

Part III

Inequality

11

Changes in UK Wage Inequality Over the Last Forty Years

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Key findings

- Wage inequality has risen significantly in the UK since the late 1970s.
- The most rapid widening out of the gap between high and low paid workers occurred in the 1980s, where earnings gaps widened throughout the distribution.
- In the 1990s, changes were more muted, but wage gaps continued to rise. In the 2000s, a rather different picture emerged, with upper tail wage inequality continuing to rise, but lower tail wage inequality stagnating.
- The standard supply-demand model of the labour market is relatively successful in accounting for some, but not all, of these observed changes. In addition in the 2000s, the national minimum wage is likely to have contributed to the stagnancy of lower tail wage inequality.

Introduction

This chapter offers an up-to-date picture of what has happened to wage inequality in the UK over the past forty years. I first focus upon documenting the patterns of change and trends in wage structures, and then on explaining why these changes have occurred. The chapter highlights that there have been different episodes of changes in wage inequalities. In the 1970s, there were reduced inequalities but, in terms of what followed, these narrowings were small in magnitude. The 1980s saw very rapidly rising wage inequalities, with wage gaps widening out at all parts of the wage distribution. In the 1990s, changes were more muted but wage gaps continued to rise. In the 2000s, a

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rather different picture emerged, with upper tail inequality continuing to rise, but lower tail inequality stagnating. Throughout this time period skilled workers improved their position relative to less skilled workers and there is evidence that labour market polarization caused a hollowing out of middle paying jobs.

Turning to explanations, I argue that the standard supply-demand model of the labour market is successful in accounting for some, but not all, of these observed changes. A key long-run driver has been skill-biased technology change (SBTC), which has been developed further in work that links closely to the polarization phenomenon from the observation that many jobs that have been lost have been through technology substituting for jobs that mainly involve routine tasks (task-biased technical change, TBTC). In addition in the 2000s, the national minimum wage is likely to have contributed to the stagnancy of lower tail wage inequality.

The rest of the chapter is structured as follows. The next section spends time describing the basic facts in terms of what has happened to wage inequality over the last four decades. The following section considers explanations of the observed patterns of change. The chapter ends with some general observations and concluding remarks.

Changes in UK wage inequality, 1970–2009

Overall changes in wage inequality since 1970

Figure 11.1 displays the evolution of the 90–10 earnings differential for full-time men and women since 1970, based upon New Earnings Survey (NES) and Annual Survey of Hours and Earnings (ASHE) data.¹ The figure reveals what by now has become a well-known pattern. From the late 1970s onwards the 90–10 ratio significantly increased and inequality is now a lot higher than it used to be. This is the case for men and women, though the increase in the 90–10 for women tends to taper off from the late 1990s.

Figure 11.2 separately considers the upper and lower halves of the distribution. For men, upper tail wage inequality (measured by the 90–50 wage ratio) rises sharply from the late 1970s and consistently throughout the entire period up until 2009. Male lower tail wage inequality (measured by the 50–10 wage ratio) also shows a significant increase, but with most of its increase concentrated in the 1980s and early to mid-1990s. Following that, it flattens out. For women, the story is similar, but with some subtle differences. Most

¹ The NES data runs up to 1996 and the ASHE data from 1997 to 2009.

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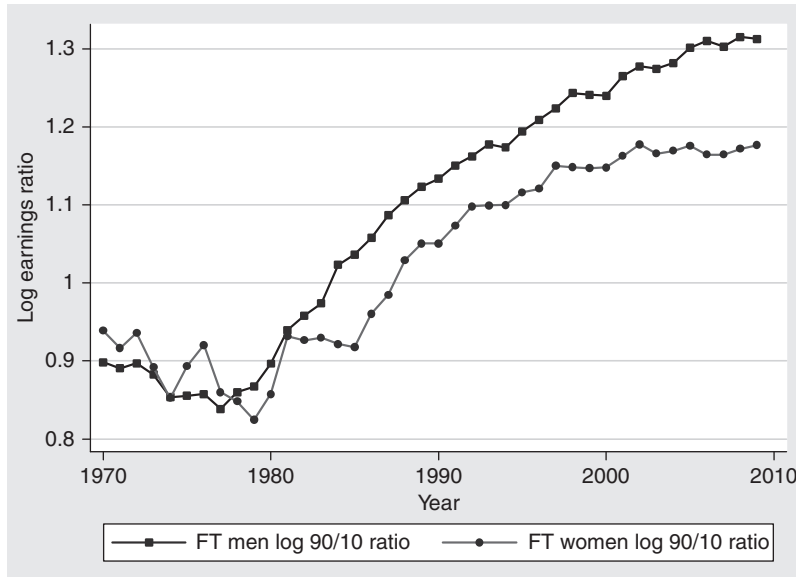


Figure 11.1: 90–10 Log weekly earnings ratios, full-time men and women, 1970–2009
Source: National Equality Panel Analysis; 1968–1996 New Earnings Survey (NES) and 1997–2009 ASHE.

notable is the halting of the increase in lower tail inequality from the mid-1990s.

Overall, however, what is very clear from Figures 11.1 and 11.2 is that wage inequality is significantly higher now than it was some thirty years ago. This is true for men and women, and is the case in both the upper and lower halves of the distribution.

Changes in educational wage differentials

Rising wage inequality has been accompanied by increasing gaps within and between different groups of workers. The wage premium received by graduates as compared to non-graduates is a between-group wage differential that has received considerable attention in the literature. Figure 11.3 shows the wage gap between graduates and non-graduates from 1980 to 2004. The premium rises sharply from 1.48 in 1980 to 1.60 by 1990 and continues to rise, albeit at a more modest pace, up until 2004. This is in line with the idea, recognised in various places in the literature, that education has become more highly valued in the labour market and that this is one of the key features of rising wage inequality.

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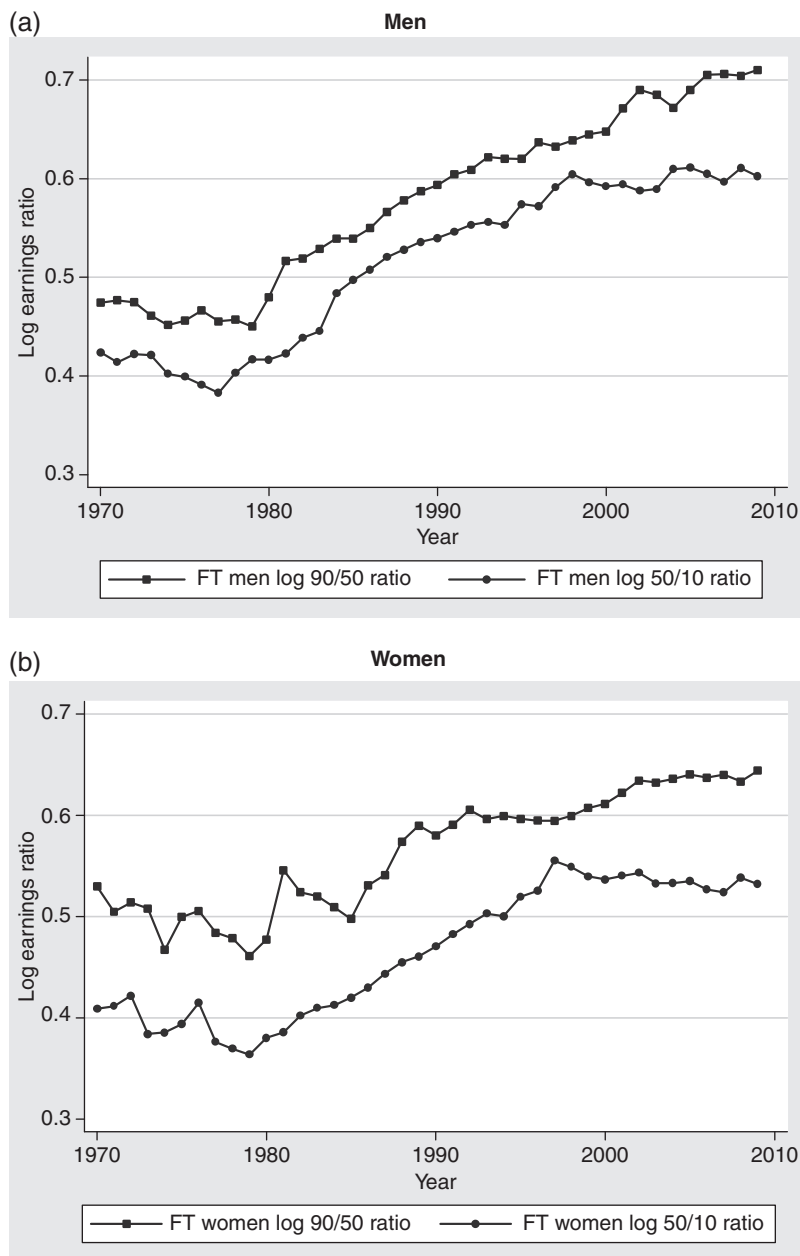


Figure 11.2: Upper tail (90–50 log earnings ratio) and lower tail (50–10 log earnings ratio) inequality, full-time men and women, 1970–2009 (a) Men (b) Women

Source: As for Figure 11.1.

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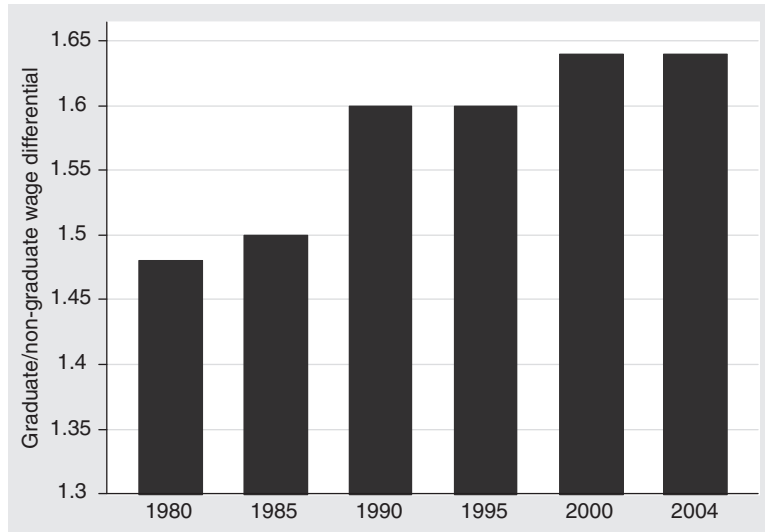


Figure 11.3: Graduate/non-graduate earnings differentials, 1980–2004

Notes: Wages are for full-time workers. The relative wage ratios are derived from coefficient estimates on a graduate dummy variable in semi-log earnings equations controlling for age, age squared and gender (they are the exponent of the coefficient on the graduate dummy).

Source: Graduate/non-graduate earnings differentials derived from General Household Survey (GHS) and Labour Force Survey (LFS) data. Updated from Machin and Vignoles (2005).

Labour market polarisation

In terms of employment, another key feature of rising labour market inequality has been the polarisation of jobs growth (Goos and Manning, 2007). Figure 11.4 (taken from Mieske, 2009) shows this very clearly, with there being very rapid growth over time in the top two deciles of job quality (as measured by median occupational wages from 1979). Employment actually fell from deciles 2 through 8, showing a hollowing out of the distribution, but there is positive growth for the bottom decile.

Decade by decade differences

The results presented to date make it very clear that wage inequalities are now significantly higher than they were forty years ago. However, looking at them more closely reveals different episodes of changes in wage inequalities. Table 11.1 looks at decade by decade changes in overall, upper and lower tail wage inequality. It reveals some different evolutions across the four decades covered by the analysis.

The table shows that the 1970s actually saw reduced inequalities (for women) but, in terms of what followed, these narrowings were relatively small in magnitude. The 1980s was very different. It saw very rapidly rising

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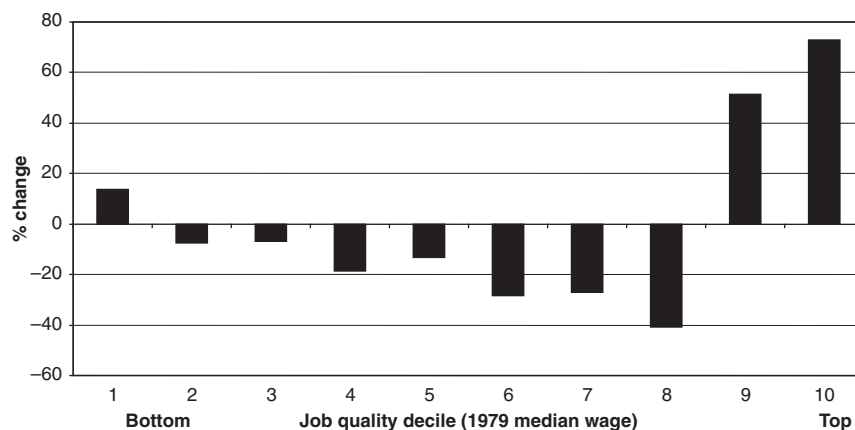


Figure 11.4: Polarisation of the UK labour market, 1979–2008

Notes: Taken from Mieske (2009). Percent changes are for the entire period.

Table 11.1: Trends in UK earnings inequality indices

	Trends in UK full-time weekly earnings inequality indices (annualised percentage points)			
	1970–1980	1980–1990	1990–2000	2000–2009
Men	0.0	2.4	1.1	0.7
90–10 Ratio				
90–50 Ratio	0.1	1.2	0.6	0.6
50–10 Ratio	–0.1	1.2	0.5	0.1
25–10 Ratio	0.0	0.6	0.2	0.0
Women	–0.8	1.9	1.0	0.3
90–10 Ratio				
90–50 Ratio	–0.5	1.0	0.3	0.3
50–10 Ratio	–0.3	0.9	0.7	0.0
25–10 Ratio	–0.1	0.3	0.4	–0.2

Source: National Equality Panel Analysis; 1968–1996 New Earnings Survey (NES) and 1997–2009 Annual Survey of Hours and Earnings (ASHE).

wage inequalities, with wage gaps widening out at all parts of the wage distribution, for both men and women.

In the 1990s, changes were more muted but wage gaps continued to rise, at approximately half the pace of the 1980s, and still being characterised by rising upper and lower tail inequality. In the 2000s, a rather different picture emerged, with upper tail inequality continuing to rise (albeit at a more modest rate, especially for women), but with lower tail inequality no longer increasing.

The stagnancy of the 50–10 differential in the 2000s based upon the ASHE data is an issue that requires comment as it has been stated in some places that lower tail inequality has fallen in the current decade. Other data sources do

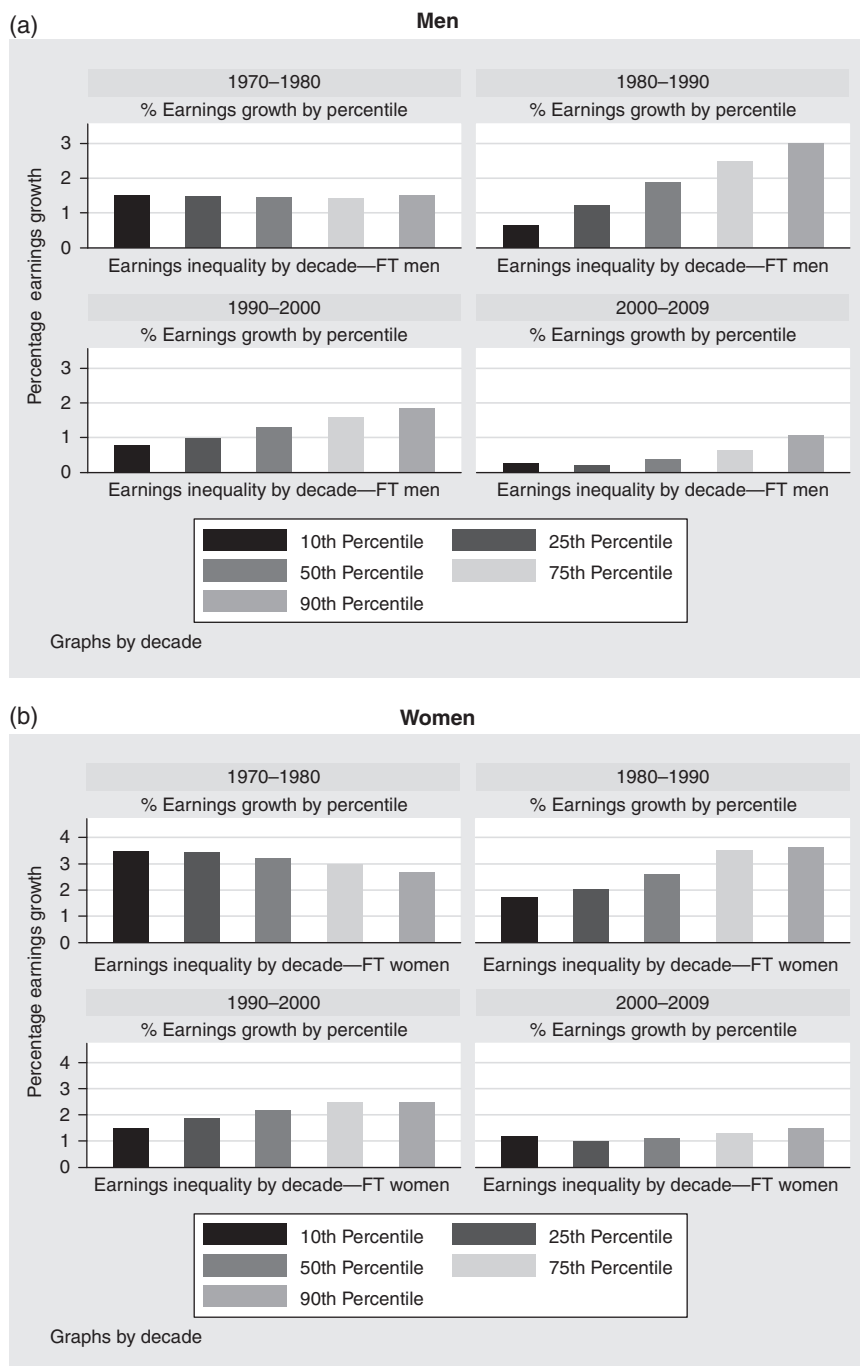


Figure 11.5: Real weekly earnings growth at different percentiles by decade (a) Men
(b) Women

Source: ASHE.

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suggest there may have been a modest reduction in the 50–10 ratio—in Brewer, Muriel and Wren-Lewis’s (2009) analysis of FRS Survey data, the 50–10 differential is constant for full-time men and falls by 0.3 percentage points a year (up to 2008) for full-time women. In the ASHE data, the 25–10 differential for full-time women does fall slightly (by 0.2 percentage points a year). Probably the key thing to take from this is that lower tail inequality is no longer rising in the 2000s, and may be falling in its lower regions.

Overall, Table 11.1 makes it evident that the period where wage inequalities rose significantly and fastest was the 1980s. Considering different parts of the distribution in more detail makes this even clearer. Figure 11.5 shows real earnings growth at the 10th, 25th, 50th, 75th and 90th percentiles of the distribution by decade. The faster growth at the top that occurred in the 1980s is very clear. The 1990s looks rather like a toned down version of this, but the 2000s show a more mixed pattern.

The National Minimum Wage in the 2000s

A key feature of the 2000s is the stagnancy of the 50–10 wage ratio, which may well be characterised by falls in inequality further down the distribution (see the fall in the 25–10 ratio for women in Table 11.1). An obvious candidate explanation for this is the introduction of the national minimum wage to the UK labour market in April 1999. In its ten years of existence, the minimum has been raised at a faster rate than average earnings. While the minimum covers rather less than 10% of employees directly, it seems likely to have propped up the lower part of the wage distribution.

Mobility through the wage distribution

It is sometimes said that wage inequality in any given year can be ameliorated over time since individuals do not always stay at the top (or bottom) of the wage distribution (see also Blanden and Macmillan, Chapter 13, for a discussion of income mobility over generations). Dickens and McKnight (2008) analysed the extent to which earnings mobility over time reduces the cross-section snapshot of wage inequality. They concluded that at the start of the 1980s, on average, over four years, mobility reduced male wage inequality by around 30% and over ten years, on average, mobility reduced wage inequality by around 40%. However, throughout the 1980s and 1990s earnings mobility fell, reducing the extent to which wage inequality can be ameliorated over time (down to 25% and 30% respectively by the middle of this decade). Not only was the wage distribution getting wider, it was getting harder to move through the wage distribution over time. Since then mobility over time has

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started to rise a little again, but remains a long way below the mobility rates observed in periods when wage inequality was much lower.

International comparison

Many commentators have remarked upon the rapid wage inequality rise in the 1980s, arguing that, along with the US where wage inequality also rose very rapidly (and from higher starting levels), the UK labour market was pinpointed as one of the few places that then experienced rising wage inequality. Table 11.2 picks up on this by showing OECD data on male 90–10 wage ratios in 1970, 1980, 1990, 2000 and 2008 (or the closest year to that) for twelve countries.

Table 11.2 does confirm 1980s increases in the 90–10 for the UK and US, with relative stability elsewhere. However, when one moves to the 1990s and 2000s, the picture is not so clear. In the 1990s, wage inequality starts to rise in some countries like Australia, Germany, Korea, the Netherlands and Sweden. In the 2000s, rising wage inequality appears to be the norm, even in the Nordic countries where rises are small but there are increases, leaving only France having a relatively stable wage structure over time.

Explanations of changing wage structures

Changes in supply and demand

In recent times, there have been considerable adjustments in the skill structures of the workforces of many countries as the labour market has altered to

Table 11.2: Male 90–10 wage ratios across countries, 1970–2008

	1970	1980	1990	2000	2008
Australia	2.4 ^a	2.7	2.7	3.1	3.5
Denmark		2.1	2.2	2.5	2.7 ^e
Finland	—	2.5	2.5	2.4	2.6 ^e
France	3.7	3.3	3.3	3.0	2.9 ^d
Germany	—	2.5 ^b	2.5	2.8	2.9 ^d
Japan	2.6 ^a	2.6	2.8	2.8	2.9
Korea	—	4.1 ^b	3.2	3.7	4.7
Netherlands	—	2.3 ^b	2.5	2.9	2.9 ^d
New Zealand	—	2.2	2.5	2.7	3.1
Sweden	2.2 ^a	2.1	2.1	2.4	2.4 ^c
UK	2.7	2.7	3.3	3.4	3.7
US	3.4	3.6	4.4	4.8	5.0

Notes: Taken from OECD Stat Extracts web site (<<http://stats.oecd.org/index.aspx>>). Data are from different years from the column header for some countries as denoted by the following superscripts: a—1975; b—1984; c—2004; d—2005; e—2007.

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cope with the new demands for work and with the new work systems that now operate. Employers have shifted their patterns of demand for labour towards workers who possess more education and skills. In many countries, these workers have not only increased their relative employment, but also their relative wages, thereby increasing labour market inequality.

Economic researchers have extensively studied changing wage gaps between workers at different points in the wage distribution in terms of the relative demand and supply of skills. This has been operationalised in empirical models that relate changes in the relative wages of groups of workers (e.g. more educated versus less educated) to changes in the relative demand and supply of these groups of workers. The logic goes that, if relative demand is growing faster over time than relative supply, then relative wages are likely to have risen, but if the opposite holds, they are likely to have fallen.

Table 11.3 presents UK estimates based on annual data from 1974 to 2007 relating the relative wage of graduates as compared to non-graduates to a demand index (proxied by a time trend) and the relative supply of graduates as compared to non-graduates.² The model seems to fit the data well. As expected, the estimated coefficient on the supply variable is negative and significant and in the range of -0.17 to -0.20 . However, the positive coefficient on the trend variable shows that, despite the very sharp increase in the relative supply of graduates, there must have been an even faster growth in

Table 11.3: Estimates of the relative supply and demand model for the UK

	Relative Wages – Ln(Graduate/Non-Graduate Wage)		
	GHS, LFS earnings, GHS, LFS supply	GHS, LFS earnings, GHS supply	GHS, LFS earnings, LFS supply
Supply - Ln(Relative Graduate/Non- Graduate Employment)	–0.168 (0.032)	–0.174 (0.044)	–0.200 (0.079)
Demand - Time Trend	0.007 (0.001)	0.008 (0.002)	0.008 (0.003)
R-Squared	0.48	0.37	0.28
Sample Size	33	30	22

Notes: The earnings sources are General Household Survey (GHS) for 1974–91, Labour Force Survey (LFS) for 1993–2007; 1992 is omitted. The combined supply series are GHS for 1974–83 and 1986, LFS for 1984–5 and 1987–2007; the GHS supply series covers 1974–2006 (excluding 1997 and 1999) and the LFS series runs from 1984–2007 (excluding 1986). The preferred sample has 33 observations, and includes all years between 1974 and 2007 (inclusive), with the exception of 1992.

Source: Taken from Amior (2008).

² This type of model was first presented using US data in Katz and Murphy (1992) and more recently has been updated by Autor et al. (2008). The UK results discussed here are from Amior (2008).

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relative demand for graduates. This shows that relative wages rose by the order of 0.7–0.8% per year over and above the increases in relative supply that occurred. Thus a key factor underpinning rising wage inequality has been a relative demand shift in favour of more skilled workers.

Skill-biased technical change

In the research on rising wage inequality and shifts in relative demand for skills, a strong focus has been placed upon asking what are the key drivers of these relative demand shifts. A lot of the literature has concluded that SBTC has been the key driver of such change.³

Stated in its simplest form, the SBTC hypothesis says that new technologies lead to higher productivity, but only some (more skilled) workers possess the necessary skills to operate them. Therefore in response to introducing these kinds of technologies into their workplace, employers raise demand and/or wages for highly skilled workers who are complements with the new technologies. Lower wages, or lay-offs, occur for less skilled workers who do not possess the skill to use the new technologies.

A typical empirical approach adopted to test this hypothesis asks the question as to whether plants, firms or industries that are more likely to have introduced new technologies are also those with faster increases in the relative demand for skilled workers. A large academic literature has considered this, using a range of data sources at different levels of aggregation, from different time periods and countries, and using different measures of skill demand and new technology. There is now an abundance of empirical research that suggests that SBTC is an important and international phenomenon. Table 11.4 reports results from some selected UK studies showing this, for a range of different technology indicators, time periods and data sources.⁴

It is worth noting that the studies reaching this conclusion for the UK (Machin, 1996, and Machin and Van Reenen, 1998) use data from the period where wage inequality rose fastest. A natural question to ask, given the decade differences in changing patterns of wage inequality noted above, is whether such effects still operate. A new analysis described in the first row of Table 11.4 confirms that they do. Even in the 2000s the industries experiencing faster increases in skill demand are those with higher R&D intensities.

³ For straightforward descriptions of the SBTC hypothesis see Machin (2003). The assertion that SBTC is the key driver is by no means without controversy. See Card and DiNardo (2002) for a very sceptical position.

⁴ Further international studies are surveyed in the more detailed table 2 in Machin (2008).

Table 11.4: Summary of UK evidence on changes in skill demand and technology

Study	Unit of analysis	Time period	Skill demand measure	Technology measure	Impact of technology measure	Controls
This chapter	17 manufacturing industries	2000–08 ^a	Graduate wage bill share	R&D/value added (Y)	0.176 (0.081)	Capital stock, output
Machin and Van Reenen (1998)	15 UK manufacturing industries	1973–89	Non- production wage bill share	R&D/value added (Y)	0.026 (0.009)	Capital stock, output
Machin (1996)	16 UK manufacturing industries	1982–89 ^a	Non- production wage bill share	R&D/sales (S)	0.065 (0.026)	Capital stock, output, industry
	16 UK manufacturing industries	1980–85 ^a		Innovation count from 1970s	0.092 (0.053)	
	398 British workplaces	1984–90 ^a	Managers, senior technical and professional employment share	Micro computers introduced	0.044 (0.022)	Employment decline, Industry

Notes: ^a denotes that models are long differenced (i.e. treated as a single cross-section in changes) and so no year dummies need to be included as controls.

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Task-biased technical change

In an important recent paper, Autor, Levy and Murnane (2003) have recast the SBTC hypothesis, especially the impact of computerization, in a fresh light. They argue that the nature of jobs, and the tasks done by workers in their jobs, are key to thinking about the way in which technological changes impact on the wage distribution. They argue that computers raise the demand for jobs where non-routine tasks are required of more skilled and educated workers, but they substitute for jobs with routine tasks done by middle-educated workers (like manufacturing production, or secretarial jobs). Thus routine non-manual tasks may be replaced by computers, whilst some non-routine tasks done by manual workers (like cleaning) are largely unaffected by ICT.

Autor, Levy and Murnane present empirical evidence of non-monotone impacts of computers on the demand for jobs, with a strong complementarity between computerisation and the demand for non-routine jobs and a strong substitutability with the relative demand for jobs involving routine tasks. Autor and Dorn (2009) have also studied aspects of TBTC, arguing that the reason for increased demand for low wage service sector jobs highlighted in the labour market polarisation research occurred in places with high initial levels of routine tasks.

Empirical research has considered this by looking at data across areas over time to ask whether areas with higher shares of jobs involving routine tasks at the start of the analysis see faster increases in the share of non-graduate service sector jobs in the area over time. The key idea is that having more routine task jobs initially causes the hollowing out of middle of the distribution jobs and that this polarisation results in an increased demand for low wage service sector jobs.

Evidence for this idea based upon data on UK counties over time is reported in Table 11.5 (taken from Mieske, 2009). It shows faster cross-county growth in the non-graduate service share in places where there were initially more

Table 11.5: Some UK evidence on task-biased technical change

	Changes in non-graduate service sector employment share					
	1992 to 2008		1992 to 2000		2000 to 2008	
Initial routine employment share	0.038 (0.015)	0.029 (0.016)	0.032 (0.012)	0.030 (0.013)	0.044 (0.024)	0.026 (0.025)
Controls	No	Yes	No	Yes	No	Yes
R-squared	0.15	0.21	0.22	0.25	0.10	0.20
Sample size	392	392	196	196	196	196

Notes: Four-year differenced models based on 98 UK counties. The control variables included are (all in changes): graduate share, working student share, non-graduate migrant share, female employment share, elderly share, inactivity and unemployment.

Source: Taken from Mieske (2009).

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routine tasks⁵ that could be substituted by new technologies. Moreover, the finding remains robust both for the 1990s and 2000s, providing some evidence that TBTC matters for the changing nature of the UK labour market.

Conclusions

This chapter has studied changes in the structure of wages in the UK over the last four decades. Wage inequality is significantly higher now than it was in the past. This is the case for upper and lower tail wage inequality. There are decade to decade differences in the patterns of change and it seems clear that the 1980s was the period where wage inequalities seemed to open out at all parts of the distribution. After that, the picture has become more complex.

In terms of explanations, the evidence shows the wage distribution has been characterised by long-run growth in the relative demand for skills driven by technology change and that changes in skill supply and institutional changes (like the introduction of the UK minimum wage) have affected the timing of how skill-biased and task-biased technical change impact upon the wage structure.

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⁵ The definition of routineness is complex and described in detail in Mieske (2009). She mapped 1980 US Census occupation codes and corresponding task measures from the Dictionary of Occupational Titles (DOT) to their closest UK SOC2000 codes by hand. She then followed Autor et al. (2008) in ranking the routine task level of each occupation by the arithmetic average of DOT classifications 'Set Limits, Tolerances and Standards' and 'Finger Dexterity'.

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