.

In marked contrast, no other ethnic group faces an earnings penalty above the median and in fact the majority receive a *premium*. This is most pronounced at the 90th percentile point, with the Indian (23 per cent) and Pakistani/Bangladeshi (17 per cent), Other ethnicity (15 per cent), and Non UK-born White (7 per cent) groups all receiving a substantial premium. While not as great, significant premiums are also found for the Other (5 per cent), Pakistani/Bangladeshi (10 per cent), and Indian (15

per cent) ethnic groups at the 75th percentile point.

A corollary of these results would be that while an unexplained EPG exists in the NHS PRB, this is limited to those from Black and Chinese/Other Asian backgrounds and tends to be concentrated at median earnings levels and below. However, there are more positive outcomes at higher earnings level (above the median), and for Indians and Pakistani/Bangladeshis in particular, where the majority of ethnic minority workers are paid (substantially) more *ceteris paribus* than their UK-born White counterparts.

6: Concluding Comments

This report focuses on establishing whether EPGs exist in the UK public sector in general and within the PRBs in particular. Statistical analysis has been undertaken using the Annual Population Survey (APS) over the period from 2017 to 2019. The APS is a rich household survey in the UK that contains detailed information on ethnicity and labour market outcomes. Following a literature review, descriptive statistics and log wage regressions, the main results that are presented are based on decomposition analysis. This regression-based approach enables the hourly pay gap between two groups to be split into a part that can be explained (by characteristics such as age, education and location) and an unexplained component, of which discrimination is often thought to be a contributor. In this analysis, decompositions are typically reported for six ethnic groups in comparison to UK-born Whites, with these corresponding to the UK's main ethnic groups subject to a sufficient number of observations being available.

Summary of Main Findings

In terms of the overall UK labour market, there are substantial EPGs for several ethnic groups both for males and females across all sectors, with the most substantial deficits being observed for the Pakistani/Bangladeshi and Black ethnic groups. The decomposition analysis provides consistent evidence of unexplained EPGs, that is pay gaps based on comparable characteristics or pay inequality. EPGs further tend to be less substantial for native-born ethnicities and to increase as we move along the earnings distribution. The latter is consistent with a 'glass ceiling' or particular pay inequality among higher earners.

The average pay gaps between the UK-born White and ethnic minority groups within the public sector are generally found to favour ethnic groups - although some variations are observed, with certain ethnicity groups doing relatively well and others less so. It is also particularly noticeable that the pay gaps are small in relation to those that exist in the private sector. For example, for males, average pay in the private sector for UK-born White employees was 25 per cent higher than the Pakistani/Bangladeshi group and 18 per cent higher than the Black group. In both cases, virtually all of the pay gap could not be explained by differences in characteristics but was unexplained. In contrast in the public sector, the average pay of Pakistanis and Bangladeshis exceeded that of UK-born White workers by 8 per cent, as a result of their higher endowment of productivity enhancing characteristics, whilst Black employees saw a pay disadvantage of around 3 per cent. Indian males experienced a pay advantage of over 10 per cent in both sectors but this was largely accounted for by their characteristics. There was a similar picture for Chinese/Other Asian males in the public sector, but this group had slightly lower average earnings than UK-born White workers in the private sector. In this respect, the findings are consistent with suggestions that the public sector leads the private sector in relation

to pay equality and would support government policy targeted on EPGs in the private sector. Even within the public sector, though, affirmative action would seem to be warranted. For one, and this resonates with the views of the *Commission on Race and Ethnic Disparities* that the BAME acronym is unhelpful, there are considerable variations in EPGs across (and even within) ethnic groups. The need to monitor these groups separately would seem paramount. Second, given the stark contrast in findings based upon raw and unexplained EPGs in the public sector, this would highlight the need to consider composition effects carefully when looking at raw EPGs (which in themselves might be misleading).

For females, there are generally small ethnic pay differentials in the private sector apart from Indians and the Pakistani/Bangladeshi group. However, the direction of the gap is different for these two groups, with Indian females earning significantly more than UK-born Whites and Pakistanis/Bangladeshis earning significantly less. There are also only small EPGs for females in the public sector, with the only significant differences compared to the UK-born White group observed for Non-UK born Whites and Indians, who earn between 3 and 5 per cent more. As was the case for males, these gaps could more than be explained by the greater endowments of productivity enhancing characteristics.

The decomposition analysis for the PRBs is based on combining male and female workers. We are also unable to consider the PRBs individually, apart from those in the NHS, because the number of observations was insufficient to compare pay differentials by ethnic groups in the non-NHS PRBs. For the PRBs as a whole, both Non-UK born White and Non-White Ethnic Minority workers have slightly higher average pay than UK-born Whites. These small pay advantages of 2 and 3 per cent respectively can again be more than explained by the characteristic effects for both of these groups. Similar patterns are also observed if the PRBs are split into those within and outside the NHS. Quantile regression analysis that compares EPGs across the distribution relative to UK born Whites also reveals that Non-UK born White, Indian, Pakistani/Bangladeshi and Other groups working in the NHS experience the highest pay advantages at the upper percentiles (75th and 90th). In contrast, the lower pay received by Black workers in the NHS is found to exist across at each point across the distribution.

Limitations and Extensions

The empirical analysis has been undertaken at the UK level. It would also have been interesting to observe whether EPGs vary across different parts of the UK. Not only would these be useful findings for the devolved nations (and their governments) but also for those areas that have large concentrations of particular ethnic minority groups. The limited number of observations has also dictated the choice of ethnic groups to be compared to a certain extent, therefore analysis that considers more disaggregated groups would also likely uncover some interesting nuances. Examples could include

splitting Other Asians into its largest groupings/nationalities. The availability of suitable administrative data may enable such extensions to be undertaken – even if these data may only permit the identification of more detailed EPGs rather than allowing for the application of the more advanced techniques that have been used in this report.

It would also be useful to examine the impact of potentially relevant variables that are not available in the APS. These include (English) language ability, especially for workers in the PRBs who were born overseas. In addition, it would be interesting to establish the extent to which particular overseas qualifications are (under) valued in the UK labour market. For the PRBs, then this is likely be most relevant for medical and health-related qualifications in the NHS. In addition, the APS does not contain any information on trade unions - although questions are asked in one quarter of the Labour Force Survey each year. This aspect of the public sector/PRBs may achieve greater prominence given the recent industrial action that has taken place across the UK, predominantly because of the increased cost of living that employees have experienced over the past couple of years.

The availability of detailed administrative data should provide more accurate information than surveys - including on wages. Moreover, administrative data containing the population of workers will not be subject to sampling variations, and this should enable analysis using finer ethnic categories. Future work could also usefully consider the complex selection processes that determine employment, sector and PRB and how this differs by ethnicity. This is not only important for analysis of EPGs but in understanding differences in workforce composition by ethnicity.

Our findings relate to a period just before the COVID-19 pandemic and there will have been different impacts of the pandemic on the workforce between sectors and across PRBs. In addition, there have been changes resulting from the UK's decision to leave the EU in the 2016 referendum. The Withdrawal Agreement is already likely to have had some effect, with the potential for this to continue in the future. This includes changes in immigration rules and procedures towards EU citizens that were put in place prior to the UK leaving the EU and then after it left. For example, the EU Settlement Scheme was introduced in 2018 and required the vast majority of migrants from the EU living in the UK to register for either settled or pre-settled status. This as well as other factors (such as increased harassment and a decrease in the sense of belonging) has contributed to a fall in the EU-born population in the UK since 2019, especially amongst those born in Central and Eastern European countries such as Poland (Barnard *et al.*, 2022). Newly arrived EU migrants looking to work in the UK have also been subject to the same immigration rules as citizens from outside the EU since January 2021, rather than having the freedom of movement to the UK. As a result, there is likely to be a relative shift in the areas of origin of workers in the UK labour market, including in the PRBs, in future years. This could lead to a rise in workers from continents such as Africa and Asia, with an accompanying increase in the size of related ethnic groups. Therefore, it is likely that the pay differences between

ethnic groups will need to be monitored and potentially updated to ensure that the results in this report remain.

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Appendices

Appendix Table A1: Identifiable Pay Review Bodies in the APS

Review Body[i]	National coverage	Occupation	SOC 2010 code	Sector[ii]	SIC 2007 code[iii]
Review Body on Doctors' and Dentists' Remuneration[iv]	United Kingdom	Medical practitioners	2211	Public	
		Dental practitioners	2215	Public	
NHS Pay Review Body	United Kingdom	Psychologists	2212	Public	
		Pharmacists	2213	Public	
		Ophthalmic opticians	2214	Public	
		Medical radiographers	2217	Public	
		Podiatrists	2218	Public	
		Health professionals n.e.c.	2219	Public	
		Physiotherapists	2221	Public	
		Occupational therapists	2222	Public	
		Speech and language therapists	2223	Public	
		Therapy professionals n.e.c.	2229	Public	
		Nurses	2231	Public	
		Midwives	2232	Public	
		Paramedics	3213	Public	
		Medical and dental technicians	3218	Public	
		Nursing auxiliaries and HCAs	6141	Public	
		Ambulance staff	6142	Public	
		Dental nurses	6143	Public	
		Non-medical staff: Managers	1000s	Public	86.10/1 Hospital activities[vi]
		Non-medical staff: Professionals	2000s	Public	86.10/1 Hospital activities
		Non-medical staff: Assoc Prof and Technical	3000s	Public	86.10/1 Hospital activities
		Non-medical staff: Admin and clerical	4000s	Public	86.10/1 Hospital activities
		Non-medical staff: Skilled trades	5000s	Public	86.10/1 Hospital activities
		Non-medical staff: Personal and protective service	6000s	Public	86.10/1 Hospital activities
		Non-medical staff: Sales	7000s	Public	86.10/1 Hospital activities

		Non-medical staff: Routine operatives and drivers	8000s	Public	86.10/1 Hospital activities
		Non-medical staff: Elementary	9000s	Public	86.10/1 Hospital activities
Police Remuneration Review Body	England, Wales and Northern Ireland	Senior police officers	1172	Local authority only	
		Police officers (sergeant and below)	3312	Local authority only[vii]	
Prison Service Pay Review Body	England, Wales and Northern Ireland	Operational managers	1173	Public	84.23 Justice and judicial activities
		Prison officers	3314	Public	
School Teachers' Pay Review Body[viii]	England and Wales	Secondary education teaching professionals	2314	Public	85.3 Secondary education
		Primary and nursery education teaching professionals	2315	Public	85.2 Primary education
		Special needs education teaching professionals	2316	Public	85.2 or 85.3 Primary or Secondary education
		Senior professionals of educational establishments	2317	Public	85.2 or 85.3 Primary or Secondary education
Armed Forces' Pay Review Body	United Kingdom	Officers in UK armed forces	1171	Public	
		COs and other ranks, UK armed forces	3311	Public	

Notes: reproduced from Jones and Kaya (2019) [i] the Senior Salaries PRB and National Crime Agency Remuneration Review Body are excluded from the table as these occupations cannot be identified separately; [ii] in some occupations (e.g., teachers), there are practitioners both within the PRB system (e.g., in state schools) and those outside it (e.g., private schools). In these cases, the adjusted self-reported information on sector is used to identify the remit group; [iii] some occupation codes capture a group of jobs across different industrial activities (e.g., SOC2010=1173 Senior officers in fire, ambulance, prison and related services). In this case, the Standard Industrial Classification (2007) can be used to identify the remit group; [iv] some General Practitioners covered by the Doctors' and Dentists' Review Body are excluded from the analysis as the APS does not contain earnings on the self-employed.

Appendix Table A2: Variable Means Pooled Across Sectors and Gender by Ethnic Group

	UK-born White	Non UK-born White	Black	Indian	Pakistani/ Bangladeshi	Chinese/ Other Asian	Other
Log (hourly earnings)	2.553	2.535	2.484	2.671	2.409	2.552	2.527
Age (years)	43.047	39.410	42.550	40.797	37.525	40.998	39.007
Illness	0.306	0.198	0.229	0.218	0.249	0.206	0.248
Qualifications – degree	0.334	0.447	0.444	0.573	0.474	0.556	0.468
Qualifications – other HE	0.108	0.097	0.115	0.078	0.063	0.068	0.089
Qualifications – A-level	0.241	0.130	0.149	0.104	0.149	0.087	0.135
Qualifications – GCSE	0.220	0.077	0.133	0.101	0.130	0.065	0.116
Qualifications – other	0.053	0.192	0.106	0.093	0.118	0.155	0.136
Qualifications – none	0.044	0.057	0.052	0.051	0.067	0.068	0.055
Single	0.343	0.360	0.377	0.152	0.197	0.224	0.383
Married	0.527	0.534	0.467	0.779	0.724	0.695	0.508
Other marital status	0.127	0.103	0.155	0.069	0.078	0.077	0.105
Work region – NE	0.070	0.027	0.021	0.017	0.031	0.038	0.026
Work region – NW	0.133	0.080	0.091	0.089	0.211	0.085	0.093
Work region – Y/H	0.088	0.067	0.048	0.035	0.092	0.047	0.066
Work region – E Mids	0.050	0.058	0.071	0.115	0.053	0.038	0.052
Work region –W Mids	0.071	0.063	0.114	0.155	0.113	0.060	0.073
Work region – Eastern	0.060	0.084	0.078	0.059	0.082	0.076	0.066
Work region – London	0.063	0.201	0.380	0.283	0.226	0.298	0.298
Work region – SE	0.109	0.148	0.109	0.158	0.118	0.172	0.139
Work region – SW	0.092	0.095	0.039	0.043	0.018	0.071	0.084
Work region – S/W/NI	0.264	0.177	0.048	0.047	0.056	0.114	0.103
Firm size 1-24	0.319	0.277	0.278	0.230	0.379	0.320	0.326
Firm size 25-499	0.485	0.506	0.453	0.457	0.414	0.402	0.445
Firm size 500+	0.196	0.217	0.269	0.313	0.207	0.279	0.229
Tenure (years)	9.446	5.647	6.262	7.392	6.015	6.559	5.671
Full-time employment	0.757	0.819	0.765	0.817	0.696	0.758	0.775
Permanent contract	0.965	0.944	0.918	0.948	0.939	0.949	0.934
Occupation – senior	0.327	0.319	0.307	0.435	0.287	0.382	0.329
Occupation – higher skilled	0.352	0.284	0.260	0.269	0.293	0.260	0.291

Occupation – intermediate	0.234	0.234	0.295	0.197	0.291	0.222	0.241
Occupation – elementary	0.087	0.163	0.137	0.099	0.129	0.136	0.139
Public sector	0.275	0.145	0.314	0.243	0.248	0.239	0.209
Total observations	111,780	11,449	2,848	3,105	1,919	1,770	2,705

Notes: see Appendix Table A3 for variable definitions.

Appendix Table A3: Variable Definitions in Empirical Analysis

Group	Description
Earnings	The natural logarithm of gross hourly earnings in main job. Hourly earnings are defined as gross weekly earnings divided by the sum of weekly usual hours and weekly usual overtime hours. Earnings are top coded at £80/hour.
Gender	A dummy variable denoting the gender of the respondent.
Other controls	A set of dummy variables denoting month of interview (12), year of interview (3) and a proxy respondent (1).
Age	Age of the respondent in years, and its square
Qualifications	A series of dummy variables denoting the highest educational qualification of the respondent: 1 – degree or equivalent; 2 – other HE below degree level; 3 – A-level or equivalent; 4 – GCSE or equivalent; 5 – other qualification; 6 – none.
Illness	A dummy variable denoting the respondent has an illness/disability that has lasted longer than 12 months.
Marital status	A series of dummy variables denoting the marital status of the respondent: 1 – married; 2 – widowed, divorced, or separated; 3 – single.
Region of work	A series of dummy variables denoting the region of work of the respondent: 1 – North East; 2 – North West; 3 – Yorkshire & Humberside; 4 – East Midlands; 5 – West Midlands; 6 – Eastern; 7 – London; 8 – South East; 9 – South West; 10 – Wales, Scotland, and Northern Ireland.
Firm size	A series of dummy variables denoting the size of form the respondent works at: 1 – under 25 employees; 2 – 25-499 employees; 3 – 500+ employees.
Tenure	Number of years tenure of the respondent with current employer, and its square.
Employment	A set of dummy variables denoting full-time employment and permanent employment of the respondent.
Occupation	A series of dummy variables denoting the occupation of the respondent: 1 – managers, directors, senior officers, and professionals; 2 – associate professionals, technical occupations, administrative occupations, and skilled trades; 3 – caring, leisure, sales, and customer service; 4 – elementary occupations.
Public sector	A dummy variable denoting that the respondent works in the public sector.

Appendix Table A4: Blinder-Oaxaca Decomposition Analysis Pooled Across Sectors for Males with Occupation Controls Excluded

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	0.029***	0.143***	-0.126***	0.202***	0.016	0.060***
	(0.009)	(0.014)	(0.016)	(0.017)	(0.023)	(0.017)
Explained	-0.057***	-0.141***	-0.254***	-0.063***	-0.184***	-0.076***
	(0.006)	(0.011)	(0.009)	(0.012)	(0.014)	(0.011)
Unexplained	0.086***	0.284***	0.128***	0.266***	0.200***	0.136***
	(0.007)	(0.013)	(0.013)	(0.015)	(0.019)	(0.015)
Breakdown of explained component						
Other controls	-0.001**	-0.003***	-0.003***	-0.003***	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.000	-0.018***	-0.016***	0.005	-0.012***	0.008**
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)
Illness	-0.007***	-0.005***	-0.005***	-0.002**	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	0.000	-0.031***	-0.090***	-0.031***	-0.062***	-0.023***
	(0.004)	(0.006)	(0.006)	(0.007)	(0.009)	(0.007)
Marital status	0.001	-0.002	-0.035***	-0.031***	-0.021***	0.002
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Region of work	-0.057***	-0.107***	-0.090***	-0.057***	-0.102***	-0.089***
	(0.002)	(0.005)	(0.004)	(0.005)	(0.006)	(0.005)
Firm size	-0.008***	-0.011***	-0.026***	0.010***	-0.007**	0.000
	(0.001)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
Tenure	0.025***	0.021***	0.014***	0.023***	0.017***	0.024***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Employment	-0.002***	0.011***	-0.000	0.024***	0.010***	0.011***
	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)
Public sector	-0.008***	0.004***	-0.002**	-0.002*	-0.001	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Total observations	57,630	5,3656	53,986	53,546	53,198	53,719
UK-born White	52,415	52,415	52,415	52,415	52,415	52,415
Other ethnicity	5,215	1,241	1,571	1,131	783	1,304

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Appendix Table A5: Blinder-Oaxaca Decomposition Analysis in the Private Sector for Males with Occupation Controls Excluded

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	0.033***	0.182***	-0.113***	0.254***	0.041	0.073***
	(0.009)	(0.016)	(0.017)	(0.018)	(0.026)	(0.019)
Explained	-0.069***	-0.128***	-0.277***	-0.052***	-0.186***	-0.082***
	(0.007)	(0.013)	(0.011)	(0.014)	(0.017)	(0.013)
Unexplained	0.102***	0.310***	0.164***	0.307***	0.227***	0.155***
	(0.008)	(0.016)	(0.014)	(0.016)	(0.021)	(0.016)
Breakdown of explained component						
Other controls	-0.001**	-0.004***	-0.004***	-0.003**	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Age	-0.003	-0.017***	-0.018***	0.003	-0.013***	0.005
	(0.002)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)
Illness	-0.007***	-0.006***	-0.006***	-0.002***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.005	-0.023***	-0.095***	-0.023***	-0.059***	-0.024***
	(0.004)	(0.007)	(0.006)	(0.008)	(0.010)	(0.007)
Marital status	-0.000	-0.000	-0.039***	-0.034***	-0.023***	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Region of work	-0.060***	-0.106***	-0.101***	-0.060***	-0.113***	-0.098***
	(0.003)	(0.006)	(0.005)	(0.005)	(0.007)	(0.006)
Firm size	-0.012***	-0.009***	-0.026***	0.015***	-0.002	0.004
	(0.001)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Tenure	0.022***	0.018***	0.011***	0.021***	0.017***	0.022***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Employment	-0.002*	0.018***	0.000	0.031***	0.014***	0.015***
	(0.001)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
Total observations	47,747	43,955	44,318	43,948	43,648	44,118
UK-born White	42,999	42,999	42,999	42,999	42,999	42,999
Other ethnicity	4,748	956	1,319	949	649	1,119

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Appendix Table A6: Blinder-Oaxaca Decomposition Analysis in the Public Sector for Males with Occupation Controls Excluded

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	-0.099***	0.034	-0.206***	-0.079*	-0.110**	-0.044
	(0.025)	(0.030)	(0.041)	(0.046)	(0.054)	(0.047)
Explained	-0.066***	-0.129***	-0.150***	-0.122***	-0.176***	-0.071***
	(0.013)	(0.017)	(0.016)	(0.022)	(0.023)	(0.022)
Unexplained	-0.033	0.163***	-0.055	0.042	0.065	0.027
	(0.022)	(0.029)	(0.039)	(0.042)	(0.050)	(0.044)
Breakdown of explained component						
Other controls	0.000	0.000	0.001	-0.003	-0.002	-0.000
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Age	-0.003	-0.012***	-0.011***	0.007	-0.007	0.013**
	(0.003)	(0.003)	(0.004)	(0.006)	(0.005)	(0.006)
Illness	-0.003**	-0.005***	-0.003	0.001	-0.005**	-0.007***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Qualifications	-0.035***	-0.044***	-0.073***	-0.081***	-0.083***	-0.040***
	(0.009)	(0.012)	(0.012)	(0.013)	(0.016)	(0.014)
Marital status	-0.000	-0.005*	-0.020***	-0.019***	-0.015***	0.006
	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)	(0.004)
Region of work	-0.037***	-0.090***	-0.044***	-0.038***	-0.053***	-0.049***
	(0.005)	(0.009)	(0.008)	(0.009)	(0.010)	(0.009)
Firm size	-0.010***	-0.008**	-0.027***	-0.014***	-0.022***	-0.021***
	(0.003)	(0.003)	(0.004)	(0.005)	(0.006)	(0.004)
Tenure	0.025***	0.040***	0.029***	0.030***	0.011*	0.029***
	(0.004)	(0.005)	(0.005)	(0.006)	(0.007)	(0.006)
Employment	-0.003**	-0.004**	-0.003	-0.004	0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Total observations	9,883	9,701	9,668	9,598	9,550	9,601
UK-born White	9,416	9,416	9,416	9,416	9,416	9,416
Other ethnicity	467	285	252	182	134	185

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Appendix Table A7: Blinder-Oaxaca Decomposition Analysis Pooled Across Sectors for Females with Occupation Controls Excluded

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	0.006	0.002	-0.095***	0.116***	-0.019	-0.001
	(0.007)	(0.012)	(0.015)	(0.020)	(0.019)	(0.014)
Explained	-0.083***	-0.148***	-0.199***	-0.061***	-0.160***	-0.102***
	(0.005)	(0.009)	(0.009)	(0.012)	(0.011)	(0.010)
Unexplained	0.089***	0.150***	0.103***	0.177***	0.141***	0.101***
	(0.006)	(0.012)	(0.013)	(0.019)	(0.017)	(0.012)
Breakdown of explained component						
Other controls	-0.000	0.001	-0.003***	-0.003**	-0.002	-0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.001	-0.014***	-0.014***	0.013***	-0.012***	0.005*
	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)
Illness	-0.004***	-0.003***	-0.003***	-0.003***	-0.004***	-0.002***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)
Qualifications	-0.038***	-0.035***	-0.069***	-0.035***	-0.059***	-0.044***
	(0.003)	(0.006)	(0.006)	(0.008)	(0.008)	(0.006)
Marital status	0.000	0.007***	-0.017***	-0.010***	-0.011***	0.003***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.054***	-0.117***	-0.081***	-0.065***	-0.081***	-0.085***
	(0.002)	(0.005)	(0.004)	(0.005)	(0.005)	(0.004)
Firm size	-0.006***	-0.015***	-0.021***	0.001	-0.013***	-0.006***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Tenure	0.036***	0.031***	0.018***	0.032***	0.028***	0.037***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Employment	-0.010***	-0.004***	-0.008***	0.008***	-0.005***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Public sector	-0.006***	0.001	-0.001**	0.000	-0.002***	-0.003***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Total observations	65,410	60,800	60,727	59,984	60,179	60,592
UK-born White	59,196	59,196	59,196	59,196	59,196	59,196
Other ethnicity	6,214	1,604	1,531	788	983	1,396

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, ***p<0.01.

Appendix Table A8: Blinder-Oaxaca Decomposition Analysis in the Private Sector for Females with Occupation Controls Excluded

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	-0.017**	0.025	-0.124***	0.154***	-0.020	-0.014
	(0.00*	(0.017)	(0.018)	(0.025)	(0.024)	(0.017)
Explained	-0.124***	-0.150***	-0.264***	-0.085***	-0.184***	-0.138***
	(0.006)	(0.012)	(0.011)	(0.015)	(0.014)	(0.012)
Unexplained	0.107***	0.175***	0.139***	0.239***	0.165***	0.124***
	(0.008)	(0.016)	(0.016)	(0.024)	(0.021)	(0.015)
Breakdown of explained component						
Other controls	-0.000	0.001	-0.004***	-0.003**	-0.002*	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Age	-0.006***	-0.018***	-0.016***	0.021***	-0.019***	0.003
	(0.002)	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)
Illness	-0.005***	-0.002***	-0.004***	-0.004***	-0.005***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.044***	-0.023***	-0.085***	-0.042***	-0.054***	-0.053***
	(0.004)	(0.007)	(0.007)	(0.009)	(0.009)	(0.007)
Marital status	-0.002***	0.008***	-0.024***	-0.012***	-0.017***	0.002
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Region of work	-0.061***	-0.132***	-0.107***	-0.081***	-0.095***	-0.100***
	(0.003)	(0.007)	(0.006)	(0.007)	(0.006)	(0.006)
Firm size	-0.016***	-0.008***	-0.026***	0.000	-0.006*	-0.009***
	(0.001)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Tenure	0.024***	0.023***	0.012***	0.028***	0.018***	0.028***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Employment	-0.013***	0.001	-0.009***	0.008***	-0.003	-0.006***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Total observations	42,922	38,896	38,929	38,396	38,596	38,918
UK-born White	37,901	37,901	37,901	37,901	37,901	37,901
Other ethnicity	5,021	995	1,028	495	695	1,017

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Appendix Table A9: Blinder-Oaxaca Decomposition Analysis in the Public Sector for Females with Occupation Controls Excluded

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	-0.034**	-0.028***	-0.051**	0.056	-0.054	-0.015
	(0.015)	(0.018)	(0.025)	(0.035)	(0.034)	(0.028)
Explained	-0.081***	-0.114***	-0.082***	-0.008	-0.130***	-0.057***
	(0.009)	(0.013)	(0.014)	(0.018)	(0.017)	(0.016)
Unexplained	0.047***	0.086***	0.030	0.064*	0.076**	0.042*
	(0.013)	(0.018)	(0.023)	(0.033)	(0.032)	(0.025)
Breakdown of explained component						
Other controls	-0.001	-0.000	-0.002	-0.002	-0.002	-0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Age	-0.003	-0.006***	-0.009***	0.003	-0.001	0.002
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.003)
Illness	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.075***	-0.051***	-0.031***	-0.013	-0.084***	-0.038***
	(0.007)	(0.009)	(0.011)	(0.014)	(0.013)	(0.012)
Marital status	-0.000	0.005***	-0.007***	-0.005***	-0.004***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.034***	-0.080***	-0.033***	-0.034***	-0.047***	-0.048***
	(0.003)	(0.007)	(0.005)	(0.006)	(0.007)	(0.006)
Firm size	-0.008***	-0.016***	-0.016***	0.001	-0.026***	-0.011***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Tenure	0.043***	0.045***	0.025***	0.038***	0.042***	0.043***
	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)
Employment	-0.002*	-0.008***	-0.006***	0.007***	-0.006***	-0.005**
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Total observations	22,488	21,904	21,798	21,588	21,583	21,674
UK-born White	21,295	21,295	21,295	21,295	21,295	21,295
Other ethnicity	1,193	609	503	293	288	379

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Appendix Table A10: Blinder-Oaxaca Decomposition Analysis Pooled Across Sectors and Gender

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	0.019***	0.070***	-0.118***	0.144***	0.002	0.026**
	(0.006)	(0.009)	(0.011)	(0.013)	(0.015)	(0.011)
Explained	-0.037***	-0.087***	-0.205***	-0.037***	-0.133***	-0.062***
	(0.004)	(0.007)	(0.007)	(0.009)	(0.010)	(0.008)
Unexplained	0.056***	0.157***	0.087***	0.181***	0.134***	0.087***
	(0.004)	(0.008)	(0.008)	(0.011)	(0.011)	(0.009)
Breakdown of explained component						
Gender	0.002***	0.005***	-0.005***	-0.017***	0.004**	-0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Other controls	-0.000	-0.001**	-0.000	-0.001	0.001	-0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	0.001	-0.013***	-0.012***	0.011***	-0.009***	0.007***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Illness	-0.004***	-0.003***	-0.004***	-0.002***	-0.004***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Qualifications	-0.014***	-0.021***	-0.050***	-0.021***	-0.038***	-0.022***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Marital status	0.000	0.004***	-0.019***	-0.015***	-0.012***	0.002***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.048***	-0.100***	-0.074***	-0.052***	-0.079***	-0.077***
	(0.001)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Firm size	-0.007***	-0.012***	-0.022***	0.005***	-0.009***	-0.003*
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Tenure	0.024***	0.020***	0.012***	0.021***	0.018***	0.024***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment	-0.003***	0.003***	-0.003***	0.006***	0.001	0.001
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Occupation	0.021***	0.029***	-0.027***	0.031***	-0.001	0.015***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Public sector	-0.010***	0.003***	-0.002***	-0.002***	-0.003***	-0.005***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Total observations	123,040	114,456	114,713	113,530	113,377	114,311
UK-born White	111,611	111,611	111,611	111,611	111,611	111,611
Other ethnicity	11,429	2,845	3,102	1,919	1,766	2,700

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Appendix Table A11: Blinder-Oaxaca Decomposition in the Private Sector Pooled Across Gender

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	0.018***	0.111***	-0.125***	0.191***	0.021	0.033***
	(0.006)	(0.012)	(0.013)	(0.014)	(0.017)	(0.033)
Explained	-0.050***	-0.062***	-0.241***	-0.038***	-0.129***	-0.070***
	(0.005)	(0.009)	(0.009)	(0.011)	(0.012)	(0.009)
Unexplained	0.068***	0.173***	0.116***	0.229***	0.150***	0.103***
	(0.005)	(0.010)	(0.010)	(0.012)	(0.013)	(0.010)
Breakdown of explained component						
Gender	0.006***	0.006***	-0.004***	-0.018***	0.007***	0.001
	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Other controls	-0.000	-0.002**	-0.000	-0.000	0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.002*	-0.014***	-0.014***	0.010***	-0.013***	0.005**
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
Illness	-0.005***	-0.003***	-0.004***	-0.003***	-0.004***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Qualifications	-0.018***	-0.016***	-0.058***	-0.021***	-0.037***	-0.026***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)
Marital status	-0.001*	0.005***	-0.025***	-0.019***	-0.016***	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.052***	-0.104***	-0.089***	-0.059***	-0.090***	-0.086***
	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Firm size	-0.014***	-0.008***	-0.027***	0.009***	-0.004	-0.002
	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Tenure	0.018***	0.016***	0.009***	0.018***	0.014***	0.019***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment	-0.002***	0.008***	-0.002**	0.007***	0.004***	0.003***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Occupation	0.021***	0.052***	-0.027***	0.038***	0.010**	0.018***
	(0.002)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)
Total observations	90,669	82,851	83,247	82,344	82,244	83,036
UK-born White	80,900	80,900	80,900	80,900	80,900	80,900
Other ethnicity	9,769	1,951	2,347	1,444	1,344	2,136

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Appendix Table A12: Blinder-Oaxaca Decomposition in the Public Sector Pooled Across Gender

	(1) Non UK-born White	(2) Black	(3) Indian	(4) Pakistani/ Bangladeshi	(5) Chinese/ Other Asian	(6) Other
Difference	-0.048***	-0.010	-0.107***	-0.009	-0.073***	-0.028
	(0.013)	(0.015)	(0.021)	(0.027)	(0.027)	(0.023)
Explained	-0.068***	-0.105***	-0.111***	-0.042***	-0.148***	-0.060***
	(0.008)	(0.011)	(0.012)	(0.016)	(0.016)	(0.015)
Unexplained	0.020**	0.095***	0.004	0.033	0.074***	0.032
	(0.010)	(0.014)	(0.017)	(0.023)	(0.023)	(0.020)
Breakdown of explained component						
Gender	0.004**	-0.002	-0.004	-0.011***	-0.002	-0.003
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Other controls	-0.001	-0.001	0.000	-0.002	0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.001	-0.007***	-0.008***	0.008**	-0.001	0.007**
	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Illness	-0.002***	-0.003***	-0.002***	-0.001**	-0.003***	-0.002***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.034***	-0.027***	-0.026***	-0.026***	-0.047***	-0.021***
	(0.003)	(0.004)	(0.005)	(0.006)	(0.006)	(0.005)
Marital status	-0.000	0.003***	-0.008***	-0.007***	-0.005***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.031***	-0.075***	-0.032***	-0.031***	-0.043***	-0.043***
	(0.003)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)
Firm size	-0.006***	-0.010***	-0.014***	-0.004**	-0.018***	-0.010***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Tenure	0.030***	0.035***	0.021***	0.027***	0.024***	0.030***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Employment	-0.001	-0.004***	-0.003***	0.002*	-0.003***	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Occupation	-0.025***	-0.014**	-0.035***	0.002	-0.050***	-0.017**
	(0.004)	(0.006)	(0.006)	(0.008)	(0.009)	(0.008)
Total observations	32,371	31,605	31,466	31,186	31,133	31,275
UK-born White	30,711	30,711	30,711	30,711	30,711	30,711
Other ethnicity	1,660	894	755	475	422	564

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Appendix Table A13: RIF Quantile Decomposition Analysis Pooled Across Sectors and Gender

Percentile		(1) 10th	(2) 25th	(3) 50th	(4) 75th	(5) 90th
Non UK-born White (N=131,103)	Difference	0.008 (0.005)	0.034*** (0.005)	0.060*** (0.007)	0.001 (0.009)	-0.060*** (0.012)
	Explained	0.007*** (0.003)	0.010*** (0.003)	-0.021*** (0.005)	-0.078*** (0.005)	-0.141*** (0.006)
	Unexplained	0.000 (0.005)	0.024*** (0.004)	0.081*** (0.006)	0.078*** (0.008)	0.081*** (0.011)
Black (N=122,216)	Difference	0.014 (0.010)	0.035*** (0.009)	0.066*** (0.012)	0.114*** (0.013)	0.147*** (0.017)
	Explained	-0.006 (0.005)	0.003 (0.006)	-0.037*** (0.009)	-0.119*** (0.009)	-0.220*** (0.010)
	Unexplained	0.020** (0.010)	0.032*** (0.008)	0.103*** (0.010)	0.233*** (0.012)	0.367*** (0.017)
Indian (N=122,291)	Difference	-0.035*** (0.011)	-0.044*** (0.012)	-0.137*** (0.016)	-0.180*** (0.015)	-0.236*** (0.019)
	Explained	-0.057*** (0.005)	-0.094*** (0.005)	-0.204*** (0.008)	-0.285*** (0.009)	-0.357*** (0.010)
	Unexplained	0.022** (0.010)	0.050*** (0.010)	0.067*** (0.012)	0.105*** (0.013)	0.120*** (0.019)
Pakistani/ Bangladeshi (N=121,117)	Difference	0.105*** (0.014)	0.115*** (0.010)	0.017*** (0.014)	0.164*** (0.022)	0.129*** (0.024)
	Explained	0.039*** (0.006)	0.028*** (0.007)	-0.011 (0.010)	-0.075*** (0.011)	-0.149*** (0.012)
	Unexplained	0.066*** (0.013)	0.087*** (0.010)	0.186*** (0.012)	0.239*** (0.018)	0.277*** (0.023)
Chinese/ Other Asian (N=120,941)	Difference	0.024* (0.013)	0.052*** (0.013)	0.008 (0.020)	-0.034 (0.021)	-0.103*** (0.029)
	Explained	-0.015** (0.006)	-0.031*** (0.007)	-0.112*** (0.011)	-0.203*** (0.012)	-0.287*** (0.013)
	Unexplained	0.038*** (0.013)	0.083*** (0.011)	0.120*** (0.015)	0.169*** (0.018)	0.183*** (0.027)
Other (N=121,995)	Difference	0.046*** (0.011)	0.062*** (0.010)	0.063*** (0.014)	0.020 (0.018)	-0.044* (0.023)
	Explained	0.032*** (0.005)	0.023*** (0.006)	-0.022** (0.009)	-0.094*** (0.010)	-0.181*** (0.011)
	Unexplained	0.014 (0.011)	0.039*** (0.009)	0.085*** (0.011)	0.114*** (0.015)	0.137*** (0.021)

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Appendix Table A14: Blinder-Oaxaca Decomposition Analysis in PRB and Other Public Sector Occupations for Males

	PRBs		Other Public Sector	
	(1)	(2)	(3)	(4)
	Non UK-born White	NWE	Non UK-born White	NWE
Difference	-0.082*	-0.115***	-0.091***	0.022
	(0.043)	(0.026)	(0.033)	(0.024)
Explained	-0.052**	-0.104***	-0.057***	-0.094***
	(0.024)	(0.016)	(0.019)	(0.015)
Unexplained	-0.029	-0.011	-0.034	0.117***
	(0.036)	(0.024)	(0.028)	(0.021)
Breakdown of explained component				
Other controls	0.001	-0.001	-0.001	-0.002
	(0.004)	(0.002)	(0.002)	(0.002)
Age	-0.003	-0.007**	-0.003	0.001
	(0.005)	(0.004)	(0.004)	(0.003)
Illness	-0.003*	-0.003**	-0.002	-0.002**
	(0.002)	(0.001)	(0.001)	(0.001)
Qualifications	-0.023***	-0.038***	-0.012*	-0.020***
	(0.008)	(0.006)	(0.007)	(0.006)
Marital status	0.005	-0.012***	-0.002	-0.005***
	(0.004)	(0.003)	(0.003)	(0.002)
Region of work	-0.013***	-0.020***	-0.049***	-0.082***
	(0.005)	(0.006)	(0.008)	(0.008)
Firm size	-0.010***	-0.013***	-0.002	-0.005*
	(0.003)	(0.004)	(0.003)	(0.003)
Tenure	0.031***	0.035***	0.015***	0.018***
	(0.008)	(0.005)	(0.004)	(0.003)
Employment	-0.001	-0.005*	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Occupation	-0.035***	-0.040***	0.001	0.006
	(0.012)	(0.009)	(0.009)	(0.007)
Total observations	3,004	3,365	6,879	7,089
UK-born White	2,815	2,815	6,601	6,601
Other ethnicity	189	550	278	488

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Appendix Table A15: Blinder-Oaxaca Decomposition Analysis in PRBs and Other Public Sector Occupations for Females

	PRBs		*Other Public Sector*	
	(1)	(2)	(3)	(4)
	Non UK-born White	NWE	Non UK-born White	NWE
Difference	-0.002	0.021	-0.020	-0.009
	(0.020)	(0.016)	(0.021)	(0.016)
Explained	-0.027**	-0.014	-0.065***	-0.053***
	(0.011)	(0.010)	(0.014)	(0.013)
Unexplained	0.025	0.035**	0.045***	0.043***
	(0.018)	(0.015)	(0.016)	(0.014)
Breakdown of explained component				
Other controls	-0.001	-0.001	-0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Age	-0.000	-0.000	-0.002	-0.003
	(0.003)	(0.003)	(0.002)	(0.002)
Illness	-0.002**	-0.002***	-0.001**	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.024***	-0.009*	-0.045***	-0.022***
	(0.006)	(0.005)	(0.005)	(0.004)
Marital status	-0.000	-0.001*	-0.000	-0.001
	(0.001)	(0.001)	(0.000)	(0.000)
Region of work	-0.025***	-0.033***	-0.032***	-0.057***
	(0.004)	(0.005)	(0.005)	(0.006)
Firm size	0.001	0.003**	-0.004**	-0.005***
	(0.001)	(0.002)	(0.002)	(0.002)
Tenure	0.032***	0.029***	0.035***	0.027***
	(0.004)	(0.003)	(0.003)	(0.003)
Employment	0.001	0.001	0.000	-0.001
	(0.001)	(0.001)	(0.002)	(0.001)
Occupation	-0.009*	-0.002	-0.015*	0.010*
	(0.005)	(0.004)	(0.008)	(0.006)
Total observations	9,153	9,649	13,335	13,718
UK-born White	8,563	8,563	12,732	12,732
Other ethnicity	590	1,086	603	986

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Appendix Table A16: Blinder-Oaxaca Decomposition Analysis in NHS and Non-NHS PRBs for Males

	NHS PRB		Non-NHS PRB	
	(1) Non UK- born White	(2) NWE	(3) Non UK- born White	(4) NWE
Difference	-0.123**	-0.167***	-0.078	-0.130***
	(0.061)	(0.032)	(0.063)	(0.049)
Explained	-0.108***	-0.187***	-0.037	-0.043*
	(0.034)	(0.023)	(0.031)	(0.025)
Unexplained	-0.015	0.020	-0.040	-0.087*
	(0.054)	(0.032)	(0.056)	(0.047)
Breakdown of explained component				
Other controls	0.001	-0.002	0.002	-0.001
	(0.007)	(0.004)	(0.006)	(0.005)
Age	0.004	-0.006	-0.011	-0.003
	(0.007)	(0.006)	(0.008)	(0.006)
Illness	-0.008**	-0.006**	-0.000	-0.003
	(0.004)	(0.003)	(0.002)	(0.003)
Qualifications	-0.053***	-0.076***	0.000	-0.004
	(0.014)	(0.010)	(0.011)	(0.008)
Marital status	0.006	-0.018***	-0.000	-0.002
	(0.006)	(0.005)	(0.006)	(0.005)
Region of work	-0.024**	-0.030**	-0.003	-0.008
	(0.011)	(0.012)	(0.007)	(0.007)
Firm size	-0.012***	-0.010***	-0.007	-0.013**
	(0.005)	(0.004)	(0.005)	(0.005)
Tenure	0.035***	0.032***	0.014	0.033***
	(0.009)	(0.007)	(0.014)	(0.011)
Employment	-0.003	-0.006	-0.001	-0.002
	(0.004)	(0.004)	(0.003)	(0.003)
Occupation	-0.054***	-0.066***	-0.030**	-0.040***
	(0.016)	(0.011)	(0.015)	(0.011)
Total observations	1,479	1,782	1,525	1,583
UK-born White	1,355	1,355	1,460	1,460
Other ethnicity	124	427	65	123

Notes: robust standard errors in parenthesis; reference group is UK-born White; * p<0.1, ** p<0.05, *** p<0.01.

Appendix Table A17: Blinder-Oaxaca Decomposition Analysis in NHS and Non-NHS PRBs for Females

	NHS PRB		Non-NHS PRB	
	(1) Non UK-born White	(2) NWE	(3) Non UK-born White	(4) NWE
Difference	-0.020	0.009	-0.009	-0.044
	(0.023)	(0.017)	(0.045)	(0.042)
Explained	-0.040***	-0.043***	0.018	0.011
	(0.013)	(0.011)	(0.018)	(0.017)
Unexplained	0.020	0.052***	-0.027	-0.055
	(0.021)	(0.017)	(0.044)	(0.042)
Breakdown of explained component				
Other controls	-0.001	-0.001	0.003	-0.001
	(0.002)	(0.001)	(0.005)	(0.003)
Age	0.007*	0.003	0.019***	0.004
	(0.004)	(0.003)	(0.007)	(0.007)
Illness	-0.002**	-0.003***	0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Qualifications	-0.035***	-0.022***	-0.006	0.009
	(0.006)	(0.005)	(0.011)	(0.009)
Marital status	0.001	-0.002**	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Region of work	-0.028***	-0.037***	0.017**	-0.020**
	(0.006)	(0.007)	(0.008)	(0.008)
Firm size	-0.001	-0.002	0.006	-0.006
	(0.001)	(0.001)	(0.004)	(0.004)
Tenure	0.034***	0.031***	-0.022***	0.025***
	(0.004)	(0.004)	(0.006)	(0.006)
Employment	0.002	0.002*	-0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.002)
Occupation	-0.018***	-0.013***	0.001	-0.002
	(0.006)	(0.004)	(0.002)	(0.002)
Total observations	6,392	6,828	2,761	2,821
UK-born White	5,951	5,951	2,612	2,612
Other ethnicity	441	877	149	209

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Appendix Table A18: Single Equation Quantile Regression Analysis in the NHS PRB for Males

Percentile	(1) 10th	(2) 25th	(3) 50th	(4) 75th	(5) 90th
Non UK-born White	-0.092***	-0.013	0.005	0.082	0.095
	(0.029)	(0.038)	(0.039)	(0.057)	(0.059)
Black	-0.083*	-0.091***	-0.117***	-0.121***	-0.082***
	(0.043)	(0.025)	(0.036)	(0.057)	(0.024)
Indian	0.005	0.043	0.178***	0.207***	0.051**
	(0.025)	(0.040)	(0.061)	(0.037)	(0.026)
Pakistani/Bangladeshi	-0.085**	-0.041	0.161*	0.186***	0.099***
	(0.037)	(0.076)	(0.087)	(0.035)	(0.023)
Chinese/Other Asian	-0.019***	-0.198***	-0.124*	-0.038	-0.089**
	(0.059)	(0.063)	(0.063)	(0.055)	(0.035)
Other	-0.121	0.011	0.051	0.161***	0.045
	(0.099)	(0.032)	(0.091)	(0.035)	(0.040)
Total observations	1,906	1,906	1,906	1,906	1,906

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$; additional controls included but not reported for age, illness, qualifications, marital status, region of work, firm size, job tenure, employment status, occupation, month, year, and proxy response; total observations composed of 1,355 (UK-born White), 124 (Non UK-born White), 96 (Black), 121 (Indian), 62 (Pakistani/Bangladeshi), 81 (Chinese/Other Asian) and 67 (Other).

Appendix Table A19: Single Equation Quantile Regression Analysis in the NHS PRB for Females

Percentile	(1) 10th	(2) 25th	(3) 50th	(4) 75th	(5) 90th
Non UK-born White	-0.082**	-0.044**	-0.008	0.010	0.027
	(0.034)	(0.021)	(0.017)	(0.018)	(0.038)
Black	-0.099**	-0.095***	-0.076***	-0.054***	-0.090***
	(0.045)	(0.017)	(0.020)	(0.020)	(0.014)
Indian	-0.048	-0.046***	-0.004	0.065*	0.249***
	(0.045)	(0.016)	(0.020)	(0.036)	(0.092)
Pakistani/Bangladeshi	-0.092	-0.077***	-0.049	-0.010	-0.016
	(0.104)	(0.020)	(0.050)	(0.079)	(0.276)
Chinese/Other Asian	-0.078***	-0.071***	-0.066***	-0.090*	-0.033
	(0.026)	(0.020)	(0.020)	(0.049)	(0.052)
Other	-0.007	-0.028	-0.042**	0.012	0.119
	(0.022)	(0.026)	(0.020)	(0.035)	(0.125)
Total observations	7,269	7,269	7,269	7,269	7,269

Notes: robust standard errors in parenthesis; reference group is UK-born White; * $p<0.1$, ** $p<0.05$, *** $p<0.01$; additional controls included but not reported for age, illness, qualifications, marital status, region of work, firm size, job tenure, employment status, occupation, month, year, and proxy response; total observations composed of 5,951 (UK-born White), 441 (Non UK-born White), 275 (Black), 220 (Indian), 70 (Pakistani/Bangladeshi), 167 (Chinese/Other Asian) and 145 (Other).