

# Occupations and the structure of pay in Great Britain: Some preliminary findings

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## **Acknowledgements**

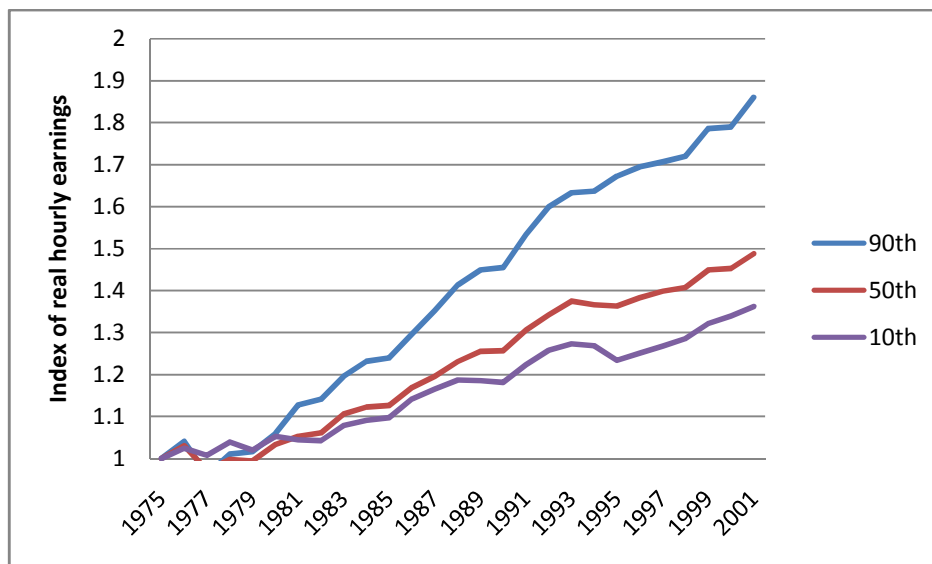
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## Introduction

This paper presents some preliminary findings from my research on occupations and the growth in overall wage inequality in the Britain since the 1970s<sup>1</sup>. The primary aim of my thesis is to contribute to the understanding of the changing occupation composition of the labour market and its association with the changing structure of pay. The secondary aim is to analyse the impact of occupational change on the quality of work. Although the literature on pay inequality since the 1970s is well-developed in economics, the link between occupations and pay is not so well-developed, and in fact, occupations as a category for research are often ignored by economists.

It is well established that the distribution of hourly earnings has become more unequal over the last thirty years or so in the Britain (Machin 1996; Machin 2003; Kondylis and Wadsworth 2007; Machin and van Reenen 2007). Indeed, the inequality in pay is wider now than it was 100 years ago (Machin 1996). There are many ways to measure the growth of inequality in earnings. One simple but effective way is by splitting the distribution for each year into percentiles and tracing out the levels at each different point in the distribution. Figure 1 traces out the growth in inflation-adjusted hourly earnings for those in the 10<sup>th</sup> percentile, at the median, and the 90<sup>th</sup> percentile. They have been indexed against their 1975 level (where 1975=1) to illustrate their growth. Real wages have grown for all three points in the distribution, however, incomes of the 90<sup>th</sup> percentile have grown much faster than for the other points in the distribution, contributing to the widening in overall wage inequality. In other words, the relatively rich have got richer relative to the rest.

*Figure 1. Hourly earnings growth 1975-2001*



Source: New Earnings Surveys

<sup>1</sup> This paper only provides a picture up until 2001. I have only recently gained access to the Annual Survey of Hours and Earnings (ASHE) which contains more recent data and is comparable to the series used in this paper. This paper is work in progress.

Following the election of New Labour in 1997, the growth in pay inequality was tempered, albeit not reversed. Income for the poorest fifth barely grew under Thatcher era. However, under the Blair era, income growth for all quintiles of the distribution was strong, with the poorest two experiencing slightly larger growth than the top three (Dickens, Gregg et al. 2003). It seems that an important part of the rise in pay inequality in the 1980s was due to the weakening of labour market institutions. One caveat to keep in mind, however, is that the rise in wage inequality predates the major onslaught of labour market reform when Thatcher came into power. There appears no single overarching account for the rising inequality since the 1970s. It seems that much of the 1980s rise in dispersion can be accounted for by the fact the distribution of wages was compressed by incomes policy in the 1970s. Then the weakening of unions further contributed to the dispersion in wages.

## Background

There are three broad categories of explanation put forward by economists for the top pulling away and the bottom remaining stable.

1. “Globalisation”
2. Institutions
3. Skill biased technological change (henceforth SBTC)

### 1. “Globalisation”

The basic idea here is that trade costs/barriers have been falling so that there has been a global equalisation in factor prices. For developed countries, this would mean a rise in the demand for skilled labour relative to unskilled labour as production is shifted toward skill-intensive industries since they would not be able to compete with the wages of low-skilled workers in less developed countries. Of course, unskilled labour in developing countries is much cheaper than in the developed countries and so demand would fall for unskilled labour in developed countries.

Trade-based explanations for the increase in inequality are largely discounted or found to be insignificant relative to the other two explanations (Gregory, Zissimos et al. 2001; Machin and van Reenen 2007). Evidence from non-traded sectors shows that there has been a shift toward skilled-labour, whereas the “globalisation” view would predict shifts in the traded sectors only. A trade-based explanation would predict that would shift towards less-skilled workers in nontraded industries as skilled labour is drawn towards traded industries and low-skilled labour is forced out of the traded sector. There is some evidence in the US, however, that wages for manual occupations have fallen in real terms over the 1980s. There is no evidence of this in Britain. Moreover, the “globalisation” view might predict that skilled/unskilled wage differentials should fall in developing countries, as they have to effectively compete with skilled labour from developing countries. This has not happened.

Another way “globalisation” could have an impact on the wage structure is through immigration. The rate of immigrant inflow has risen over the last decade or so: in 1995 the net inflow of immigrants was around 50,000 individuals. By 2005, this had risen to around 220,000 immigrants (Nickell and Saleheen 2008). By 2007, around 13 percent of the working age population had been born overseas (Manacorda, Manning et al. 2006). The evidence seems to show that the wage and employment impact of

immigration are small. Interestingly, newly arrived migrants bear disproportionately the cost of increased migration in terms of lower wages (Manacorda, Manning et al. 2006). The effect of immigration seems to be concentrated in specific occupations as well, such as care homes, bars, shops, restaurants, and cleaning. A 10 percentage point rise in the proportion of immigrants working in semi/unskilled services leads to a 5 percent reduction in pay of these sectors (Nickell and Saleheen 2008).

## 2. Institutions

Institutions appear to play an important role in mediating the pay inequality. At the national level, countries where labour market institutions have declined the most are also the countries where wage inequality has grown the most. Much of the rise in 1980s wage inequality can be attributed to institutional changes. The rise in earnings inequality the 1980s is harder to pin on institutional change, although it undoubtedly had some impact. The two most important institutions are trade unions and the government's labour market policy.

Trade unions in Britain have historically bargained for a rate for the job and not the individual. Countless studies show that the distribution of pay within unionised firms is more compressed compared to the distribution within non-union firms (Blanchflower and Bryson 2003; Card, Lemieux et al. 2003). The powers of trade unions were significantly curtailed in the 1980s following the introduction of a series of legislation by the Thatcher government. Union membership fell from its zenith in 1979 at 13.2 million by 5.5 million over the next two decades (Metcalfe 2003; Fernie 2005). Collective bargaining coverage also fell by a similar magnitude. We would expect that the curbing of trade unions in the 1980s might reduce their ability to bargain for a rate for the job. Studies typically find that around 20 per cent of the increase in inequality between the 1980s and 1990s can be attributed to the decline in unionisation (Machin 1996). Estimates of variance explained are even higher, at around 30-40 per cent mark, when only looking at the rise in male inequality (Machin 1997; Gosling and Lemieux 2001).

Government policy must have had big impact on the dispersion in wages, especially policies directly related to wages such as the incomes policies of the 1970s and the introduction the National Minimum Wage (NMW) in 1998. Minimum wages affect overall dispersion as they set a floor on wages. Moreover, as we have seen, one of the reasons for the increased dispersion in pay for those at the lower tail of the distribution has grown very slowly relative to the top, or not at all. The New Labour government introduced the National Minimum Wage (NMW) in 1998. The impact of the NMW on overall employment and inequality has been small (Machin 1997; Dickens and Manning 2003). Since the minimum wage covers so few workers (less than 5 per cent) and most upratings of it are modest relative to changes in the average wage. Its impact on overall inequality must be small. At best, the NMW can explain a reduction in inequality in the bottom percentile, but there is little evidence of spillovers or knock-on effects further up the distribution<sup>2</sup>.

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<sup>2</sup> However, it must be noted that since 1909, a large proportion of the low-paid had minimum wages set by wage councils, including hairdressing, catering and retail. The weakening of wage councils in the 1980s was found to account for between 9 and 20 per cent of the rise in dispersion in the low-paid sector (Machin and Manning 1994).

### 3. Skill-biased technological change (SBTC)

Changes in workplace technology (and also the organization of work) may have contributed to overall earnings inequality. Changes in technology – mainly the introduction of computers – have arguably led to the demand for skilled labour outstripping its supply. In other words, changes in technology are biased in favour of skilled workers. Consequently, the price of skilled labour has risen relative to that of unskilled labour. Generally, economists use “skilled” and “unskilled” labour as synonyms for “graduate” and “nongraduate” workers. Table 1 shows that, although there has been a marked increase in the proportion of the labour force that holds a degree, the ratio of graduate earnings to nongraduate earnings actually increased, implying demand for these workers must have outstripped supply. However, the ratio seems to have stabilised in the 2000s, indicating a slowdown in demand.

*Table 1. Earnings and employment graduates relative to nongraduates*

	% Graduate Share of Employment	Relative Weekly Wage (Full-Time)
1980	5.0	1.48
1985	9.8	1.50
1990	10.2	1.60
1995	14.0	1.60
2000	17.2	1.64
2004	21.0	1.64
Changes:		
1980-2004	16.0	.16
1980-1990	5.2	.12
1990-2000	7.0	.04
2000-2004	3.8	.00

Source: Derived from General Household Survey and Labour Force Surveys in Machin and van Reenen (2007).

In addition to the continual rise in the graduate premium, Machin (2001) outlines several other pieces of evidence consistent with the SBTC thesis:

1. Much of the shifts in relative demand for skilled labour have occurred within industries and workplaces – not between. Therefore, it is less related to declining number of jobs in manufacturing but more to do with a shift to skilled work *within* industries.
2. Skills demand has risen faster in more technologically intensive workplaces.
3. Workers using computers get a wage premium. Detailed studies that attempt to control for selection effects still show some premium.

#### **The role of occupations as a factor?**

This is, of course, a rather broad brush overview of the work in the area. A more nuanced view of skill-biased technological change making reference to specific mechanisms by which technological change can impact upon specific kinds of occupations has been developed more recently. The results from this research suggest occupations could be a useful unit of analysis in accounting for the rise in overall inequality.

Occupations, as a category for research are often discounted by economists working in the area when trying to account for these trends. Usually the level of education is used to define “skill”, and even then, it is only a two-factor measure – graduates and nongraduates. This is a rather crude measure of skill actually used in the job. Many graduates now find themselves in nongraduate jobs. Furthermore, much of the growth in overall inequality is said to have occurred *within* education groups.

It does appear that the demand for graduates has outstripped their supply (Table 1), but to what extent can we attribute this to skill-biased technological change? Looking directly at the workplace, skills used in the job, and occupation, may more directly explain the growth in overall earnings inequality. In this paper, the evidence presented is on occupations. The other two factors shall be taken up in my thesis too.

Occupations are a useful unit of analysis when trying to account for the growth in overall inequality. They are traditionally of much sociological interest, yet are often ignored by economists as a unit of analysis. Why would occupations make a decent unit of analysis in for examining the growth in overall inequality? First, they provide a better measure of skill used in the job than an education dummy. Second, they more accurately reflect the dynamics of the labour market. Third, occupations provide a disaggregated unit of analysis and so can be useful in examining the extent to which class categories conceals inequalities. Fourth, a lot of the variance in earnings is explained by occupation, more so than standard set of controls in a wage equation (for findings with US data (Eckstein and Nagypál 2004). Finally, a growing number of recent studies have used occupations as a unit of analysis in explaining the growth in overall inequality or gender inequality, with a degree of success (Goos and Manning 2007; Weeden, Young-Mi et al. 2007; Autor, Katz et al. 2008; Kim and Sakamoto 2008; Manning and Petrongolo 2008; Mouw and Kalleberg forthcoming).

Of course an occupation-based perspective of the labour market is not without its difficulties. One difficulty in using occupations at the most detailed level is that occupational classification systems often change around every decade or so for various reasons such as older systems are found to be problematic in some way, or they are changed to more accurately reflect the labour market. While changing the system periodically seems logical, it makes the task of using occupations as a unit of analysis in the long-run difficult as the different systems must then be bridged. For more information on the procedure used to create a consistent occupation classification over several decades, see the Appendix.

In this paper earnings and employment are examined by socioeconomic class and detailed occupation. The two measures of occupations adopted are, first, the National Statistics Socioeconomic Classification (NS-SEC) and the Standard Occupation Classification 1990 (SOC90). The NS-SEC has eight categories, whereas SOC90 has 367 categories. The NS-SEC is an aggregation of detailed occupations, deriving its eight categories from the 367 occupation categories, affording a much finer level of detail. When SOC90 categories are used, cells with numbers of less than ten respondents are not show<sup>3</sup>. It is useful to use

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<sup>3</sup> This is partly to produce reliable estimates and partly due to the disclosure rules attached to usage of the New Earnings Survey data.

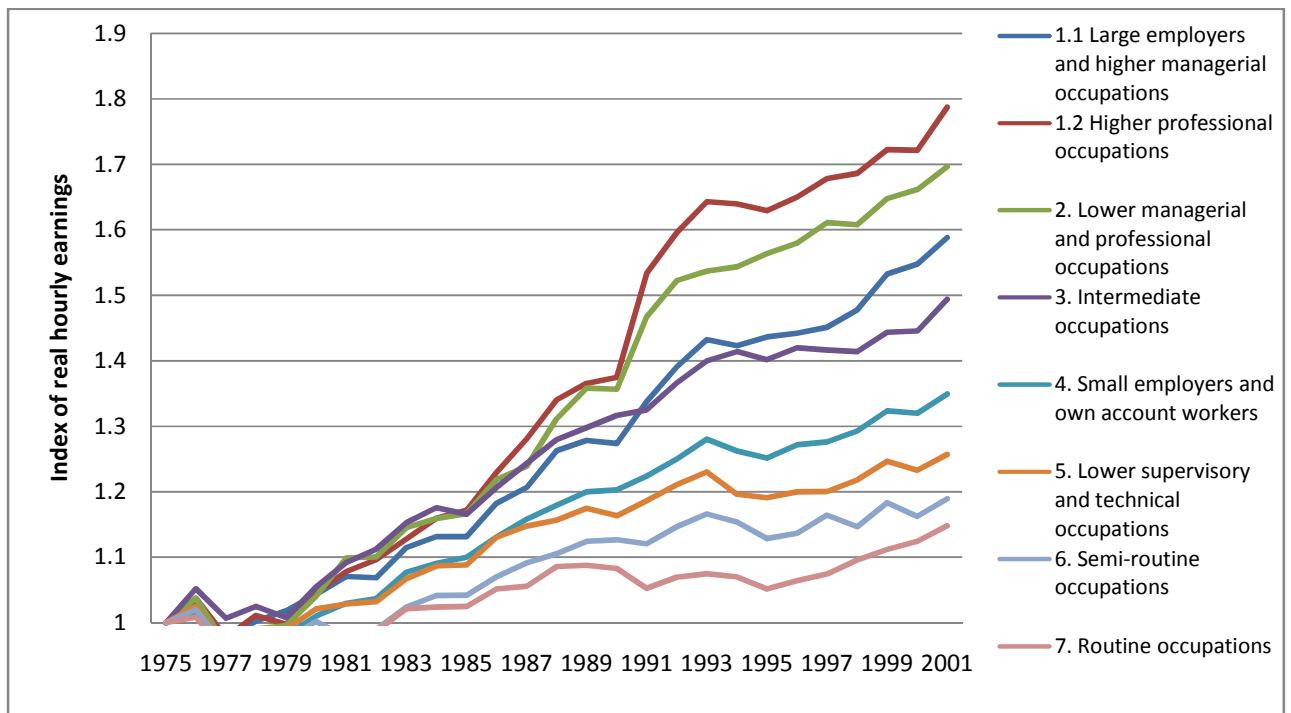
both classifications: NS-SEC is useful summary measure for presentational purposes, and SOC90 provides a more detailed measure.

## A brief overview of trends in earnings and employment

When examining trends in earnings, hourly earnings are often the preferred measure, as to control for differences in hours worked affecting year on year changes. When hourly earnings are broken down by socioeconomic class, there are few surprises in their rank-ordering. In terms of their median real hourly pay, the rank-order is as follows (and remains unchanged for the whole period): higher *professional occupations*, lower *managerial and professional occupations*, large employer and higher managerial occupations, intermediate occupations, lower supervisory and technical occupations, small employers and own account workers, semi-routine occupations, and finally, routine occupations.

Figure 2 shows that hourly earnings have grown for every socioeconomic class since 1975. Since the data is indexed, it shows some occupational groups have grown more than others. The already better-paying occupations have grown relatively more than the poorer-paying occupations. For example, real hourly earnings of higher professional occupations have grown by nearly 80 per cent, whereas routine occupations have grown by around 15 per cent over the same period.

Figure 2. Real hourly earnings growth by socioeconomic group 1975-2001



Source: New Earnings Survey

Next, we turn to change in employment by socioeconomic group. Table 2 shows employment estimates using the Labour Force Survey (LFS). The LFS is used as its sample more closely resembles the labour

force than that of the New Earnings Survey<sup>4</sup>. Unfortunately, this means that the employment estimates are for the years 1979-2000, which is slightly different from the period from the earnings data presented in this paper<sup>5</sup>. In absolute terms, *lower managerial and professional occupations* grew the most over the period, growing by nearly 1.9 million (a percentage change of nearly 50 per cent). In relative terms, the occupational group that grew the most was *higher professional occupations*, more than doubling in size, with the majority of the growth coming in the 1980s. These also happen to be the highest paying occupations, perhaps the SBTC thesis. If we look at the detailed SOC90 occupations in Table 3, there has been some spectacular relative employment growth in occupations outside of the *managerial and professional occupations* and *higher professional occupations* NS-SEC groups such as *care assistants* and *nondomestic housekeepers*, which may not be predicted by SBTC<sup>6</sup>.

There was also modest growth in *large employer and higher managerial occupations*, *intermediate occupations* and *semi-routine occupations*, with all the growth of the latter concentrated in the 1990s. With the exception of the latter, which is generally a low-paid group, these modest-growth occupational groups tend to be in the middle of the income distribution.

Two of the occupational groups that have shown a relatively dramatic decline in employment are *lower supervisory and technical occupations* and *routine occupations*. Employment in the former occupational group declined by around 600,000 people over the period, representing a decline of around 19 per cent. Employment in the latter group declined by around 750,000 over the period, representing a fall of around 26 per cent. Detailed occupations that would most likely be classified into these two NS-SEC groups dominate the list of ten occupations that declined the most in relative terms (Table 3), with two coal-mining related occupations (face trained coalmining workers and coal mine labourers) virtually collapsing altogether<sup>7</sup>.

*Table 2. Employment change by occupational group 1979-2000*

	NS-SEC	Employment level 1979	Employment level 1990	Employment level 2000	Percentage change 1979-1990	Percentage change 1990-2000	Percentage change 1979-2000
1.1	Large employers and higher managerial occupations	3,175,690	3,543,008	3,657,037	11.57	3.22	15.16
1.2	Higher professional occupations	1,027,870	1,621,484	2,149,527	57.75	32.57	109.12
2	Lower managerial and professional occupations	3,862,923	5,241,498	5,773,123	35.69	10.14	49.45
3	Intermediate occupations	2,515,204	2,785,704	2,692,727	10.75	-3.34	7.06

<sup>4</sup> For more information on the datasets used see the Appendix.

<sup>5</sup> The reason for this difference is because the occupation codes in the LFS pre-1979 cannot be coded to SOC90 codes as no double-coded dataset exists. Post-2000, the LFS uses the SOC2000 classification system, which has not yet been mapped on to SOC90 codes at the unit level.

<sup>6</sup> See Goos and Manning 2007 for a more nuanced view of SBTC, explaining the growth in nonroutine manual occupations..

<sup>7</sup> An interesting social mobility question to ask is where (i.e. what kind of occupation) do the people in declining occupations go and the converse question of where do people in growing occupations come from. Are they forced into lower-paying occupations, or do they progress to higher-paying occupations?

4	Small employers and own account workers	5,291,336	5,401,767	5,308,080	2.09	-1.73	0.32
5	Lower supervisory and technical occupations	3,208,873	2,860,695	2,607,233	-10.85	-8.86	-18.75
6	Semi-routine occupations	2,573,623	2,539,135	2,797,701	-1.34	10.18	8.71
7	Routine occupations	2,849,567	2,446,629	2,100,168	-14.14	-14.16	-26.3
	Total	24,505,086	26,439,920	27,085,596	7.90	2.44	10.53

Source: Labour Force Surveys

*Table 3. Employment change for selected occupations 1979-2000*

	SOC90	Employment level 1979	Employment level 1990	Employment level 2000	Percentage change 1979-1990	Percentage change 1990-2000	Percentage change 1979-2000
<b>Top 10</b>							
1	Housekeepers (non-domestic)	1,517	5,743	15,690	278.50	173.20	934.07
2	Organisation and methods and work study managers	1,663	3,314	13,796	99.23	316.29	729.39
3	Other health associate professionals n.e.c.	3,922	10,831	31,132	176.17	187.43	693.80
4	General administrators; national government (Assistant Secretary/Grade 5 and above)	3,122	10,019	19,105	220.91	90.69	511.93
5	Software engineers	30,052	67,968	176,652	126.17	159.90	487.82
6	Care assistants and attendants	100,770	265,583	550,960	163.55	107.45	446.75
7	Actuaries, economists and statisticians	6,666	19,772	36,250	196.61	83.34	443.80
8	Educational assistants	44,473	59,347	216,431	33.45	264.69	386.66
9	Welfare, community and youth workers	45,089	77,586	194,295	72.07	150.43	330.92
10	Psychologists	3,509	9,215	15,088	162.62	63.73	329.99
<b>Bottom 10</b>							
1	Face trained coalmining workers, shotfirers and deputies	76,302	40,179	1,922	-47.34	-95.22	-97.48
2	Bus conductors	16,234	5,496	768	-66.14	-86.03	-95.27
3	Coal mine labourers	30,378	13,420	2,852	-55.82	-78.75	-90.61
4	Boring and drilling machine setters and setter-operators	39,482	8,667	3,796	-78.05	-56.20	-90.39
5	Tracers, drawing office assistants	3,345	4,506	421	34.72	-90.66	-87.41
6	Tannery production operatives	13,143	9,979	2,307	-24.07	-76.88	-82.45
7	Oilers, greasers, lubricators	11,319	7,207	2,022	-36.33	-71.94	-82.14
8	Rollers	6,133	5,662	1,119	-7.68	-80.24	-81.75
9	Grinding machine setters and setter-operators	48,920	21,677	9,778	-55.69	-54.89	-80.01
10	Electrical, energy, boiler and related plant operatives and attendants	38,570	29,697	8,229	-23.00	-72.29	-78.66

Source: Labour Force Surveys

These findings seem to be consistent with the ALM hypothesis (Autor, Levy et al. 2003) and the findings of (Goos and Manning 2007) that suggest growth in the “polarization” in the labour market that occurred in the 1980s and 1990s. Technological change is not simply biased in favour of skilled workers – it is heavily dependent on the *type* of skill. Most of the earlier SBTC research (both empirical and theoretical) revolved around models that had a binary notion of skill – manual or nonmanual. However, computers (or technology more generally) are not always a direct substitute for manual work. Furthermore, much nonmanual work can be substituted with technology. Autor, Levy et al. (2003) provide a more nuanced view by making a distinction between routine and nonroutine tasks. They argue that computerisation is a good substitute for *routine* tasks – whether manual or nonmanual such as repetitive assembly or record-keeping respectively – but are a poor substitute for *nonroutine* tasks – whether manual or nonmanual such as a care assistant or housekeeper. This could in part explain the small growth in the 1990s of the NS-SEC categories of *intermediate* and *semi-routine occupations*.

### Stability in the structure of occupational earnings?

The economic historian, Henry Phelps Brown observed that the ratio in day rates between a craftsman and a labourer in Southern England remained remarkably stable at about 3 to 2 for around 500 years prior to 1900 (Phelps Brown and Hopkins 1955). Phelps Brown asserts it must have been custom, a rule of thumb of “half as much again” that set wages, rather than purely market forces that determined day rates. Such stability is still found today in occupational earnings.

When occupations are ranked against each other by their median pay in each year, their rank positions change little over time. Table 4 lists the top, middle, and bottom ten occupations by their average ranking in the occupational hierarchy from 1975-2001. Occupations that usually lay in the middle of the occupational hierarchy show a greater range in their ranks and standard deviation of ranks, but this might be more to do with the fact that they are less likely to be bounded by the top or bottom rank. Nonetheless, even if we just look at the top and bottom ten occupations, there is relative overall stability in the rank of top and bottom occupations.

*Table 4 . Average ranking of occupations 1975-2001*

	Mean ranking	Occupation	Standard deviation	Range
<b>Top 10</b>				
1	1.93	general administrators; national government	1.86	9
2	7.04	medical practitioners	2.44	12
3	7.37	dental practitioners	4.30	13
4	7.59	police officer (inspector and above)	3.42	14
5	10.81	aircraft flight deck officers	14.09	65
6	10.89	general managers; large companies and organisations	20.99	91
7	12.96	university and polytechnic teaching professionals	6.23	21
8	13.81	special education teaching professionals	5.83	20
9	14.19	secondary (and middle school deemed secondary) education tea	6.79	22
10	15.67	treasurers and company financial managers	11.76	35
<b>Middle</b>				

<b>10</b>				
1	180.22	managers and proprietors in service industries n.e.c.	26.51	140
2	181.93	other metal making treating process operatives steel	14.34	151
3	181.96	brewery and vinery process operatives	54.94	100
4	185.63	moulders, core makers, die casters	27.53	132
5	185.93	auto electricians	38.62	99
6	188.30	coach and vehicle body builders	14.79	150
7	189.56	hotel and accommodation managers	38.80	139
8	190.48	sheet metal workers	10.91	166
9	190.89	welding trades	20.79	157
10	191.63	washers, screeners and crushers in mines and quarries	64.31	108
<b>Bottom 10</b>				
1	353.93	retail cash desk and check-out operators	4.74	344
2	354.48	shelf fillers	6.70	341
3	354.74	sales assistants merchants car	4.32	347
4	355.33	other childcare and related occupations n.e.c.	3.92	349
5	355.85	counterhands, catering assistants help	2.13	352
6	358.19	waiters, waitresses	3.54	351
7	358.56	kitchen porters, hands	3.09	352
8	359.07	bar staff	4.43	349
9	359.33	petrol pump forecourt attendants	3.46	352
10	362.26	hairdressers, barbers coiffeur	2.43	358
All		Mean	22.74	84.89

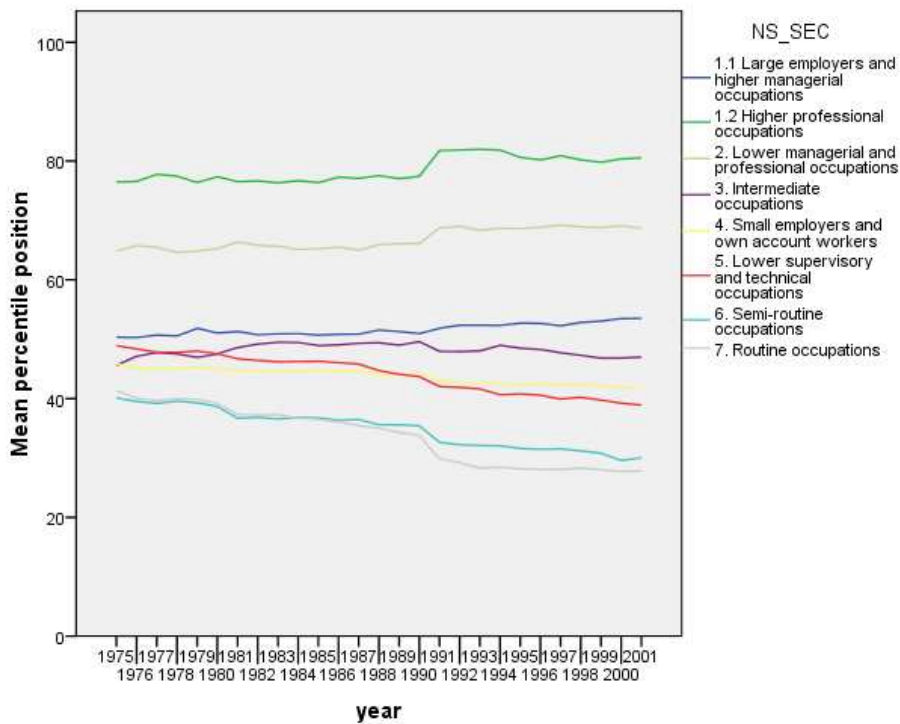
Source: New Earnings Survey

## Winners and losers in relative pay

Ranking occupations by their median wage and then examining changes in their rank position from year to year only tells us about how occupations perform relative to one another. A way of examining occupations in relation to the hourly earnings distribution in a given year is by seeing how the mean percentile position of people employed in certain occupations has changed over time. Looking at percentile positions has the advantage of holding constant changes in the overall distribution

Figure 3 reveals that percentile position of those working in higher paying occupational groups have not changed much and remained remarkably stable. The mean percentile position of *higher professional occupations* has remained stable at around 77 of the median during the 1970s, rising to around 80 during the 1990s. A similar story of high and stable percentile positions found for *lower managerial and professional occupations* (stable at around 70) and *large employers and higher managerial* (stable at around 56).

Figure 3. Mean percentile position 1975-2001



Source: New Earnings Survey

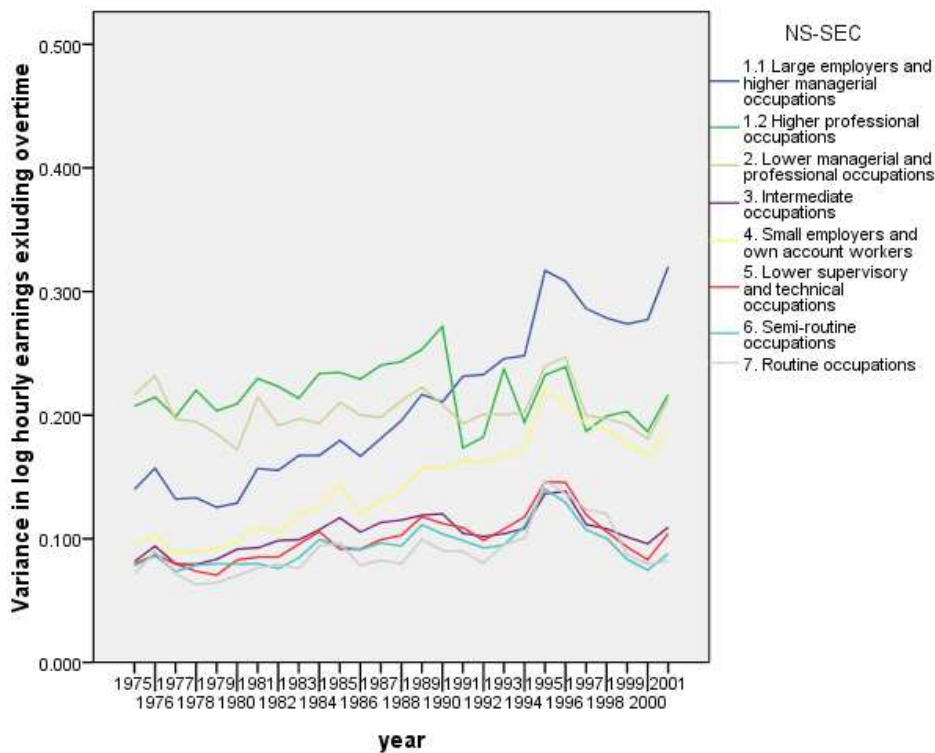
All in all, it appears there have been real winners as the top-paying occupations have high and extremely stable mean percentile positions. There are definite losers. The average percentile position of those working in *lower supervisory and technical occupations*, *routine*, and *semi-routine occupations* actually fell over the period – by about 10 percentage points for each group. *Small employers and own accounts workers* had overtaken *lower supervisory and technical occupations* by around 1990.

### Within-occupation earnings inequality

Looking at only average (median or mean) earnings of groups can be misleading. Using data from the 1970s, Phelps Brown found that the *variance* of pay was greater in the higher-paying occupations and less in lower-paying occupations (Phelps Brown 1977). Thus a high-paying occupation may have much overlap in earnings with lower-paying occupations.

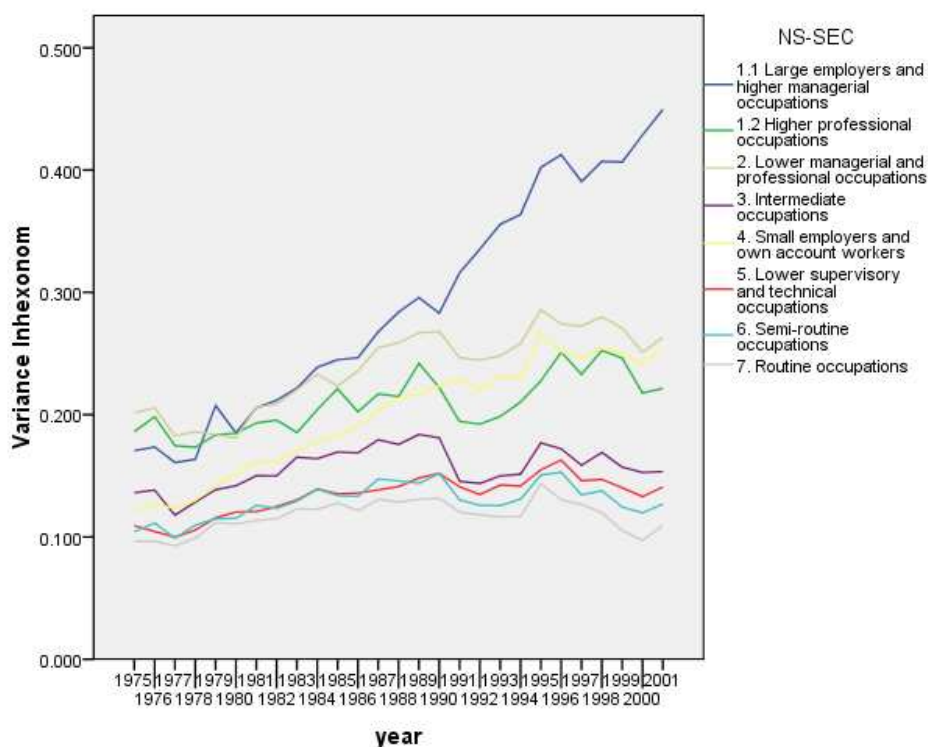
Figures 4 show the change in the variance of log hourly earnings by NS-SEC for females and Figure 5 for males. The logarithm of real hourly earnings is used to standardize for wage levels.

Figure 4. Variance in female log real hourly earnings by occupational group



Both Figures 4 and 5 show that, in general the variance in log hourly earnings has grown over time for both males and females, although in general, the female occupational groups show less variance than male occupational groups. For both males and females, the higher paying occupational groups, and the ones that have grown the most in real terms (Figure 2), are also the ones that have the higher variances. By far the most heterogeneous group in terms of hourly earnings is *large employers and higher managerial occupations*. This is especially true for men, where the variance seems to have shot up during the 1980s and 1990s, making it by far the most unequal occupational group. The variance for *large employers and higher managerial occupations* also grew for women, but to a lesser extent. This group generally pays less than *higher professional occupations* and *lower managerial and professional occupations* when looking at averages, but its high variance might indicate a substantial portion of high earners in this group is obscured by averages.

Figure 5. Variance in male log real hourly earnings by occupational group



## Occupations and gender inequality

The final piece of evidence on occupations and the structure of pay is how occupational earnings are structured in terms gender. This is done by calculating the ratio of female hourly earnings to male hourly earnings for each NS-SEC category for selected years, shown in Table 5.

A gender pay gap exists for all occupational groups. Occupational groups that stand out as becoming more equal over time are *higher professional occupations* and *lower managerial and professional occupations* and *small employers and own account workers*. *Large employers and higher managerial occupations* and *lower supervisory and technical occupations* stand out as making relatively little progress, with the ratio of female to male earnings remaining almost constant throughout the period.

*Table 5. Ratio of female hourly earnings to male hourly earnings*

NS-SEC	1976	1981	1986	1991	1996	2001
Large employers and higher managerial occupations	.70	.69	.68	.70	.71	.71
Higher professional occupations	.65	.66	.75	.90	.91	.94
Lower managerial and professional occupations	.73	.71	.70	.80	.83	.84
Intermediate occupations	.71	.68	.67	.72	.74	.75
Small employers and own account workers	.72	.71	.72	.75	.77	.79

Lower supervisory and technical occupations	.68	.65	.64	.65	.65	.66
Semi-routine occupations	.68	.69	.69	.72	.74	.75
Routine occupations	.73	.70	.70	.71	.75	.76

## Summary and next steps

To summarise:

- Overall earnings inequality has widened. Some of the simple descriptives presented in this paper suggest that the changing composition of occupations may have played a role.
- Generally, the higher paying occupations have seen their relative hourly earnings rise the most, whereas the rest have risen more modestly.
- There has been a growth in higher-paying occupations, but also a smaller growth in lower-paying occupations.
- Although some occupational groups seemed to grow more than others, the relative positions of occupations in the occupational earnings hierarchy have not changed much. Although people working in some occupational groups (*lower supervisory and technical occupations, routine, and semi-routine occupations*) have actually seen their mean percentile position fall over the years.
- There has been a modest growth in the variance of all broad occupational groups implying that the detailed occupations within them are becoming more unequal. Especially for males, *large employers and higher managerial occupations* seemed to have become the most unequal group.

This paper has examined some descriptive statistics of the basic elements that allows several hypotheses regarding the role of occupations and the widening of overall inequality. Occupations can contribute to overall inequality in three ways<sup>8</sup>:

1. Changes in the size of occupations – certain higher-wage occupations might grow while some low-paying occupations also grow, leading to a growth in overall inequality. Another way might be due to a decline in middle-income occupations.
2. The average level of occupational earnings (between occupation component) – even if employment was held constant in all occupations, the average level of occupations can change, contributing to overall inequality.
3. The variance of wages within occupations – as has been shown; looking at averages can conceal what is happening to wages within an occupation. Even holding the above constant, increased inequality within occupations can lead to an increase in overall inequality.

Evidence has been presented for each of these. From simple descriptives, it is difficult to infer which of these is the most important. The next step is to decompose the growth in overall inequality into each of these three components, to see the relative weights that must be attached to each in accounting for

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<sup>8</sup> See Mouw Kalleberg (forthcoming) for an empirical examination of these three hypotheses in the US.

overall inequality. A second step is examine to what extent can changes in the class composition account for overall inequality (Weeden, Young-Mi et al. 2007). This step will use a decomposition technique similar to the first step to decompose the growth in overall inequality into:

1. Between classes – has the growth in overall inequality stemmed from the between-class inequalities?
2. Within class, between occupation. – has the growth in inequality stemmed from changes in earnings between occupations, but within broad classes?
3. Within occupation – or has the growth in inequality stemmed from the growth in inequality within occupations?

## Appendix

### Creating a consistent occupational classification

Within the NES series used, there are two occupational classification systems, KOS and SOC90. Occupations are coded to KOS codes from 1975-1990. From 1991-2001, they are coded to SOC90. They have period 1975-2000 have been recoded to the SOC90 system. A consistent coding was made by obtaining an edition of the 1990 NES where occupation was double-coded to both KOS and SOC90 classifications. A mapping matrix of old and new codes was then constructed based on the observed frequencies of being classified in one occupational category under one classification, and then being classified in an occupational category under the other system. Many occupations are easily mapped one-to-one. Where a fractional allocation is required, a random allocation procedure is used to achieve the proportions observed in the cross-over year.

### The Labour Force Survey

One difficulty in using occupations at the three-digit level as a unit of analysis is that most surveys sample sizes are too small for any robust statistical analysis of such potentially small subpopulations (in terms of  $N$ ). One survey that has a sample size large enough is the Labour Force Survey (LFS). The LFS began in 1975 and was a condition of entry into the EU in order to monitor regional unemployment. Since then, it was conducted every two years until 1983 when it became annual. In 1992, the survey became quarterly and a panel component was introduced. The major drawback with this survey for the purposes of this paper is that it does not contain wage data until the panel component was introduced in 1992. However, the sampling procedure of the LFS means that it more accurately reflects the labour market relative to the other dataset used in this paper.

### The New Earnings Survey

The NES is the largest consistent survey of hourly wage rates in Britain. It is a panel dataset that started in 1968, although computerized data is only available after 1975. It was conducted until 2003 and has since been replaced with Annual Survey of Hours and Earnings (ASHE). It samples approximately 1 per cent of the labour force, with respondents being selected on the basis of their National Insurance number (those ending with the digits 14). The main advantages of the NES are: (1) The sample size is very large – more than 150,000 observations per year. In total, there are around 4,000,000 wage observations. Sample size is very important when looking at detailed subsections such as at the three-digit occupational level in order to provide reliable estimates; (2) since it is filled out by employers, this may increase the accuracy of the pay data – especially when compared to other surveys where wage data is often filled out by a proxy respondent (as in the LFS), or is missing; (3) it is a panel survey. The main disadvantages of the NES are: (1) It is known to undersample certain groups, particularly part-time workers as they do not work/earn enough to meet the minimum threshold to pay national insurance (Elias and Gregory 1994). However, since 2003 with the move towards ASHE, such problems have been addressed in the survey design; (2) It contains poor indicators of socioeconomic characteristics of individuals, and no information on education.

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