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Is there a public sector earnings premium in UK healthcare?

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Abstract
Using data from the Annual Survey of Hours and Earnings, we provide the first estimates of intra-occupation sectoral hourly remuneration differentials in Britain. Focusing on healthcare, we find that public sector remuneration differentials for comparable workers vary substantially across occupations, with benchmark estimates from a premium of 34 per cent for care workers to no significant differential for medical secretaries. This variation, as well as differences in trends in intra-occupational estimates, illustrates the insights from intra-occupation estimates for government pay setting. Indeed, in stark contrast to national estimates of a relatively small public sector differential, we find sizeable and robust public sector premiums for doctors, auxiliary nurses and care workers.

KEYWORDS
public sector earnings premium, healthcare, remuneration

JEL CLASSIFICATION
I11, J31, J38, J45

1 | INTRODUCTION

Following a period of real pay erosion in the UK public sector during austerity (2011–17), below-inflation pay rises post COVID-19 intensified concerns about employee living standards. The resulting industrial action from nurses, doctors and other National Health Service (NHS) workers has further reinforced the public and policy debate regarding public sector pay. There are long-standing arguments for pay comparability between the public and private sectors based on grounds of efficiency and equity (Belman and Heywood, 1996). While efficiency refers to the balance between supporting recruitment, retention and the motivation of high-quality workers in the public sector to maintain service delivery and minimising public spending, equity focuses on the need for pay equality for equivalent work and

ensuring public sector workers are paid the 'market rate'.[1] Studies exploring national sectoral pay differences have, however, found evidence of an (adjusted) public sector pay premium which exists after accounting for differences in worker and job characteristics, albeit one that has declined over time and varies between groups of workers, including by gender and across the pay distribution (Cribb, Emmerson and Sibieta, 2014; Blackaby et al., 2018; Singleton, 2019; Murphy et al., 2020), and for different measures of 'pay' (Cribb and Emmerson, 2016; Boileau, O'Brien and Zaranko, 2022).

However, relatively little is known about specific occupations, particularly whether *within* professions, employees routinely earn more working in the public or private sector. This is despite evidence of significant heterogeneity in the occupational composition between sectors (Singleton, 2019), concerns about a lack of sectoral overlap in national studies (Bryson and Forth, 2017) and the occupational focus of public sector pay setting. Indeed, about half of UK public sector workers are covered by (eight) Pay Review Bodies (PRBs) which provide independent annual recommendations to government on levels of pay for their remit groups, including doctors and NHS staff.[2] We address this evidence gap using nationally representative and reliable payroll data from the Annual Survey of Hours and Earnings (ASHE) to provide the first estimates of intra-occupation public sector hourly remuneration differentials in Britain.[3] More specifically, we follow the standard earnings equation approach adopted in the UK literature but estimate public sector *remuneration* differentials *within* narrowly defined occupations. By focusing on hourly remuneration rather than pay, we consider the value of employer pension contributions, which are often neglected in the contemporary debate and, despite reforms, are typically more generous in the public than in the private sector. As such, they might compensate hourly wage differentials if there is sectoral alignment in 'total reward' (Danzer and Dolton, 2012). Our intra-occupation focus facilitates comparisons between more homogeneous workers, likely reducing the influence of between-sector unobservable heterogeneity relative to national studies that aggregate across a diverse range of occupations. This further facilitates exploration of variation in sectoral remuneration premiums *between* occupations, adding depth to the existing analysis of heterogeneity and specific information for government pay setting. Moreover, by analysing changes in the intra-occupational sectoral premiums between 2011 and 2018, we explore variation in the levels and *trends* between occupations.

Our focus is the healthcare industry given the presence of employment in both sectors and prominent policy debates around public sector pay, productivity and future healthcare demand and spending.[4] Collectively, this industry covers more than 3.5 million jobs, about 15 per cent of all employment and 34 per cent of public sector jobs in Britain. Our occupations include a diverse set of job roles, spanning both the earnings and skill distribution, and pay-setting arrangements, and thereby provide valuable insights into the potential drivers of sectoral remuneration differences. Moreover, they include core NHS occupations such as doctors and nurses and thus contribute vital evidence to contemporary debates on the remuneration of healthcare workers. Indeed, while recruitment shortages have motivated international analysis of the elasticity of labour supply in healthcare (for the UK, see Phillips (1995) for nurses and Ikenwilo and Scott (2007) for doctors), few studies have focused on pay determination within this industry and none to our knowledge on intra-occupation sectoral comparisons. This is despite recognition of the potential importance of private sector comparisons in evaluating pay efficiency within the NHS (Elliott, 2003). For example, Elliott et al. (2007) suggest relative pay influences service quality, finding a relationship between NHS nursing vacancy rates and

[1] In terms of efficiency, minimising public spending is required both to support other government priorities and to reduce the tax burden. As Boileau, O'Brien and Zaranko (2022) note, the public sector pay bill is significant, accounting for more than 20 per cent of government spending or 10 per cent of national income in 2021–22.

[2] For further information, see https://www.gov.uk/government/publications/pay-review-bodies-and-police-boards-introduction/an-introduction-to-pay-review-bodies-and-police-boards [accessed 15 November 2023].

[3] We do not have comparable information for Northern Ireland.

[4] Two PRBs are particularly relevant in this context. Pay recommendations for doctors and dentists working in the UK public sector are made by the Review Body on Doctors' and Dentists' Remuneration (DDRB), with the vast majority of other workers in the UK NHS (including nurses) covered by recommendations from the NHS Pay Review Body (NHSPRB).

local wage gaps measured between NHS nurses and private sector occupation comparators. Extending this line of inquiry to patient outcomes, Propper and Van Reenen (2010) further find that increases in local private sector wages outside of nursing increase mortality from emergency heart attacks.

Our analysis shows that national estimates of public sector remuneration differentials mask substantial variation across occupations. After adjusting for differences in observable personal and work-related characteristics across sectors, the public sector differential varies from a premium of 34 per cent for care workers to no significant sectoral differential for medical secretaries, confirming the potential insights from intra-occupation estimates for government pay setting. Indeed, in stark contrast to national estimates of a relatively small public sector remuneration differential, our evidence of sizeable and robust public sector premiums for doctors, auxiliary nurses and care workers suggests future analysis and scrutiny of intra-occupational sectoral differentials are required. Further exploration of the components of remuneration confirms that employer pension contributions play an important role in the public sector premiums, but that their role also varies *between* occupations. Our analysis also suggests that whilst the public sector remuneration premium has declined between 2011 and 2018 for most occupations, intra-occupation differences in *trends* are also evident.

The remainder of this paper is structured as follows. Section 2 provides an overview of existing evidence on public sector remuneration premiums in the UK. Section 3 introduces data from ASHE, and the specific measures and statistical methods adopted to estimate intra-occupational sectoral remuneration premiums. Section 4 presents estimates of these premiums, explores the role of elements of remuneration and traces trends in the premiums between 2011 and 2018. Section 5 briefly concludes.

2 | BACKGROUND

Evidence of a raw public sector pay premium in the UK as well as internationally has attracted considerable academic, policy and public attention. Econometric studies based on individual-level earnings equations (developed from the so-called 'people' approach – see Belman and Heywood (1996)), the dominant approach in the UK, have found an important role for differences in sectoral composition, particularly that public sector workers are more likely to work in skilled occupations (Singleton, 2019).[5] Adjusting for personal and work-related controls has generally been found to narrow sectoral wage differentials, and while there remains debate as to the true differential, with estimates dependent on data and model specification, national estimates in the UK generally suggest a positive but small adjusted public sector hourly pay premium (e.g. Cribb, Emmerson and Sibieta, 2014).

Extensions to this evidence, which consider broader measures of remuneration, highlight the importance of differences in the nature and value of workplace pensions (a deferred benefit) between sectors. Public sector remuneration premiums, which additionally include the value of employer pensions, tend to be larger than those based on hourly pay alone (Cribb and Emmerson, 2016; Boileau, O'Brien and Zaranko, 2022). This reflects both greater coverage and relative generosity of employer pension schemes in the public sector, with the majority of public sector employees in defined benefit schemes – where the benefits relate to salary and tenure – rather than defined contribution schemes, where the benefits directly relate to contributions (Boileau, O'Brien and Zaranko, 2022). With the exception of Danzer and Dolton (2012), who analyse sectoral differences in 'total reward' over the life cycle, few studies consider the value of other pecuniary and non-pecuniary benefits (at least partially due to data limitations) including, for example, paid holidays, health insurance and job security, which may also vary by sector.[6]

[5] For an extensive discussion of the role of occupation in the US, see Belman and Heywood (2004).

[6] Danzer and Dolton (2012) show that relative to employees in the private sector, those in the public sector have on average a higher number of paid holiday days, less generous employer-provided health insurance and lower risk of unemployment.

A consistent feature of the evidence relating to public sector earnings differentials has, however, been heterogeneity in the premium, particularly between groups of workers such as by gender and earnings levels, with the adjusted premium found to be greater for women and lower earners (Cribb, Emmerson and Sibieta, 2014; Murphy et al., 2020; Boileau, O'Brien and Zaranko, 2022). Despite this heterogeneity, studies have tended to focus on an aggregate public sector premium across occupations.[7] The extent to which such estimates, which are driven in part by occupations with a presence in only one sector, provide a reliable measure for specific occupations is therefore unknown, and it is this question we explore in the context of healthcare.[8]

Analysis of trends over time also documents a decline in the adjusted national premium during the period characterised by austerity, including the public sector pay freeze (2011–13) and public sector pay cap (2013–17), and has renewed concerns about worker recruitment and retention, and public service quality (Cribb, Emmerson and Sibieta, 2014; Murphy et al., 2020). The most recent analysis suggests a further decline leading to a small adjusted public sector pay penalty in 2021–22, albeit the adjusted remuneration premium remains positive at 6 per cent consistent with sectoral differences in the value of employer pension contributions (Boileau, O'Brien and Zaranko, 2022). Our analysis adds further depth to this evidence by examining the extent to which such trends are common across occupations.

3 | DATA AND METHOD

Our benchmark analysis utilises data from ASHE, the most accurate source of UK earnings data (Office for National Statistics, 2023), which contains detailed information from employer records, including the legal status of the enterprise and employee occupation, and for a large enough employee sample to explore detailed occupational groups. We focus on data from 2018 given the complexities in measurement introduced by COVID-19, but subsequently trace changes in our estimates since 2011.[9] Our estimates therefore pre-date any changes in work patterns or reward brought by the pandemic or subsequent cost-of-living crisis. The sample is restricted to working-age employees (aged 16–64) who are paid an adult rate, and whose earnings are not affected by absence. We retain employees who hold more than one job (less than 5 per cent of all employees) but explore the robustness of our results to this in Section 4. The estimates are weighted to be representative of the respective population, but the (unweighted) sample size (N) is also reported.[10] After excluding individuals with missing values for the variables used in the analysis, our maximum sample is 159,798 employee observations in 2018.[11]

Sector is measured according to the legal status of the enterprise from the Inter-Departmental Business Register (IDBR). The public sector, defined as public corporations and nationalised industries, central government and local authorities, where remuneration is determined in part by political decisions and budgetary pressure, is distinguished from the private and voluntary sectors, where, to a greater extent, remuneration is likely to reflect market forces.[12] It is possible for employees to hold more than one job, including potentially simultaneously holding roles within the public and private sectors. Our data, which are recorded at the job level, suggest that multiple job holding is

[7] Those that explore heterogeneity focus on administrative sections of the public sector (e.g. national or local government), particularly in the US (e.g. Belman and Heywood, 2004), and broad (Hundley, 1991; Mahuteau et al., 2017) rather than specific occupational groups. In the UK, sectoral differences in wage *growth* have, however, been explored between 'similar' occupations (Bryson and Forth, 2017).

[8] Unlike in the US, position-based approaches which generate national differentials by aggregating wage gaps across narrow occupations (Belman and Heywood, 1996) are not typical in the UK (see Elliott and Duffus (1996) for an exception).

[9] 2011 is the year from which our definition of occupation is consistent. 2018 is the latest confirmed data available at the time of writing. Section 4 explores the robustness of our findings to using provisional 2019 data.

[10] We explore the robustness of our findings to application of population weights in Section 4.

[11] For simplicity, we refer to these as employees throughout but recognise that an employee might hold multiple jobs.

[12] Section 4 explores the robustness of our results to exclusion of the voluntary sector.

limited in practice, with only about 7 per cent of public sector employees and 4 per cent of private sector employees being employed in another job but, as noted above, we explore the robustness of our analysis to multiple job holding.

We focus on five occupations in which at least 70 per cent work in 'healthcare' (defined by Standard Industrial Classification (SIC) (2007) section Q (Human health and social work activities)). We define each occupation by the most detailed, four-digit, Standard Occupational Classification (SOC) (2010) code to minimise heterogeneity. Each occupation has a sufficiently large sample in each sector (minimum 100 observations) to facilitate between-sector comparisons. This approach means comparisons are undertaken between more homogeneous workers, particularly in terms of training and job responsibilities, than national studies. Our occupations ('job title', SOC code) include doctors ('Medical practitioners', 2211), nurses ('Nurses', 2231), medical secretaries ('Medical secretaries', 4211), auxiliary nurses ('Nursing auxiliaries and assistants', 6141) and care workers ('Care workers and home carers', 6145).[13] Collectively, these represent nearly 60 per cent of healthcare employees, cover core NHS occupations, are distinct in terms of earnings and skill levels, and are covered by different pay-setting arrangements, including independent PRBs and national collective bargaining (see Table 1 later). To contrast our approach to the existing literature, we also provide estimates for all 'healthcare' employees (covering all occupations within the industry section) and national estimates (based on all employees regardless of occupation or industry). As is standard in the literature, we focus exclusively on employees given the complexity surrounding the measurement of pay among the self-employed. This means self-employed workers – for example, some general practitioners – are excluded.[14]

Aligned to the arguments of the importance of 'total reward' (Danzer and Dolton, 2012), we consider hourly remuneration rather than focus exclusively on hourly pay as is often the case in the literature. More specifically, we utilise the information on weekly employer pension contributions, in addition to the detailed information on employees' earnings and hours, in ASHE. Our benchmark measure of (log) hourly remuneration is defined following the Office for National Statistics (2019) and equals gross hourly pay plus hourly employer pension contributions.[15,16] To better understand the role of the components of remuneration and to facilitate comparisons with the existing literature, we nevertheless explore sensitivity of the analysis to the precise measure of remuneration employed in Section 4.[17,18,19]

ASHE contains detailed information on work-related characteristics and, following the existing literature (e.g. Blackaby et al., 2018), we include established determinants of hourly earnings with variables capturing the influence of human capital, job amenities and firm characteristics. In terms of personal characteristics, we control for gender, age (and age-squared) as a proxy for experience,

[13] Full details, job duties and typical education requirements are provided for each occupation within the SOC. Our approach requires that there is limited variation by sector *within* each occupation.

[14] Figures from the Quarterly Labour Force Survey (QLFS) suggest that only about 8 per cent of healthcare workers are self-employed.

[15] Gross hourly pay is calculated using gross weekly earnings for the reference period (basic weekly earnings + incentive pay paid in this period relating to the pay period + additional premium payments during the pay period for shift work and night or weekend work not treated as overtime + weekly overtime pay for the pay period + pay received in the pay period for other reasons) divided by total paid weekly hours worked during the reference period (basic weekly paid hours worked + weekly paid overtime hours worked during the reference period).

[16] Pensions are provided in ASHE in the form of weekly employer and employee contributions. To get an hourly amount, these are divided by total paid weekly hours during the reference period (i.e. basic weekly paid hours worked + weekly paid overtime hours during the reference period).

[17] We remove hourly remuneration outliers (values above ten times the 99th percentile and below half the 1st percentile of the distribution).

[18] Employer-provided pension contributions can be valued in multiple ways (see Cribb and Emmerson (2016) for a comprehensive discussion). We include employer pension contributions (i.e. costs) rather than employee benefits. Boileau, O'Brien and Zaranko (2022) suggest this approach will likely underestimate the public sector remuneration premium.

[19] As is typical in this literature (Cribb and Emmerson, 2016; Blackaby et al., 2018; Singleton, 2019; Murphy et al., 2020; Boileau, O'Brien and Zaranko, 2022), we recognise that adjusted remuneration differentials might act to compensate differences in other unobserved pecuniary or non-pecuniary job characteristics, including, for example, other in-kind benefits, job security, annual leave entitlement, the nature of the work environment and work intensity/pressure. Again, however, our intra-occupational focus should act to reduce the influence of these differences relative to national studies.

and work region.[20,21] Our work-related characteristics include (log) firm size (defined by the number of employees in the enterprise on the IDBR), tenure in years (and tenure-squared), coverage of collective agreements, a permanent contract indicator and a full-time employment dummy.[22] For healthcare and all employees, we align our specifications with the intra-occupational analysis by additionally controlling for detailed occupation (defined by the four-digit SOC code) to capture heterogeneity in occupational composition across sectors.[23] By considering both personal and work-related characteristics, our approach therefore reflects a hybrid 'positions and people' approach adopted by Belman and Heywood (1996). While information on educational attainment, an important determinant of earnings, is not available in ASHE, we argue that it is less important in a within-occupation context. Indeed, detailed information on occupation has previously been used as a proxy for educational attainment (e.g. Gibbons, Overman and Pelkonen, 2014).[24]

Table A1 in the online appendix provides further details and summary statistics for the explanatory variables by sector and occupation. It confirms several well-established sectoral patterns which are evident across occupations, including longer average tenure and greater coverage of collective bargaining in the public sector. Several patterns distinct to healthcare are, however, worth noting, particularly the similarity in the concentration of females between sectors (in both cases, females represent at least 75 per cent) and pronounced sectoral differences in employment size.

Our estimates of intra-occupation public sector hourly remuneration differentials are obtained from the following ordinary least squares (OLS) earnings equation, estimated for each occupation j:

$$\ln E_{ij} = \alpha_j + \mu_j S_{ij} + \boldsymbol{x_{ij}\beta_j} + \boldsymbol{z_{ij}\theta_j} + \varepsilon_{ij} \quad (1)$$

where the natural logarithm of hourly remuneration of individual i in occupation j ($\ln E_{ij}$) is regressed on a (public) sector indicator (S_{ij}), and ε_{ij} is a random error term. The occupation-specific public sector differential (μ_j), estimated excluding and including the personal ($\boldsymbol{x_{ij}}$) and work-related ($\boldsymbol{z_{ij}}$) characteristics described above, provides raw and adjusted differentials, respectively.[25] While we are able to control for the influence of a range of observable characteristics correlated with sector and occupation, unobservable characteristics remain a potential bias – for example, in terms of selection into sector – and it is not clear in which direction this bias might operate. In the absence of variables that would form a credible exclusion restriction, following the existing literature (e.g. Cribb, Emmerson and Sibieta, 2014; Blackaby et al., 2018; Murphy et al., 2020; Boileau, O'Brien and Zaranko, 2022), we do not attempt to model this.[26]

[20] We initially estimate equations that pool males and females, but we explore gender differentials in the premium in Section 4. However, these are found to be less important in our intra-occupational analysis.

[21] We aggregate NUTS regions due to small sample sizes but capture variation arising from health being devolved in Wales and Scotland.

[22] To generate tenure, we use the month and year in which the employee started working for the organisation. Following Jewell, Razzu and Singleton (2020), we recode a small number of unrealistic values as missing, where the start date lies in the future or where it implies an employee started working aged 15 or younger. Recognising the debate about the inclusion of firm size and collective bargaining in the literature, we explore the robustness of our findings to their exclusion in Section 4.

[23] We do not control for industry due to its overlap with sector. For all employees, around 96 per cent of the public sector employees are employed in three sections ('O Public administration and defence; compulsory social security', 'P Education' and 'Q Human health and social work activities') of the SIC 2007.

[24] We explore the robustness of our findings to including information on additional personal characteristics (highest qualification, marital status, presence of dependent children, ethnicity and disability) using the QLFS. However, in the absence of information on pension contributions in the QLFS, we do so using hourly pay (see Section 4).

[25] The relatively small samples in some of the sector–occupation-specific groups motivate our focus on the model that pools observations across sectors but, as Elder, Goddeeris and Haider (2010) show, this approach provides a proxy for the unexplained gap in an Oaxaca–Blinder decomposition.

[26] The similarity between our findings for hourly pay and those using a more comprehensive specification from the QLFS (see Section 4) does, however, offer some reassurance in this regard.

4 | RESULTS

4.1 | Intra-occupation sectoral differences in hourly remuneration

Table 1 provides a profile of our five selected healthcare occupations, which represent 9 per cent of all employees and 58 per cent of employees in healthcare. Our occupations, which are selected due to having a presence in each sector, range from being predominately public sector – for example, doctors (82 per cent) – to predominately private sector – for example, care workers (81 per cent). For healthcare as a whole, there is a roughly equal presence across sectors (54 per cent public sector). With the exception of care workers, most public sector workers in these occupations are covered by an independent PRB (as defined by Bryson and Forth (2017)). Consistent with variation in academic and skill requirements, average hourly remuneration also varies dramatically between occupations. While doctors receive nearly two-and-a-half times the national average, care workers earn about two-thirds of the national average.[27] There is also greater pay variation among doctors (measured by the standard deviation) than among the other healthcare occupations, consistent with greater potential for earnings to increase with experience among this group. Overall, however, average remuneration in healthcare is very similar to the national average. Finally, Table 1 presents the contribution of different elements of remuneration.[28] Whilst overtime and incentive pay play a relatively minor role across occupations, employer pension contributions account for as much as 11 per cent of total remuneration in the case of medical secretaries.

Table 2 presents the mean raw (Panel A) and adjusted (Panels B and C) hourly public sector remuneration differentials by occupation.[29] The estimates in Panel B are adjusted for personal characteristics, and Panel C additionally includes work-related characteristics. Consistent with the existing literature, we find a sizeable raw national public sector hourly remuneration premium

TABLE 1 Occupational profiles.

	Doctors	Nurses	Medical secretaries	Auxiliary nurses	Care workers	Healthcare	All employees
% public	81.93	80.05	67.21	60.36	18.95	53.98	23.51
% public covered by PRB	100.00	100.00	94.06	100.00	26.89	93.76	45.93
Mean log hourly remuneration	3.580	2.955	2.516	2.440	2.315	2.704	2.710
	(0.546)	(0.293)	(0.207)	(0.285)	(0.288)	(0.502)	(0.548)
% of hourly remuneration from:							
Employer pension contributions	9.60	9.95	10.62	7.91	3.56	7.44	5.86
Overtime pay	2.76	1.74	1.02	2.77	3.11	2.15	2.36
Incentive pay	0.31	0.09	0.03	0.07	0.09	0.10	0.68
Population	251,038	812,303	40,078	357,366	669,616	3,655,666	24,342,447
	{1.03}	{3.34}	{0.16}	{1.47}	{2.75}	{15.01}	{100.00}
	[6.87]	[22.22]	[1.10]	[9.78]	[18.32]	[100.00]	-
N	1,341	4,733	329	2,736	5,070	24,353	159,798

Note: Authors' calculations based on 2018 ASHE data. Figures in ( ) are standard deviations. Figures in { } / [ ] are the percentage of all employees / in healthcare.

[27] Multiplicative factors are calculated using exp(log points).

[28] Comparable information by sector is available in Table A2 in the online appendix.

[29] A full set of coefficient estimates is available upon request.

TABLE 2 Intra-occupational public sector hourly remuneration differentials.

	Doctors	Nurses	Medical secretaries	Auxiliary nurses	Care workers	Healthcare	All employees
Panel A. Raw							
Public	0.139**	0.021	0.090***	0.251***	0.329***	0.444***	0.248***
	(0.043)	(0.012)	(0.025)	(0.010)	(0.010)	(0.006)	(0.003)
R^2	0.01	0.00	0.04	0.19	0.20	0.19	0.04
Panel B. Adjusted for personal characteristics							
Public	0.172***	0.051***	0.100***	0.249***	0.313***	0.421***	0.252***
	(0.043)	(0.012)	(0.024)	(0.010)	(0.010)	(0.006)	(0.003)
R^2	0.30	0.13	0.21	0.23	0.23	0.29	0.22
Panel C. Adjusted for personal and work-related characteristics							
Public	0.142*	0.047*	0.044	0.222***	0.290***	0.152***	0.039***
	(0.056)	(0.018)	(0.063)	(0.018)	(0.013)	(0.007)	(0.003)
R^2	0.37	0.16	0.27	0.25	0.24	0.66	0.62
Population	251,038	812,303	40,078	357,366	669,616	3,655,666	24,342,447
N	1,341	4,733	329	2,736	5,070	24,353	159,798
Of which public sector:							
Population	205,678	650,284	26,936	215,716	126,885	1,973,205	5,723,347
N	1,098	3,784	222	1,650	957	12,568	36,644

Note: Authors' calculations based on 2018 ASHE data. Estimates are based on equation (1). Panel A presents raw public sector hourly remuneration differentials, Panel B adjusts for personal characteristics and Panel C additionally includes work-related characteristics (see text for a description). The specifications for 'Healthcare' and 'All employees' additionally control for SOC 2010 four-digit categories. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

(28 per cent).[30] This is virtually unchanged by the inclusion of personal characteristics but narrows considerably after accounting for work-related characteristics, particularly occupation, such that there is a much smaller adjusted public sector remuneration premium (4 per cent). In healthcare, the raw public sector premium (56 per cent) also diminishes after accounting for characteristics, again particularly occupation, but the adjusted premium remains positive (16 per cent). The importance of detailed controls for occupation in narrowing the premiums in both specifications is consistent with the influence of sectoral differences in occupational composition, including potentially occupations with a presence in only one sector.

Consistent with the importance of occupational composition to the national sectoral premium and greater homogeneity of workers *within* than *between* occupations, intra-occupation raw and adjusted differentials are more similar. In this respect, and unlike at the national or industry level, naïve comparisons based on intra-occupational aggregates provide useful insights, with evidence of sectoral hourly remuneration gaps in four of the five occupations. However, adjusting for observable personal and work-related characteristics, which account for variation in experience, employer size and unionisation across sectors, is important. While the adjusted public sector premium for medical secretaries is not significantly different from zero, an adjusted premium emerges for nurses. Comparisons between occupations also confirm substantial unexplained inter-occupation variation in the sectoral premiums. Moreover, that intra-occupation adjusted sectoral remuneration gaps are

[30] Percentages are calculated as $100 \times (\exp(\mu_j) - 1)$ (Halvorsen and Palmquist, 1980).

typically far larger than corresponding national estimates suggests wider sectoral differentials within specific occupations than across the entire economy.

In contrast to expectations based on a more compressed earnings distribution within the public sector, the pattern across occupations does not simply reflect higher public sector premiums among lower earners (Hundley, 1991; Mahuteau et al., 2017). The adjusted remuneration premium among doctors (15 per cent) is higher than the one for either nurses (5 per cent) or medical secretaries (insignificant). However, the premium is greatest for care workers (34 per cent), followed by auxiliary nurses (25 per cent). Such patterns might reflect occupational differences in public sector pay-setting arrangements, political or public pressure, sectoral challenges in occupational recruitment or retention, as well as public sector presence and occupation-specific assessments of non-competitive factors – for example, market power – operating in the private sector.

Our findings are robust to the application of population weights, restricting the analysis to only the main job, exclusion of multiple job holders from the sample, exclusion of the voluntary sector from the definition of private sector and year of data (see Table A3 in the online appendix). They are further robust to the choice of model specification, including the exclusion of collective bargaining among the controls. However, consistent with evidence from Blackaby et al. (2018), excluding the control for firm size increases the public sector premium aligned to evidence of a large firm pay premium in the private sector (Main and Reilly, 1993). Indeed, in this case, the premium for medical secretaries (10 per cent) is now significant. Finally, with the exception of nurses, where the premium becomes insignificantly different from zero, our estimates are also robust to alternatively clustering standard errors at the level of the employer.

Overall, we find evidence of a sizeable and robust adjusted sectoral hourly remuneration differential in several occupations, including public sector premiums of more than 10 per cent among care workers, doctors and auxiliary nurses. The premium in these occupations is considerably larger than aggregate national estimates, renewing concerns that comparability based on national differentials can mask substantial differences among segments of the public sector (see Belman and Heywood (1996) for similar arguments in the US). As such, we suggest that estimates of intra-occupation sectoral premiums provide important new information of particular relevance to policymakers.[31,32]

4.2 | Understanding the role of components of remuneration

We explore the importance of the measurement of hourly remuneration to the adjusted premiums by changing the measure of remuneration in equation (1). These estimates are presented in Table 3. In Panel A, following the Office for National Statistics (2019), we extend our measure of pensions to include employee pension contributions in a salary sacrifice arrangement. In this type of arrangement, pay is exchanged for pension-related benefits, which has the potential to reduce taxable pay and therefore increase take-home pay. Our estimates of adjusted sectoral premiums are, however, very similar to our benchmark specification. We then explore the role of three elements of remuneration where sectoral differences might be expected. In Panel B, we exclude performance-related pay (PRP), including profit sharing, bonuses, piecework and commission payments (well established to be higher in the private sector on average). We exclude overtime pay given potential contractual differences between sectors in Panel C and we exclude employer pension contributions (typically more generous

[31] In further analysis, we attempt to reduce potential intra-occupational heterogeneity among doctors and nurses using the detailed information on industry within ASHE. The remuneration premiums for doctors and nurses are larger when the sample is restricted to those working in 'Human health and social work activities' (SIC section Q) or excluding those working in 'General medical practice activities' (SIC code 86.21) (results are available upon request), suggesting intra-occupational industrial heterogeneity is not driving our results.

[32] Given previous evidence of a greater public sector pay premium for women (e.g. Singleton, 2019), Table A4 in the online appendix explores intra-occupation public sector remuneration premiums by gender using a gender–sector interaction term. While the adjusted national public sector premium is more pronounced for women, there is no significant gender differential in healthcare, or across four of the five occupations considered. The exception is care workers, where the public sector premium is greater among men but experienced by both genders.

TABLE 3 Intra-occupational adjusted public sector remuneration differentials: analysis of pecuniary benefits.

	Doctors	Nurses	Medical secretaries	Auxiliary nurses	Care workers	Healthcare	All employees
Panel A. Log hourly remuneration including employer pension contributions and employee pension contributions in a salary sacrifice arrangement							
Public	0.155**	0.041*	0.000	0.215***	0.293***	0.154***	0.024***
	(0.055)	(0.020)	(0.052)	(0.021)	(0.015)	(0.008)	(0.004)
R^2	0.40	0.17	0.37	0.22	0.26	0.66	0.61
Population	223,224	715,606	35,071	301,505	471,031	3,009,046	19,224,567
N	1,196	4,178	288	2,308	3,580	19,875	124,809
Panel B. Log hourly remuneration excluding incentive pay							
Public	0.150**	0.049**	0.042	0.223***	0.290***	0.152***	0.042***
	(0.056)	(0.018)	(0.063)	(0.018)	(0.013)	(0.007)	(0.003)
R^2	0.37	0.16	0.27	0.25	0.24	0.66	0.62
Population	251,038	812,303	40,078	357,366	669,616	3,655,666	24,342,447
N	1,341	4,733	329	2,736	5,070	24,353	159,798
Panel C. Log hourly remuneration excluding overtime pay							
Public	0.136*	0.046*	0.043	0.219***	0.292***	0.150***	0.040***
	(0.056)	(0.018)	(0.063)	(0.018)	(0.013)	(0.007)	(0.003)
R^2	0.36	0.16	0.26	0.25	0.24	0.66	0.61
Population	251,038	812,303	40,078	357,366	669,616	3,655,666	24,342,447
N	1,341	4,733	329	2,736	5,070	24,353	159,798
Panel D. Log hourly remuneration excluding employer pension contributions							
Public	0.129*	–0.040*	0.003	0.112***	0.170***	0.061***	–0.029***
	(0.055)	(0.016)	(0.061)	(0.016)	(0.013)	(0.007)	(0.003)
R^2	0.37	0.16	0.28	0.18	0.13	0.65	0.60
Population	251,038	812,303	40,078	357,366	669,616	3,655,666	24,342,447
N	1,341	4,733	329	2,736	5,070	24,353	159,798

Note: Authors' calculations based on 2018 ASHE data. All specifications include personal and work-related characteristics (see text for a description) and a constant term. Specifications for 'Healthcare' and 'All employees' also control for SOC 2010 four-digit categories. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

in the public sector) in Panel D. In this respect, we capture the influence of sectoral differences in both the incidence and amount of the respective element of remuneration. The findings are very similar regardless of whether PRP or overtime pay within the reference period is included or excluded, suggesting that neither component drives the sectoral differences we observe.[33] This is consistent with evidence from Bryson, Forth and Stokes (2017), who find that much of the sectoral gap in PRP reflects occupational composition rather than differences within occupations.

As expected, and consistent with previous national evidence (e.g. Cribb and Emmerson, 2016; Boileau, O'Brien and Zaranko, 2022), public sector premiums are reduced considerably with the exclusion of employer pension contributions, with the 4 per cent national premium being reversed

[33] Our measure excludes payments made outside the reference period, such as annual bonuses, which might vary by sector.

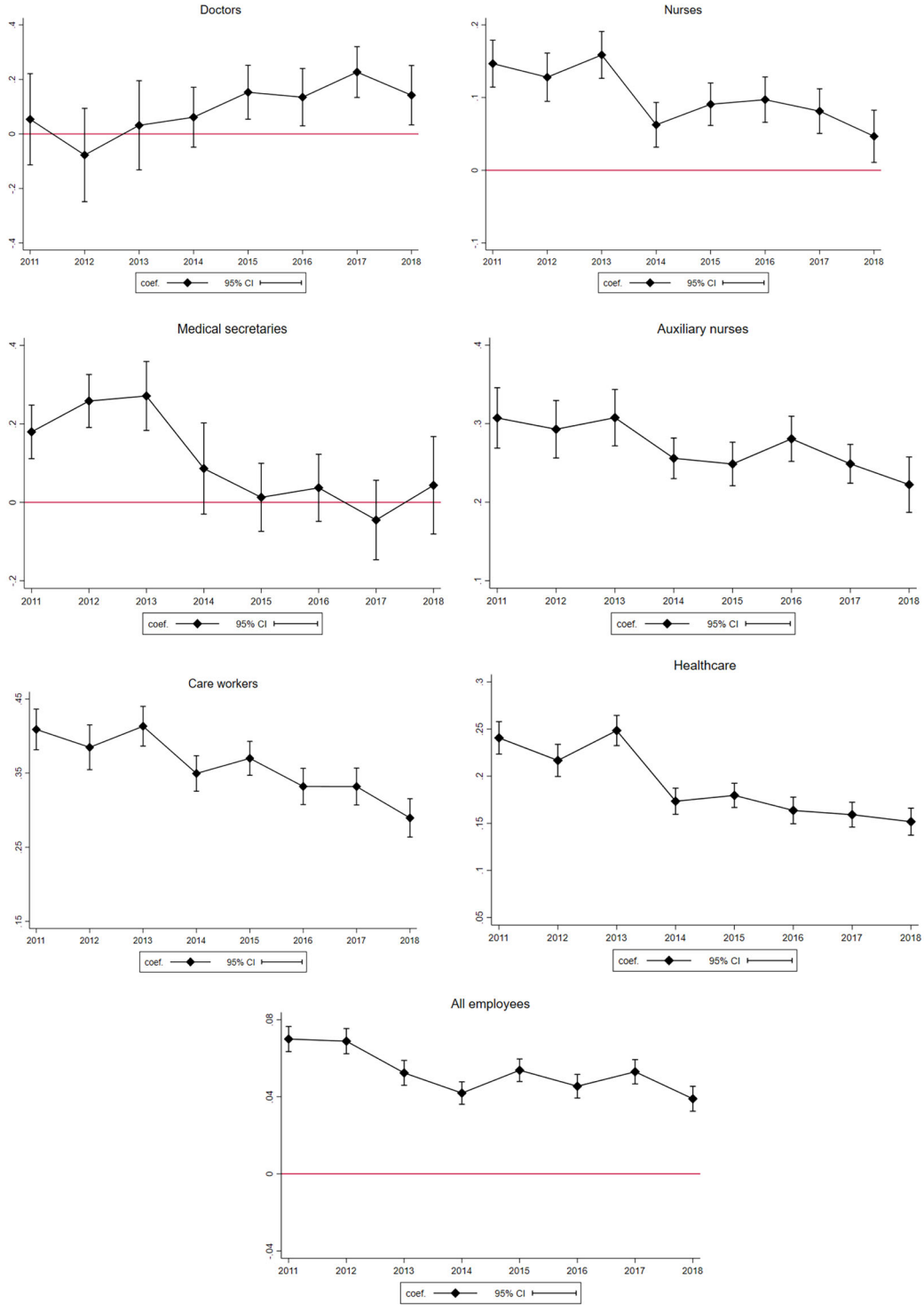

FIGURE 1 Intra-occupational public sector hourly remuneration differentials, 2011–18. *Note*: Authors' calculations based on 2011–18 ASHE data. Each dot represents the coefficient estimate based on equation (1) with controls for personal and work-related characteristics (see text for a description). Specifications for 'Healthcare' and 'All employees' also control for SOC 2010 four-digit categories. CI denotes confidence interval. [Colour figure can be viewed at wileyonlinelibrary.com]

to a 3 per cent penalty.[34] There are, however, notable differences in the influence of the exclusion of pensions across occupations. While the sectoral premium for doctors is only dampened slightly, suggesting it is not predominately driven by employer pension contributions, the premium for nurses turns into a penalty once pensions are excluded and the premiums for auxiliary nurses and care workers roughly halve. Our analysis thus confirms the importance of the concept and measurement of 'remuneration' for understanding occupation-specific sectoral differentials but again suggests a more nuanced picture relative to national studies. Nevertheless, an adjusted public sector pay premium remains evident for doctors, auxiliary nurses and care workers, as well as for healthcare as a whole.[35]

4.3 | Trends in intra-occupation sectoral remuneration premiums

Given the emphasis on pay erosion and evidence of a declining public sector premium during austerity (Cribb, Emmerson and Sibieta, 2014; Murphy et al., 2020), we further explore how the adjusted intra-occupation sectoral remuneration differentials changed over the preceding period of public sector pay restraint (2011–17).[36] Figure 1 presents coefficient estimates from regression models equivalent to equation (1) estimated separately for each occupation and each year between 2011 and 2018, the period over which the definitions of occupation are consistent. Supporting our analysis for 2018, there has been no public premium for medical secretaries since 2013. In general, however, the pattern is of a declining public sector hourly remuneration premium, aligned to national estimates (Office for National Statistics, 2019).[37] In this respect, the patterns suggest a deteriorating relative position of public sector remuneration.[38] There is, however, a distinct contrasting pattern for doctors, with evidence of a growing public sector premium, which becomes significantly different from zero from 2015. In this respect, our analysis also uncovers differences in the *trends* in the intra-occupational sectoral premium between occupations.

5 | CONCLUSION

Motivated by renewed debate on the pay of public sector healthcare workers in Britain, we use high-quality nationally representative data to quantify, and explore variation in the levels of and trends in, intra-occupation public sector hourly remuneration differentials across five core healthcare occupations. Our benchmark estimates for 2018 suggest substantial variation around the national public sector hourly remuneration premium of 4 per cent, with intra-occupation public sector remuneration differentials ranging from a premium of 34 per cent for care workers to no significant differential for medical secretaries. We further demonstrate differences in the trends in

[34] This reversal has also been used to make a case for rebalancing remuneration in the public sector towards pay (Boileau, O'Brien and Zaranko, 2022).

[35] Despite our intra-occupation focus, which should reduce heterogeneity among employees relative to national studies, we recognise that, in addition to inequality in reward, adjusted public sector differentials potentially reflect sectoral differences in unobserved employee and/or job characteristics. As the ASHE data contain fairly limited information on personal characteristics, we explore the robustness of our results to using information from the QLFS to address potential unobservable employee characteristics that determine remuneration and differ by sector (see Appendix B online for a detailed discussion). In the absence of information on pension contributions, in the QLFS our comparison relates to hourly pay (as in Panel D of Table 3). A comparison between specifications using the QLFS suggests the findings are robust to the inclusion of other personal characteristics (namely, highest qualification, marital status, presence of dependent children, ethnicity and disability), consistent with the specification in ASHE providing reliable estimates of sectoral pay differentials.

[36] This period was also characterised by the roll-out of automatic pension enrolment, which might be anticipated to have a greater impact within the private sector given lower levels of pension coverage.

[37] Figures for hourly pay differentials follow a similar pattern but, aligned to the analysis from 2018, are consistently lower (results are available upon request).

[38] It is worth noting that this holds even in the presence of unobservable sectoral differences in employee or job characteristics, conditional on these being constant over time.

intra-occupation premiums (2011–18) between occupations, particularly between doctors and other healthcare occupations. Overall, these patterns highlight an important and neglected occupation-specific dimension to the existing evidence of heterogeneity in the public sector pay premium (Blackaby et al., 2018; Murphy et al., 2020; Boileau, O'Brien and Zaranko, 2022) and suggest intra-occupation estimates provide important additional information for public sector pay setting, particularly given the remit of individual Pay Review Bodies and evidence of links between sectoral pay differentials and vacancies (Elliott et al., 2007), and patient outcomes (Propper and Van Reenen, 2010).

Unlike much of the existing evidence, our focus on hourly remuneration allows us to explore the role of pecuniary benefits beyond basic hourly pay, including pension contributions and performance-related pay. We find that estimates of public sector remuneration premiums are greater than those based on hourly pay alone, consistent with the wider coverage and relative generosity of employer pension contributions in the public sector. While our results therefore confirm the importance of the concept and measurement of remuneration in sectoral analysis (see also Cribb and Emmerson (2016) and Boileau, O'Brien and Zaranko (2022)), variation in its influence across occupations is again evident.

We conclude by commenting on three important issues which merit consideration in future research. First, while we argue that it is less important in a within-occupation context, where the analysis is based on relatively more homogeneous workers, we acknowledge the possible influence of unobserved employee and/or job characteristics that may vary across sectors and bias our estimates. However, our supplementary analysis using the Quarterly Labour Force Survey, which provides information on additional personal characteristics relative to the Annual Survey of Hours and Earnings, offers some reassurance in this regard.

Second, although our focus on pecuniary rewards aligns with the existing literature, it abstracts from other aspects of jobs, including working conditions and job security. In this respect, future research could explore whether the sizeable and robust adjusted public sector remuneration premiums we observe for doctors, auxiliary nurses and care workers reflect intra-occupation sectoral compensating wage differentials due to unobserved non-pecuniary factors or whether such differentials determine worker transitions or quality across sectors and therefore might address sector-specific recruitment and retention challenges.

Finally, our intra-occupation approach assumes that the relevant comparator is *within* occupations. As a result, it is likely to be more appropriate for more specialised occupations with low occupational mobility. Nevertheless, the extent of intra-occupational sectoral variation evident across our healthcare occupations, combined with the widespread concerns around equity and efficiency in public sector service provision, suggests there is value in extending this intra-occupational approach to other industries. Whilst our approach is necessarily restricted to occupations with presence in both sectors, it might also be worth exploring comparator occupations more broadly, defined for example by skill levels and job tasks, in the absence of, and complementary to, evidence based on direct intra-occupation comparators.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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