BANKERS' PAY AND EXTREME WAGE INEQUALITY IN THE UK

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Abstract

It is well known that the distribution of income in the United Kingdom has widened considerably in the last three decades. This rise has been a result of a widening at both the top and bottom of the wage distribution. More recently, most of the action appears to have occurred at the top of the distribution with lower wage workers keeping pace with the median. This paper explores this increased dispersion at the very top of the wage distribution. We show that the growth has occurred primarily within the top few percentiles and that the rise in inequality in recent years is much more pronounced when we focus on annual earnings as opposed to weekly wages (where most work has concentrated). This is because annual wages include bonuses. By the end of the decade to 2008, the top tenth of earners received £20bn more purely due to the increase in their share (it would have been only £173bn had their share of the pie remained the same as 1998), and £12bn of this went to workers in the financial sector (almost all of which was bonus payments). We consider various reasons why the bankers have managed to capture an increasing share of the wage bill over the last decade.

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I. INTRODUCTION

The UK wage distribution has become dramatically more unequal over the last three decades. In 1979 a man at the 90th percentile (just in the richest tenth of workers) earned 2.5 times more than a man at the 10th percentile (just in the poorest tenth of workers). By 2009 he earned 3.7 times more (Machin, 2010; Machin and Van Reenen, 2010). Overall inequality took off in the late 1980s and slowed from the early 1990s, although it continued to rise. Figure 1 illustrates these trends, but breaks down the distribution into two halves: "upper tail inequality" which is defined as the difference between the 90th percentile and the median (the 90-50) and "lower tail inequality" which is defined as the difference between the median and the 10th percentile. The 90-50 has risen at almost a secular rate since 1980 regardless of business cycle or political party. The 50-10, by contrast, shows a sharp increase in the 1980s and stabilization or even falls in the 1990s and 2000s. The bottom of the wage distribution is affected by institutional changes such as union decline and the minimum wage, whereas there are likely to be fundamental economic forces determining the continued rise in upper tail inequality[1].

An extensive literature has recently developed exploring the movements in income distribution over an extended period of time using individual tax return data. Instigated by the careful analysis of a century's worth of data for France and the United States by Piketty (2003) and Piketty and Saez (2003), the general conclusions of this stream of research is that income inequality in many Anglo-Saxon economies has tended to follow a U-shaped relationship over time, with a sharp decline in the share of income going to the top percentiles from the Great Depression to the end of the Second World War, relative stability until the 1970s and then a sustained rise since then. Since the 1990s there also appears to be an increase in inequality in most OECD countries (with the exception of France) following the UK and US experience. There is evidence that the increase in income inequality in the UK and US in the

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[1] A qualitatively similar picture arises from analysis of US data (e.g. Autor, Katz and Kearney, 2008)

recent past has been primarily focused at the very top of the wage distribution (e.g. Kaplan and Rauh, 2009).

This paper contributes to an understanding of the evolution of wage and income inequality in the UK at the very top of the distribution (i.e. the top 1% and 5% of workers). We show that the income tax data and the wage data present a reasonably coherent picture of a large and sustained increase in inequality at the very top of the distribution. This rise has been particularly rapid over the last decade but would be almost entirely missed by the standard analysis in the wage inequality literature in the UK that focuses on weekly wages. The growth in inequality has been driven by increasingly large bonus payments made to the better off. Unsurprisingly, these payments have been primarily in the financial sector and we calculate that around 60% of the increased income share attained by the top percentiles has accrued to such workers even though they account for only around 5% of the UK workforce.

The structure of this paper is as follows. We first describe the evolution of top pay in Section II, and then we look at the financial services sector in particular ("bankers' pay) in Section III. Section IV looks at the bonus part of total pay and Section V looks at explanations for these trends. Some concluding comments follow.

II. THE EVOLUTION OF EXTREME WAGE INEQUALITY

Earnings for those in the top 10%

We start by estimating the share of the total wage bill that accrues to the top percentile, the next four percentiles (i.e. the top 5% excluding the top 1%) and the second vingtile (i.e. the sixth through tenth percentiles). This contrasts with the more usual focus in the wage inequality literature on the wage rate at a particular percentile relative to the median (as in Figure 1). Such measures fail to capture dispersion within a particular decile which will be a core feature of our results.

Our main dataset is the Annual Survey of Hours and Earnings (ASHE) (previously called the New Earnings Survey, NES). ASHE is a random sample of 1% of employees based on the final two digits of an individual's National Insurance number. The gross weekly wage data is collected with reference to a specified survey week (always in April) and is completed by the employer on the basis of payroll data and is

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thus likely to be much more reliable than traditional survey data (such as the Labour Force Survey). In addition, employers are legally obliged to provide the information and so non-response bias is likely to be small. This is particularly important for our purposes since such bias is likely to be particularly high in survey data focused on the very top part of the income distribution. We sample all full-time workers aged 18-65 whose pay was not affected by absence in the survey week. This data has been used previously to examine the distribution of top earnings in the UK by Atkinson and Voitchovsky (2009)[2].

In Figure 2 we use annual employment income from tax returns to compute the share of the total wage bill accruing to the bottom and top deciles. Such measures more directly relate to the subsequent analysis and relate to annual rather than weekly wages. In spite of differences in definition and sources, the data show a very similar pattern to those in Figure 1. The wage share of the top decile has risen consistently over the last thirty years, while the bottom decile saw falls in their wage share until the mid 1990s. Since then the bottom decile's share has been broadly stable.

We now turn to our analysis of those at the top of the wage structure. Our first objective is to document the changes in the share of the total wage bill accruing to those at the top of the wage distribution. Figure 3 plots the evolution of these shares since 1975 while Table 1 provides the details. Workers in the top decile have seen their share of the total wage bill rise by 5.9 percentage points over the period, from 19.8% to 25.7%. Within the top decile, the 90-94th percentile share rose by 1 percentage point, while the 95-99th group and the top percentile both saw their share rising by about 2.5 percentage points. In other words, almost all the increase in the wage share experienced in the last thirty years at the top decile has accrued to only the top half of that decile and roughly half of that gain (2.3 percentage points) has gone to the top 1%.

The data in Figure 3 follows virtually all analyses of UK wage inequality by focusing on gross weekly wages (or hourly wages derived from the weekly measure). The main

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[2] Atkinson and Voitchovsky sample all workers including those working part-time. We exclude part-time workers to mitigate the effect of changing hours on gross weekly wages, but nothing significant hinges on this choice.

justification for using such a variable is that it is consistently measured in the ASHE back to the early 1970s. However, a weekly wage variable misses any remuneration that is made at a lower frequency than the current pay period. In particular incentive and bonus payments made in infrequent lump sums (e.g. a year-end bonus) will in general be missed. Technically the survey tries to capture these payments by asking employers to proportionately allocate to the survey pay period any incentive or bonus payments made outside the survey week, which at least partially reflected work conducted in the survey week. However it is clear that this failed to capture a large share of infrequent and often large bonus payments.

Since 1998, the ASHE has asked for gross annual wages at the same time as gross weekly wages. To see the effect of focusing on weekly wages and hence effectively ignoring bonus payments, we can compare the evolution of the top earnings share using both gross weekly wage and the gross annual wage since 1998. Figure 4 shows the change in the share of the total wage bill going to the three percentile groups over the period 1998-2008 using both weekly and annual wages. Using gross weekly wages, the top decile's share grew by 1.5 percentage points. In contrast the share rose 3.0 percentage points measured on an annual wage basis – a large rise given that the share on a weekly wage basis rose only 5.9 points over the whole period from 1975. The differences are almost entirely within the extreme of the top decile. For the top 1% of workers, the share based on weekly wages rose only 0.4 percentage points over the period 1998-2008. Using annual wages suggests a rise of 1.8 percentage points. *So almost all the rise in extreme wage inequality over the last decade would be missed using weekly wages.*

In the subsequent sections we shall explore the extent to which incentive and bonus payments account for this movement in wage inequality. But who has "lost out" as a result of these gains? The answer is that the losses have been rather evenly spread across the lower nine deciles of the wage distribution. Two-fifths of the share loss was accounted for by the top half excluding the top decile, with three-fifths coming for the bottom half of the distribution. Within the bottom half, the bottom quartile performed slightly better than the next quartile.

Alternative Datasources: Tax returns and BHPS

Before proceeding, we examine two alternative data sources on wages. First we make use of data from tax returns to provide a measure of annual wages back to the 1970s. The tax return data have been examined extensively in recent work by Atkinson (2005) and Atkinson, Piketty and Saez (2009). In contrast to their work, which examined overall trends in income inequality for the last hundred years, we focus on those taxpayers who report income from employment.[3] Using annual tables for the distribution of employment income, we can estimate wage shares for the percentile groups considered above. Figure 5 plots the share going to the top decile and the top percentile from the tax return data alongside the corresponding shares calculated from the ASHE weekly wage data. The share of the total wage bill going to the top percentiles is somewhat higher using the tax data. However the trends are almost identical until the mid-1990s. Between 1975 and 1995, we estimate that the top decile increased its share of the wage bill by 4.8 percentage points using the tax return data and by 3.7 percentage points using the weekly wage data. The corresponding share changes for the top percentile are 1.7 and 1.5 respectively. However since the mid-1990s the annual wage data from the tax records shows much stronger gains for the top earners, as we saw previously using gross annual wages from ASHE.

The tax return data also allow us to consider whether the evolution of post-tax income has been appreciably different. While out focus in this paper is on the labour market and is therefore primarily about pre-tax wages i.e. the price of labour, from a public policy perspective it is interesting to know the extent to which the tax system has unwound any of the large increase in inequality. Looking at total income, the share of pre-tax income of the top 10% has risen by 3.9 percentage points between 1998 and 2007. For this same group, their share of post-tax income has risen 3.2 percentage points. So the tax system has unwound no more than 20% of this rise in inequality. The comparable figures for the top 1% are 2.5pp and 2.1pp, again giving less than a 20% attenuation of the rise in inequality.

A second source of data comes from the British Household Panel Survey (BHPS). The BHPS is a sample of over 5,000 households in the UK, conducted annually since

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[3] The sample should be reasonably close to the ASHE sample as both only report data for those earning more than the starting threshold for income tax.

1991. Data on annual income from employment comparable to that used in the ASHE has been collected since 1997.[4] Given the smaller sample sizes in the BHPS we pool observations for 1997/99 and 2005/7 and estimate the change in total wage bill shares between these two periods. Table 1 shows the decompositions. Again, we find a rise in the share for the top decile, though in this data the gain is only 2 percentage points. We suspect that the lower increase in the BHPS is a result of the response rate to a voluntary survey being quite low at the very top of the wage distribution. In spite of this, the BHPS does show that the gains within the top decile are entirely in the top 5% and mainly in the top percentile. And again, if we focused instead on usual gross monthly wages that ignore infrequent bonus payments we would have seen no change in the share of wages taken by the top decile.

Magnitudes and Summary

We can provide some estimate of the total amount of aggregate income involved in these recent changes. The National Accounts record total wages and salaries in the UK. This figure rose from £407bn in 1998 to £652bn in 2008.[5] In 1998, the top decile would have taken £108bn of this total. If their share had remained constant, they would have received £173bn in 2008 – a gain of £65bn in nominal terms. However, the rise in their share of the total wage bill resulted in them receiving £193bn. Of this additional gain of £20bn, £12bn went to the top 1% of earners.

To summarise, we have shown that the top decile have witnessed a substantial rise in their wage bill share over the last thirty years. Over the last decade, this increase would have been severely underestimated in weekly wage measures that are typically used to examine wage inequality in the UK. In contrast, annual wage data show that the wage bill share increase over the last decade has in fact accelerated and become increasingly focused within the upper half of the top decile. This result is consistent across a range of data sets. In the next two sections we explore the rising share in the

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[4] The data on annual earnings in the BHPS is constructed from monthly and weekly earnings rather than being directly asked as in the PSID. Hence whilst the annual income data is reported back to 1991 in the BHPS we only use data from 1997 when there was a separate question asked regarding the value of all bonuses received in the last 12 months. We add this value to the annual income total to produce a figure that should be comparable with that reported in the ASHE.

[5] An alternative source is Inland Revenue statistics on income from employment for taxpayers. This rose from £332bn in 1998 to £573bn in 2007. The additional gain to the top percentile is £14bn using these figures. This is roughly equivalent to the total income from employment for the bottom 10% of workers in 2007.

last decade in more detail. In the next section we show how the gains have been unevenly distributed across sectors of the economy. Most notably, the majority of the gains have gone to those working in the finance sector. In the subsequent section we examine in more detail the role that incentive and bonus payments have made to these developments.

III. BANKERS' PAY IN THE EVOLUTION OF INEQUALITY

How much of the rise in inequality can be explained by workers within the financial industry? The furore over bankers' pay in the financial crisis has highlighted the often astronomical levels of remuneration paid to workers in the financial sector at grades well below the level of CEO. But in contrast to CEO pay, none of this remuneration is detailed in company accounts and is rarely discussed in the literature. Two notable recent exceptions using US data are Philippon and Reshef (2008) and Kaplan and Rauh (2009).

Both the ASHE wage data and the income tax returns allow us to break down the increase in inequality by industry of employment[6]. To maintain large enough sample sizes and to comply with confidentiality requirements associated with accessing the data, we focus on one digit industry breakdowns.[7] Fortunately financial intermediation is consistently categorised over our sample period. For the income tax data we examine both wages and self-employment income. The latter is likely to be particularly important for those workers at the top of the distribution who are paid as partners. Partnerships are an important form of corporate structure for groups of workers who are commonly thought to have increased their share of income from employment in the last decade such as lawyers, management consultants and hedge funds.

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[6] For our analysis of the income tax returns in this section we use the public use tapes of the Survey of Personal Incomes (SPI). The SPI is a random sample of all taxpayer filings in the UK, with sampling probabilities increasing with income up to 100% for those with high incomes. The most recent release is for 2007 and contains over 500,000 records. To ensure confidentiality, records are composited for those on extremely high incomes (above £600,000 in 2007), but the composite records report cell means and industry distributions so the underlying distribution can still be obtained. The compositing affects only the top 0.1% of incomes. We sample all taxpayers aged 18-65 who have annual incomes above the PAYE threshold. We also exclude those reported as retired.

Table 2 decomposes the changes in income and wage inequality presented in the previous section into those that can be accounted for by workers in the financial sector. Using the tax data, we find that 60% of the rise in income share of the top decile accrued to finance workers. It should be noted that only around 12% of workers in the top decile worked in finance in 1998. The gains for bankers are fairly evenly distributed across the top decile, with 60% of the gains in the top 1% also going to them. Interestingly, investment income plays no role in the income gains of finance workers whereas it accounts for almost 30% of the gains for the top decile as a whole. This is somewhat surprising given the prevalence of stock awards as a part of the bonus compensation for top earning bankers which would be expected to yield some dividend income assuming they are held for any length of time after the award is vested. There is also some evidence that self-employment income has played a role in changes at the very top of the distribution. For top percentile workers, 65% of the income gains come from pay from employment with 35% coming from self-employment profits. The self-employment gains were primarily in business services such as accounting, law and management consultancy with a smaller contribution from finance. This is consistent with the analysis of Kaplan and Rauh (2009) for the U.S. Focusing more narrowly on wages gives a similar picture. Almost three-quarters of the wage bill gains for the top decile in ASHE accrued to those working in the financial sector. Again, the role for finance was broadly similar across the percentiles at the top.

In passing we can also make some comment about other sectors of the economy. Table 3 breaks down the wage bill changes according to one digit industry. In addition to the strong role for finance, it is clear that other business services have seen significant gains though not at the very top of the distribution. This group includes lawyers and management consultants who were highlighted by Kaplan and Rauh as additional sources of extreme income gains in the US. In contrast, manufacturing has witnessed a substantial fall in their share of the top income groups. Also of interest given recent debate is the public sector. In spite of widespread reports of large pay awards at the top of the public sector, their share has fallen and public sector workers now account for only 1% of top percentile wages. There has been some increase for health sector workers particularly in the 95-99th percentile which is likely to be a consequence of the very generous G.P. settlement made by the Government in 2004.

IV. INCENTIVE PAY AND EXTREME WAGE INEQUALITY

Section II showed that there has been a continuous upward trend in the share of wages going to the very top of the wage distribution and that only annual wages capture the recent increase well. In this section we show that almost the entire increase in wage inequality over the last decade is a result of increased bonuses going to workers at the top of the wage distribution. We then explain the pattern of industry gains shown in the previous section by showing that large bonus payments are almost the exclusive preserve of the financial sector.

Although the ASHE annual wage data started being collected in 1998, it was only in 2002 that the survey asked employers to separate out the incentive element of the annual total. Hence between 1998 and 2001 we observe annual wages including bonuses but cannot isolate the latter. So our analysis here necessarily looks only at the period 2002-2008. However we also present some evidence from the BHPS which gives information on annual wages and bonuses over a slightly longer time period.

To begin we explore the incidence and size of incentive payments across the wage distribution. Figure 7 plots the incidence of incentive payments in annual wages across the wage distribution for 2002 and 2008, while Figure 8 shows the share of total annual wages accounted for by bonuses across the distribution for the same years – calculated only for those workers who receive a bonus. Incentive pay is reasonably common across the entire wage distribution, with an average incidence of 38% in 2008.[8] There is however a sharp rise in the proportions receiving incentive pay at the very top of the distribution. For the top decile, 63% of workers received a bonus in 2008 while the proportion jumps to 82% for the top percentile. Such a pattern is also reflected in the share of total remuneration accounted for by bonuses. Amongst those receiving bonuses they account for 8.7% of total pay. There is little variation in this share across the first nine-tenths of the wage distribution.

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[8] Note that this underestimates the proportion of jobs that are incentivised. As Lemieux, MacLeod and Parent (2009) point out, incentive jobs do not necessarily make a bonus payment every year. If we calculate the share of jobs that has at some point during the job duration made a bonus payment, the incidence rises to over 50%.

The importance of bonus payments within the top of the wage distribution is shown in Figure 9. We plot the share of the total wage bill within a given percentile group that is accounted for by bonuses. For the first nine deciles, bonuses make up less than 5% of the total wage bill. Even for the second vingtile, the bonus share still only averages about 6%. But for the top 1% of workers, the bonus share makes up around 40% of all earnings. The differences across workers are even more extreme when we examine the bonus share across different industries and percentiles. Table 4 reports averages over the period 2002-2008. The size of the bonuses in the financial sector relative to other sectors is very pronounced. Over 25% of pay for all finance workers comes from bonuses, though this is heavily concentrated at the top of the distribution. Unsurprisingly, those working in public sector industries such as public administration, education and health receive very low bonuses as a share of the wage bill, even if they are located at the top of the wage distribution.

The above results strongly suggest that the payment of bonuses, particularly in the financial sector, will go a long way in accounting for the results in the previous two sections. Table 5 decomposes the rise in extreme wage inequality for the different percentile groups. Note that the overall rise in wage bill share as measured by the annual wage is 1.2 percentage points for the top decile and 0.7 for the top percentile over the period 2002-2008. Comparing these with the 3.0pp and 1.8pp rise respectively reported in Section II for the annual wage computations over the longer 1998-2008 period suggests that there were significant movements over both sub-periods. However we also present evidence from the BHPS over the longer 1997-2007 period which suggests that our conclusions would apply to both sub-periods. The Table provides clear evidence of the role that bonuses have played in the evolution of wages at the top of the distribution. Across all workers in the top decile, basic pay relative to the lower deciles has actually fallen leading to a decline in the wage share. But this has been more than compensated for by a rise in the bonus contribution. The shift from basic pay to bonus pay is particularly noticeable for the top percentile. The rise in bonus payments to bankers more than explains the rise in total extreme wage inequality. The BHPS data confirm that this role of bonuses is not a result of looking at the shorter time frame as the pattern over the 1997-2007 period is broadly similar. The only notable difference is that the BHPS suggests smaller relative movements in basic pay.

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The data on bonuses in ASHE only cover those payments made during the year in cash. However we know that a substantial portion of bonus remuneration in the financial sector, particularly to the highest earners, is paid using restricted shares and option grants. Such awards give rise to income tax liability in either the bonus or vesting year and potentially some capital gains tax liability. The exact rules on which tax is liable and at what point are complex and likely to vary according to the exact details of the bonus scheme. The income tax data used in the previous sections should capture all the income related to employment, including the value of shares and options that are liable to income tax. The final rows of Table 2 show that at the very top of the distribution, the gains recorded in the tax data are larger than those in the ASHE wage data for the last decade, with an additional 0.7 percentage points accruing to the top percentile[9]. It seems likely that share-based bonus payments are an important element of this difference but there are no available data to shed more light on this.

V. HOW CAN BANKERS EARN SO MUCH?

A natural question arising from the previous sections is how can bankers have so increased their share of the pie in recent years? In this section we focus on two possible explanations. First we document the substantial rise in gross value added per employee in the financial sector relative to the rest of the economy. A standard rent-seeking model (see Van Reenen, 1996 or Blanchflower, Oswald and Sanfey, 1996) would suggest that these gains will be bargained over with workers and at least some of the gain will accrue to them. Indeed Philipon and Reshef (2008) suggest that rents can explain up to half of the relative gains to finance workers in the US over the last decade. While this explanation appears intuitively plausible, it is not clear why the gains have accrued so extensively to the top of the distribution. As we shall show, workers in the financial sector below the 90th percentile appear to have done only marginally better than other workers in spite of the apparent rents within the sector. An alternative explanation relies on the economics of superstars which predicts that

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[9] In addition the absolute share of the wage bill for top earners is higher using tax return data. So for example, we estimate that the top percentile took 8.6% of total annual wages in 2008 but 10.8% of total employment remuneration.

the most talented workers within the sector can receive pay many multiples of that obtained by workers who seem very similar but are slightly less talented.

Before moving on to these possible explanations, we should note the potential role that the moral hazards associated with the banking sector has played a part in the evolution of financial pay in the last few years. The combination of the moral hazard problem that banks have implicit and explicit guarantees that protect the downside (the "too-big-to-fail" problem) and the standard principal-agent problems of management and shareholders may result in the provision of high-powered incentives to workers that do not induce the socially optimal level of risk-taking on the part of workers. Workers paid bonuses on the basis of the annual profits of their trading book have an incentive to search for short-term profit and to maximise the risk they can take at the expense of the long-term interest of the firm. These effects become magnified during a period in which the low policy rates of the major central banks encouraged risk-taking and leverage. This is particularly so for traders who make money in aggregate only by luck and have no ability to outperform the market in the long run. The worst that can happen to such traders is that they lose their job, but they keep the bonuses they had previously received. The management of the firm is less incentivised to address these issues since the moral hazard problem reduces the downside costs of such actions.

The financial sector has witnessed a substantial rise in gross value added over the last decade. Figure 10 shows gross value added per employee relative to the economy average for manufacturing, finance, other business services and other services. Over the period 1995-2007, the economy as a whole saw a 65% rise in GVA per employee. The rise across broad industry was roughly the same except for finance which saw a rise of 156%. Other figures show a similar pattern of gains for the financial sector. For example gross trading profits per employee reported to the tax authorities rose 70% over the same period across the economy but the rise in finance was 114%. However we measure corporate performance, there was a substantial outperformance by the financial sector over the last decade. This certainly created opportunities for workers to bargain over rents. But did all finance workers benefit from the increased profitability of their employer? It should be noted that gains do not need to be evenly spread across the wage distribution for rent-sharing to be an explanation of rising

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wage inequality amongst bankers. It may well be that workers at the top of the distribution have more bargaining power and so are able to extract a substantial share of the rents available at the expense of other workers. It is however interesting to see whether possible rent-sharing was widespread. One way of looking at this issue is to examine the evolution of the wage premia that finance workers enjoy relative to other workers at various points in the wage distribution. Table 6 shows quantile regression estimates of the annual wage premia at the 10th, 50th and 90th percentile and also at the mean. The last row of the Table shows the annualized trend increase in the premia. The results are somewhat remarkable. There were no significant gains for finance workers at the 10th or 50th percentile of the wage distribution.[10] The gains are strongly associated only with those in the top decile. Whilst we cannot reject a rent-sharing interpretation of the gains for bankers over this period, it is surprising that essentially none of the gains accrued across the broad swathe of workers in the industry.

The economic theory of superstars can potentially help explain increased inequality at the very top of the distribution. The basic insight of Rosen (1981) was that sellers of a particular service e.g. traders at an investment bank, are not perfect substitutes. The purchaser of these services, the investment bank, will prefer to buy the services of the extraordinarily talented trader than one almost as good. Because only a few traders possess exceptional ability[11], investment banks will be willing to pay a substantial premia for their services. The potential importance of superstars in the financial sector is likely to have increased in recent years as a result of technological change. As markets have become more globalized and liquid, traders have witnessed a substantial rise in the number of different markets and asset types that they can trade. In addition, large increases in the size of assets under management allow for superstars to trade with much larger capital.

Could the existence of such superstars help explain extreme wage inequality? First it should be noted that Gabaix and Landier (2008) use such arguments to explain the large rises in CEO pay over the last two decades. In their model, CEOs differ in

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[10] Indeed the small gains that are observed are a result only of the jump in the estimated coefficient between 1998 and 1999. If 1998 were dropped, the trend coefficient would be slightly negative for the 10th percentile and zero for the 50th percentile.

[11] This claim seems reasonable in light of the extensive evidence showing that individuals can rarely consistently outperform the market.

managerial talent and are matched to firms competitively. If the marginal impact of a CEO's talent increases with the value of the firm under his control, then the best CEO manages the best firm. Furthermore, even very small differences in talent can produce large differences in remuneration. For example, they calibrate the model and find that the value of a firm increases by only 0.016% if they replace the 250th best CEO with the best CEO. Yet these small differences in talent translate into large pay differences as they are magnified by firm size. The same calibration shows that the number 1 CEO is paid over 500% more than the 250th CEO.

We provide two pieces of very preliminary evidence on this issue. First, we rank the top percentile of all workers into 50 equally-sized bins based on total wage[12]. So the workers in the top bin are the top 0.02% of earners. We then compute the share of the top 1% wage bill that accrues to each bin in 1998 and 2008. It follows that the sum of all these shares will be 1. Figure 11 shows the results. In effect we are now focusing on the extremes within the extreme. The top 2% of the percentile took 11% of the wage share in 1998 and 13% in 2008. The relatively large share taken by the very top earners seems consistent with superstar theory, though they by no means account for most of the gains that have accrued over the last decade.[13]

The evidence also seems to suggest that the financial sector may be more susceptible to superstar effects than the rest of the economy. Figure 12 shows the top percentile of wages broken into 20 equally-sized bins separately for finance and non-finance workers. The top bin now covers the top 0.05% of workers. This top group take 23% of top percentile wages in the financial sector and 21% in the other sectors. The chart suggests that the dispersion of remuneration is higher in finance than in other sectors within the top percentile. It is a subject for future research as to whether such effects can truly be ascribed to the different exposure of industries to superstar effects.

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[12] Disclosure requirements for ASHE require that no summary statistic can be based on less than 10 observations in a cell. This prevents us from reporting a more natural 100 bins within the top percentile.
[13] So for example, we know that the top decile increased its total wage bill share by 3.0% using ASHE annual wage data between 1998-2008. Of this 1.8% went to the top percentile. We can now see that the top 0.02% increased their share of the *total* wage bill by 0.4%. This is not insubstantial (it is four times the gain of the 90-94th percentile group) but clearly we would have to take a broad view of who is a superstar to ascribe most of the gains to this explanation.

VI. CONCLUSIONS

The share of the gross weekly wage bill going to the top decile, and particularly the top part of that decile has increased substantially over the last 30 years – by 5.9 percentage points for the top decile with the top 5% gaining 4.9 percentage points and the top percentile gaining 2.3 percentage points.

Weekly wages fail to capture lumpy and infrequent payments to workers – particularly year-end bonuses. Since 1998 ASHE provides annual wage data including bonuses: focusing on this measure the gains to the top percentiles have actually accelerated over the last decade. The top decile received £20bn more in wages in 2008 purely due to the increase in their share (they would have received £173bn had their share remained at 1998 levels), and £12bn of this went to workers in the financial sector.

All the gains for the top 5% of workers since 1998 have been as a result of substantial increases in bonus pay and again these accrued substantially to workers in the financial sector. Thus, about 60% of the increase in extreme wage inequality is due to the financial sector.

We suggested that not all of these gains to financial services were purely due to rent sharing, as they were not equally distributed to all bankers. There is some element of the "superstar" phenomenon where even within the financial the gains are skewed to those who can leverage their ability across a more globalized market.

The data of this paper ends in April 2008, prior to the onset of the financial crisis. 2008 was a bad year for bankers, but 2009 was extremely good. We doubt that incorporating these years will fundamentally change the picture we paint here.

We have focused on facts more than policy (see Bell, 2010, for some policy discussion). Marginal tax rates on higher earners will rise substantially in the UK and there has been a supposedly one-off tax on bonuses. In the light of the changes in the distribution discussed here, these tax changes are unsurprising.

REFERENCES

Atkinson, A. B. (2005) "Top Incomes in the United Kingdom over the Twentieth Century", *Journal of the Royal Statistical Society*, Series A, 168, 325-43.

Atkinson, A. B., Piketty, T., and Saez, E. (2009) "Top Incomes in the Long Run of History", NBER Working Paper No 15408.

Atkinson, A. B., and Voitchovsky, S. (2009) "The Distribution of Top Earnings in the UK since the Second World War", *mimeo*, Nuffield College, Oxford.

Autor, D., Katz, L. and Kearney, M. (2008) "Trends in US Wage Inequality; Revising the Revisionists", *Review of Economics and Statistics,* 90(2) 200-323.

Bell, B. (2010) "Bankers' Bonuses" Election Briefing, Centre for Economic Performance.

Blanchflower, D. G., Oswald, A. J., and Sanfey, P. (1996) "Wages, Profits, and Rent-Sharing", *Quarterly Journal of Economics*, 111(1), 227-51.

Burkhauser, R. V., Feng, S., Jenkins, S. P., and Larrimore, J. (2009) "Recent Trends in Top Income Shares in the USA: Reconciling Estimates from March CPS and IRS tax return data", ISER Working Paper No 2009-27.

Gabaix, X., and Landier, A. (2008) "Why has CEO Pay increased so much?", *Quarterly Journal of Economics*, 123, 49-100.

Gordon, R. J., and Dew-Becker, I. (2007) "Selected Issues in the Rise of Income Inequality", *Brookings Papers on Economic Activity*, 169-92.

Gosling, A., Machin, S., and Meghir, C. (2000) "The Changing Distribution of Male Wages in the U.K.", *Review of Economic Studies*, 67, 635-66.

Kaplan, S. N., and Rauh, J. (2009) "Wall Street and Main Street: What Contributes to the Rise in the Highest Incomes?", *Review of Financial Studies*,

Machin, S. (2010) "Changing Wage Structures: Trends and Explanations", *mimeo*, Centre for Economic Performance, LSE.

Machin, S. and Van Reenen, J. (2010) "Inequality", Election Briefing, Centre for Economic Performance.

Philippon, T., and Reshef, A. (2008) "Wages and Human Capital in the U.S. Financial Industry: 1909-2006", *mimeo*, New York University.

Piketty, T. (2003) "Income Inequality in France, 1901-1998", *Journal of Political Economy*, 111, 1004-42.

Piketty, T., and Saez, E. (2003) "Income Inequality in the United States, 1913-1998", *Quarterly Journal of Economics*, 118, 1-39.

Rosen, S. (1981) "The Economics of Superstars", *American Economic Review*, 71(5), 845-58.
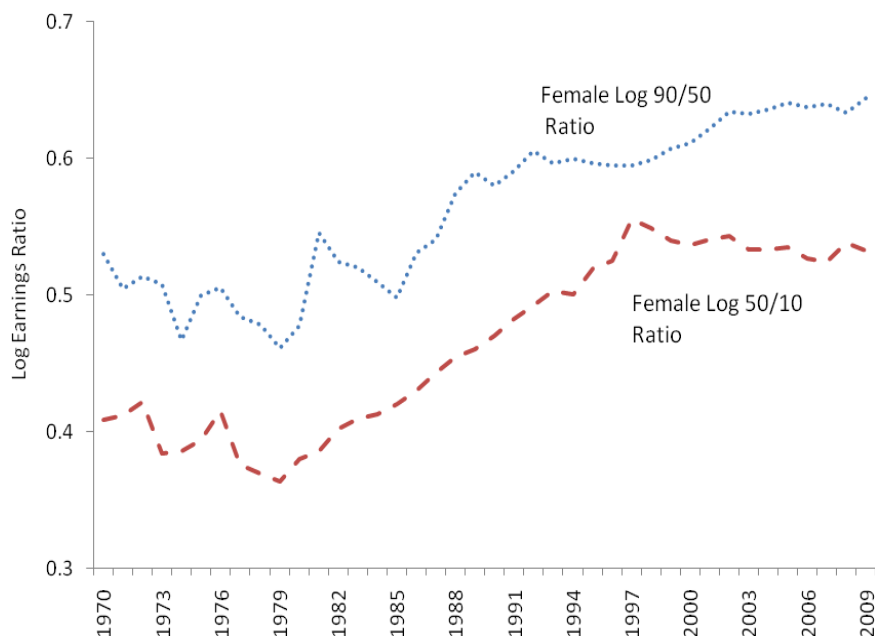
Van Reenen, J. (1996) "The Creation and Capture of Economic Rents: Wages and Innovation in a Panel of UK Companies" *Quarterly Journal of Economics*, CXI, 443, 195-226.

FIGURE 1: UPPER TAIL (90-50 LOG EARNINGS RATIO) AND LOWER TAIL (50-10 LOG EARNINGS RATIO) INEQUALITY, FULL-TIME MEN AND WOMEN, 1970-2009, ASHE

A) MEN
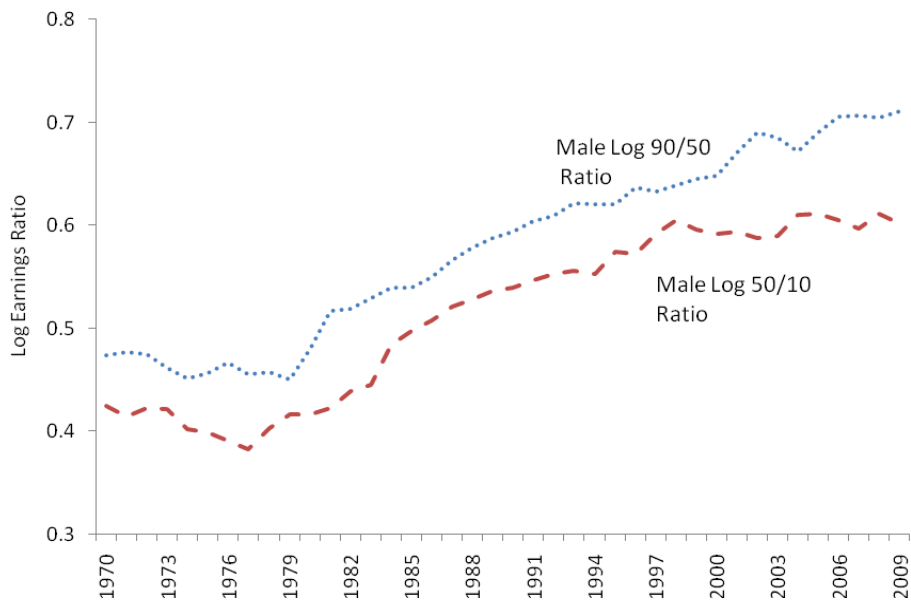
B) WOMEN

Notes: From Machin (2010). Source - National Equality Panel Analysis; 1968-1996 New Earnings Survey (NES) and 1997-2009 Annual Survey of Hours and Earnings (ASHE).

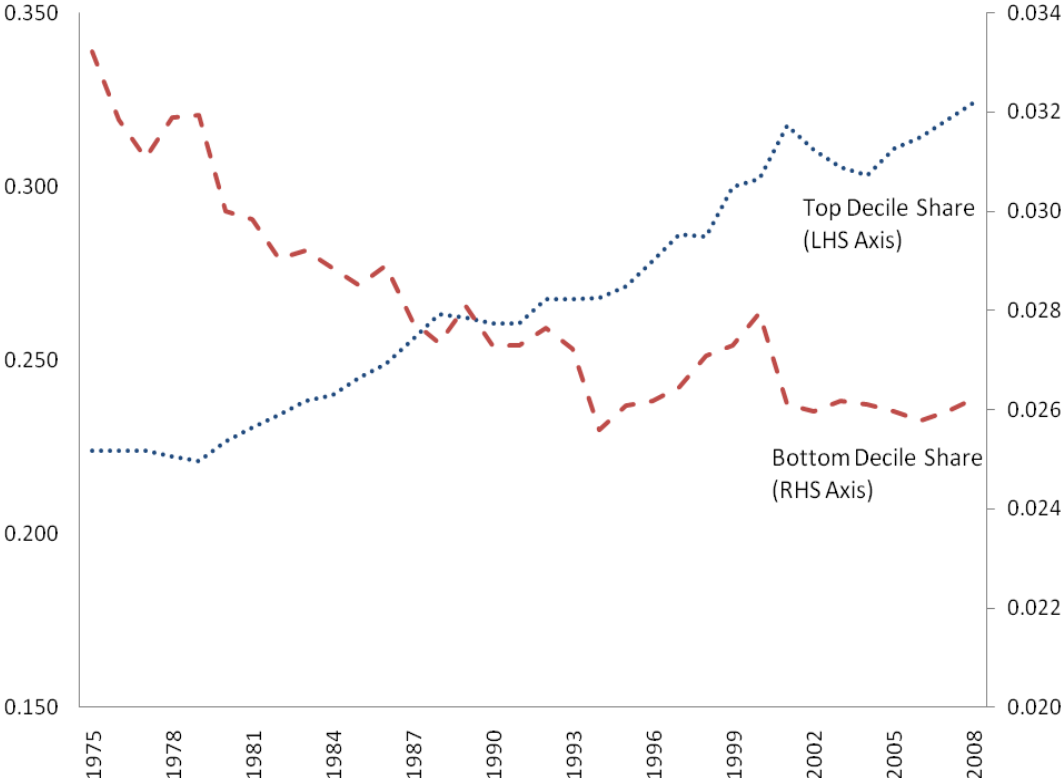FIGURE 2: SHARES IN TOTAL WAGE BILL FROM ANNUAL TAX RECORDS

20

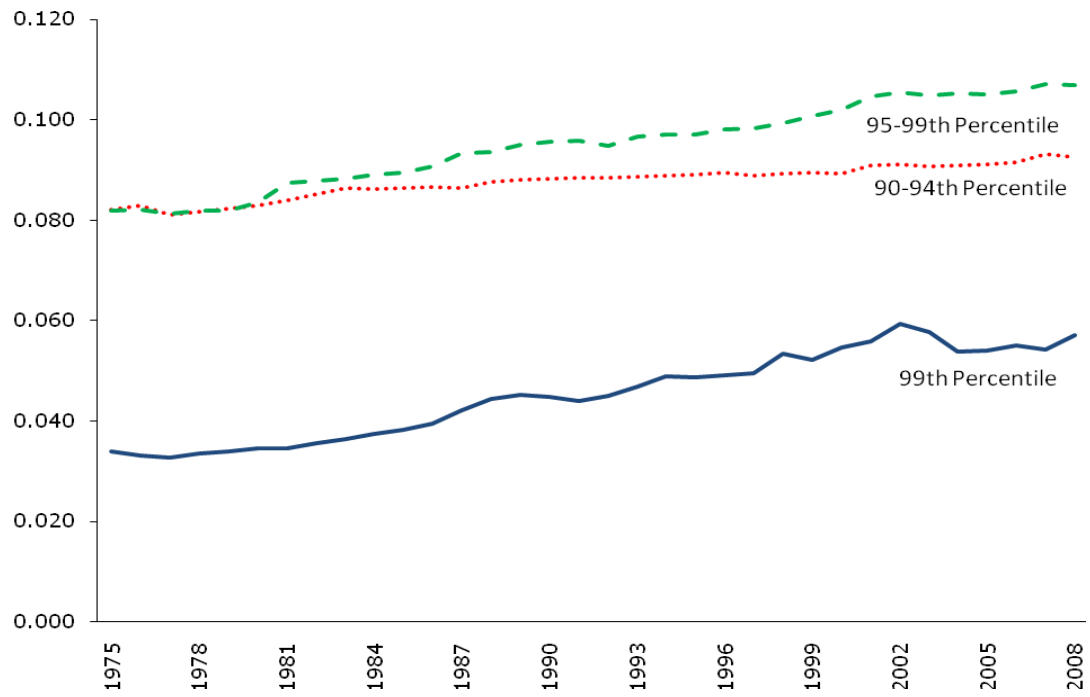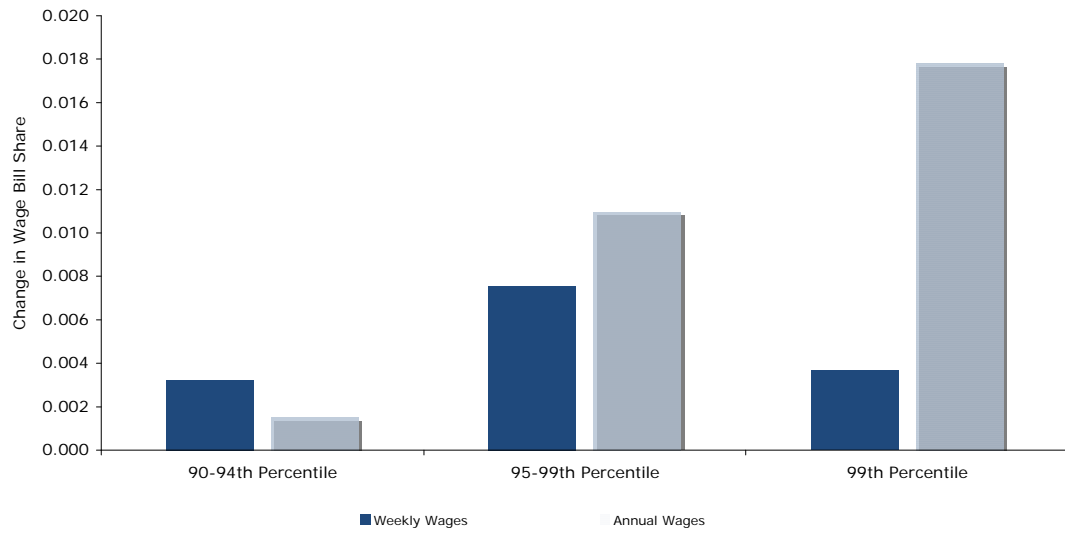FIGURE 3: SHARES IN TOTAL GROSS WEEKLY WAGES, ALL WORKERS, ASHE

FIGURE 5: SHARES IN TOTAL WAGE BILL, WEEKLY GROSS WAGES
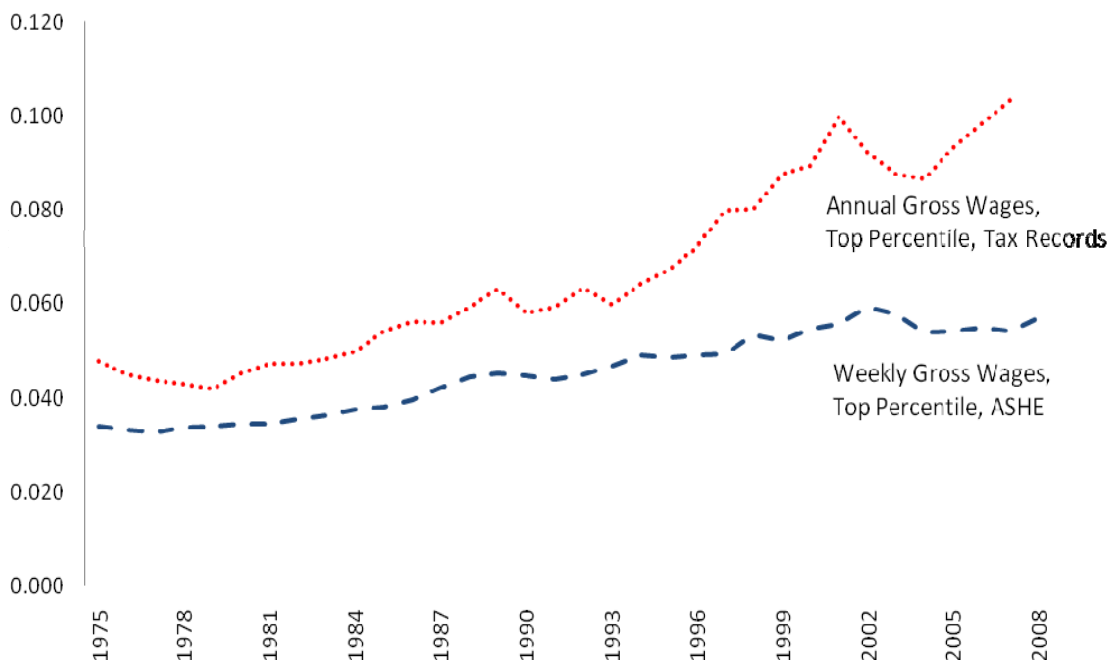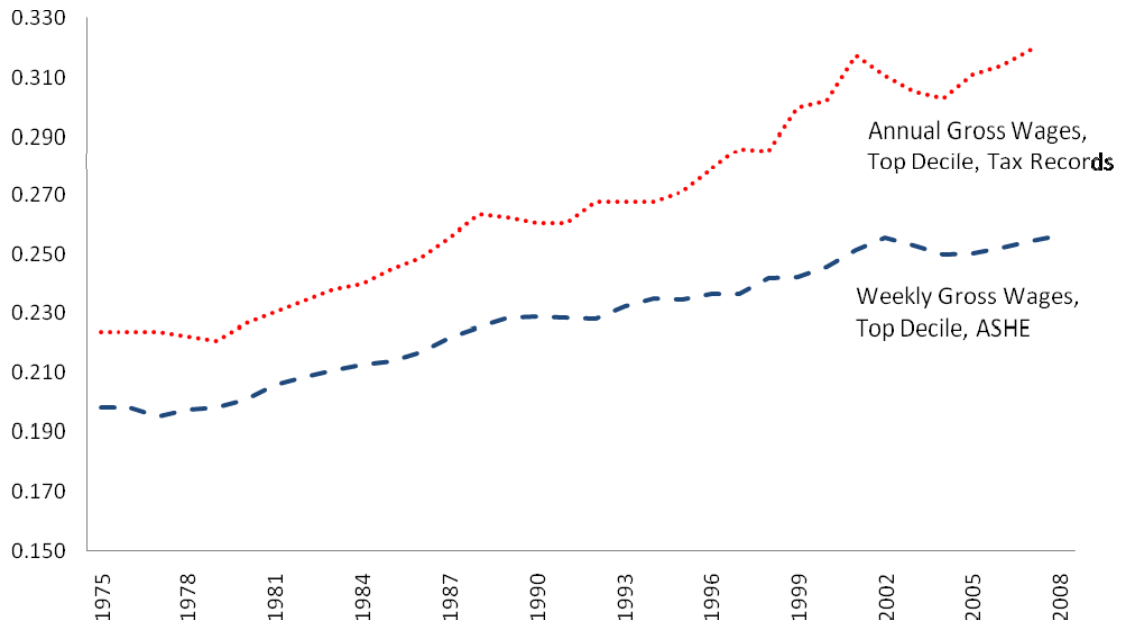AND TAX RECORD ANNUAL WAGES, 1975-2008

FIGURE 6: CHANGES IN THE ANNUAL WAGE BILL SHARE, 1998-2008 ASHE
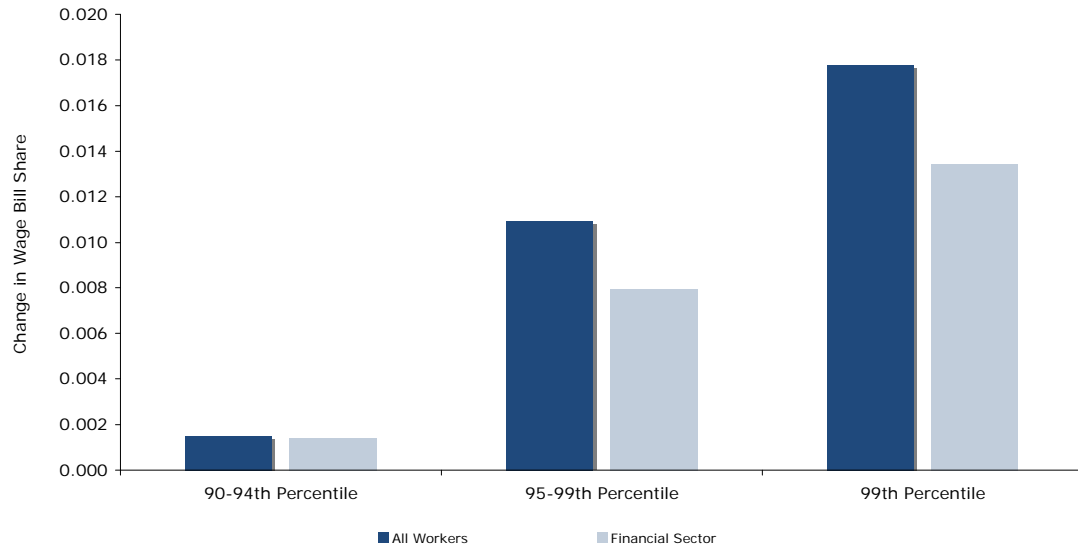
FIGURE 7: INCIDENCE OF INCENTIVE PAY ACROSS THE
WAGE DISTRIBUTION, 2002 AND 2008, ASHE

Percentiles of the Wage Distribution
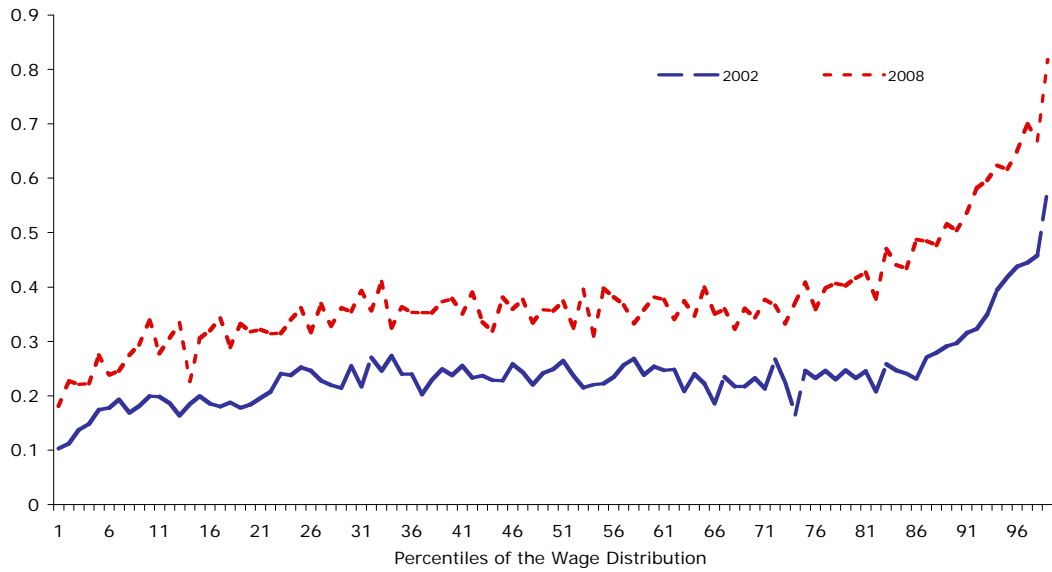
FIGURE 8: BONUS SHARE IN TOTAL ANNUAL REMUNERATION ACROSS
THE WAGE DISTRIBUTION, 2002 AND 2008, ASHE

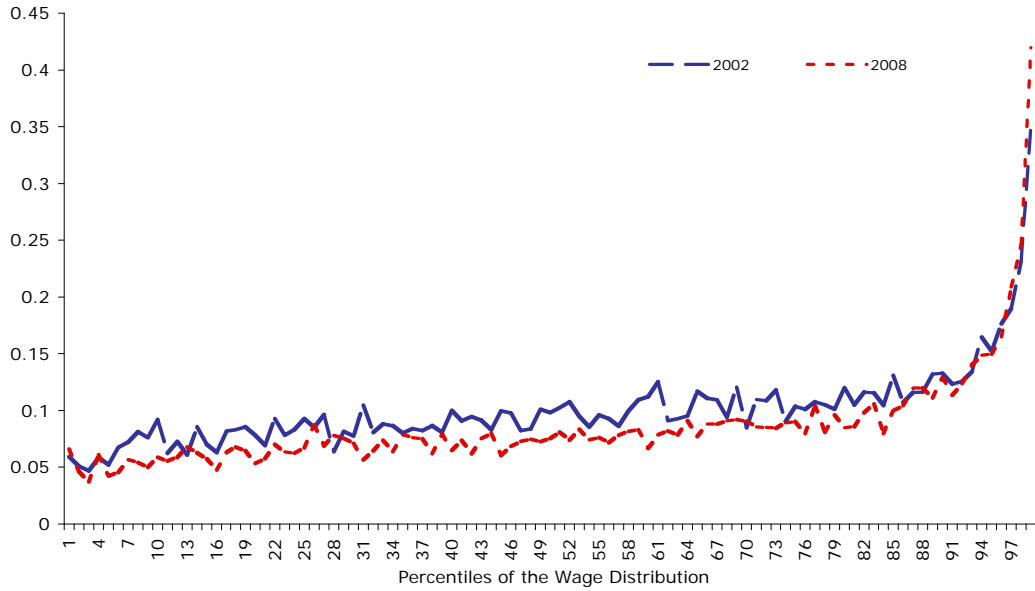Percentiles of the Wage Distribution

25

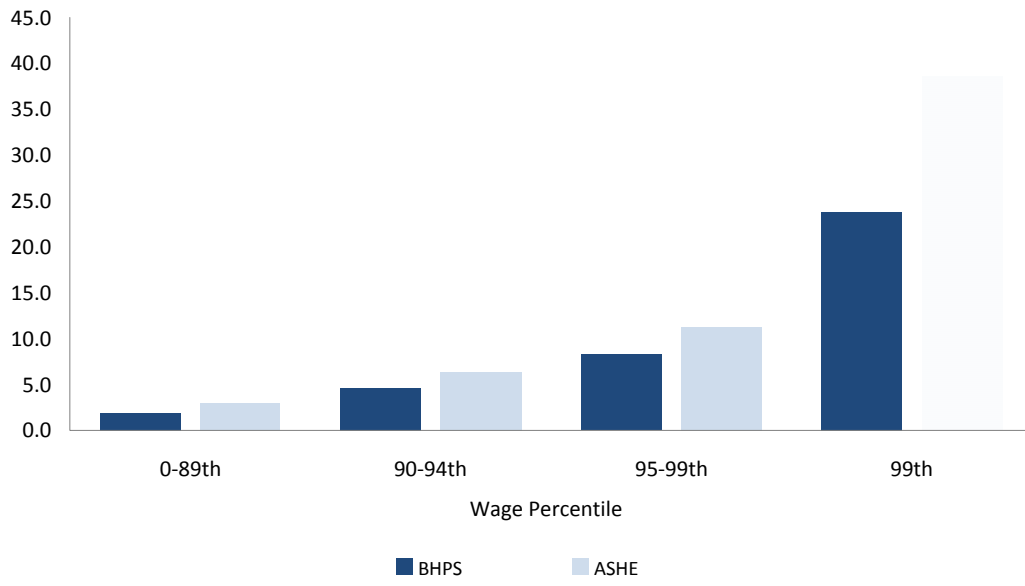FIGURE 9: BONUSES AS A SHARE OF TOTAL PERCENTILE WAGE BILL

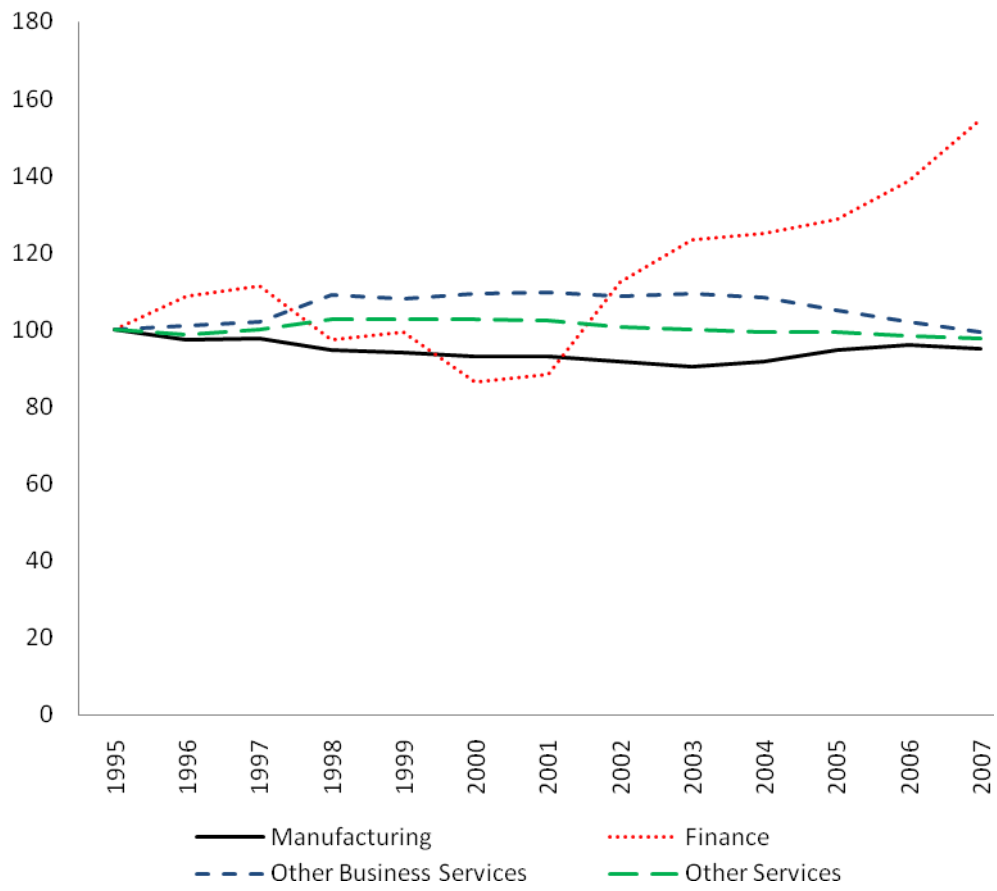FIGURE 10: RELATIVE GROSS VALUE ADDED PER EMPLOYEE, 1995=100
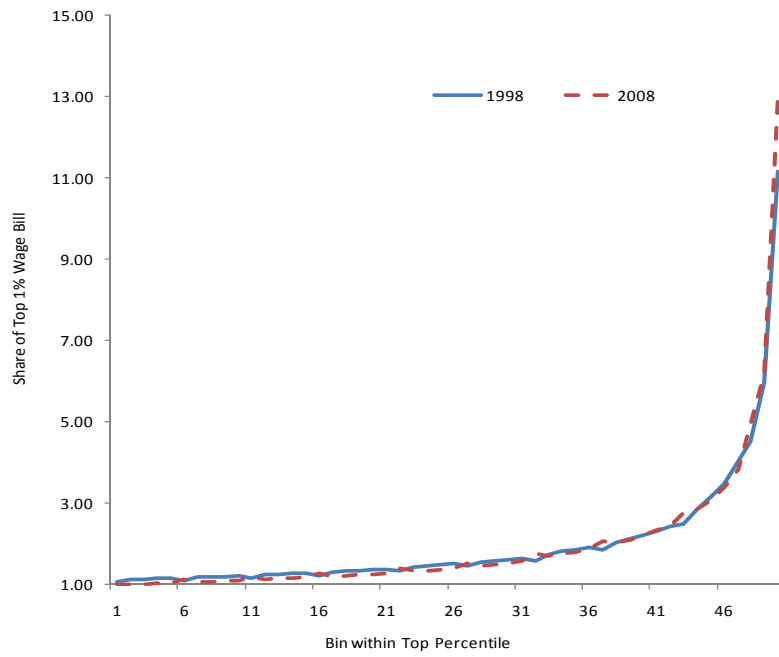
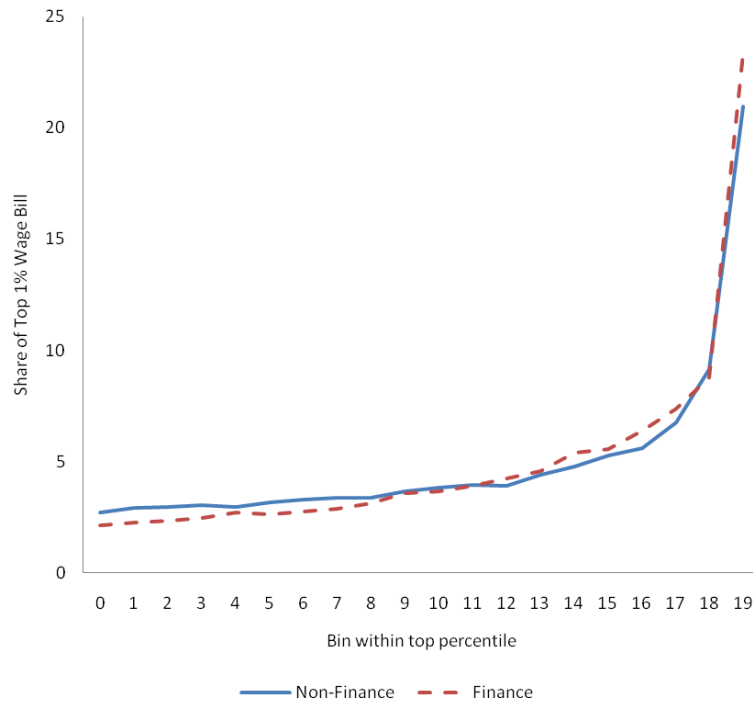FIGURE 11: DISTRIBUTION WITHIN THE TOP 1% WAGE BILL

FIGURE 12: DISTRIBUTION WITHIN THE TOP 1% WAGE BILL BY SECTOR, 2008

TABLE 1: AGGREGATE CHANGES IN TOTAL WAGE BILL SHARE

	90-99TH	90-94TH	95-99TH	99TH
ASHE WEEKLY WAGES				
1975	19.8	8.2	8.2	3.4
1998	24.2	8.9	9.9	5.3
2008	25.7	9.3	10.7	5.7
Change 1975-2008	5.9	1.0	2.5	2.3
Change 1998-2008	1.5	0.4	0.8	0.4
ASHE ANNUAL WAGES				
1998	26.6	9.3	10.6	6.8
2008	29.6	9.4	11.7	8.6
Change 1998-2008	3.0	0.1	1.1	1.8
TAX RETURNS ANNUAL WAGES				
1975	22.4	8.5	9.1	4.8
1998	28.5	9.3	11.2	8.0
2008	32.4	9.6	12.0	10.8
Change 1975-2008	10.0	1.1	2.9	6.0
Change 1998-2008	3.9	0.3	0.8	2.8
BHPS ANNUAL WAGES				
1997/9	24.5	9.1	10.1	5.3
2005/7	26.5	9.1	10.7	6.7
Change 1997-2007	2.0	0.0	0.6	1.4
BHPS MONTHLY WAGES				
1997/9	23.5	9.2	9.5	4.8
2005/7	23.6	9.0	10.1	4.6
Change 1997-2007	0.1	-0.2	0.6	-0.2

Note: All figures are the percentage point shares of the total aggregate wage bill for the relevant percentile group. The changes for the BHPS sample are the averaged over 1997-99 and 2005-07.

	90-99TH	90-94TH	95-99TH	99TH
TAX RETURNS – ALL INCOME, 1998-2007				
ALL WORKERS				
Total Income Change	3.7	0.2	1.0	2.6
of which:				
Investment Income	1.1	0.3	0.7	0.1
Earned Income	2.6	-0.1	0.2	2.5
of which:				
Pay from Employment	2.9	0.4	0.9	1.6
Self Employed Profits	-0.3	-0.5	-0.6	0.9
FINANCE WORKERS				
Total Income Change	2.2	0.1	0.5	1.6
of which:				
Investment Income	0.2	0.0	0.0	0.1
Earned Income	1.9	0.1	0.4	1.5
of which:				
Pay from Employment	1.7	0.1	0.4	1.2
Self Employed Profits	0.2	0.0	0.0	0.3
For Comparison:				
TAX RETURNS – WAGES ONLY, 1998-2007				
All Workers	4.1	0.3	1.3	2.5
Finance Workers	2.3	0.1	0.5	1.7
ASHE ANNUAL WAGES, 1998-2008				
All Workers	3.0	0.1	1.1	1.8
Finance Workers	2.2	0.1	0.8	1.3

Note: All figures are the percentage point change in the share of the total aggregate wage bill for the relevant percentile group.

	90-99TH	90-94TH	95-99TH	99TH
ASHE, 1998-2008				
All Workers	3.0	0.1	1.1	1.8
Finance	2.2	0.1	0.8	1.3
Business Services	1.6	0.5	0.7	0.3
Health Services	0.7	0.1	0.4	0.1
Construction	0.6	0.2	0.2	0.2
Transport & Comm	0.2	0.1	0.1	0.0
Public Admin & Educ	-0.3	-0.1	-0.1	0.0
Manufacturing	-1.6	-0.7	-0.7	-0.3
Other	-0.4	-0.1	-0.2	0.0
TAX RETURNS – ALL INCOME, 1998-2007				
All Workers	3.7	0.2	1.0	2.6
Finance	2.2	0.1	0.5	1.6
Business Services	2.1	0.4	0.7	1.0
Health Services	0.8	0.1	0.3	0.3
Construction	0.7	0.3	0.2	0.2
Transport & Comm	0.0	-0.1	0.0	0.0
Public Admin & Educ	0.0	0.0	0.0	0.1
Manufacturing	-1.6	-0.6	-0.5	-0.5
Other	-0.5	0.0	-0.2	-0.1

Note: All figures are the percentage point change in the share of the total aggregate wage or income bill for the relevant percentile/industry group.

TABLE 4: BONUSES AS A SHARE OF PERCENTILE WAGE BILL ACROSS INDUSTRIES

	ALL DECILES	90-99TH	99TH
ASHE, 2002-2008			
All Workers	7.1	17.4	38.5
Finance	25.1	34.4	51.2
Business Services	9.2	16.3	33.7
Health Services	0.6	1.3	3.4
Construction	6.0	14.0	33.9
Transport & Comm	4.9	12.3	27.3
Public Admin & Educ	0.9	1.1	5.5
Manufacturing	5.9	14.4	33.6
Other	4.9	10.4	17.1

Note: All figures are the average over 2002-2008 of the share of the total wage bill received in bonuses within the relevant percentile/industry group.

TABLE 5: BONUS PAY AND CHANGES IN TOTAL WAGE BILL SHARE

	90-99TH	90-94TH	95-99TH	99TH
ASHE, 2002-2008				
ALL WORKERS				
Gross Weekly	0.1	0.2	0.1	-0.2
Gross Annual	1.2	0.1	0.4	0.7
of which:				
Basic Pay	-1.5	-0.2	-0.2	-1.1
Incentive Pay	2.7	0.3	0.6	1.8
FINANCE WORKERS				
Gross Weekly				
Gross Annual	1.2	0.0	0.3	0.9
of which:				
Basic Pay	-0.3	0.0	0.0	-0.3
Incentive Pay	1.5	0.0	0.3	1.2
BHPS, 1997-2007				
ALL WORKERS				
Gross Monthly	0.1	-0.2	0.6	-0.2
Gross Annual	2.0	0.0	0.6	1.4
of which:				
Basic Pay	-0.1	-0.1	0.3	-0.3
Incentive Pay	2.1	0.1	0.3	1.7

Note: All figures are the percentage point change in the share of the total aggregate wage bill for the relevant percentile group. The changes for the BHPS sample are the averaged over 1997-99 and 2005-07.

TABLE 6: QUANTILE REGRESSIONS OF THE FINANCE PREMIA

	MEAN	10$^{\text{TH}}$	50$^{\text{TH}}$	90$^{\text{TH}}$
1998 Premia	0.271	0.220	0.187	0.389
	(0.007)	(0.010)	(0.008)	(0.012)
1999 Premia	0.324	0.253	0.237	0.446
	(0.007)	(0.009)	(0.009)	(0.011)
2000 Premia	0.322	0.246	0.231	0.463
	(0.007)	(0.009)	(0.008)	(0.013)
2001 Premia	0.346	0.250	0.252	0.522
	(0.007)	(0.009)	(0.009)	(0.014)
2002 Premia	0.341	0.261	0.263	0.486
	(0.007)	(0.010)	(0.008)	(0.014)
2003 Premia	0.356	0.252	0.256	0.573
	(0.007)	(0.009)	(0.008)	(0.014)
2004 Premia	0.337	0.236	0.233	0.548
	(0.007)	(0.009)	(0.009)	(0.013)
2005 Premia	0.364	0.253	0.250	0.585
	(0.008)	(0.009)	(0.008)	(0.012)
2006 Premia	0.361	0.244	0.237	0.577
	(0.008)	(0.009)	(0.008)	(0.013)
2007 Premia	0.375	0.243	0.245	0.598
	(0.008)	(0.010)	(0.008)	(0.012)
2008 Premia	0.368	0.251	0.247	0.619
	(0.008)	(0.010)	(0.008)	(0.013)
Trend Estimate	0.762	0.082	0.287	2.080
	(0.150)	(0.106)	(0.178)	(0.241)

Note: Coefficients from annual cross-section regressions of log(annual wage) on finance worker dummy, age, age squared, female dummy and female-age interactions. Trend estimates are multiplied by 100 and so are interpretable as % relative annual wage increase for finance workers.