Resolution Foundation | Commission on Living Standards: Improving the lives of people on low-to-middle incomes

The Changing Shape of the UK Job Market and its Implications for the Bottom Half of Earners

Craig Holmes
Ken Mayhew

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E: info@resolutionfoundation.org T: 020 3372 2960 F: 020 3372 2999

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Executive Summary

In recent years, the idea that the UK labour market has become more polarised into high-wage "lovely" occupations and low-wage "lousy" occupations, while the middle jobs have been hollowed out, has gained currency. The creation of an 'hour-glass economy' has been attributed to the growth of technology which has replaced workers in routine jobs. Routine jobs tended to be middle wage, such as process operatives in manufacturing and some administrative jobs. Where there is a decline in routine jobs, the expectation is that the labour market polarises towards high wage, high skilled non-routine work at the top and low wage, non-routine service sector jobs at the bottom end. The assumption is that the hollowing out of routine jobs in the middle has been important driver of growing wage inequality. Yet, little has been said about how non-routine jobs have changed in terms of earnings or other measures of job quality.

Our analysis finds far less evidence of polarisation in wage distributions than this above description suggests. We find that many jobs continue to be found around the middle of the wage distribution. What we do find has changed is not so much earnings but job titles, as many of these apparently good jobs continue to earn middle wages despite higher status job titles. We find evidence that there has been a growth in lower paid jobs within a category of jobs generally considered to be well-paid. For example, in the retail and wholesale sector, where managerial jobs increased between 2000 and 2008, the proportion of these jobs earning below £400 per week – adjusting for inflation – increased from 37 per cent to 58 per cent in this time period. In financial intermediation, a sector which has performed relatively well over this time period, there has clearly been a growth in high wage managerial jobs in this sector – those earning over £1,500 per week increased from just a couple of percent in 1993 and 2000, to 10 per cent in 2008. However, between 2000 and 2008, there was also a growth in the proportion of managers in this sector earning less than £400 (from 24 per cent to 30 per cent).

The difference between our conclusions and those derived from existing evidence is largely down to our choice of methodology. Our main analysis incorporates what has already been demonstrated in earlier work, and goes beyond that to consider a number of other factors which have reshaped wage distributions. According to our analysis, a shift in occupational structure has played a role in lower wage growth for middle-wage earners, but this is only part of the story. We show that education and union membership have also played important roles in suppressing relative wage growth at the middle, in addition to the growing dispersion of earnings within 'good' non-routine jobs noted above.

At the bottom end of the distribution, there has been an increase in low-wage work in the UK. This finding is consistent with previous work on the UK (Lloyd, Mason and Mayhew, 2008). Part of the explanation for this comes from the shift towards low-wage non-routine employment. However, the decline in union presence seems to have had a far greater effect on earnings. Moreover, policy effects, such as the introduction of the National Minimum Wage, have led to relatively high levels of wage growth for some of the lowest earners, compared to other low to middle wage earners, making the effects on low wage workers less severe than they otherwise would have been.

Increased educational attainment rather than the shift towards non-routine jobs appears to explain a larger part of the wage growth in higher-wage employment. However, we also find that the growing number of 'good' jobs became increasingly polarised between the highest earners – whose wages have grown far faster than all other workers – and the rest, who have been left behind. While the graduate wage premium has remained approximately constant across most of the distribution, it has risen very fast for the top 20 percent of earners. Those outside the top 20 percent now more closely resemble those working in mid-range occupations rather than those in top jobs.

Understanding the true effects of occupational polarisation on earnings inequality is important in identifying the appropriate policy response. Although the growth of good non-routine jobs would, at first glance, suggest an increase in firms' demand for skills, there is concern that the pace at which workers are becoming increasingly well-qualified may lead to their skills being underutilised. It is important to understand what skills are actually being demanded in these expanding, non-routine jobs. Policymakers cannot simply rely on an expectation that employers will up-skill all jobs in response an increased supply of highly-qualified workers.

In terms of social mobility, we argue that a change in the occupational structure towards non-routine jobs will have implications for paths of career progression. A major concern here is that the hourglass labour market, even in the way we have presented it, does not just create opportunities for improved labour market outcomes – it may also harm some workers. Drawing upon our existing research, we emphasise the possibility of downward mobility for workers displaced from routine jobs, the worsening position of new entrants when many routine occupations have disappeared, and the lower earnings of those moving 'upwards' to good non-routine jobs as concerns that need to be tackled by policymakers.[1]

[1] Research papers referred to in this report are available from www.skope.ox.ac.uk/publications - thanks to Ewart Keep for his comments on skill utilisation issues and Felix Chow for detailed analysis of earnings, educational levels and occupational structures.

Introduction

In recent years, the idea that the UK labour market has become more polarised has gained currency in policy and academic circles. By this is meant that the number of jobs at both the top and bottom end have grown, hollowing out the middle of the labour market. This perception raises many questions around the role of technology and the implications for the distribution of earnings. This paper explores such issues and specifically asks:

- Has the UK in fact seen a rise in both higher paid and lower paid employment?
- To what extent are changes in the distribution of earnings caused by changes in the occupational structure?
- What might these changes mean for skills policy, mobility and progression?

Technology and routinisation

Technology is a key determinant of what sort of jobs firms require. As the general level of technology improves, firms are able to invest in more, better and cheaper capital, particularly computerised machinery. Some jobs may be complementary to the introduction of new technology, while others may be substitutable. For example, if an engineer is more productive because she now works with an upgraded computer system or software design package, then we would expect the total demand for engineers to increase as firms seek to capitalise on their increased profitability. In contrast, an automated production process may replace part (or indeed all) of a manned production line. These different changes can appear within a single firm – the same automated production process that reduces employment of production line workers may require firms to employ more highly skilled production supervisors to monitor or program it.

One viewpoint is that jobs which are most complementary to technological improvements are more highly skilled, while jobs which are substitutable with these advances are low skilled. This is commonly referred to as skill-biased technical change. An alternative viewpoint is that technology is related to particular *tasks*, rather than particular *skills*. Jobs which predominantly performed routine tasks were replaced by new technology, while those which performed non-routine tasks were not. Indeed in many cases, non-routine work is complementary with new technology, though this is not always the case.

Non-routine work falls into two categories – high wage, high skilled jobs, where the tasks performed could be classified as non-routine abstract or creative, or low wage, low skill jobs, where the tasks could be considered non-routine manual or service. Routine jobs tended to be middle wage, such as process operatives in manufacturing and some administrative jobs. Therefore, following this process of routinisation, where there is a decline in routine jobs, the expectation is that the labour market polarises towards work at the top and bottom ends. This is sometimes referred to as an hourglass labour market. We begin this report in section 2 by summarising this existing evidence on the growth of non-routine "lovely" and "lousy" jobs in the UK, and the apparent emergence of an hourglass labour market in the UK.

The growth of lovely and lousy jobs in the UK

In this section, we look at how the occupational structure of the UK has changed over the past three decades – in particular, we are interested in which occupations have grown and continue to grow, and which jobs are in decline.

The decline of routine jobs

A common way of viewing the changing occupational structure of the UK labour market is through the employment shares of different job categories. Historically, this has been done using classifications of social class or socio-economic groups and more recently through occupational classifications. For example, using the top level of aggregation in the SOC2000 classification system, Anderson (2009) finds increased employment share of professional, managerial, associate professional, and personal and customer service occupations (SOC groups 1, 2, 3 6 and 7 respectively) and the decline of administrative occupations, skilled trades and process operatives and elementary occupations (SOC groups 4, 5, 8 and 9 respectively). (See Table).

Table 2.1: Change in employment share by SOC major group occupations, 1984-2004

Occupational group	1984	2004	Change
Managers and Senior Officials	12.1%	15.3%	+3.2%
Professional Occupations	8.4%	11.8%	+3.4%
Associate Professional and Technician	10.1%	14.3%	+4.2%
Administrative and Secretarial	15.0%	12.6%	-2.4%
Skilled Trades Occupations	16.4%	11.4%	-5.0%
Personal Service Occupations	4.1%	7.5%	+3.4%
Sales and Customer Service	6.1%	8.0%	+2.1%
Process, Plant and Machine Operatives	11.8%	7.9%	-3.9%
Elementary Occupations	16.1%	11.3%	-4.8%

Source: Anderson (2009)

However, occupational classifications such as SOC are not predominantly based around whether jobs perform routine or non-routine tasks. Using the US Dictionary of Occupational Tasks (DOT), Autor, Levy and Murnane (2003) showed that if we look at narrower occupational definitions than those mentioned above, it is the occupations which predominantly perform routine tasks that have declined in employment share over the past three decades. In the case of the UK, Goos and Manning (2007) found that, at the beginning of the period of study, routine jobs fell more heavily into the middle of the wage distribution, while non-routine jobs tended to be more common at the low and high ends.

Hence, there is a need to look beyond the top level of the SOC classification, as occupations within these top level groups differ by pay, patterns of employment growth and additional information on tasks performed, which suggests that these groups contain both routine and non-routine jobs.

For example, *administrators* in government earn significantly more than other administrative occupations, and have not experienced a decline in employment share since 1981. Similarly, elementary occupations cover both low skilled manual jobs (which have declined in employment share and are replaceable with technology) and growing low-skill customer service jobs (which are not substitutable by ICT capital). Finally, *draughtsmen*, an associate professional occupation, have declined in employment share (probably as a consequence of advances in design software) while other associate professional groups have continued to grow. Some, such as *transport* and *business associate professionals* earn wages closer to professional levels and, in the case of pilots or financial advisors have stricter formal entry requirements in terms of qualifications than other associate professional and technician occupations.

Using the more disaggregated 3-digit SOC2000 classification, we assigned occupations to one of seven groups. High wage non-routine occupations are divided into professions, managerial and intermediate occupations, reflecting differences in pay and entry requirements. Low wage non-routine occupations are predominantly service occupations, although there are some manual jobs. Routine jobs come in two forms: administrative occupations and process operatives. Allocation to these groups was made on the basis of pay, changes in employment share and occupational description. Table 2.2 reports employment share growth rates of these categories.

Table 2.2: Routine and non-routine occupational growth rates

	1981-86	1986-91	1991-95	1995-99	1999-04	2004-08	1981-2008
Professional	19.1%	5.9%	4.9%	10.0%	3.6%	3.7%	56.4%
Managerial	11.5%	19.6%	13.8%	-1.8%	-1.4%	6.8%	56.7%
Intermediate	14.0%	15.5%	3.0%	0.0%	11.9%	3.2%	56.6%
Routine Admin	-6.0%	-11.4%	-4.4%	0.9%	-11.8%	-9.3%	-35.8%
Routine Manual	-13.1%	-12.1%	-10.4%	-6.8%	-17.5%	-5.8%	-50.4%
Non-routine Service	12.6%	10.9%	11.0%	5.4%	16.7%	1.0%	72.2%
Non-routine Manual	1.8%	-4.3%	-15.0%	-5.3%	20.8%	0.8%	-4.3%

Source: LFS 1981-2008

The table shows that the growth of non-routine jobs has not occurred evenly across all categories. For instance there was a small decline in the number of managers during the late 1990s and early 2000s, while professional and service occupations continued to grow. The proportion of the workforce in service occupations at the start of the 1980s was far smaller than those employed in higher skill non-routine occupations. However, the employment share of these non-routine service jobs has grown faster over the past three decades than any other occupational group.

Implications for wage distributions

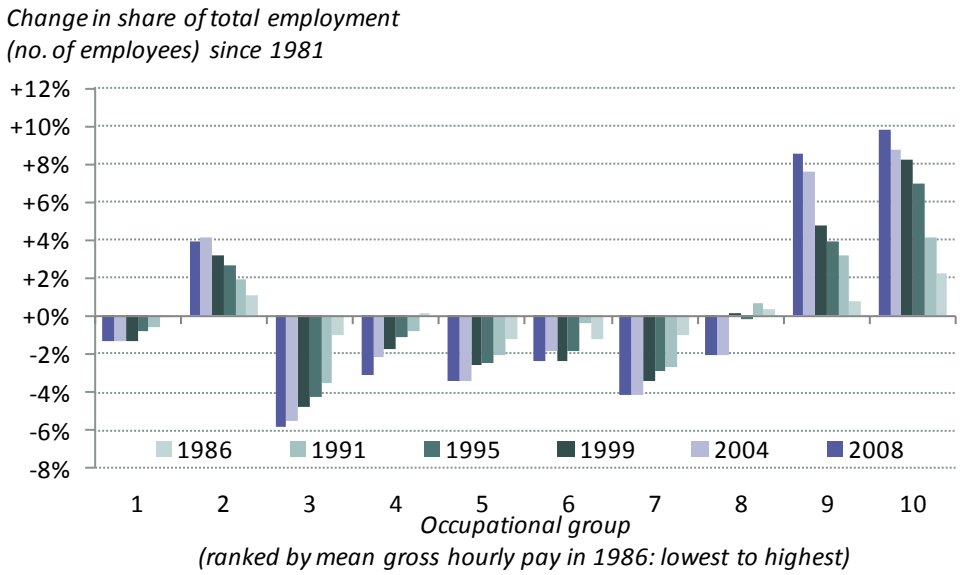
Goos and Manning (2007) were the first to propose a way of looking at how the changing occupational structure could mean increased employment at the extreme ends of the wage distribution. Using data from the New Earnings Survey, they ranked occupations over the time period 1979-2002 using their initial wage, divided them into groups of approximately 10 per cent of total employment, and recorded changing employment shares in these groups over the time period.

They found that the highest and lowest wage groups experienced increased employment, while the groups in the middle recorded a decline in employment shares. A number of studies have found similar evidence of this phenomena in the US (Autor, Katz and Kearney, 2006; Autor, 2011) Germany (Spitz-Oener, 2006; Oesch and Rodríguez Menés, 2011), Spain and Switzerland (Oesch and Rodríguez Menés, 2011) and across Europe (Goos, Manning and Salomons, 2009).

Following the same methodology, Figure 2.1 and Figure 2.2 show similar findings in UK Labour Force Survey data between 1981 and 2008, although growth in jobs with low initial wages is less marked in these data than is sometimes suggested. Figure 2.1 calculates employment shares on the basis of number of employees, while Figure 2.2 corrects for usual hours of work (including overtime).[2]

[2] Occupations are classified using 3-digit SOC2000 codes, converted from KOS (1981-1991) and SOC90 (1991-1999).

Figure 2.1: Employment share growth of occupations, 1981-2008, number of employees



Source: LFS 1981-2008

In both cases, allocation to groups is made on the basis of mean gross hourly wage in 1986, using the New Earnings Survey, with group 1 representing the occupations with the lowest mean wages and group 10 representing the occupations with the highest mean wages. The diagrams show the total change in employment share of each group from 1981 until a specified end year.

Figure 2.2: Employment share growth of occupations, 1981-2008, number of employee-hours

Source: LFS 1981-2008

Clearly, there has been a large growth in occupations at the top end of this scale over the time period, as well as an increase in some occupations at the bottom end of the scale. According to Figure 2.2, occupations in groups 1, 9 and 10 increased in employment share from 30 per cent to 53 per cent between 1981 and 2008. Occupations in the middle declined significantly – groups 3-8 experienced a fall in employment share from 58 per cent to 40 per cent.

Comparing the two diagrams shows that when corrected for usual hours of work, increases in employment share is found further towards the extremes. The difference between the two diagrams is

explained by differences in hours worked across different occupations. Those in low initial wage jobs tend to work fewer hours, so that many of those in group 2 in Figure 2.1 are placed in group 1 in Figure 2.2. Meanwhile, those in the highest initial wage jobs have recorded faster growth in working hours over this time period, increasing the measured increase in employment share of group 10.

Have earnings polarised?

Wage distributions

The labour market data presented in the previous section indicated that there has been a growth in occupations which, 30 years ago, could be classified as either high wage or low wage occupations. By contrast, occupations with wages closer to median earnings have experienced a decline in employment share.

If nothing else had changed apart from the sort of jobs people were now performing, then the changes discussed in the previous section would clearly affect the earnings distribution, causing increased employment in low-wage and high-wage work, and decreased employment in the middle. However, other things *have* changed. For example, since the early 1980s there has been a decline in the power of trade unions, increased participation by women in the labour force and increased educational attainment of new labour market entrants (particularly the rapid expansion of graduate labour). All of these changes in the characteristics and composition of the labour force will also affect the overall pattern of pay, so the first question we ask in this section is: how important is the shift towards non-routine work for the distribution of wages?

Within and between occupation effects

Putting these issues to one side, there may also be an impact of the distribution of earnings caused by both changes in the pay differentials *between* different sorts of jobs and changes of the dispersion of earnings *within* occupational groups.

In relation to between-occupation effects, Autor, Katz and Kearney (2006) discuss wage effects arising from the decline of routine work – increased firm demand for high-skill non-routine work and decreased demand for routine work will raise the wage of the former relative to the latter.[3] The decline in routine work should increase the supply of workers in low-skill non-routine jobs. On the assumption that low skill work is neither a strong complement nor substitute for technological advances, this should somewhat lower the wage of low-skill non-routine jobs, but not by as much as the wages fall for routine jobs.[4]

In relation to within-occupation effects, it is well known in the literature on wage inequality that such effects can explain a significant portion of the variance of earnings. Within-occupation wage effects reflect differences in productive or personal characteristics that affect wages between those in a particular occupational group at the start of a period of time and those in that group at the end. As well as observable differences (such as education, union membership or labour market experience), these effects may also include unobservable characteristics (for example, the extent to which some people are better at performing certain tasks, regardless of their education and training).

[3] Autor, Katz and Kearney assume that low-skill non-routine jobs were complementary with technology, and that firm demand for these jobs should increase. This assumption seems debatable. For example, it is not obvious how technological advances and productivity increases could explain a large increase in demand for childcare or personal healthcare service jobs. Similarly, the growth in retail assistants seems to have happened despite technological advances that should make them less valuable to firms, such as online shopping and widespread product information available through the Internet.

[4] The U-shaped pattern of wage growth is sometimes also referred to as polarisation – it should be referred to as the polarisation of wages, to distinguish it from Goos and Manning's polarisation of jobs and avoid confusion. It seems to be a phenomena particular to the US (Antonczyk, DeLeire and Fitzenberger, 2010).

In the context of the growth of non-routine work, the workers who move into those jobs may be less productive in them than those who would have worked in them in the absence of technological progress. For example, those filling the growing number of managerial positions or associate professional jobs may, in the past, have been better suited to a routine job. A consequence of this is that while individuals may have moved to jobs which have, in the past, been classified as higher or lower paid, they themselves do not move much within the earnings distribution.

At the other end of the labour market, those moving into lower wage service jobs may be affected in a number of ways. To the extent that these jobs use interpersonal or "soft" skills, some former routine jobs workers may be less productive in them. On the other hand, former routine workers are likely to be more educated than existing low-skilled service workers.

Finally, there may be within-group effects for routine occupations, if those that remain within declining routine occupations are the best at the job, have the most valued skills, and thus have the most to lose if they move to a different occupation. This effect counteracts the between-groups effect, meaning that there is an ambiguous effect on mean wages of routine occupations.

The crucial factor in all these cases is whether it is the *characteristics of a job*, or *individual productive capabilities*, which are most important for determining earnings. In this section, we show how the wage returns to different characteristics have changed, and how this has varied for different parts of the labour market.

Wage distributions: composition and impact effects

To look at both of these issues, wage distributions themselves need to be examined. Understanding what causes the wage distribution to change as it has is more complex than looking at occupational distributions. Holmes and Mayhew (2010) discuss a recently developed methodology for decomposing changes in the overall distribution of earnings into different components[5].

First, it shows the effect of an alteration in the *composition* of occupations, holding the wage differences between those occupations constant. This captures the effect isolated in Goos and Manning (2007), where a shift towards non-routine occupations increases employment in the lower and upper parts of the distribution. This compositional change is set against a number of other important changes in the characteristics of the workforce. In particular, we estimate the effect on wage distributions of:

- declining union membership
- increased educational attainment (at post-compulsory schooling and graduate level)
- increased female participation in the labour market
- increased use of more flexible working arrangements (such as part-time work).

For each of these compositional changes, the impact of these characteristics on wages is held constant. For example, the increase in the number of graduates is expected to push out wages at the upper end of the distribution, because having a degree is associated with higher earnings relative to less qualified workers.

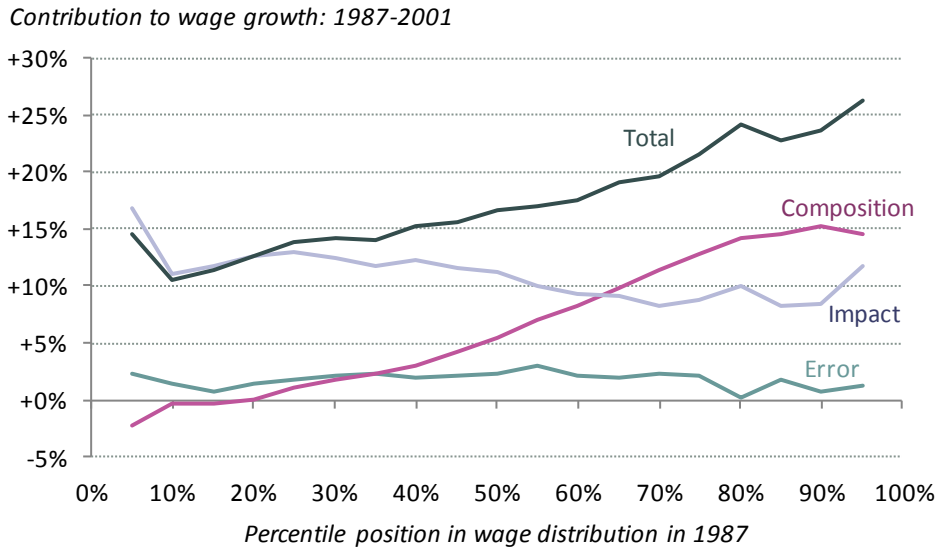
Secondly, this decomposition methodology shows the effect of changes in the *impact* of each of these variables on earnings. For example, after allowing for the change in the proportion of workers in different

[5] This decomposition methodology is called the recentered influence function approach, and was introduced by Firpo, Fortin and Lemieux (2009).

occupations, it then calculates how wage differentials between each of these occupations have changed and affected the overall wage distribution, holding everything else constant. Similarly, after allowing for a change in the proportion of unionised workers to non-unionised workers, or in the proportion of graduates, it then calculates how the impact of union membership or having a degree on wages has changed over the time period.

Figure 3.1 shows the overall change in UK wage distributions between 1987 and 2001 using data from the Family Expenditure Survey. The dependent variable is log gross hourly wages. The diagram shows the total increase in wages (less inflation) across the entire distribution. Wages at the 10th percentile rose by 11 per cent over this period, while those at the 90th percentile rose by 24 per cent. Median wages increased by 17 per cent in real terms. This total increase in wages is broken down into three main components: changes due to *compositional shifts*, changes due to *impact shifts*, and an unexplained *error component*.

Figure 3.1: Composition and impact effects on wage distributions, 1987-2001



Source: FES, 1987-2001

The diagram shows that changes in the *composition* of the labour force led to high wage growth for higher earners – around 10-15 per cent for the top 40 per cent of earners – and zero, or even negative, wage growth at the bottom end. This is consistent with polarisation – more people in low and high wage work should push the earnings of those at the top and bottom of the distribution away from the median wage, indicating an increased incidence of low wage and high wage work, and decreased employment in middle wage jobs.

Figure 3.1 also shows the proportion of wage growth due to the changing *impact* of these variables on earnings. These effects are larger for below median workers than most above median workers, and only begin increasing again for the highest earning 25 per cent.

Has wage polarisation occurred?

The overall effect of these changes is that, with the exception of workers between the 1st and 2nd deciles, there was only limited polarisation in the bottom half of the wage distribution, with wages growing across all percentiles at around 14-17 per cent. Differences in wage growth rates have meant that workers earning below two-thirds of the median wage increased from 20 per cent to 26 per cent during this time

period. In contrast, wages increased at very different rates across the upper half of the distribution – wage growth between the median wage and the 7th decile increased by 17-19 per cent over this period, compared to around 24-26 per cent among the highest earning 20 per cent of the work force.

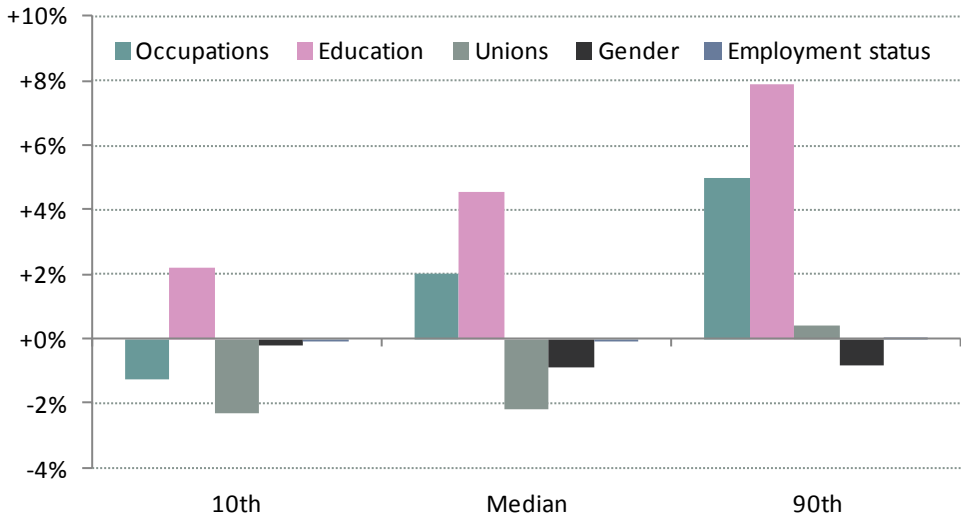
The consequence of the highest paid moving away from the rest of workers earning above-average wages is that work in the upper half of the distribution has itself become more polarised. A number of relatively 'good' jobs begin to look a lot more like mid-wage jobs. It is here that we think the notion of polarisation and the shrinking middle is incorrect – any notion of a mid-level job can only be defined relative to the top and the bottom. As the very top has accelerated away from the rest of the distribution, the definition of the middle should shift. Instead of declining, we argue that employment in middle-wage jobs has remained relatively constant, although the types of jobs being performed by these workers are different.

The influence of 'compositional' factors

Using the method described in Holmes and Mayhew (2010), the overall *composition* effect shown in Figure 3.1 can be decomposed further into the influence of each factor on earnings. The effect of changes in the composition of the work force is summarised in Figure 3.2.

It shows that the change in the occupational structure towards non-routine work has, as expected, led to faster growth of wage in top-end jobs, and has depressed wage growth at the bottom. This is the effect identified by Goos and Manning's methodology – an increase in employment at the top and bottom end of the labour market, holding the wage differences between occupations constant.

Figure 3.2: Contribution of explanatory factors to compositional change in UK wage distributions, 1987-2001



Source: FES, 1987-2001

However, Figure 3.2 also shows that there are other factors which would explain a shift towards high wage and low wage work. First, the expansion of higher education has disproportionately benefitted the highest earners. Wage growth due to increased educational attainment at the top of the distribution is much larger than that caused by a shift towards non-routine jobs. Secondly, the decline of union membership has disproportionately hurt low wage workers. The negative effect of this on the incidence of low-wage work is greater than the negative effects of a growth in low-wage service jobs.

Finally, keeping wage differences between men and women constant, the increased participation of women in the workplace has depressed wage growth almost uniformly across the distribution, but this is a relatively small effect. The increased occurrence of part-time work has effectively had zero effect on the distribution of hourly wages and hence, cannot explain any polarisation that may exist.

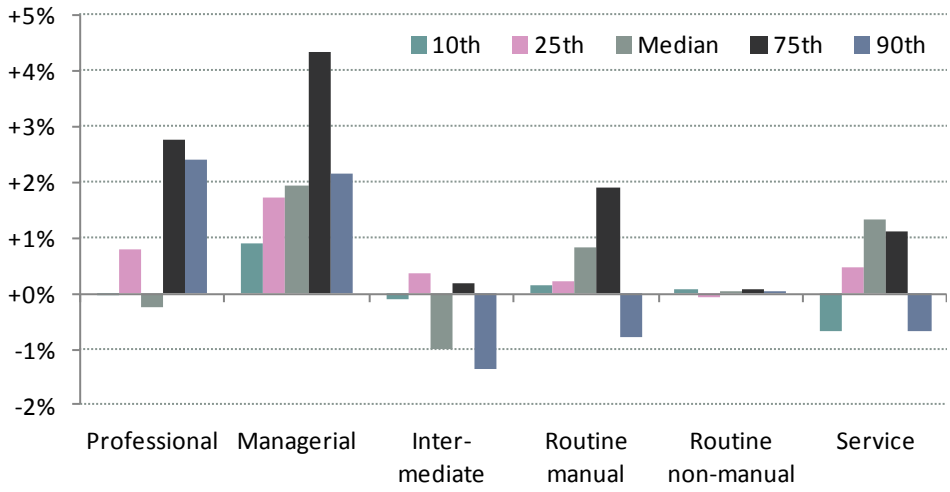
The influence of 'impact' factors

Next, we decompose the *impact* effect in Figure 3.1 into the changing wage differentials between groups of workers across the distribution (captured by the *impact* line). However, looking at wage differentials between different occupations proves very hard to interpret, as we have to define a reference group for comparing these wage differentials to, without being able to see what has happened to the reference group's wages.

We evaluate occupational wage differences relative to those earned in routine administrative jobs, with our expectation being that if there are no within-group effects (as discussed above) the relative wages of non-routine occupations should increase across the entire distribution. Instead, however, we do not see a consistent pattern of changes in the wage structure (Figure 3.3).

Figure 3.3: Impact on wage distribution of changing occupational wage differentials, 1987-2001

Wage growth relative to administrative routine jobs 1987-2001
by percentile position in wage distribution in 1987



Source: FES, 1987-2001

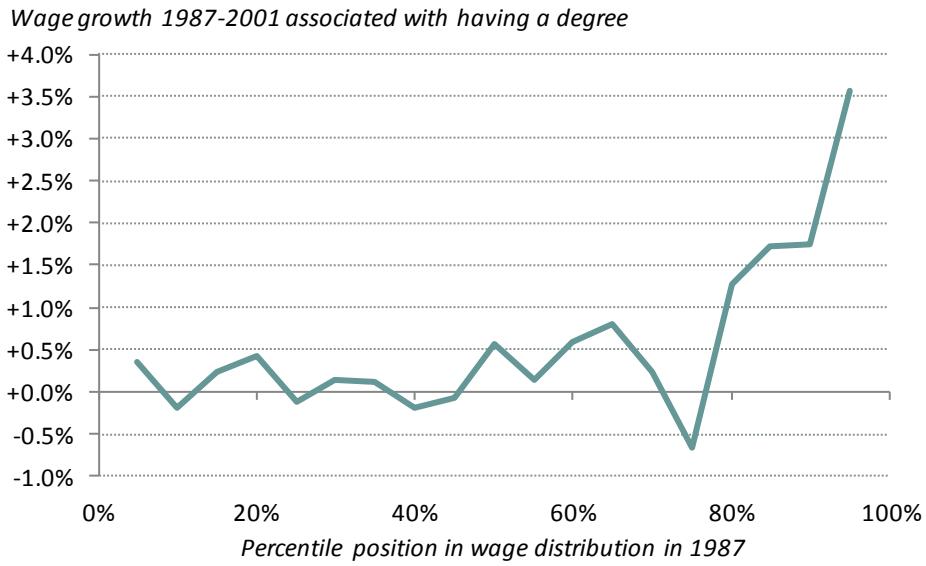
Managerial and professional occupations have recorded wage increases relative to these routine jobs, while intermediate non-routine occupations have not experienced a growth in relative wages at all. Within managerial and professional occupations, the largest change in wage differentials seems to be at the top of the distribution. One interpretation of this is that there is a widening of earnings within the good non-routine occupations, which suggests many of these apparently good jobs are less-well paying than has been previously suggested. Similarly, wages in service occupations around the median rose, while those at the bottom end declined, relative to administrative occupations. This would also be indicative of a widening of pay within a previously more homogenous group.

Conscious of the problems of interpreting these occupational wage differentials with anything but caution, we feel it is useful to assess alternative way of analysing the dispersion of earnings within growing non-routine occupations. As a result, the Appendix presents data on changing wage distributions within

growing non-routine occupations in certain industries, to show the growing dispersion of earnings within some of these non-routine occupations.

Not all of the decompositions of wage effects were as problematic. For example, changes in the returns to education across the distribution did prove insightful, as a comparison of earnings between the more qualified and a reference group of school-leavers does have a natural interpretation. In particular, Figure 3.4 shows that the graduate premium has remained approximately constant across most of the distribution, although has risen very fast for the top 20 per cent of earners, perhaps suggesting that the increase in demand for graduates in the best jobs has outstripped their growing supply.

Figure 3.4: Impact on wage distribution of changing graduate premium



Source: FES, 1987-2001

Conversely, there is some evidence that it has declined for workers between the 7th and 8th deciles, leading to the opposite conclusion for these jobs. There appears to be two tiers of graduate employment (see discussion of Brown, Lauder and Ashton, 2011, in section 3.2). This would help explain why those at the top of the distribution have continued to move away from the rest.

We also found that there is a there is a 'shift' term, as the entire distribution moves outwards over time. This is larger for the lowest earners, largely explaining why wage effects (the *impact* effect in Figure 3.1) are larger for those at the bottom of the distribution. Among other potential effects, it captures policy changes, such as the introduction of the minimum wage. We argue that the introduction of this policy has mitigated somewhat the effects of the move towards non-routine work and the decline of union membership.

Summary of analysis

To summarise, our analysis has shown that the UK wage distribution changed across all levels of earning between 1987 and 2001, which we focus on here as a way of assessing the effects of occupational polarisation on pay. We observe that there has been an increase in the incidence of low wage work and that good jobs became increasingly polarised between the highest earners – whose wages have grown far faster than all other workers – and the rest, who have been left behind and now more closely resemble mid-range occupations rather than top jobs.

Looking purely at compositional shifts, the labour market has become more polarised in terms of earnings, although it is increased educational attainment and decreasing union membership which are largely responsible for this, rather than the shift towards non-routine employment. Changes in the wage structure have benefitted the highest earners, who have seen the largest increases in graduate and occupational premia. Policy effects may explain why the lowest earners have seen such fast wage growth, compared to other low-to-middle wage earners – this has reversed some of the polarisation caused by compositional changes.

Polarisation and the stagnation of middle incomes

Recently, there has been research and media interest in the idea that over the past decade, median incomes in the UK have stagnated and have grown much slower than the growth in national income (Plunkett, 2011; Financial Times, 2011). The evidence on wage distributions above would certainly support this – presuming that labour's share of output has not altered dramatically, the only way some workers wages could increase faster than others is if other workers wage growth rates start to fall.

It has been argued previously that this can be explained by polarisation. The median wage worker, it is suggested, was a worker in a routine job. As we have discussed above, technological advances have placed a downward pressure on her wages. Meanwhile, there are workers in well-paying non-routine jobs whose productivity and wages have increased as a result of technical progress. As a result, overall increases in productivity of the economy are shared unevenly between the top and the middle, leading to a stagnation of middle incomes.

Our analysis of polarisation would suggest that this explanation does not fully account for this phenomenon. First, it is important to remember that the median worker is not fixed. As the share of non-routine jobs has grown, the worker near the middle of the earnings distribution is increasingly likely to be working in a managerial, associate professional or technician role, rather than in a routine job. By 2008, over 44 per cent of occupations were classified as high-skill non-routine. Hence, at least part of the explanation has to be due to growing dispersion of earnings *within* high skill non-routine occupations, rather than *between* these occupations and middle-wage non-routine occupations. We discussed above how wage growth within many of these high-wage non-routine occupations has benefitted the highest earners disproportionately more.

Secondly, our analysis has indicated that as well as the effects of a shift towards non-routine work, there have also been important effects on wage distributions due to educational attainment and institutional changes such as the decline in union membership. Increased educational attainment, particularly the increase in the number of graduates, has pushed up the earnings of those at the top by considerably more than those nearer to the median. Similarly, the decline in union power has had a negative impact on mid-range jobs but little effect on the largely non-unionised top end.

Finally, an alternative explanation for this phenomenon is given by Brown, Lauder and Ashton (2011). They argue that distinctions between quality and cost – that countries could compete either by producing at low-cost or by innovating and developing high-quality products – are becoming increasingly blurred. This has been caused by the development of a labour market – particularly a market for graduate labour – that is increasingly global. On the supply side of this market, there has been a rapid increase in the number of graduates from "low-cost" countries such as India and China.

At the same time, there has been a deskilling of many graduate-level jobs through a process of standardisation, making it possible for these jobs to migrate to any part of the world with sufficiently qualified workers. This has put downward pressure on the wages of most graduates, which they call a 'global auction'. Meanwhile, there remains a small proportion of graduates who have been exempt from these pressures. The global 'war for talent' among large multi-national companies, where these firms place huge resources in attracting the top graduates, has driven up the wages of the highest earners while the earnings of many others graduates have stagnated.

The evidence presented in the previous section is supportive of this view. In particular, we find a rising graduate premium over the period 1987-2001 for those in the highest paying jobs only, and some evidence of a decline in this for many workers earning between the median and the 8th decile. Obviously, there is still a need to look at the situation over the past decade. However, we would argue that any explanation of recent patterns in wage growth that relies purely on the polarisation hypothesis set out by Goos and Manning is overly-simplistic.

Implications for public policy

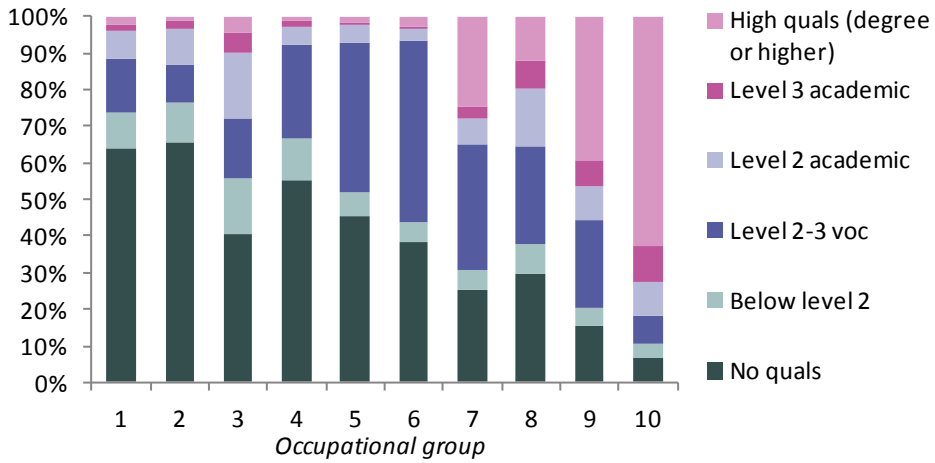
The polarisation hypothesis has important implications for several areas of government policy. In this final section, we consider two of these: skills policy and social mobility.

What does this mean for skills policy?

In the previous section, the "lovely" and "lousy" occupations which have grown over the past three decades were characterised as being historically either high wage or low wage. In addition, these types of jobs are often described as high skill and low skill. This section briefly looks at the effect of the growth of non-routine jobs on skill requirements.[6] We use Labour Force Survey data on qualifications and occupations.

Figure 5.1 shows a simple breakdown of the qualification levels of workers in each of the occupational groups used in Figure 2.1. We identify groups of qualification levels – those with degrees or higher education qualifications (including HNDs, diplomas in higher education, and nursing and teaching professional qualifications), those with qualifications below degree level (broken down into level 2 and level 3 academic, and vocational qualifications at both levels) and those with no qualifications.

Figure 5.1: Relative share of qualified workers in occupational deciles, 1981



(ranked by mean gross hourly pay in 1986: lowest to highest)

Source: LFS 1981-2008

It shows that in 1981, it was the top two groups where graduates were predominantly employed, while those with no qualifications or low levels of qualifications were more likely to be found in jobs at the lower end of the distribution. Those with vocational qualifications (which includes those who had completed an apprenticeship) were predominantly found in greater numbers in the middle of the distribution.

Using these data as a benchmark for skill requirements in each occupation, we can estimate how the skill requirements of the labour market would have changed under the assumption that the skill content and work organisation of jobs had not changed at all.

[6] A small number of papers have looked at polarisation directly through measures of skill, rather than earnings. Examples include Spitz-Oener (2006) and Autor (2007). This requires having a single dimension measure of skill – for example, Autor uses average length of schooling.

On the basis of the changing employment share of each of these groups, and assuming for the moment that the input of skilled labour into each occupation remains constant, we can predict the necessary number of graduates and non-graduates in the labour market. Table 5.1 shows these employment shares. The final column presents the actual 2008 shares of highest qualifications. In all cases except for no qualifications, there are more people with each level of qualification than is predicted under the assumption of fixed skill requirements in each job.

Table 5.1: Shares of qualified labour, 1981-2008

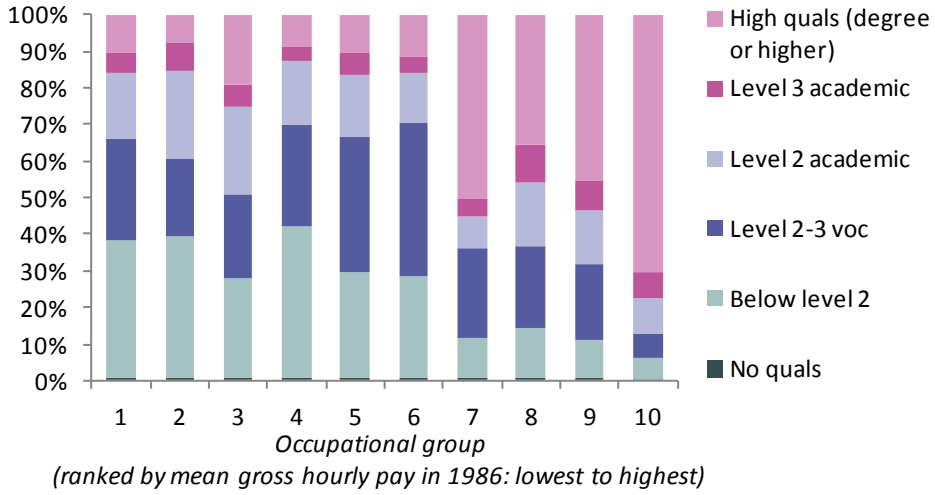
	1981	2008 (predicted)	2008 (actual)
High qualifications	14.4%	23.5%	33.6%
Level 3 academic	3.9%	5.0%	6.7%
Level 2 academic	9.0%	9.0%	15.6%
Level 2-3 vocational	24.9%	21.3%	22.2%
Below level 2	8.1%	7.3%	21.3%
No qualifications	39.7%	34.0%	0.6%

Source: LFS 1981-2008

The extent to which there has been increased qualification attainment can be seen in Figure 5.2, which shows the qualification shares of these same occupational groups in 2008.

This shows two main trends. First, the share of labour in each group with no qualifications or very low level qualifications has diminished dramatically – almost no workers had no qualifications at all (although they are heavily represented within the unemployed), and while the share of individuals with low level qualifications had risen, it has not risen by as much as the fall in unqualified labour. The share of workers with vocational qualifications has increased in groups at the bottom end of the labour market. Meanwhile, the share of graduates across all groups has risen, particularly in all groups below 9 and 10. Most noticeably, more than 50 per cent of workers in group 7 and 20 per cent of workers in group 3 had degrees or higher education qualifications.

Figure 5.2: Relative share of qualified workers in occupational deciles, 2008

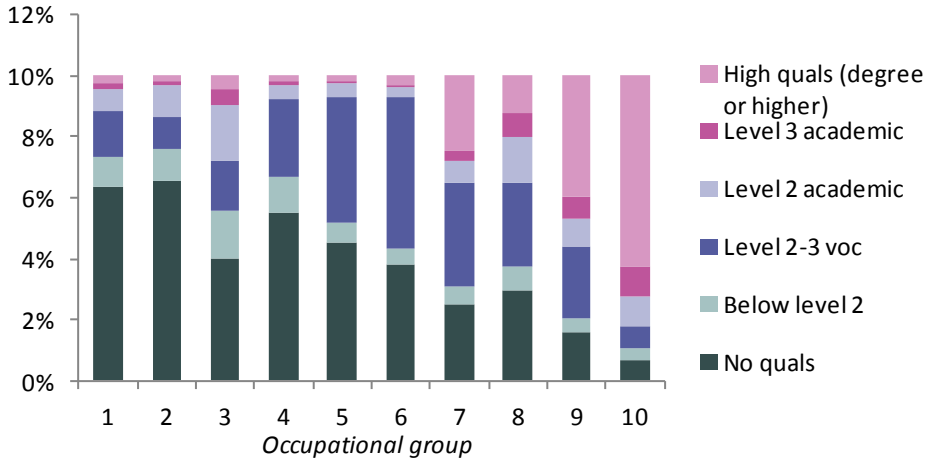


Source: LFS 1981-2008

Figure 5.3 and Figure 5.4 show these changes in absolute terms, reflecting both the change in educational attainment of each group as well as the changing employment share of each group. This really emphasises the dramatic increase in graduates, and shows that while many of them are being employed in the

growing higher wage groups, there are sizeable numbers of graduates appearing across this occupational distribution. It also illustrates how the effect of the decline in the groups of occupations in the middle of the distribution has driven middle-skilled workers (with level 2-3 qualifications) in both directions. As well as some workers qualified to this level finding work in 'lovely' jobs, a larger number have ended up in 'lousy jobs' – note in particular the absolute increase in level 2-3 vocational and academic workers in all of the bottom 5 groups.

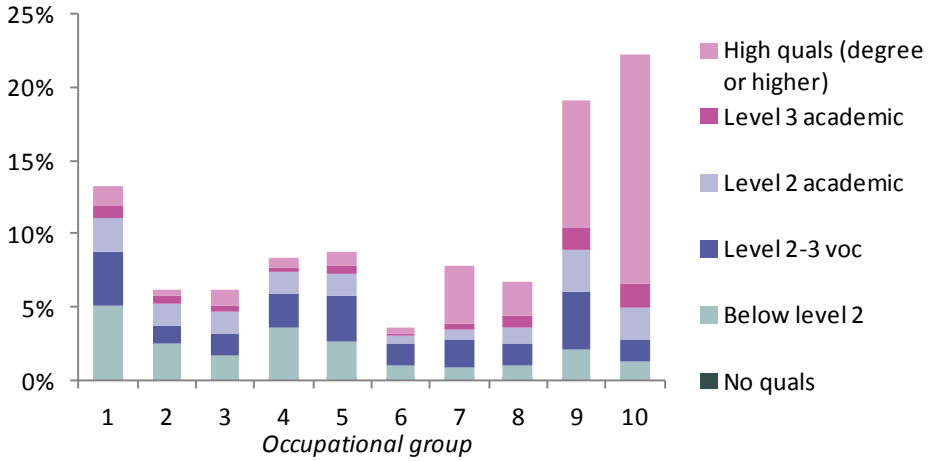
Figure 5.3: Absolute share of qualified workers in occupational deciles, 1981



(ranked by mean gross hourly pay in 1986: lowest to highest)

Source: LFS 1981-2008

Figure 5.4: Absolute share of qualified workers in occupational deciles, 2008



(ranked by mean gross hourly pay in 1986: lowest to highest)

Source: LFS 1981-2008

These trends seem likely to continue. Figures from Living Futures (CBI, 2011) suggest that between 2007 and 2017, 52 per cent of administrative and secretarial occupations, 30 per cent of sales and customer service occupations, 23 per cent of personal service occupations and 24 per cent of elementary occupations will require a degree.

These projections may reflect either demand or supply side factors. It may be that occupations have genuinely up-skilled and reorganised to take advantage of more qualified workers, leading to an increase in demand. Alternatively, it could be that jobs have not up-skilled while the supply of highly qualified workers in the labour market has increased. These workers end up competing for jobs which, in the past, would not have employed a large number of graduates. Higher qualifications act as a screening

mechanism for firms hiring new workers, rather than as a requirement based on the skill content of the job.

In the case of many higher-skill non-routine jobs, the role of technology is important. The adoption of new technology in these jobs requires more skilled labour to achieve all the possible benefits of these investments. Hence, while improvements in technology increase firms' demands for these jobs in general, this increase in demand is particular strong for more skilled workers.

However, in other jobs, there may be what Brown, Lauder and Ashton (2011) describe as 'digital Taylorism', where technology has made it possible to standardise and routinise formerly high-skill work processes – even ones which would have previously been considered non-routine. Here, the adoption of new technology, particularly ICT capital, may both raise the productivity of workers doing that job (increasing firms' demand for these jobs) while at the same time reduce the skill requirement job. For example, many managerial positions have far less discretion than they would have had in the past as a result of firms using more technology. New computerised processes may have made these companies more profitable and their workers more productive than in the past, but the workers themselves are increasingly found working from pre-written scripts and making few decisions on their own. Examples include managers in supermarkets (see Grugulis *et al,* 2011) and retail banking.

For declining routine jobs, there is little expectation of upskilling. In these jobs, computerised capital replaces labour, and the nature of the tasks mean that those left in these jobs operate new automated systems which make work simpler and less skilled. Finally, as shown in Figure 5.4 the growing number of low-end jobs which previously required very few (if any) qualified labour now employ a large proportion of workers above level 2, include a sizeable number of graduates.

Skills policy in the UK has almost entirely focused on increasing the supply of more qualified workers into the labour market. This section has shown the huge increase in attainment levels over the past three decades. However, with this should come as a concern about underutilisation of skills developed by workers with these higher qualifications, particularly those entering the labour market with degrees (Felstead *et al*, 2007; Chevalier and Lindley, 2009; Green and Zhu, 2010).

The change in the occupational structure may create increased firm demand for more qualified labour through the growth of well-paying non-routine jobs. However, not all of these jobs are actually high skill. Behind the occupational titles, there may be significant variation in the skill content of the jobs, in the same way that there is significant variation in earnings in these groups of occupations. Moreover, the tendency to refer to these jobs as high skill is not particularly helpful. No job requires high levels of all possible skills. The real question should be what sorts of skills are needed within these jobs, and how should the education and training system provide those skills. There is a need for more work on this issue. In addition, as middle-skill occupations are in decline, it seems increasingly likely that well-qualified labour market entrants unable to find good non-routine jobs will be found working in low-skill, low-wage occupations, where the gap between skill supply and requirement is even greater. We present data showing the rising proportion of well-educated workers in the growing low-skill non-routine occupation group identified by Goos and Manning, which should be a concern for policymakers.

What does this mean for progression and social mobility?

While the above discussion has been more sceptical of the idea that labour markets have polarised into high wage and low wage segments, there has clearly been a huge change in the types of jobs which are

available. This sort of a change will have implications for occupational mobility, as opportunities within different career paths change.

Recent UK government papers on mobility have acknowledged the hourglass labour market, yet tend to focus on the potential for the growth of higher skill non-routine jobs to create opportunities for improving labour market outcomes. There has been an emphasis on the role of education and training as a mechanism for creating "winners" in this labour market. In the previous section, we questioned whether all of these growing good jobs were actually high skill, or would continue to be in the future, but there will be some need for more educated or trained workers. Through meeting these skill requirements, both existing routine workers and new labour market entrants are expected to benefit from increased employment opportunities in these better jobs.

So far, little has been said about the inevitable "losers" – those displaced from mid-range routine jobs but unable to move upwards, those who would have entered routine jobs in the absence of these structural changes, and those in low-wage, "lousy" jobs who are less able to move upwards following the decline in the middle. All of these cases pose significant challenges. In addition, our discussion in section 1 of the difference between occupational and wage polarisation should lead us to question whether the upwardly mobile "winners" are really winning much at all in terms of improved wages.

There is still a great deal of research to be done in these areas, however, there have been some recent developments.[7] First, the change in the occupational structure affects the mobility of displaced routine workers, separate from the proportion of individuals who would have otherwise progressed from routine jobs to better intermediate and managerial occupations over their career. Periods of time when a large proportion of routine jobs were lost significantly increased mobility. Moreover, some of this mobility was "downward", in that individuals moved to non-routine service occupations. There is some evidence that some qualification levels and prior labour market experience mitigate this effect (more qualified displaced workers are more likely to move to managerial and intermediate occupations, while some routine workers with degrees transition to professional occupations).

Secondly, the decline in routine occupations has affected which jobs new labour market entrants go into. Controlling for differences in qualifications, those entering the labour market at the end of the 1980s were less likely to be employed in routine occupations, more likely to be employed in service occupations and no more likely to be employed in managerial occupations, than those entering the labour market in the mid-1970s. However, this decline in routine employment was not as large as might have been supposed, and was not more noticeable for more qualified workers. This finding is somewhat inconsistent with the work of Autor and Dorn (2009), who argue that routine occupations should be "getting older" as more mobile younger workers leave or avoid these jobs, anticipating the declining value of acquiring the relevant specific skills.

Finally, there is some evidence upward *occupational* mobility does not necessarily mean upward *wage* mobility, with those moving from routine and service occupations into good non-routine occupations having lower earnings than workers doing these jobs already. This does not necessarily reflect occupational-specific skills, as individuals moving between other good non-routine occupations did not

[7] This research has been summarised in Holmes and Mayhew (2011). For more details on the methodology used to assess to effect of the change in the occupational structure on the mobility of routine workers, see Holmes (2011). The cross-cohort comparison is discussed in greater detail in Holmes, Mayhew and Chow (2011).

experience this penalty. Given this, it seems plausible that some apparently upward mobility into good non-routine jobs may not necessarily translate into higher wages.

Conclusion

This report has assessed the impact of the shift in the occupational structure in the UK towards non-routine jobs. The prevailing opinion among both academic and policymakers is that this change has led to the development of an hourglass labour market, with increased employment at the top and bottom of the distribution, and a decline in jobs in the middle.

When looking at occupational titles and assuming that the wages remain constant, there does indeed appear to be a hollowing out of the middle of the labour market, as employment shares of "lovely" and "lousy" jobs increase. However, looking at wage distributions directly reveals less support for this hypothesis. Holding wages constant, we see increased incidences of well-paid and low-paid jobs resulting from this shift towards non-routine occupations; however, much larger effects result from increased educational attainment at the top of the pay distribution, and declining union power at the bottom.

Meanwhile, we find that it is important to consider changes in both the relative wage between different occupations and the dispersion of earnings within each occupation. Our analysis looks at the impact on wage distributions of changes in the way worker characteristics impact on earnings across the distribution. Over the period studied, we find that the top earners have moved further away from the rest of the labour market, caused by an increased dispersion of earnings within some of the apparently good occupations as well as increasing returns to education and skill seem to be biased in favour of the highest earners.

By comparison, many apparently good non-routine occupations begin to appear closer to mid-range jobs than top jobs. We conclude that, despite the ongoing discussion about a polarised labour market, many jobs continue to be found in the middle of the wage distribution. What has changed is not so much earnings, but job titles.

We have added to this analysis of the shape of the jobs market by considering implications for skills policy and mobility.

On the former, we argue that there is concern that the pace at which workers are becoming increasingly well-qualified may lead to their skills being underutilised, even with a growing number of good non-routine jobs. In addition, some well-qualified workers may find themselves working in the growing number of low-skill non-routine jobs. Policymakers need to understand better what skills are need and utilised in good non-routine jobs and whether, given the changing occupational structure of the labour market, these skills are currently being oversupplied. They cannot simply rely on an expectation that employers will upskill all jobs in response an increased supply of highly-qualified workers.

On mobility, we have briefly discussed the potential effects of the change in the occupational structure of the UK labour market. Much like with our discussion of skills policy, we argue that the hourglass labour market, even in the way we have presented it, does not just create opportunities for improved labour market outcomes – it may also harm some workers. We emphasise the possibility of downward mobility for displaced workers, the worsening position of new entrants when many routine occupations have disappeared, and the lower earnings of those moving 'upwards' to good non-routine jobs as concerns that need to be tackled by policymakers.

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Appendix: the earnings distributions of growing occupations

The analysis of wage distributions suggests that while there has been a growth in 'lovely' and 'lousy' occupations, some of the jobs being created that are categorised in these groups are not the same as before. Identifying these within-group effects is an important step in fully understanding the implications of on wage inequality and skills policy of the shift towards non-routine work.

In this section, we present data on wage distributions within occupational groups, broken down by industry, to illustrate how focusing just on occupational titles can be misleading. The data is taken from the Labour Force Survey between 1993 and 2008. Figure 8.1, Figure 8.2, Figure 8.3 and Figure 8.4 show the occupational share (by SOC2000 1-digit codes) of four industries – manufacturing, retail and wholesale, financial intermediaries, and health and social care. In all of these industries, there has been a large growth in managerial occupations. Figure 8.5, Figure 8.6, Figure 8.7 and Figure 8.8 show the wage distribution of managers in these industries, corrected using the Retail Price Index to measure real wage in 2000 prices.

These figures illustrate an important issue – in some cases, there has been a growth in lower paid jobs within a category of jobs generally considered to be well-paid. This is particularly noticeable in the retail and wholesale sector, where managerial jobs increased between 2000 and 2008. The proportion of jobs earning below £400 per week (at 2000 prices) increased from 37 per cent to 58 per cent in this time period. Contrast this with the situation in healthcare or manufacturing, where the proportion of managers earning under this level decreased from 65 per cent to 43 per cent and from 29 per cent to 24 per cent respectively over the period 1993-2008, where these jobs were steadily growing.

In financial intermediation, a sector which has performed relatively well over this time period, the situation is more complicated. There has clearly been a growth in high wage managerial jobs in this sector – those earning over £1,500 per week increased from just a couple of percent in 1993 and 2000, to 10 per cent in 2008. However, between 2000 and 2008, there is also a growth in the proportion of managers in this sector earning less than £400 (from 24 per cent to 30 per cent).

At the bottom end of the wage distribution, there is some evidence that some growing service occupation jobs are better paid than those in the past. Two examples here are from personal service occupations in the health and social care sector and customer service occupations in the retail and wholesale sector. The distributions of earnings in these types of jobs have shifted towards better pay – in both cases, the proportion of workers earning under £200 a week has fallen over the time period (73 to 61 per cent and 90 per cent to 84 per cent, respectively).

Figure 8.1: Occupational share, manufacturing, 1993-2008

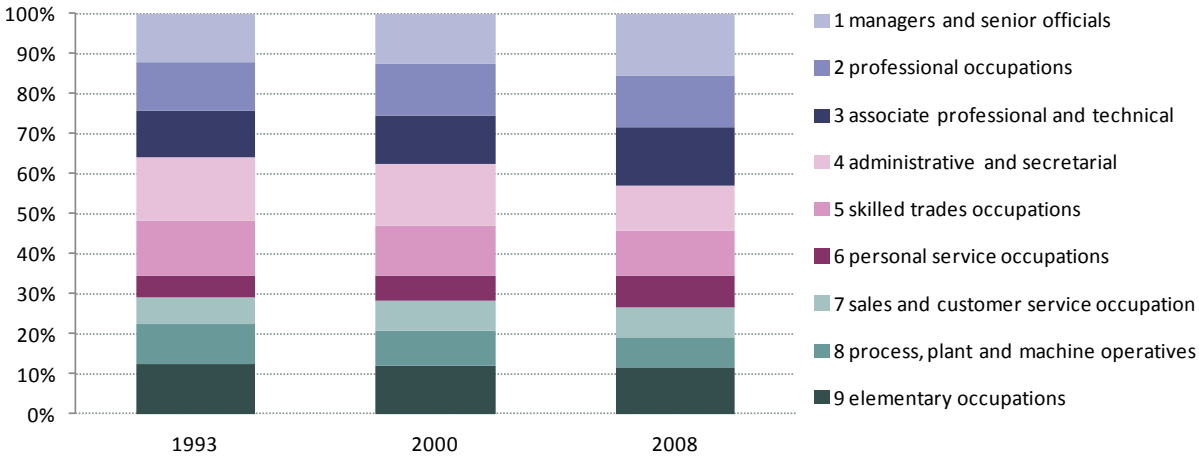


Figure 8.2: Occupational share, retail and wholesale, 1993-2008

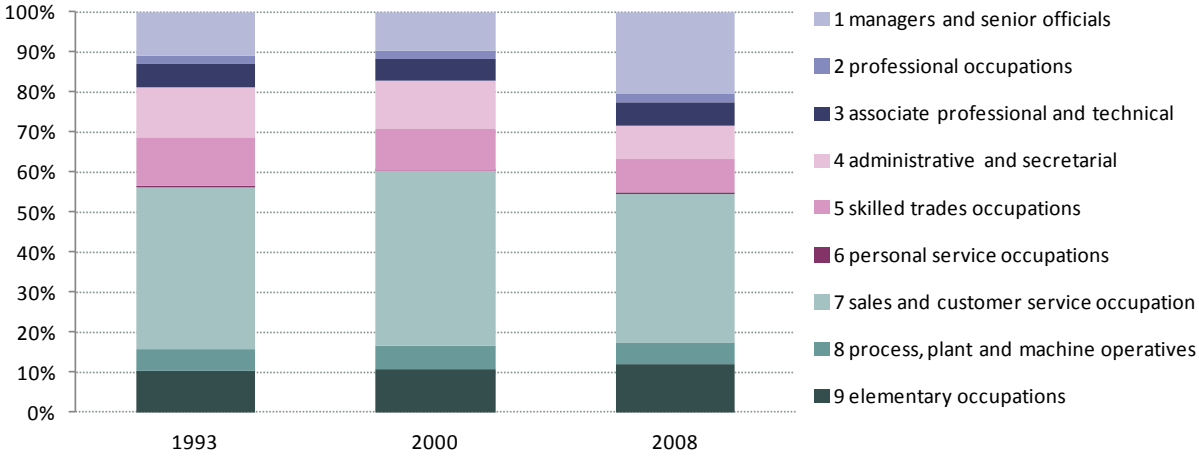


Figure 8.3: Occupational share, financial services, 1993-2008

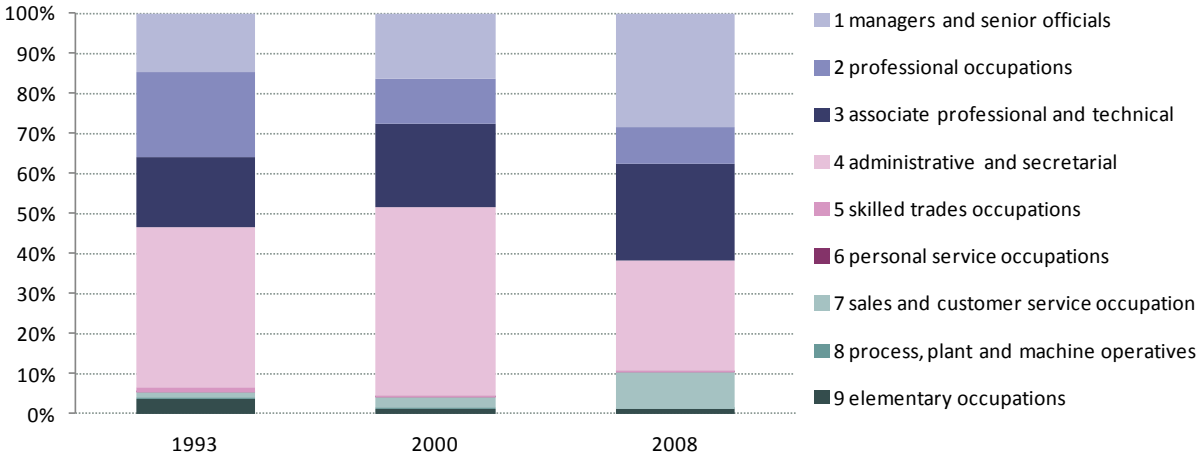


Figure 8.4: Occupational share, health and social work, 1993-2008

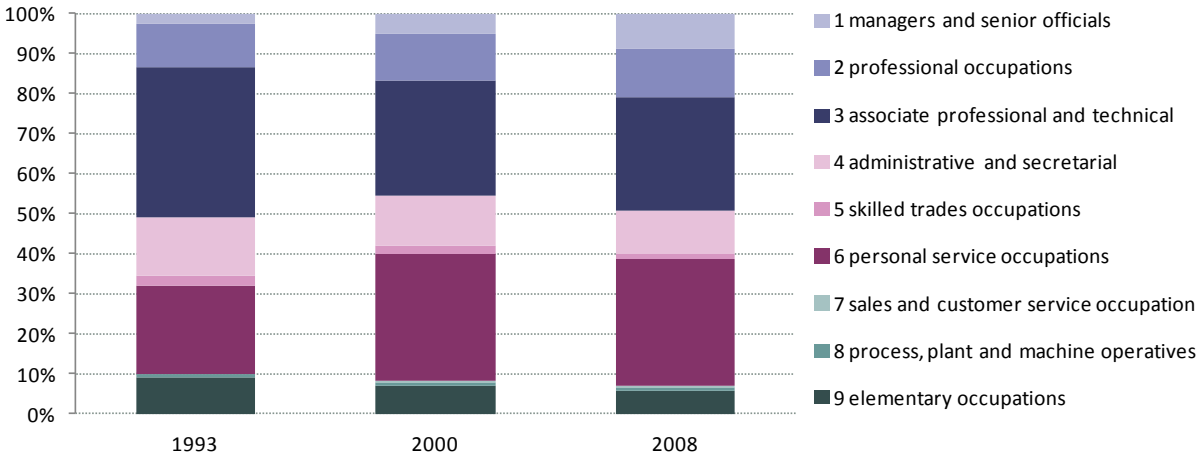


Figure 8.5: Wage distribution of managers in manufacturing, 1993-2008

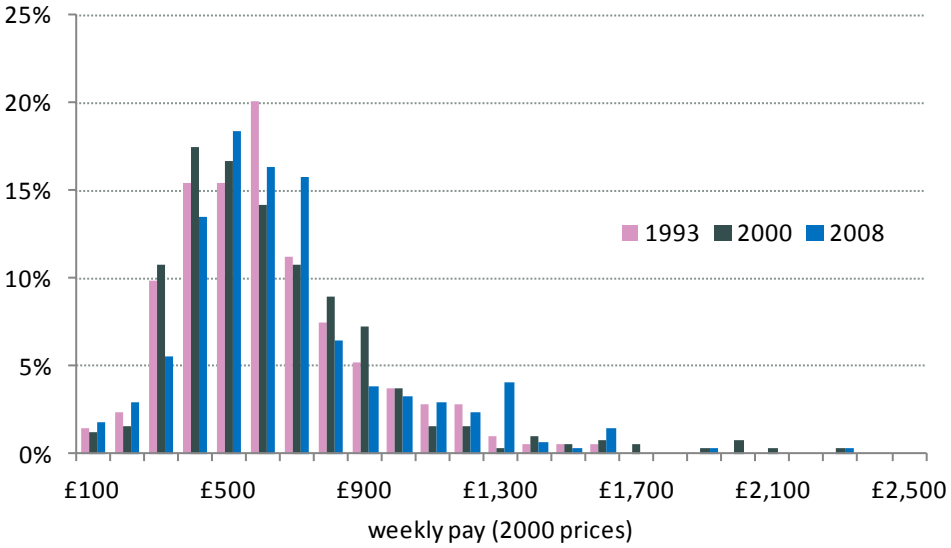


Figure 8.6: Wage distribution of managers in retail, 1993-2008

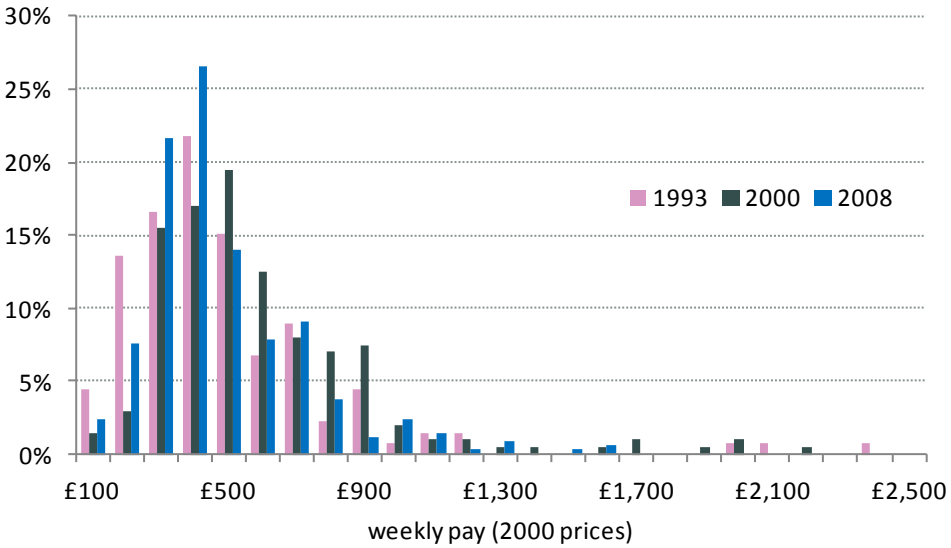


Figure 8.7: Wage distribution of managers in financial services, 1993-2008

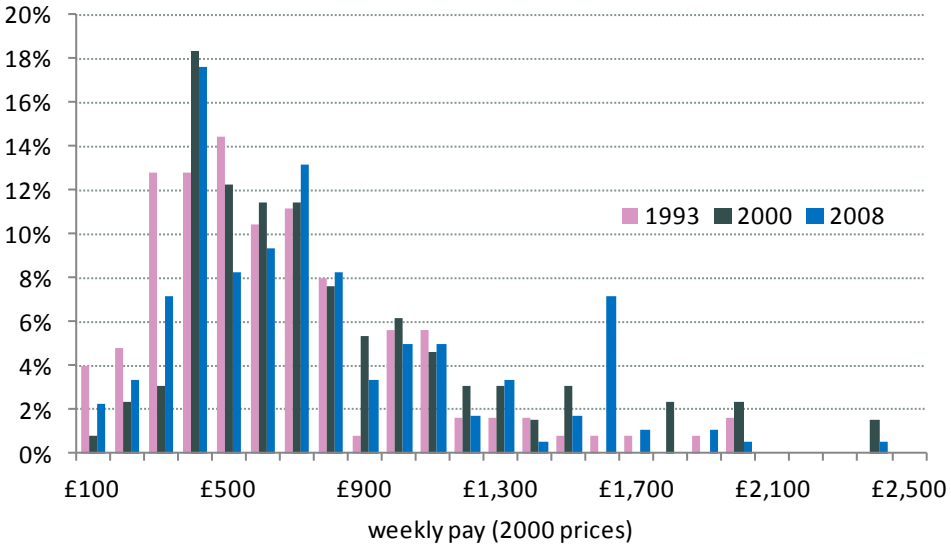


Figure 8.8: Wage distribution of managers in health and social work, 1993-2008

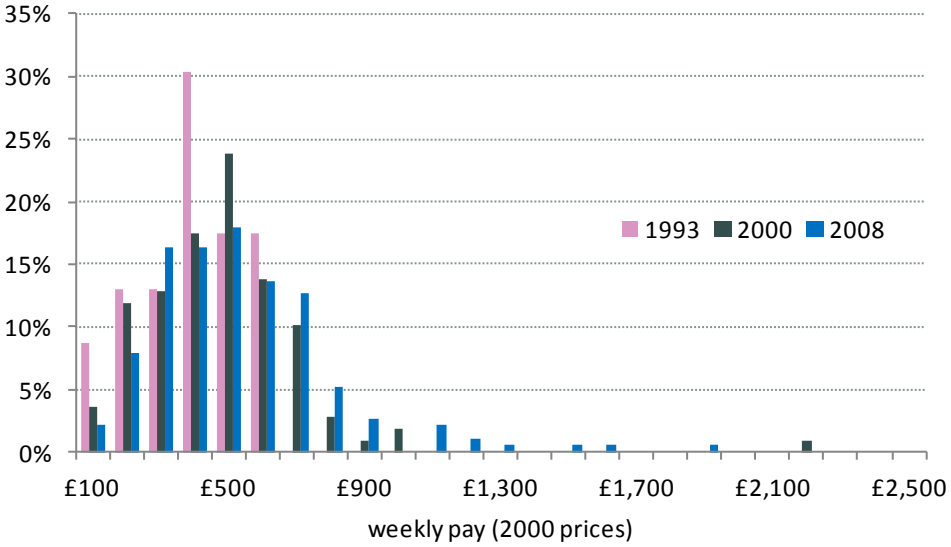


Figure 8.9: Wage distribution of personal service occupations in health and social work, 1993-2008

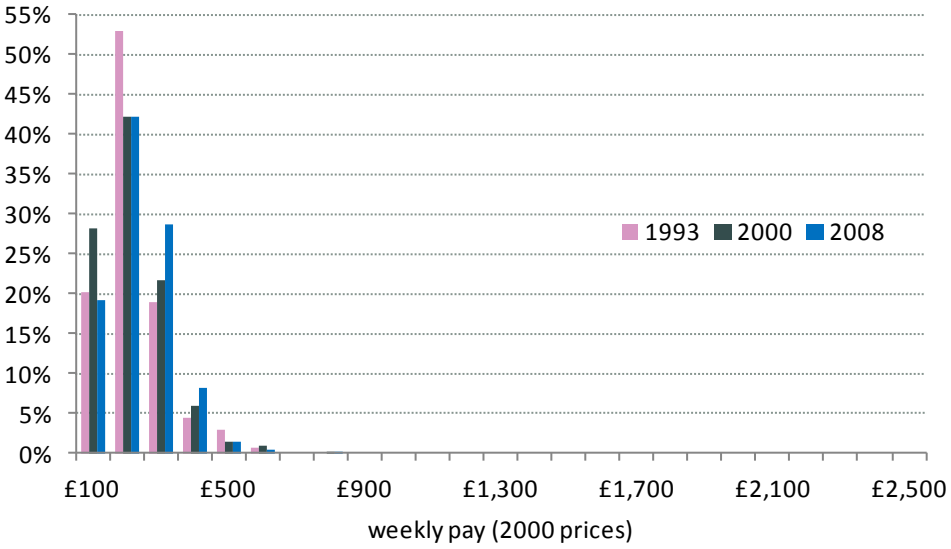
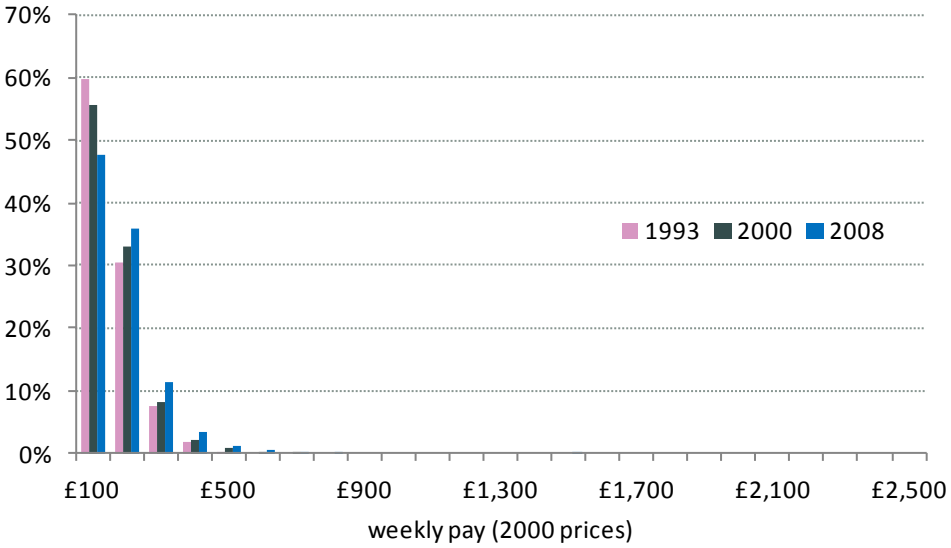


Figure 8.10: Wage distribution of customer service and sales occupations in retail, 1993-2008



The Resolution Foundation

The Resolution Foundation is an independent research and policy organisation. Our goal is to improve the lives of people with low to middle incomes by delivering change in areas where they are currently disadvantaged. We do this by:
- undertaking research and economic analysis to understand the challenges facing people on a low to middle income;
- developing practical and effective policy proposals; and
- engaging with policy makers and stakeholders to influence decision-making and bring about change.

For more information on this Briefing Note contact:

Matthew Whittaker
Senior Economist
matthew.whittaker@resolutionfoundation.org
020 3372 2958