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BANKERS AND THEIR BONUSES*

Brian Bell and John Van Reenen

We analyse the role of financial sector workers in the huge rise of the share of earnings going to those at the very top of the pay distribution in the UK. Rising bankers' bonuses accounted for two-thirds of the increase in the share of the top 1% after 1999. Surprisingly, bankers' share of earnings showed no decline between the peak of the financial boom in 2007 and 2011, three years after the global crisis began. Nor did bankers' relative employment position deteriorate over this period. We discuss proposed policy responses such as transparency, bonus 'clawbacks', numerical bonus targets and tax.

The financial crisis that began in the summer of 2007 focused public attention on the high pay levels of employees in the financial intermediation sector (henceforth, 'bankers'.¹) Even as some financial institutions collapsed and others were bailed out or given wide-ranging taxpayer guarantees,² bankers seemed to be reaping enormous rewards and suffering very little of the downside costs. This is an area where there is much heat from moral outrage and insufficient attention to facts, so the main aim of this study is to provide some objective evidence on the pay of bankers.

We begin by providing a historical context within which to view the recent evolution of income and wage inequality. The comprehensive work of Atkinson *et al.* (2011) shows how the share of income going to those at the top of the distribution has accelerated, especially for the English-speaking nations, and reached levels last seen in the interwar period. For the UK, in the decade preceding 2007, the top percentile increased their share of total income by 3.4 percentage points to reach just over 15% of total income. Over half of this gain went to the top 0.1% of tax payers.

We document how changes at the top have been heavily skewed towards bankers by using non-top coded wage and income data from several sources that allow us to

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¹ Strictly speaking, other than bankers this also includes workers in the fund management and insurance businesses. Obviously this includes many workers who are not in either retail or investment banking and work outside of the City of London. We discuss this in more detail later in the study.

² Haldane (2010) suggests that the cost of the UK and US bailouts is around 1% of GDP (£20 billion in the British case).

explore the sectoral distribution of gains across the entire distribution. Since 1999, somewhere between two-thirds and three-quarters of the total income gain for those in the top 1% has gone to bankers, even though they account for only one-third of the top percentile of workers. Furthermore, annual salaries have hardly changed for those in the top percentile over this period: their entire gain is due to increased bonuses.³ Even more remarkably, while the crisis years have seen a fall in the share of income going to the top percentile, top bankers' pay had fully recovered by 2011 to the point at which they were taking slightly more of total income than they were before the crisis began. In spite of the turmoil, we show that the probability that workers in the financial sector remained in employment was the same as for workers in other sectors, although they were less likely to be working for the same firm. This is true for financial workers generally, not just those at the top of the wage distribution. If anything, we suspect we are now substantially underestimating the share of income at the top going to bankers. Examining pay disclosures on senior employees in banks that are now required to provide more extensive remuneration information suggests that a significant fraction of such pay is in forms that standard data sets would not capture (e.g. long-term equity incentive plans).⁴

In terms of policy, we begin by considering whether there is really any 'problem' to be addressed. If bankers are paid in a competitive labour market and simply rewarded for their talent, there seems little reason for government intervention, at least on efficiency grounds. However, there seems to be substantial evidence of rents within the sector – a result of imperfect competition or arising from the implicit and explicit guarantees and subsidies that the sector receives from the government due to the 'too-big-to-fail' problem. We discuss various policy options that seek to either remove the basis for these rents or to tax them *ex post*. Finally, we note that on equity grounds, policy may seek to reduce the post-tax income taken by those in the upper echelons of the income distribution – which implicitly targets bankers given their prominence among high-earning workers. This has primarily taken the form of higher marginal tax rates.

While we document a strong rise in bankers' pay over the last decade and argue that at least some of this increased pay represents rents, there is a broader question as to whether other factors have contributed to a rising wage premium in finance. While a full discussion of such forces is outside the scope of this study, we highlight two factors that are likely to be important. First, there has been a substantial rise in the capital available to bankers, which has then been magnified by increased leverage. For example, improved information technology, globalisation and increased firm size have meant that the assets under management of a trader are far larger than 20 years ago. To the extent that such increases in capital can be managed with no additional workers, the model of Gabaix and Landier (2008) predicts a 'scaling' effect that would increase wages. Second, Philippon and Reshef (2012) argue that the wave of

³ In the Annual Survey of Hours and Earnings (ASHE) data that we use in Section 1, bonuses are defined as all payments made in cash during the year including profit sharing, productivity performance and other bonus or incentive pay, piecework and commission. It does not include share-based bonuses – see Section 2 for a discussion.

⁴ See Bell and Van Reenen (2012, 2013) for an analysis of the importance of these plans for CEOs.

deregulation that occurred in finance since the start of the 1980s enabled skilled workers in finance to operate freely and introduce new and complex financial products – which were profitable to the bank if not necessarily to society.

Finally, it is worth noting that both Kaplan and Rauh (2010) and Philippon and Reshef (2012) highlight that not all workers in the US financial sector witnessed substantial rises in pay. The gains have been primarily focused within investment banking, securities trading, hedge funds, private equity etc. Credit intermediation and insurance have not seen the same kind of trends. Our results for the UK are consistent with this finding, as the vast majority of bankers in the top percentile in our data are in the former type of firms.

The structure of this article is as follows. In Section 1 we describe changes in the pay structure, in Section 2 we remark on recent public disclosure of bankers pay, in Section 3 we discuss policy and Section 4 concludes.

1. Extreme Wage Inequality and Bankers

1.1. Long-run Income Inequality

It is well known that the UK distribution of income has widened considerably over the course of the last three decades. For example, in 1979, a man at the 90th percentile earned 2.5 times more than a man at the 10th percentile but in 2009 he earned 3.7 times more (Machin and Van Reenen, 2010). More recently, focus has switched to rising inequality driven by those at the very top of the income distribution. Standard analysis of wage inequality tends to focus on measures such as the 90th–10th percentile gap, which explicitly ignores the extremes of the income distribution. But as a series of recent studies have shown, much of the action over the last few decades has actually occurred within the top decile of income earners (Atkinson and Piketty, 2010).

To illustrate this, we use the data from Atkinson *et al.* (2011).⁵ Figure 1 plots the share of total income (including investment income) going to the top 1% and top 0.1% of income earners in the UK and US. A broadly similar pattern emerges for both countries. The rich took a large share of income in the years between the First World War and the Great Depression. There then followed a sharp decline, which continued until the end of the 1970s when the well known sustained rise in inequality began. This was only interrupted by the recent financial crisis. For example, in the UK, the share of the top 1% fell from 19.6% in 1919 to 5.7% in 1978 before rising to 15.4% in 2007. According to Figure 1, the shares of the rich were broadly similar in the UK and US until the mid-1950s, after which the share of American rich flattened out, whereas their share in the UK continued to fall. One key difference between the top percentile in the interwar period and today is that the rich used to receive a substantial fraction of their income from investment returns, whereas today most of the income accruing to the top percentile comes in the form of wage income. For example, in 1937, 23% of the top percentiles income came from labour income, whereas by 2000, this had risen to 65% (Atkinson, 2007).

⁵ Updated from the World Top Incomes Database: <http://g-mond.parisschoolofeconomics.eu/topincomes/>.

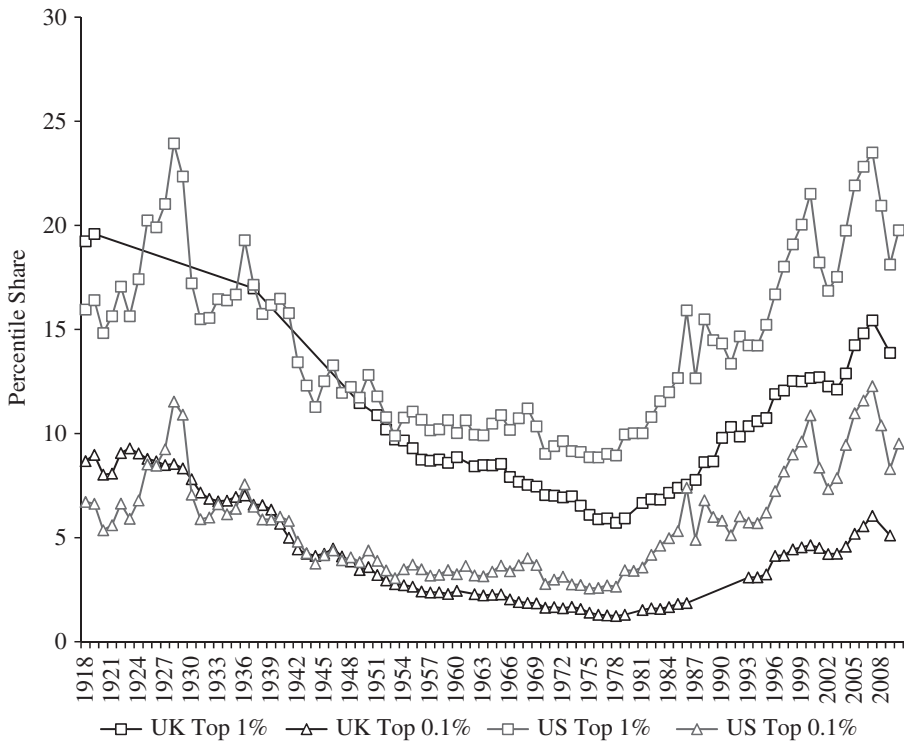


Fig. 1. *Top Percentile Income Shares in the UK and US, 1918–2010*

Note. Estimates shares of total income accruing to top 1% and 0.1% of all individuals in selected years from tax return data.

Source. World Top Incomes Database <http://g-mond.parisschoolofeconomics.eu/topincomes/>

By disaggregating the top decile we can see how uneven the gains have been even within this high-earning group. Table 1 reports the share of total income taken by the top 1%, the next four percentiles (i.e. the top 5% excluding the top 1%) and the second vingtile (i.e. the sixth through tenth percentiles) between 1979 and 2009. Over this 30-year period, the top decile increased their share of total income by 12.1 percentage points (from 28.4% to 40.4%). Fully two-thirds of this increased share (8%) went solely to those in the top percentile, while only 0.9% went to those in the second vingtile – even though there are five times as many people in this group. This again highlights how we miss a key aspect of rising inequality when we focus on standard measures such as the 90–10 differential.

1.2. *Extreme Wage Inequality in the Last Decade*

We now focus on the last decade where we have richer individual-level data. Our main data set is ASHE (previously called the New Earnings Survey). ASHE is a random sample of 1% of employees based on the final two digits of an individual's National Insurance (same as US Social Security) number. All the data are provided by the employer direct from their payroll system and so is considered highly reliable. There is no top coding of wage data, which is the key source of difficulty for most analysis of wage inequality at the

Table 1
Shares of Total Income, 1979–2009

	Top 1%	Next 2–5%	Next 6–10% (second vingtile)	Top 10%
1979	5.9	11.6	10.8	28.4
1980				
1981	6.7	12.8	11.6	31.0
1982	6.9	12.8	11.6	31.2
1983	6.8	13.2	11.8	31.8
1984	7.2	13.5	11.9	32.5
1985	7.4	13.4	11.9	32.7
1986	7.6	13.5	11.9	32.9
1987	7.8	13.6	11.9	33.3
1988	8.6	13.7	11.8	34.2
1989	8.7	13.8	11.6	34.2
1990	9.8	14.6	12.5	36.9
1991	10.3	14.8	12.5	37.7
1992	9.9	15.0	12.8	37.6
1993	10.4	15.2	12.8	38.3
1994	10.6	15.0	12.7	38.3
1995	10.8	15.1	12.7	38.5
1996	11.9	15.0	12.5	39.3
1997	12.1	14.7	12.2	38.9
1998	12.5	14.9	12.1	39.5
1999	12.5	14.7	11.8	39.0
2000	12.7	14.4	11.4	38.4
2001	12.7	14.8	11.8	39.3
2002	12.3	14.7	11.7	38.7
2003	12.1	14.3	11.4	37.8
2004	12.9	14.8	11.9	39.5
2005	14.3	15.3	12.1	41.6
2006	14.8	15.3	11.9	42.0
2007	15.4	15.3	11.8	42.6
2008				
2009	13.9	14.8	11.7	40.4
1979–2009 Change	8.0	3.2	0.9	12.1

Note. 1980 and 2008 data were not released by HMRC.

Source. World Top Incomes Database <http://g-mond.parisschoolofeconomics.eu/topincomes/>.

top of the distribution (e.g. the US Current Population Survey). We examine two wage measures. First, the gross weekly wage is collected with reference to a specified survey week (always in April). This is the measure commonly used in the analysis of wage inequality trends in the UK (Machin and Van Reenen, 2010) and is consistently measured back to the early 1970s. However, a weekly wage 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. Since 1998, ASHE has also collected the gross annual wage. This measure is the total payment made to an employee over the proceeding 12 months and captures all cash bonus and incentive payments. We exclude all wage data affected by absence, and focus on full-time adult employees who have been in the same job for at least 12 months.⁶

⁶ This last criterion ensures that the annual wage does not relate to a partial work year. Nothing in what follows is dependent on these selection criteria. Results are available on request from authors.

It is important to bear in mind the differences between such wage measures and the more comprehensive measures of income derived from tax data in Table 1 discussed above. First, the wage data exclude self-employment and investment income.⁷ Second, the total wage bill measure we use only covers those in ASHE. Importantly, this generally excludes workers whose earnings are so low they pay no tax or national insurance. In contrast, the income share measures from the tax data are adjusted to include all those below the income tax threshold including those who are not working at all (e.g. unemployed, inactive and retired).⁸ Thus, we are likely to understate the share of total wages going to the top percentiles – and indeed the reported levels are lower than those in Atkinson *et al.* (2011). A full discussion of these issues is provided in the online Appendix.

Table 2 reports the share of total wages that accrue to the top percentiles of the wage distribution using these two alternative measures of pay. Focusing first on ASHE weekly wages, we see that the top decile increased its share of the wage bill by 5.9 percentage points between 1975 and 2008 (last column of panel (a)). Most of this gain was divided fairly evenly between the top percentile and those in the next four percentiles (i.e. the top

Table 2
Aggregate Changes in Total Wage Bill Share

	Top 1%	Next 2–5%	Next 6–10% (second vingtile)	Top 10%
<i>(a) ASHE weekly wages</i>				
1975	3.4	8.2	8.2	19.8
1999	5.2	10.1	9.0	24.3
2008	5.6	10.8	9.3	25.7
2011	5.4	10.7	9.3	25.4
Change 1975–2008	2.2	2.6	1.1	5.9
Change 1999–2008	0.4	0.7	0.3	1.4
Change 2008–11	–0.2	–0.1	0.0	–0.3
<i>(b) ASHE annual wages</i>				
1999	7.1	10.1	8.7	25.9
2008	8.9	11.3	9.1	29.2
2011	8.4	11.1	9.0	28.5
Change 1999–2008	1.8	1.2	0.3	3.3
Change 2008–11	–0.5	–0.2	–0.1	–0.7
<i>(c) Tax returns annual wages</i>				
1975	4.8	9.1	8.5	22.4
1999	8.4	11.1	9.3	28.9
2008	10.9	12.1	9.5	32.5
Change 1975–2008	6.1	3.0	1.0	10.1
Change 1999–2008	2.4	1.0	0.2	3.6

Note. All figures are the percentage point shares of the total aggregate wage bill for the relevant percentile group.

⁷ ASHE excludes all those who are only self-employed and also excludes all self-employment income from those who also have paid employment.

⁸ Atkinson *et al.* (2011) accomplish this by using the ONS estimate of total income for UK adults and adjusting the share of the upper percentiles to reflect this larger denominator (see online Appendix). It is not clear how reliable this adjustment is. Even if the adjustment was perfect it represents the share of income among all adult individuals rather than among all adult workers, so the concept is slightly different.

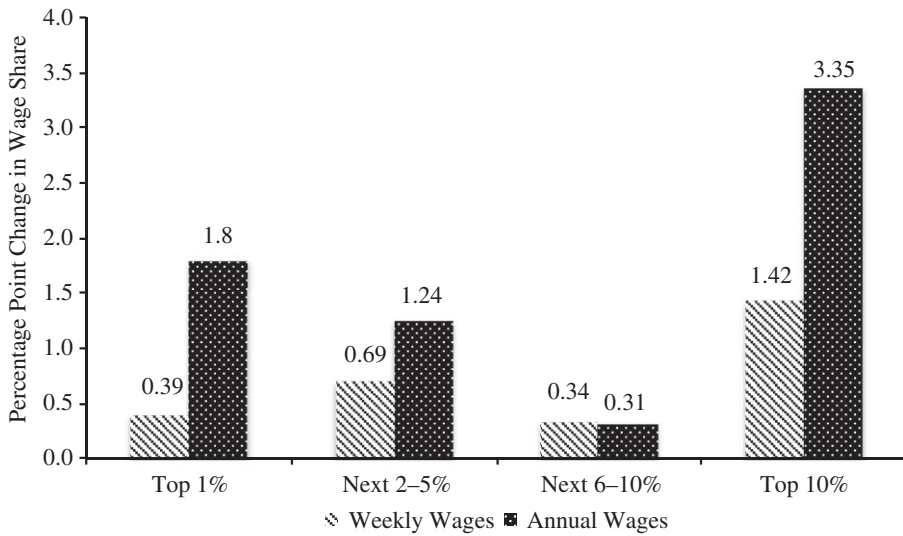


Fig. 2. *Change in Shares of Total Wage Bill, 1999–2008, ASHE*

Notes. Estimates shares of total wages accruing to 99th percentile (i.e. top 1% of earners), 95th–99th percentile (i.e. next 2–5%) and 90th–94th (i.e. next 6–10%) of all individuals in ASHE.

Source. Annual Survey of Hours and Earnings.

5% excluding the top 1%), with only a small increase for the second vingtile (next 6%–10%). So even with the standard measure of wages used in the literature we miss a substantial part of the wage inequality story by focusing on the 90th percentile. Interestingly, in the period between 1999 and 2008, the top percentile saw only a small increase in their share of the weekly wage bill. Finally, there has been a small decline in the share of the gross weekly wage bill accruing to the top decile since the onset of the financial crisis (2008–11), although it has unwound less than one-third of the previous decade gain.

Switching to annual wages in panel (b) of Table 2 gives a starkly different picture. The change in the wage bill share for the top decile between 1999 and 2008 was much larger on this measure (3.3 percentage points) than using weekly wages (1.4 percentage points).⁹ Furthermore, the distribution of these gains was also completely different. Using weekly wages suggested that those in the 6th–10th percentiles gained as much as the top percentile (0.3 and 0.4 percentage points per annum respectively). Using annual wages shows that the top percentile actually gained almost six times as much as that group (1.8 *versus* 0.3 percentage points per annum).

Panel (c) shows that the trends in the tax returns for annual wages over the overlapping period for which we have data (i.e. 1999–2008) are slightly higher but broadly similar to panel (b). This is likely to be because the tax returns include some of the deferred incentive payments, not captured by annual bonuses (see the discussion below in Section 2 around Table 5). For example the growth of the share of the top decile was 3.6 percentage points in the tax returns compared to 3.3 percentage points in ASHE.

⁹ The gain of 3.3 percentage points from 1999 to 2008 compares with a gain of 3.6 percentage points from 1999 to 2008 using the income tax return shares given in Table 1. So there is a very tight relationship between our measure of wage share changes using ASHE and the share changes using tax data over this period.

Figure 2 plots the change in the share of the total wage bill going to the three groups over the period 1999–2008 using both weekly and annual wages and the top decile as a whole. The key point here is that the vast majority of the rise in the share of the top 1% over the last decade would be missed using weekly wages (0.4% versus 1.8%). In a labour market that increasingly uses incentive and bonus payments as part of the remuneration structure, weekly (and hourly) wages will increasingly fail to capture the evolution of the wage structure adequately.

1.3. Sectoral Decomposition of Gains: The Role of Finance

How much of the rise in inequality can be accounted for by workers within the financial industry? The furore over bankers' pay has highlighted the high pay levels of bankers at grades well below the level of the CEO. But in contrast to CEO pay, none of this remuneration has been subject to required accounting disclosure. We can use the ASHE data to explore the sectoral decomposition of wage inequality changes. To maintain large enough samples and to comply with ONS confidentiality requirements associated with accessing the data, we focus on one-digit industry breakdowns. Fortunately, financial intermediation is consistently categorised over our sample period. Table 3 shows that workers in finance and business services (legal, accounting, management consultancy, IT services, etc.) have been the principal beneficiaries of increased inequality, whereas top earners in manufacturing have

Table 3
Changes in Total Wage and Income Share by Industry

	Level of share of wage bill of top 1% in baseline year	Change in the share of wage bill of			
		Top 1%	Next 2–5%	Next 6–10%	Top 10%
<i>ASHE, 1999–2008</i>					
All workers	7.1	1.8	1.2	0.4	3.3
Finance	2.4	1.4	0.9	0.3	2.5
Business services	1.6	0.8	1.1	0.8	2.7
Health services	0.1	0.1	0.2	0.1	0.4
Construction	0.1	0.3	0.2	0.3	0.6
Transport & comm	0.3	0.0	0.0	0.0	0.0
Public admin & education	0.1	0.0	–0.3	–0.2	–0.5
Manufacturing	1.1	–0.4	–0.6	–0.7	–1.8
Other	1.4	0.0	–0.1	0.0	–0.1
<i>SPI, 1999–2008</i>					
All workers	8.4	2.4	1.0	0.2	3.6
Finance	2.7	1.6	0.3	0.0	2.0
Business services	2.0	0.7	1.0	0.4	2.1
Health services	0.1	0.2	0.3	0.3	0.8
Construction	0.2	0.1	0.2	0.3	0.6
Transport & comm	0.4	0.0	0.1	0.0	0.1
Public admin & education	0.2	0.0	–0.1	–0.2	–0.2
Manufacturing	1.0	–0.2	–0.6	–0.8	–1.6
Other	1.8	0.0	–0.2	0.2	–0.2

Notes. All figures are the percentage point change in the share of the total aggregate wage bill for the relevant percentile/industry group. Data from the Survey of Personal Incomes (SPI) relates to pay from employment net of benefits and foreign earnings.

done least well. As we focus in on the top percentile workers, the increases between 1999 and 2008 are heavily focused on bankers. Over three-quarters (1.4 of 1.8 percentage points) of the increase in the top percentile's share of the UK wage bill went just to bankers. This is in spite of them only accounting for one-third of top percentile earners.

We also present complementary evidence from tax return microdata using the public use tapes of the Survey of Personal Incomes (SPI). The SPI is a stratified random sample of all taxpayer filings in the UK, with sampling probabilities increasing up to 100% for those with very high incomes (see online Appendix for details). The sample size in 2008 was over 500,000 records. We sample all taxpayers aged 18–65 who have annual pay above the PAYE threshold. Again we can identify the one-digit industry of employment. The bottom panel of Table 3 repeats the sectoral decomposition using this alternative data source and shows almost precisely the same picture as that using ASHE data – bankers were the main gainers within the top earners.

1.4. *The Role of Bonuses in Extreme Wage Inequality*

Bankers' bonuses have been a focus of public concern and regulatory activity. In Figure 3 we break down the annual wage data we have into salary and bonus component to provide some hard evidence on the importance of the latter for those at the top of the wage distribution. In 2008, 40% of all workers received at least part of their annual wage in a bonus. In the financial sector, this rises to 84%. However,

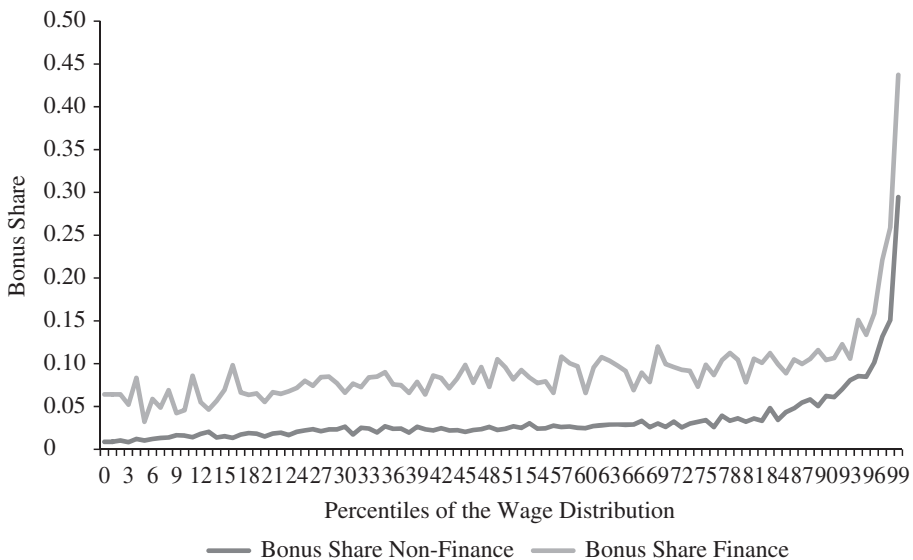


Fig. 3. *Bonus Share in Total Annual Remuneration Across the Wage Distribution, ASHE 2008*

Note. Estimates of bonus share in finance and non-finance in total annual remuneration across the whole distribution.

Source. Annual Survey of Hours and Earnings.

although the receipt of bonuses is common for many workers, these bonuses typically account for only a small part of overall pay. For those outside the top decile, bonuses account for only 2.9% of total pay.¹⁰ Even in the financial sector, only 8.6% of total pay for those outside the top decile is accounted for by bonuses. So for the average worker, bonuses are a small component of annual pay. In contrast, bonuses make up an important part of pay for those at the top of the wage distribution. Fully 83% of workers in the top percentile received a bonus and 35% of total pay for these workers came in the form of bonuses. The role of bonuses is even more substantial in the financial sector. Top percentile workers who are employed in finance received 44% of their total pay in bonuses.

The close link between rising wage inequality at the top and bonuses can be seen by calculating how much of the change in the share of wage income going to those at the top of the distribution has come in the form of bonuses. We can only do this calculation from 2002 as this is the first year that ASHE required the annual wage to be broken down into salary and bonus. From 2002 to 2008, the top percentile increased their share of the wage bill by 1.5 percentage points, from 7.4% to 8.9%. So most of the 1.8 percentage point gain observed in Table 2 for the last decade actually occurred in this subperiod.¹¹ Remarkably, the entire gain to the top percentile was a result of increased bonus payments. Indeed, salaries for this group grew at a slower rate than for workers in the rest of the wage distribution. Of the 7.4% of the wage bill accruing to the top percentile in 2002, 5.5% was paid as salary and 1.9% was bonuses. By 2008, the figures were 4.9% and 4.0% respectively.

We are not, of course, claiming here that bonuses caused the increase in extreme wage inequality. But it is clear that the growth in bonuses that we have witnessed over the last decade, particularly for bankers, has gone hand in hand with a significant increase in the share of total wages taken by those at the top of the wage distribution. It is therefore not surprising that bonuses have been such a source of contention.

1.5. *The Impact of the Crisis on Bankers' Pay and Jobs*

Has the financial crisis and subsequent weak recovery reversed the gains of the bankers? As we documented in Table 2, there is evidence of a small decline in the share of the wage bill taken by all those in the top decile since 2008. For the top percentile, this has amounted to a 0.5 percentage point decline.¹² This drop still represents less than a third of the gains made in the preceding decade. However, the decline has not been uniform across sectors. If we compute the sectoral decomposition

¹⁰ This can be decomposed into a bonus share in total pay of 7.6% for the 37.6% of workers in the bottom nine deciles who receive a bonus.

¹¹ This is not surprising given that the economy had exited recession by 2002 and this was the period characterised by low long-term and policy rates, elevated risk taking and large profits at major banks.

¹² This decline in the top percentile share appears smaller than that estimated from the income tax return data reported in Table 1. Between 2007 and 2009, the decline in income share was 1.5 percentage points according to that data. As it happens, the ASHE data paint almost the same picture. Between 2007 and 2009, the top percentile decline was 1.3 percentage points in ASHE. But the share then recovered by 0.8 percentage points by 2011 to give an overall decline of 0.5 percentage points. This suggests that the share of income recorded for the top percentile using income tax returns will bounce back when more recent years become available (as happened in the US data in 2010, see Figure 1).

of the decline since 2008, we find that bankers in the top percentile actually increased their share of the total wage bill by 0.2 percentage points between 2008 and 2011. This should really come as no surprise, as the published official figures reveal the same broad picture at the aggregate level. Between 2008 and 2011, the mean gross annual wage for all full-time employees rose 3.7% (which was of course a real wage decline as prices rose 9.6% over the same period). For finance workers in London, the rise was 14.2%.¹³ The share of finance workers in London in the total UK wage bill rose from 5.4% to 6.4% between 2008 and 2011 using this official data on full-time employees.

Are we overestimating the resilience of top bankers' pay by ignoring the employment effects of the crisis? It may be that many of those bankers previously in the top percentiles of the wage distribution have been made redundant as a result of the crisis and subsequent anaemic recovery in much greater proportions than those in other sectors of the economy. On the face of it, this seems unlikely. The official workforce jobs numbers show that the economy as a whole shed 621,000 jobs between March 2008 and March 2011 – a drop of 1.9%. But the financial sector in London lost only 5,000 jobs – a drop of 1.4%.¹⁴

To examine this issue in more detail, we created a sample from the five-quarter longitudinal data of the Labour Force Survey (LFS). The LFS surveys a large representative cross section of the UK population and follows them for five quarters. Thus, we can examine transitions from employment over a 12-month period by comparing the first and fifth wave of data. We take all respondents who entered the LFS from the first quarter of 2008 to the first quarter of 2011 and have therefore completed their fifth-quarter interview. We then estimate equations of the following form on all workers who were employed in their first interview:

$$y_{i,t+4} = \alpha_1 \text{FINANCE}_{i,t} + \alpha_2 \text{FINANCE} \times \text{LONDON}_{i,t} + \mathbf{X}_{i,t} \boldsymbol{\beta} + u_i, \quad (1)$$

where FINANCE is a dummy variable equal to unity if worker i was employed in finance, and FINANCE \times LONDON is a dummy variable equal to unity if worker i was employed in finance in London. The first outcome ($y_{i,t+4}$) we consider is whether the worker was still observed to be working 12-months later (*Employed*). We also consider whether the worker remained in the same firm or not (*SameFirm*). $\mathbf{X}_{i,t}$ is a vector of other controls for age, education, occupation, industry, region, gender and public sector and u_i is an error term. The LFS also provides information on gross weekly wages that allow us to estimate these equations for both the total workforce and for the upper part of the wage distribution.

Table 4 reports estimates of the probability of being in various states conditional on being employed in the first interview (these are marginal effects from probits). The first three columns focus on whether the worker is still in employment 12 months later,

¹³ It seems natural to focus on London financial sector workers when looking at the aggregate published statistics. For all workers in the top percentile of the wage distribution in 2011, 59% worked in London (compared with 16% of all workers). For those top percentile workers in finance, 88% worked in London.

¹⁴ There have been numerous media reports of impending large-scale headcount reductions across major banks in London. Thus far, the official data do not reflect this. The most recent workforce jobs number (March 2013) actually shows a rise of 8,000 jobs in the financial sector in London since March 2011 – so the number of jobs is now higher than pre-crisis. It may well be, however, that there has been a shift in employment within the financial sector away from investment banking and towards fund management and insurance.

Table 4
Employment Probabilities During the Great Recession

Sample	(1) All workers Employed	(2) All workers Employed	(3) Top 5% of wages Employed	(4) All workers Same firm	(5) All workers Same firm	(6) Top 5% of wages Same firm
Finance	-0.001 (0.005)	-0.011 (0.015)	-0.006 (0.025)	-0.025** (0.007)	-0.036* (0.021)	-0.003 (0.046)
Finance × London	0.023 (0.014)	0.016 (0.016)	-0.003 (0.022)	0.028 (0.018)	0.044** (0.021)	0.047 (0.040)
Full controls	No	Yes	Yes	No	Yes	Yes
Mean dependent variable	0.936	0.936	0.958	0.867	0.867	0.886
Sample size	36,370	36,370	1,605	36,370	36,370	1,771

Notes. The coefficients are marginal effects and robust standard errors from a probit regression where we condition on being employed in quarter one and track the same individuals in quarter five. Employed = 1 if the individual was still employed in quarter five and 0 otherwise. Same Firm = 1 if individual was in same firm in quarter five and 0 otherwise. Finance is a dummy equal to 1 if the worker was employed in financial intermediation in quarter one, and Finance × London is a dummy equal to 1 if the worker was employed in financial intermediation in London in quarter one. Full controls include a set of age, quarter of interview, gender, marital status, public sector, education, job tenure, region and one-digit industry and occupation dummies. Data are from the five-quarter LFS longitudinal survey, January 2008 to March 2011. ***, ** and * indicate significance at the 1%, 5% and 10% level respectively.

while the final three columns focus on whether the worker is with the same firm 12 months later. Our key coefficient variables of interest are the α 's. It is clear from columns (1) and (2) that subsequent employment probabilities were no worse for those who initially had a job in finance than those in other sectors – and the additional impact of working in finance in London was if anything positive, although insignificant.¹⁵ Taken literally, column (1) says that a worker in the finance industry in London was 2.2% more likely to remain employed. One explanation of this finding is that financial workers have more (unobserved) human capital and such workers are less likely to lose their jobs during a recession regardless of industry. To investigate this we repeat the specification of column (2) but confine the sample to workers who were in the top 5% of the pay distribution in the first quarter. While the sample size is much reduced, there remains no evidence that bankers did significantly worse in their employment outcomes in the recession compared with other workers.¹⁶

The last three columns of Table 4 examine whether the worker remains employed in the same firm. Interestingly, column (5) suggests that financial sector workers outside London were significantly more likely to move jobs than both non-financial workers and financial workers in London. So although there is substantial job churning, this does not seem to have affected London finance workers more than comparable workers. Overall, the evidence is consistent with the aggregate employment picture – ‘City bankers’ have not suffered exceptionally since the onset of the crisis.

2. Public Disclosure of Bankers’ Pay

We next provide a brief summary of some newly available pay data on bankers that suggests that the estimates in the previous section are likely to represent a lower bound on the importance of financial sector workers at the top of the distribution. The Financial Services Authority (FSA) introduced a new reporting requirement in 2010 for regulated financial entities in the UK. The rule requires a firm to identify all ‘code staff’ whose professional activities are determined as having a material impact on the firm’s risk profile. The firm must report the full aggregate remuneration of all such code staff, including deferred and equity-based compensation. These data provide a new glimpse into the world of bankers’ pay and can provide some perspective on the likely underestimation that is involved by using ASHE data that cover only salary and cash bonus payments. Code staff are effectively in the top percentile of earners.

We have collected the 2010 disclosures for some of the most significant banks that are either headquartered or have a reporting entity in London. Table 5 reports for each bank the number of code staff, the average salary, cash bonus, equity-based bonus and deferred bonus awards. For comparison, we report the estimated salary and cash bonus in 2010 from ASHE for those London bankers in the top 1% and 0.25% of the earnings distribution.

¹⁵ One might worry that the models in Table 4 are so saturated that it is difficult to identify any significant effect. This is not the case. Among the unreported coefficients, we find consistent and highly significant negative effects on remaining employed during the recession for women, private sector workers, low job tenure workers and those in lower occupation categories.

¹⁶ As an alternative, we re-ran column (2) and included dummies for each 5 percentage point range of the first-quarter wage distribution. The results are almost identical to those in column (2).

Table 5
2010 Pay Disclosures for London Banks

Name of bank	Number of code staff	Salary	Cash bonus	Equity-based bonus	Deferred cash bonus	Deferred equity-based bonus	Total
Bank of America	94	231	422	422	–	1,237	2,312
Barclays	231	268	372	333	589	835	2,398
Citigroup	95	481	331	–	–	952	1,764
Credit Suisse	73	415	301	229	1,057	1,022	3,024
Goldman Sachs	95	463	1,372	–	–	4,264	6,099
HSBC	186	192	125	121	170	184	792
J P Morgan	82	265	493	458	736	731	2,682
Lloyds Bank	155	249	8	92	–	159	507
Morgan Stanley	74	270	351	–	392	635	1,649
RBS	323	245	2	347	–	570	1,161
Average		283	285	227	237	873	1,905
ASHE Top 1%		166	172				338
ASHE Top 0.25%		213	316				529

Notes. All figures in £'000s. If figures are reported in US\$, we use an exchange rate of 1.546 which is the 2010 average exchange rate of £/\$ from Bank of England. HSBC reports figures for all code staff and UK-only code staff. We use the latter and assume that pay structures are the same for UK and non-UK staff. Goldman Sachs reports the award of various restricted share units, which we assume are valued at the end-December 2010 closing price of \$168 per share. The ASHE averages relate to those workers in the relevant percentile group in 2010 who were also employed in the financial sector in London.

The disclosures cover 1,408 workers. The average salary of these workers is £283,000 and the annual cash bonus is an additional £285,000. So total cash compensation that should broadly match the ASHE definitions is £568,000. This suggests that code staff as a group are broadly in the top 0.25% of the wage distribution. But their total cash pay is far from the total compensation that these workers receive. The average equity award amounts to another £227,000, whereas deferred cash and equity bonuses make up another £237,000 and £873,000 respectively.¹⁷ To the extent that such pay structures are more common in finance than in other sectors, we are undoubtedly underestimating the share of top income accruing to finance workers. While data sources such as ASHE clearly miss the equity-based bonuses and deferred compensation, tax return data should eventually capture such pay – provided it is structured in such a way as to generate an income tax liability rather than a capital gains tax liability. In any event, the use of such pay makes the analysis of year-to-year movements in bankers pay much more difficult and thus any attempt to examine the pay–performance link. The similarity of the trends in panel (c) (tax returns) and panel (b) (ASHE annual wages) of Table 2 is reassuring in this regard.

These disclosures also suggest that statisticians should be concerned with the paucity of data that currently exist on non-cash forms of pay. All the key micro–data sets that labour economists use to examine wage behaviour – ASHE, LFS and British Household Panel Survey (and also, in general, other countries data sources) – do not attempt to collect data on equity-based remuneration or on deferred compensation. As such pay

¹⁷ In general, deferred bonuses are primarily in the form of equity that must be held for around three years before vesting and are usually subject to future performance conditions. Exact details vary from firm to firm and are outlined in the FSA disclosures. Deferred bonuses are generally reported at face value which does not reflect the likelihood of vesting.

becomes more common, partly as a result of the policy responses we discuss below, the need for more comprehensive data becomes clear if one is concerned about what is happening at the top of the pay distribution.

Some have argued that greater transparency of pay will by itself help rectify the 'problem' of the level and structure of bankers pay. There is little empirical evidence here but we are sceptical that transparency by itself leads to declining pay rates or fewer bonuses. Indeed, Card *et al.* (2012) find that greater knowledge of pay structures leads to those in the lower half of the distribution feeling aggrieved and may lead to pressure for less well-paid bankers to demand higher wages, further increasing the average pay in this sector.

3. The Policy Response

Finally, we turn to a discussion of policy. The starting point is whether there was in fact a problem to begin with. It may be that bankers' pay is simply the outcome of a competitive labour market in which the returns to talent are high and rising over time. The Rosen (1981) model of superstars provides one framework: 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 rather than one almost as good. Because only a few traders possess exceptional ability, investment banks will be willing to pay substantial premia for their services. The potential importance of such superstars in the financial sector is likely to have increased in recent years as a result of technological change. As markets have become more globalised and liquid, traders have witnessed a substantial rise in the number of different markets and asset types they can trade. In addition, large increases in the size of assets under management allow for superstars to trade with much larger capital. This combination of superstars and an increasing asset base is at the heart of Gabaix and Landier (2008). In their model, CEOs differ in 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, the best CEO manages the biggest firm. Similarly, the best trader should work with the largest asset base. Crucially in their equilibrium, very small differences in talent can produce large differences in pay. In their calibration they show 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 best CEO should be paid over five times more than the 250th CEO.

An alternative explanation of the wage premia enjoyed by bankers focuses on the rents that accrue in the sector. These may come about as a result of lack of product market competition within the sector or as a result of implicit or explicit subsidies and guarantees that banks receive from the taxpayer. The much discussed 'too-big-to-fail' problem is an example. Governments will not allow systemically important financial institutions to fail and therefore they provide an implicit bailout guarantee. This guarantee is valuable to creditors and thus reduces the cost of finance for banks. As shareholders have limited liability, the guarantee encourages risky lending financed by the cheaper finance – losses are limited on the downside and shareholders (and workers) benefit on the upside.

The first best response to such market failures is to correct the failure and remove the ability to generate rents. The problems with such an approach should not be underestimated. Suppose we focus on the 'too-big-to-fail' issue. One response, made famous by Mervyn King, is to argue that a bank that is too-big-to-fail is too big. Then a structural response of breaking up large banks to prevent them becoming systemically important seems called for. But how do we define 'too big'? And what is the trade-off between the social costs of the implicit guarantee and the efficiency gains that large banks can potentially achieve?

As an alternative to structural reforms of breaking up universal banks, they could be divided into their retail and investment banking arms and required to hold separate capital for each arm. This is essentially one of the key recommendations of the 'Vickers' Report' (formally the Independent Commission on Banking, ICB). The structural and regulatory reforms along the lines of those outlined by the ICB are likely to mitigate the market failures that give rise to rents in the sector but are unlikely to remove such rents entirely. Indeed, the performance of the regulators during the last decade is unlikely to inspire confidence in their ability to overcome the entrenched interests at work in protecting the rents.

Thus, while financial regulatory reform¹⁸ is vital, it is unlikely that policy makers will be able and willing to commit to eliminate financial sector rents. Thus, an alternative is to tax or regulate the outcomes. Here, we consider three proposed policy responses. First, a tax on bank profits or revenues. Such a tax has been introduced in a number of EU countries and was implemented as a Bank Levy in the UK in Budget 2010. All UK banks and building societies and foreign banks operating through permanent UK subsidiaries are required to pay an annual tax rate of 0.105% on their total balance sheet. The tax rate is set so that the total expected tax revenue is equal to £2.5 billion. In addition, 'safer' forms of funding are either excluded from the balance sheet calculation or taxed at a half-rate to encourage their use over risky funding (Devereux, 2011). Larger firms will pay more under such a tax and this at least goes some way to capture the implicit cost of the guarantees but in practice the link between systemic risk and balance sheet size is likely to be complex. It is also unclear why such a levy is preferable to a tax on economic rent in the banking sector. Such a tax could be implemented as a surcharge rate on the regular corporation tax rate, rather like that applied to the oil industry. Alternatively, the International Monetary Fund (2010) has proposed a financial activities tax, which would approximate a tax on rents but in addition impose a further tax on high remuneration.

Second, consider a tax on the pool of money used to pay bankers' bonuses. The Labour Government pursued this policy in the immediate aftermath of the financial crisis. Announced in the 2009 pre-budget report, employers were subject to a 50% tax rate for any bonus paid to bankers in excess of £25,000 in the 2009/10 tax year. The bonus tax was explicitly declared as a one-off tax – although the Labour party (now in opposition) is in favour of repeating the exercise. At the time, the Treasury predicted the tax would raise £550 million. In fact, the tax seemed to generate revenue of some £2.3 billion. The key reason for the higher tax take seems to have been that firms

¹⁸ For more on financial regulatory reform, see Rajan (2010), Squam Lake Report (2010) and Turner (2011).

accepted the one-off nature of the tax and absorbed the cost of the tax across their global wage bill rather than reduce the payments to their UK-based workers. Whether such shifting would occur if the tax was viewed as permanent is less clear. In addition, taxing only one component of pay would surely encourage employers to re-classify pay in ways that avoided the tax.

Third, there has been much attention paid to altering the structure of banker's remuneration. This approach does not explicitly seek to affect the size of pay and thus does not seem to directly affect the sharing out of rents. However, it may be argued that 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 have resulted 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 increase the risk they take at the expense of the long-term interest of the firm. These effects become magnified during a period in which the low interest rates of the major central banks encouraged excessive 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 jobs, but they keep the bonuses they had previously received. The management of the firm is less incentivised to address these issues as the moral hazard problem reduces the downside costs of such actions. Thus, the focus on pay structures seeks to address these negative incentive effects and align the workers objective with those of the long-run interests of the firm.

Besley and Ghatak (2013) examine a model where there is state insurance for the financial sector on the downside and principal agent problems in banking. They show that in equilibrium there will be excessive incentives for risk taking and consider optimal policy responses over financial sector pay. They further prove that a combination of regulation of the structure of bonuses and a tax on their level emerges as the optimal policy in such a set-up.

The Financial Stability Board issued a set of principles for Sound Compensation Practices in 2009. The EU and FSA have subsequently implemented many of these principles as regulatory requirements under the Capital Requirements Directive (CRD) and the Remuneration Code respectively. UK institutions were required to comply with the FSA Code from 1 January 2011. As highlighted in Section 2, the FSA requires firms to identify code staff whose professional activities are determined as having a material impact on the firm's risk profile. The key components of a compliant pay policy are as follows:

- A substantial fraction of pay must be in variable form that is fully flexible, allowing for decreases when performance is poor.
- Between 40% and 60% of variable remuneration must be deferred with a minimum deferral period of three years. Institutions should have mechanisms to claw-back deferred remuneration in the light of poor performance.
- At least 50% of variable remuneration should be in shares or other non-cash instruments.

- Guaranteed bonuses should be exceptional and limited to the first year of employment.
- Employees must not undertake hedging activities to undermine the risk alignment effect.

More recently, the EU has adopted a restriction as part of the CRD that limits bonuses in the financial sector to be no more than salary, or no more than twice as large if shareholders approve. The rule will become effective from January 2014, subject to a legal challenge by the UK government. There has been intense speculation that the rule will primarily encourage both a switch from flexible to fixed pay and a shift of personnel to outside the EU – neither of which were presumably the intention of policy makers. It is too early to judge the effectiveness of such regulations, and indeed given the paucity of data it is hard to see how success would be measured. Nevertheless, the considerations discussed elsewhere in the article suggest that if successfully enforced, some rules governing the risk structure of pay could be a broadly sensible policy response.

The above overview of policy responses is focused on whether and how to correct failures specific to the banking sector that generate large income gains for workers in the sector. However, more generally, policy makers may wish to focus on the equity aspect of the general increase in inequality. This leads naturally to a focus on all those at the top of the income distribution. As bankers are a disproportionate share of such workers (and are disproportionately well paid within this extreme), any such policy would have the implicit effect of targeting bankers. The key response on this dimension has been the introduction of a new 50% marginal income tax rate in April 2010 on all income over £150,000. This cut-off is almost identical to the top percentile entry point and thus the policy was squarely focused on the top 1%. The rate was reduced to 45% in April 2013 following a review of the operation of the new 50% rate by HMRC (2012). In announcing the rate reduction, the Chancellor concluded that the higher rate introduced ‘massive distortions’ and may raise no more than a 45% rate. Oddly, one of the key findings of the HMRC report is that around £16 billion of income was brought forward to avoid the new 50% rate. As this cannot happen repeatedly, it is not clear why this provides any important evidence on whether the 50% rate should be reduced. In reality, the revenue-maximising marginal rate estimated from most models has large standard errors that do not allow for confident assertion on the appropriate marginal tax rate – see Mirrlees *et al.* (2011) and Saez (2013) for an extensive discussion.

Having said that, there is some evidence to suggest that there is a link between the top marginal tax rate and the share of total income going to the top percentile. Piketty *et al.* (2011) examine time-series evidence across 18 OECD countries and show that there is a strong negative correlation between changes in top marginal tax rates and changes in the top percentile income share since 1960 (see Figure 4). They interpret this correlation as supporting the hypothesis that the returns to investing in ‘compensation bargaining’ rise as the top rate falls, i.e. as workers keep more of the bargained wage after tax, the incentives to bargain harder will rise. This suggests that the optimal top tax rate is higher than in models that focus solely on the standard labour supply response.

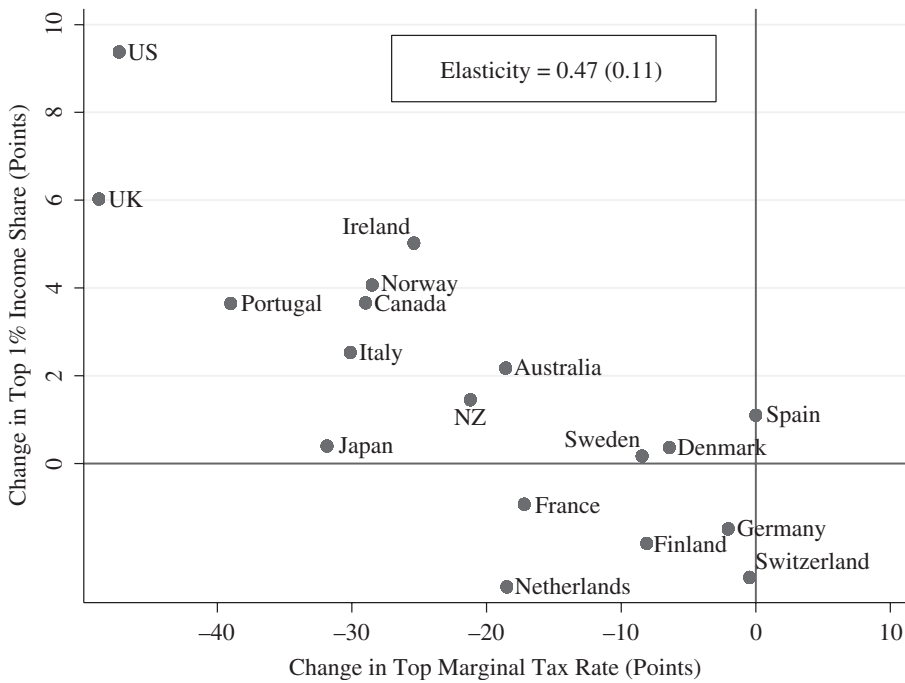


Fig. 4. *Changes in Top Income Shares and Top Marginal Tax Rates*

Source: Piketty *et al.* (2011).

4. Conclusions

The occupy movement brought a new saliency to the issue of income inequality. Their key slogan – ‘we are the 99%’ – dramatically highlighted the sense that a small elite have been the main winners in the decades leading up to the crisis (Stiglitz, 2012). Top percentile workers have substantially increased their share of the income pie – in the 1970s they took around 6% of total UK income but, by the end of the 2000s, this had risen to 15%. On this measure, we returned to levels of inequality not seen since the interwar years. But one key difference is that the high-income group used to be the rentier class enjoying returns on their fixed capital. Now, the high-income group is primarily high-wage workers enjoying returns on human capital.

Among these high-wage workers in the UK, bankers feature heavily. In 2008, 28% of all top percentile earners in the UK were London bankers. But this dramatically understates their importance in the rise in overall wage inequality during the last decade. We estimate that somewhere between two-thirds and three-quarters of the overall increase in the share of wages taken by those in the top percentile have accrued to bankers. More remarkably, the financial crisis seems to have been so far little more than a blip for the pay of bankers.

It should be borne in mind, however, that we have focused in this study on the pay and employment of bankers in the run-up to, and the immediate aftermath of, the financial crisis. Our data end roughly three years after the crisis began. It is therefore too early to assess whether the changed regulatory and competitive environment and

the inevitable adjustment to a slow, protracted economic recovery will alter the relative pay of bankers in the medium term. Preliminary evidence from the 2012 ASHE data suggests a marked fall in top bankers pay for that year. Whether this is the beginning of a medium-run adjustment or simply a bad year in the financial sector is an important issue for future research.

How should policy respond to these facts? From an efficiency perspective, the key question is the extent to which bankers pay arises from financial sector rents. To the extent that it does, regulatory and structural reforms to remove or lessen the ability to generate such rents are called for. We are sceptical, however, that such reforms will be wholly successful, which suggests that policy will also need to focus on taxing the rents themselves – either before or after they are paid out to bankers. From an equity perspective, the remarkable gains to those at the top of the income distribution over the last few decades, may call for higher marginal income taxes. The appropriate level at which to set such tax rates remains a matter of intense political and economic debate.

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Additional Supporting Information may be found in the online version of this article:

Appendix A. Differences in Measurement of Income and Earnings Across Alternative Data Sources.

References

- Atkinson, A. (2007). 'The distribution of top incomes in the United Kingdom 1908–2000' in (A. Atkinson and T. Piketty, eds.), *Top Incomes over the 20th Century: A Contrast Between Continental European and English-speaking Countries*, pp. 82–140, Oxford: Oxford University Press.
- Atkinson, A. and Piketty, T. (2010). *Top Incomes: A Global Perspective*, Oxford: Oxford University Press.
- Atkinson, A., Piketty, T. and Saez, E. (2011). 'Top incomes in the long run of history', *Journal of Economic Literature*, vol. 49(1), pp. 3–71.
- Bell, B. and Van Reenen, J. (2010). 'Bankers' pay and extreme wage inequality in the UK', Centre for Economic Performance Special Paper No. 21, London School of Economics.
- Bell, B. and Van Reenen, J. (2012). 'Firm performance and wages: evidence from across the corporate hierarchy', Centre for Economic Performance Discussion Paper No. 1088, London School of Economics.
- Bell, B. and Van Reenen, J. (2013). 'Extreme wage inequality: pay at the very top', *American Economic Review*, vol. 103(3), pp. 153–7.
- Besley, T. and Ghatak, M. (2013). 'Bailouts and the optimal taxation of bonus pay', *American Economic Review*, vol. 103(3), pp. 163–7.
- Card, D., Mas, A., Moretti, E. and Saez, E. (2012). 'Inequality at work: the effect of peer salaries on job satisfaction', *American Economic Review*, vol. 102(6), pp. 2981–3003.
- Devereux, M. (2011). 'Will the bank levy meet its objectives?', *British Tax Review*, vol. 1, pp. 33–39.
- Gabaix, X. and Landier, A. (2008). 'Why has CEO pay increased so much?', *Quarterly Journal of Economics*, vol. 123(1), pp. 49–100.
- Haldane, A. (2010). 'The \$100 billion question', Comments at the Institute of Risk and Regulation, Hong Kong.
- HMRC. (2012). *The Exchequer Effect of the 50 Percent Additional Rate of Income Tax*, London: Her Majesty's Revenue and Customs.
- International Monetary Fund (2010). *Financial Sector Taxation: The IMF's Report to the G20 and Background Material*, Washington, DC: International Monetary Fund.
- Kaplan, S. and Rauh, J. (2010). 'Wall street and main street: what contributes to the rise in the highest incomes?', *Review of Financial Studies*, vol. 23(3), pp. 1004–50.

- Machin, S. and Van Reenen, J. (2010). 'Inequality', Centre for Economic Performance Election Analysis, London School of Economics, available at: <http://cep.lse.ac.uk/pubs/download/ea015.pdf> (last accessed: 19 November 2013).
- Mirrlees, J., Adam, A., Besley, T., Blundell, R., Bond, S., Chote, R., Gammie, M., Johnson, P., Myles, G. and Poterba, J. (2011). *Tax by Design: The Mirrlees Review*, Oxford: Oxford University Press.
- Philippon, T. and Reshef, A. (2012). 'Wages and human capital in the US finance industry: 1909-2006', *Quarterly Journal of Economics*, vol. 127(4), pp. 1551–1609.
- Piketty, T., Saez, E. and Stantcheva, S. (2011) 'Optimal taxation of top labor incomes: a tale of three elasticities', Working Paper No. 17616, NBER.
- Rajan, R. (2010). *Fault Lines*, Princeton, NJ: Princeton University Press.
- Rosen, S. (1981). 'The economics of superstars', *American Economic Review*, vol. 71(5), pp. 845–58.
- Saez, E. (2013). 'Income inequality: evidence and policy implications', Arrow Lecture, Stanford University. Squam Lake Report (2010). *Fixing the Financial System*, Princeton, NJ: Princeton University Press.
- Stiglitz, J. (2012). *The Price of Inequality*, London: Allen Lane.
- Turner, A. (2011). *The Future of Finance*, London: London School of Economics.