

Estimating Differences in Public and Private Sector Pay, 2012

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Theme: **Labour Market**

Theme: **Government**

Animated YouTube video

A podcast explaining this story using audio commentary and graphical animations is available on the [ONS YouTube channel](#).

Summary

It is difficult to make comparisons of the two sectors because of differences in the types of job and characteristics of employees. Allowing for these differences as far as possible, in 2011, public sector employees were paid on average between 7.7 per cent and 8.7 per cent more than private sector employees. For consistency over time, these estimates assume employees of those banks reclassified to the public sector in 2008 were in the private sector throughout.

This analysis is based on characteristics collected in the Annual Survey of Hours and Earnings and the Labour Force Survey. There are other factors that could influence the pay difference and this analysis does not include other forms of remuneration, for example pension contributions, company cars and health insurance. Also, ASHE does not cover those who are self-employed so it will miss many high paid self-employed and also some lower paid. The timing of the survey in April means that only bonus payments related to April are included, outside of the main bonus season which is normally January to March. These factors would account for at least some of the difference.

The article also looks at the differences between the types of jobs in the two sectors and the characteristics of the people within them, showing that:

- The public sector is made up of a higher proportion of higher skilled jobs – widening over the last decade as lower skilled jobs have been outsourced from the public to the private sector.
- The public sector consists of a higher proportion of older employees and earnings tend to increase with age and experience
- The public sector workforce contains more people with a degree or an equivalent qualification, 40 per cent in 2011, compared with 25 per cent in the private sector

- The gap between the lowest and highest earners is higher in the private sector with the top 5 per cent (95th percentile) of earners paid around 5.7 times more than the bottom 5 per cent (5th percentile). The gap is 4.5 times in the public sector.

Introduction

Comparing the pay of the public sector and the private sector is not a straightforward task, and a number of different results can be derived depending on the methodology that is used to calculate pay differences. This is because the two sectors are made up of a variety of different jobs and types of people. Using a raw average of mean (or median) hourly pay in both sectors to compare earnings is often misleading. For example, there are pay differences because of disparities in the types and skill levels of jobs, the experience, distribution of men/women, the qualifications of employees, and the location of the job.

[Incomes Data Services](#) published a report that detailed some of the difficulties in comparing public sector and private sector earnings.

This article aims to explain why accounting for differences in public and private sector pay is complex, and attempts to estimate the public/private sector pay gap using regression analysis to account for some of the key differences.

The main source of data used in this article is the Annual Survey of Hours and Earnings (ASHE) which is the Office for National Statistics' (ONS) principal source for earnings estimates, collected in April of each year, and uses data on 181,000 employees.

The Labour Force Survey (LFS) is also used as a secondary source of earnings data and has additional information to that found in the ASHE dataset, for example, information on the qualifications of those in the sample. This is a continuous sample survey covering 43,000 responding households in the UK each quarter.

The earnings model used in this article estimated that the public sector, on average, earned 8.2 per cent more per hour (excluding overtime) than the private sector in 2011. However, this is by no means a definitive estimate of the public/private sector pay gap, and there may be some factors that have not been considered in this article that could influence the differences in pay between the two sectors. Also the estimate is subject to a margin of variation as it comes from survey results. The estimate provided is such that there is 95 per cent certainty that from all samples possible the pay gap in 2011 would be between 7.7 per cent and 8.7 per cent.

This article will now consider a number of factors that should be taken into account when comparing earnings in the public sector and the private sector. These include:

- Skill level of employees,
- Occupational differences,
- Age,
- Gender,
- Qualifications,
- Reclassification of the banks after the recent recession,

- Distribution of earnings in the public sector and the private sector.

Differences between the public and private sectors

Skill level

Earnings tend to increase as the skill level for the job increases, and in order to show why the skill level of jobs in the public and private sector is relevant for the pay gap between the two sectors, consider the following example.

First, assume that the characteristics of two groups of workers (called group A and group B, each containing 100 people) are identical in terms of age, sex, on-the-job training, productivity etc. However, within these two groups there are a different proportion of high and low skill workers. In group A there are 60 high skill workers and 40 low skill workers, and in group B there are 40 high skill workers and 60 low skill workers. In both groups a high skill worker is paid £9 per hour and a low skill worker is paid £6 per hour. In this example, the different proportions of high and low skill workers in each group would result in a different average wage. This is represented in table 1.

Table 1

	Group A			Group B		
	Number of workers	Hourly pay per worker (£)	Total Pay per hour (£)	Number of workers	Hourly pay per worker (£)	Total Pay per hour (£)
High skill	60	9	540	40	9	360
Low skill	40	6	240	60	6	360
All workers	100	7.80	780	100	7.20	720

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This example shows that differences in the proportion of high and low skill jobs in each group, even after controlling for all other characteristics, results in an average wage in group A that is around 8 per cent higher than the average wage in group B. This does not necessarily mean that group A is 'overpaid' in comparison to group B. Rather, the difference in the average wages reflects the higher proportion of high skill jobs in group A.

In terms of the public sector and private sector, and re-grouping occupations according to their skill level (although compositional differences within skill levels still remain between the public and private sector), from low skill to high skill, there was a larger percentage of workers in the two highest skill groups in the public sector compared with the private sector. Overall, 59 per cent of public sector employees are classed as either high skill or upper middle skill compared with 49 per cent of private sector employees.

Table 2: Percentage of employees by skill level in the public sector and the private sector, April 2011, UK

Skill-level	Public sector	Private sector
High skill	30	26
Upper middle	29	23
Lower middle	32	37
Low skill	9	14

Table source: Office for National Statistics

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Since the public sector is made up of a more skilled workforce than the private sector it would be expected that, on average, public sector pay would be higher than private sector pay (although the overall difference is determined by a number of factors).

Over time the public sector has outsourced some jobs to the private sector. While some of this outsourcing has involved contracting out higher skill jobs to the private sector, for example, Information Technology (IT) support, much of the outsourcing that has occurred has been in lower-skilled jobs, for example, cleaning. The result of this outsourcing has been to take many of the low skilled jobs that would have been carried out in the public sector and transfer them to the private sector.

Table 3: Percentage of employees by skill level in the public sector and the private sector, April 2002, UK

Skill-level	Public sector	Private sector
High skill	23	23
Upper middle	30	24
Lower middle	35	40
Low skill	12	13

Table source: Office for National Statistics

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Table 3 shows that in 2002, the earliest year available with skills data on the same basis, around 12 per cent of public sector employees were employed in low skill occupations compared with around

13 per cent of private sector employees. Also, around 23 per cent of public sector employees were employed in high skill occupations in 2002, with a similar percentage in the private sector. This shows that the proportion of low skill jobs in the public sector has declined since 2002. In contrast, the proportion of low skill jobs in the private sector has increased. The proportion of high skill jobs in the public sector increased to around 31 per cent of all public sector jobs by 2011, compared with a smaller increase in the private sector to 26 per cent of all private sector jobs.

This increases the average pay in the public sector because a smaller proportion of workers are employed in lower-skilled jobs, and the average pay in the private sector is reduced as the lower-skilled jobs that were previously carried out in the public sector are incorporated into the private sector.

Occupational differences

Even looking at more detailed occupational classifications, there are still differences in the jobs that are typically performed in the two sectors.

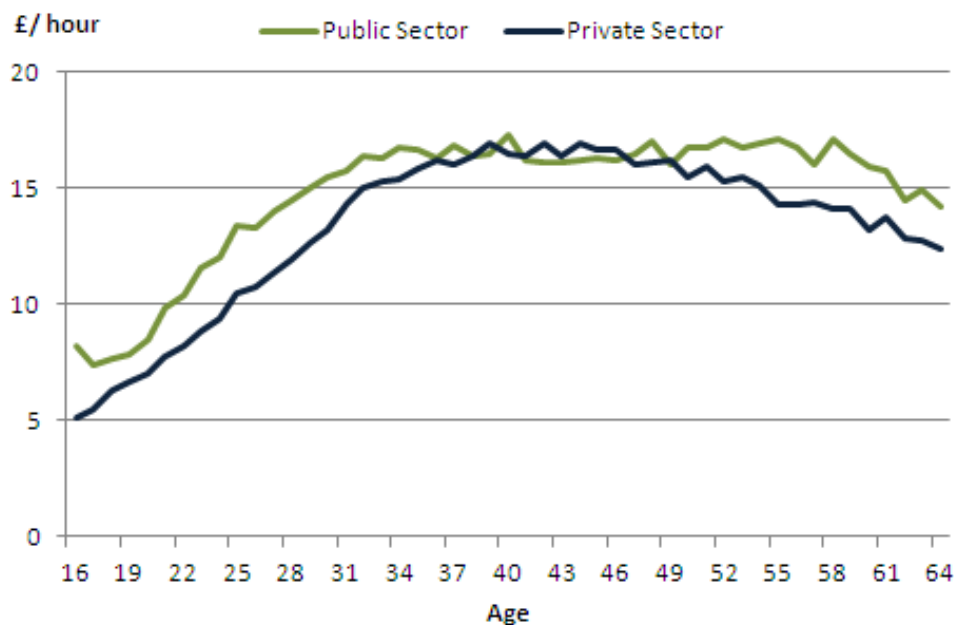
The IDS uses the example of the category 'primary and nursery education teaching professionals'. Primary school teachers are typically employed in the public sector, whereas nursery teachers are typically employed in the private sector. It would be expected that, on average, a primary school teacher would earn more than a nursery teacher due to the different levels of qualifications and training associated with the two jobs. However, by grouping both jobs into one category, the public sector earns, on average, more than the private sector in this category because the jobs typically performed in the public sector are among the higher paid jobs in this category compared with the lower paid jobs that are performed in the private sector.

This example demonstrates that comparing jobs in the public and private sector, and the corresponding earnings differences, is not a straightforward task, even after using narrow definitions for occupation classification, because differences still remain between public sector and private sector occupations.

Age

The following graph shows that earnings tend to increase with age in both the public sector and the private sector. Average mean hourly earnings peak in the early 40s in both sectors. They decline slightly approaching retirement although the decline happens earlier in the private sector than in the public sector, possibly because the higher earners in the private sector are more likely to leave the labour market earlier.

Mean hourly earnings by age in the public sector and private sector, aged 16-64, April 2011, UK



Source: Annual Survey of Hours and Earnings (ASHE) - Office for National Statistics

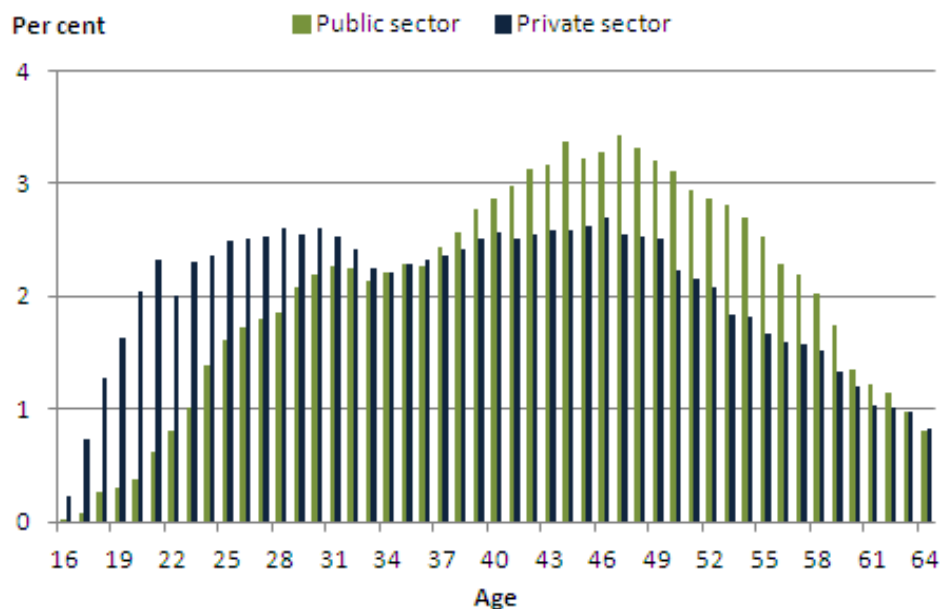
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Age is used here as a proxy for experience (a reasonable assumption given that experience tends to increase with age). Similar to the example given above regarding the different skill mix in the public and private sector, keeping all other factors constant, if group A was made up of an older workforce than group B, it would be expected that, on average, there would be higher earnings in the sector with the older (more experienced) workforce.

The public sector generally consists of an older workforce than the private sector. Around 15 per cent of employees in the private sector are aged 16 to 24 compared with around 5 per cent of employees in the public sector, and around 44 per cent of public sector workers are aged 35 to 49 compared with around 38 per cent of private sector workers. The difference in the age profiles of the two sectors, with a larger proportion of younger workers in the private sector compared with the public sector, and a larger proportion of older workers in the public sector compared with the private sector, is represented in the chart.

Percentage of workers by age in the public sector and private sector, aged 16-64, April 2011, UK



Source: Annual Survey of Hours and Earnings (ASHE) - Office for National Statistics

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Again, similar to the difference in the skill levels of the two sectors, given that the public sector is made up of an older workforce than the private sector it would be expected that, on average, public sector pay would be higher than private sector pay (although, again, the overall difference depends on a number of factors).

Gender

The difference in pay between men and women is a well-established area of research, with men tending to earn, on average, more than women.

Female employees in the public sector earn considerably more, on average, than female employees in the private sector. This is due to the differing jobs that are typically carried out by women in the public and private sectors. In the private sector a significant proportion of low paid jobs, such as cleaning and catering, are carried out by women. In the public sector, while women still perform lower paid jobs, such as caring and clerical work, there are also a high proportion of women employed in professional, higher paid occupations, such as nursing or teaching. This is represented in table 4:

Table 4: Percentage of female employees by skill level in the public sector and the private sector, April 2011, UK

Skill-level	Public sector	Private sector
High skill	28	19
Upper middle	26	15
Lower middle	38	51
Low skill	8	15

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Table 4 shows that in 2011 19 per cent of women in the private sector were employed in high skill jobs, compared with 28 per cent in the public sector. Table 4 also confirms that a higher proportion of women in the private sector were employed in low skill jobs (15 per cent) compared with the public sector (8 per cent).

Also the two sectors have a different percentage of men and women working within them. Around 66 per cent of employees in the public sector are female, compared with around 41 per cent of employees in the private sector. Gender is used in the model to control for the differences in these percentages.

Qualifications

Another characteristic that partially determines earnings is the level of qualifications of the employee. Employees with higher level of qualifications tend to earn more than employees with lower level of qualifications. Using LFS data, and taking an average over the four quarters of 2011, 40 per cent of employees had a degree or an equivalent qualification in the public sector, compared with 25 per cent of employees in the private sector. This indicates that, overall, the public sector consists of a higher qualified workforce than the private sector. A higher qualified workforce would, on average, receive higher pay than a less qualified workforce. Therefore, it would be expected that, on average, the higher level of qualifications in the public sector would translate into higher average earnings in the public sector compared with the private sector.

Table 5: Percentage of employees by highest qualification in the public sector and the private sector, four quarter average, 2011, UK

Qualification	Public sector	Private sector
Degree or equivalent	40	25
Higher education	14	8
A Level or equivalent	19	25
GCSE or equivalent	18	24
Other	6	11
None	3	7

Table source: Office for National Statistics

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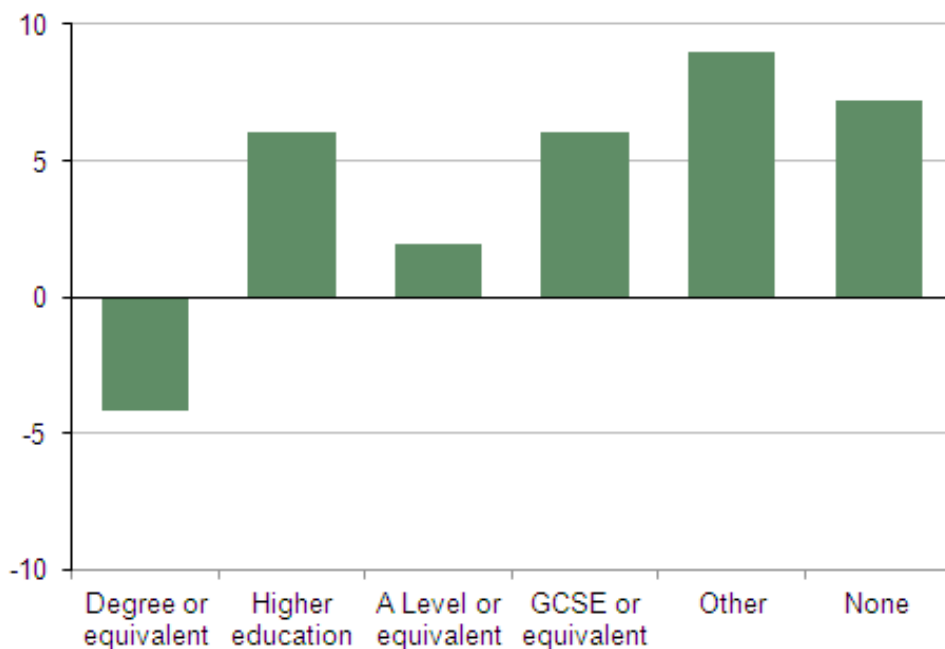
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By looking at the difference in average earnings between the sectors by qualification, for all individuals with a qualification up to higher education level, those in the public sector earn on average more than those in the private sector. However, for those with the highest level of education, a degree or equivalent, employees in the public sector earn, on average, 4.1 per cent less than employees in the private sector.

Some respondents on the LFS are known to misclassify themselves into the public sector when indeed they are working in the private sector. For instance cleaning staff working in public organisations may be contracted to private companies but think they are working for the public organisation. An adjustment is made to compensate as far as possible for this misclassification. The nature of the outsourcing of jobs means the misclassification is likely to have a greater impact at the lower end of the pay distribution.

Average public/private sector pay gap by qualification, four quarter average, 2011, UK

% pay gap (public minus private sector)



Source: Labour Force Survey - Office for National Statistics

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(31.5 Kb)

There are a greater percentage of employees in the public sector with a degree than in the private sector (and people with a degree earn, on average, more than those without a degree). Therefore, it would be expected that this would result in higher average pay in the public sector compared with the private sector. However, graph 3 also shows that if an employee has a degree or equivalent, they are, on average, likely to earn more in the private sector than an employee with a degree in the public sector. Note these differences have not been controlled for other factors.

Reclassification of banks

In 2007, Northern Rock was reclassified as a public sector company, and, in 2008, Lloyds Banking Group, Royal Bank of Scotland Group and Bradford & Bingley were also reclassified as public sector companies. As the IDS report points out, average earnings in the financial sector are higher than average earnings in the private sector as a whole.

Therefore, the reclassification of the banks into the public sector had an effect on the public/private sector pay gap as some of the highest earners in the UK economy were incorporated into the public sector. For consistency over time this article assumes employees of those banks reclassified to the public sector in 2008 were in the private sector throughout. However, a measure after reclassification is also given.

Distribution of earnings

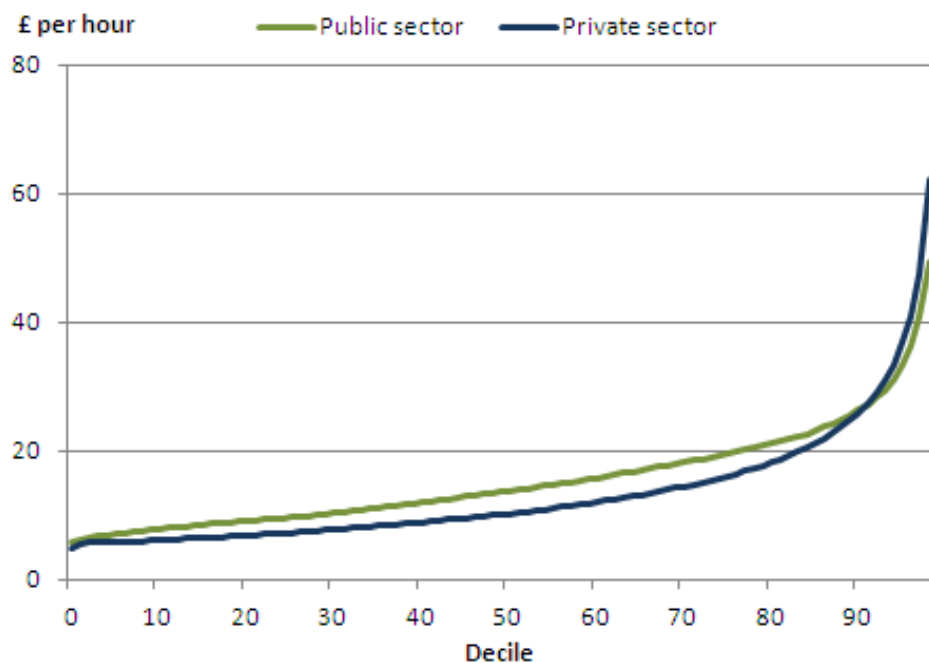
The IDS report also points out some key differences when using the mean or the median to calculate the pay gap between average public sector earnings and average private sector earnings. If every worker was ordered in terms of their hourly earnings, the median value would be the person in the middle. That is, this person would have higher earnings than half of all employees, and would also have lower earnings than half of all employees. As the IDS report comments, the median is “useful for finding a pay rate for a ‘typical’ worker within a fairly homogeneous group” (IDS, p. 13, June 2011). Mean hourly pay, on the other hand, is calculated by taking the total income of a group of workers and dividing by the total number of hours worked in this group. Therefore, the mean takes into account any very high or low earners in the dataset.

ASHE tends to use median pay to compare earnings between different groups. However, when comparing average pay in the public sector and private sector it may be more appropriate to use mean rather than median pay. This is because of differences in the earnings distributions of the public sector and private sector. As table 2 shows, the private sector (14 per cent) is made up of a higher proportion of low skilled workers than the public sector (9 per cent). These workers typically have a low level of formal qualifications, and earnings of low skilled workers tend to be at the lower end of the earnings distribution. However, the private sector also includes many of the highest paid employees in the UK. Therefore, the private sector has a wage distribution that is more dispersed than the public sector, giving opportunities for some of the highest paid jobs, but also includes a large proportion of the low paid workers in the UK.

If each person working in each sector is placed in order, in terms of their hourly pay (excluding overtime), the bottom 5 per cent of workers in the public sector earn less than £6.91 per hour, whereas in the private sector, 5 per cent of workers earn less than £5.93 per hour.

Looking at the top 5 per cent, in the public sector earnings are greater than £31.11 per hour, while in the private sector the top 5 per cent earn more than £33.54 per hour. The top 1 per cent of earners in the private sector, at more than £62.08 per hour, earns considerably more than the top 1 per cent of earners in the public sector at more than £49.37 per hour. As mentioned earlier there are other factors that influence the pay differences.

Distribution of hourly earnings in the public sector and the private sector, April 2011, UK



Source: Annual Survey of Hours and Earnings (ASHE) - Office for National Statistics

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When comparing the 95th percentile of earners with the 5th percentile in each sector:

- In the private sector the top earners are paid around 5.7 times more than the bottom earners.
- In the public sector, the top earners are paid around 4.5 times more than the bottom earners.

This shows that public sector pay is more compressed than private sector pay between high and low paid employees. Using median pay as the measure of the pay gap between the public sector and the private sector may not reflect this difference in the wage distribution of the private sector compared with the public sector. Therefore, in order to take this into account, mean pay will be used in this article to compare the average earnings of the public sector and the private sector.

Hourly earnings vs. weekly earnings

ASHE measures the earnings of employees in the public sector and the private sector in terms of hourly and weekly earnings. It is important to use the correct method of measuring earnings when considering the public/private sector pay gap due to differences in the average hours worked in the two sectors.

The reason why the average number of hours worked is relevant can be shown in the following example: Assume that there are two sectors, called sector A and sector B, and each sector pays each of their employees £500 per week. However, in sector A, each employee works 25 hours per

week, and, in sector B, each employee works 50 hours per week. This means that, in terms of hourly pay, each employee in sector A earns £20 per hour whereas each employee in sector B earns £10 per hour. If weekly earnings between the two sectors were compared it would be assumed that workers in sector A and sector B earned the same amount (and in weekly terms this is correct). However, for each hour of employment, employees in sector A earn twice as much as employees in sector B. Therefore, average hourly earnings provide a more accurate comparison of the difference in average earnings of the employees in each sector.

On average, employees in the private sector work more hours per week than employees in the public sector. This is shown in table 6 below (note that these average figures include employees who work part-time):

Table 6: Average number of paid hours excluding overtime worked per week in the public and the private sector, April 2011, UK

	Average weekly hours worked
Public sector	30.5 hours
Private sector	33.2 hours

Table source: Office for National Statistics

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This means that a comparison of average weekly earnings in the public and private sectors gives a smaller pay gap than the average hourly earnings pay gap. However, for an analysis on the earnings difference between the public sector and the private sector, average hourly earnings provides a more accurate estimate because the effect of working longer hours is removed.

Regression

The following analysis uses a statistical technique, called regression analysis, to estimate the pay difference when controlling for the factors that have been discussed above. It takes the form of an arithmetic equation that can be solved by using a computer program.

The primary source of data is ASHE using hourly earnings (excluding overtime) for employees whose pay in the April period was not affected by absence and were paid adult rates.

The results presented are based on a linear regression of log-hourly earnings with independent variables:

- Sex (because of differences in the distribution of men and women in the public and private sectors).
- Age & Age squared (because Graph 1 suggest the relationship between earnings and age is non-linear).

- Occupations by three digit occupation code (from Soc 2000 – 81 groups) (because pay is heavily determined by the occupation carried out).
- Region (12 across the UK) (because of differences in the percentages of jobs in each sector across the country).
- Sector (Public, Private, Non-profit organisations).

In the earnings model all of the above variables explain statistically significant amounts of the variation in the data. The model is run independently for each year from 2002 to 2011 (inclusive) as 2002 is the earliest dataset that includes a consistent and comparable occupational variable.

The sign of the coefficient for each variable indicates whether the variable in question has a positive or negative association with hourly earnings, holding all other variables in the model constant. The variable sex has a positive coefficient, with females as the reference group, meaning that men earn more per hour than women, holding all other variables constant. The coefficient for age is positive, and that for age# is negative, and together they mean that earnings initially increase with age, and then decline after a certain point.

For the occupation variable the reference group is corporate managers, and the coefficients for each of the other 80 occupation groups indicate whether hourly earnings are larger or smaller than corporate managers. The reference group for region is London, and for the sectors, the private sector is the reference group. Finally, an error term captures all of the unexplained effects on wages. For example, this could include factors including: worker motivation or ability, qualifications, and job conditions.

A summary of the fit for this model for 2011 is included as an annex. The variable “public” reports the coefficient value that indicates the difference in pay between the public and the private sector. To calculate the pay gap, which is public minus private pay expressed as a percentage of private pay, the exponential of the coefficient value (0.0864687) is taken and multiplied by 100. This gives a pay gap between the public and private sector of 9.0 per cent in 2011. That is, according to this model specification, accounting for gender, age, occupation and region, a public sector employee earned, on average, 9.0 per cent more than a private sector employee in 2011.

As this estimate is based on a sample, there is the possibility that a different sample would give a different result. A 95% confidence interval suggests that the pay gap between the public and private sector in 2010 would be between 8.5 per cent and 9.6 per cent.

Note that different regression models give different results and increasing the number of parameters explains more of the variation in the data, but also increases the complexity of the model. There is no single definitive model and the model fitted includes most of the factors discussed in this paper, with occupation having the strongest influence in explaining variations in pay.

Alternative models have been investigated, including different levels of occupation and regional aggregation. The pay difference was noted to decrease slightly as more detailed occupation codes were added, with a corresponding increase in model complexity. The decision to use SOC 3-digit level codes was a compromise between simplicity and explaining the variation in the data.

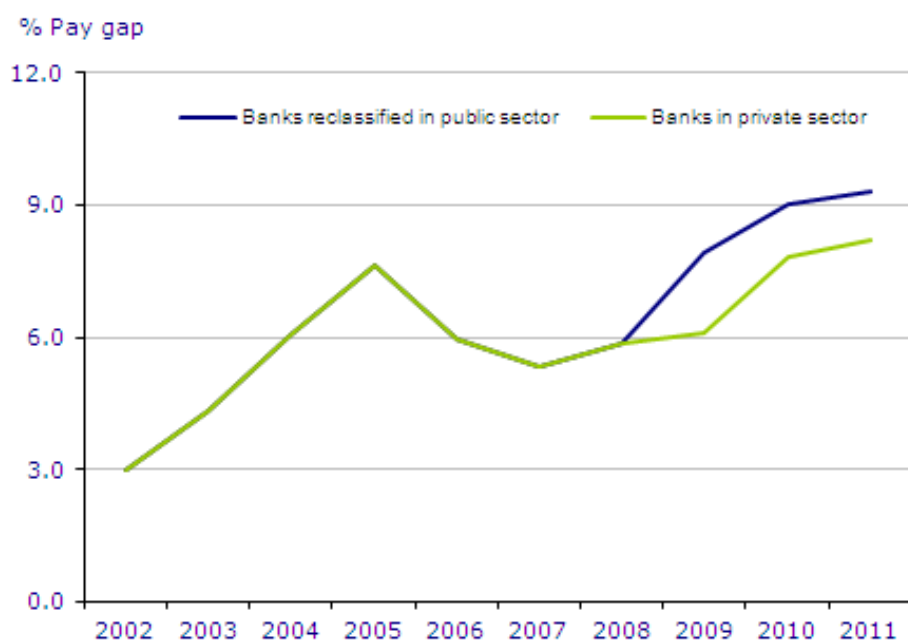
Adjusting for qualification

As explained earlier, another characteristic that determines earnings is the qualifications of the employee. This information is not collected by ASHE. However, the LFS does collect this information and so the same model is fitted using LFS data, with the addition of qualification level.

Adding this to the regression model reduces the pay gap by around 0.82 percentage points in 2011 compared with a regression without the qualifications variable included. The adjustment in 2010 was 1.17 percentage points.

Although it is not possible to infer from one survey (LFS) to another (ASHE) with a high level of certainty, it may be indicative that including qualifications in a public/private sector regression model reduces the pay gap by around 0.82 percentage points. Therefore, after accounting for this, and the other variables specified above, it is estimated that in 2011 a public sector worker earned, on average, 8.2 per cent more per hour than a private sector worker.

Pay gap between the public and private sector, 2002-2011, April each year, UK



Source: Annual Survey of Hours and Earnings (ASHE), Labour Force Survey - Office for National Statistics

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Graph 5 shows the estimated change in the hourly pay gap (excluding overtime) between the public sector and the private sector after accounting for the effect of qualifications on the pay gap. The gap increased from 3.0 per cent to 7.6 per cent, between 2002 and 2005, before falling to 5.3 per cent by 2007. The gap stood at 5.9 per cent in 2008, the start of the recent recession, and has since increased to 8.2 per cent in 2011.

Graph 5 also shows the impact of the reclassification of some banks into the public sector that occurred in 2008. This reclassification had a significant effect on the public/private sector pay gap because some employees in the reclassified banks earn salaries that are higher than the average pay in both the public sector and the private sector.

Notes

1. [Standard Occupational Classification 2000 \(SOC 2000\)](#).

Other factors

There may be other factors not collected on the ASHE dataset that, if controlled for, would affect the pay difference between the public and private sector. Employees in both the public sector and the private sector receive other forms of remuneration or benefits that are not taken into account in this analysis. For example, employees may receive pension contributions from their employer, and this is a form of deferred earnings.

In the private sector some workers may receive a company car or health insurance as a form of remuneration. This is a significant payment to the employee that would not be included in their hourly earnings. The timing (April) of the ASHE survey is such that it falls outside of the main period in which bonuses are paid to private sector employees and may under-represent this component of pay. If these other forms of payment were included in the pay gap model, a different pay gap may be derived.

It is also worth noting that self-employed workers are not included on the ASHE dataset. This has an important effect. With regards to the public sector, ASHE captures most of the highest paid workers. However, in the private sector, many highly paid workers are self-employed (for example, lawyers, businessmen and entrepreneurs). This means that the ASHE estimate of average pay does not include many of the highest earners in the private sector whereas a large proportion of the highest earners in the public sector will be included in the ASHE dataset. Therefore, the public/private sector pay gap that has been estimated in this article might be different had the ASHE dataset included self-employed workers in the sample.

Conclusion

This article has shown that when comparing public sector and private sector earnings there are a number of factors that must be taken into account due to the different characteristics of these sectors. This makes it difficult to estimate a definitive 'public/private sector pay gap', and the gap estimated in this article is exactly that - an estimate of the pay gap rather than an authoritative measure of the difference in the average earnings of the public sector and the private sector.

The earnings model used in this article estimated that after accounting for: gender, age, occupation, the region that the job is located in, and factoring in qualifications, the public sector, on average, earned 8.2 per cent more per hour (excluding overtime) than the private sector in 2011.

However, the pay gap may also be explained by other characteristics that were not included in the regression model because they are not collected on the ASHE or LFS datasets. For example, ASHE does not collect earnings data on self-employed workers. This excludes some of the highest paid workers, and also some of the lowest paid workers. Further, the timing of the survey in April means that only bonus payments related to April are included, outside of the main bonus season which is normally January to March. These factors would account for some but not all of the difference.

Also, despite using a detailed level of occupation classification in order to remove many of the differences in jobs between the public and the private sector, some differences still remain meaning that the pay in the two sectors for certain occupations may not be directly comparable.

References (and other reading)

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[Standard Occupational Classification 2000 \(SOC 2000\)](#)

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Appendices

Annex A - Linear regression output

The reference group for the sector variables is the private sector. The variable 'public' refers to the public sector.

The reference group for the occupation variable is 'Corporate Managers and Senior Officials'.

The reference group for the region variable is 'London'.

Further information on the regression output is available in the [supporting spreadsheet \(30.5 Kb Excel sheet\)](#).