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ABSTRACT

Occupations provide a central unit of analysis for economic inequality in stratification research for two main reasons. First, occupations are supposed to *structure* inequality. Second, occupations are supposed to proxy as a *source* of inequality. Although there was a 'massive rise' in British wage inequality, relatively little is known about the relationship between the occupations and growing British wage inequality, and the sparse empirical research is inconclusive. Since sociologists traditionally have tended to place a great deal of emphasis on occupations, we might expect the changing structure of occupations and changing occupational wages to play a key role in accounting for trends in overall British wage inequality. More recent strands of stratification theory, however, have challenged the idea that occupations structure economic inequalities, and argue that the link between occupations and wages might have been weakening over time, instead predicting that growing wage inequality mostly occurs within occupations. We decompose trends in British wage inequality into between-occupation and within-occupation components and show that, although most wage inequality is within occupations, it is inequality between occupations that accounts for the lion's share of changes in wage inequality trends. Furthermore, trends in between-occupation inequality cannot be 'explained away' by fundamental labour market changes such as rising educational attainment and the decline in collective bargaining. We also demonstrate what the rise in between-occupation inequality implies for the British 'big class' structure using the NS-SEC social class schema. We show that growing between-occupation inequality can be more or less described as growing between-class inequality.

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INTRODUCTION

Occupations are central to stratification research in sociology, providing the basis for socioeconomic status, prestige, and job desirability scales, and in more aggregated form, the basis for social class schemas, for two main reasons. First, occupations are supposed to capture the *structure* of inequality in the labour market. As a main reader in stratification research puts it, "measurement strategies based on the income distribution impose an excessively abstract, analytic, and statistical lens on a social world that has much institutionalized structure to it, a structure that mainly takes the form of "occupational groups"" (Grusky and Ku 2008:7). Second, occupations are supposed to relate to a *major source* of stratification. The main stratification reader argues that inequality, "far from being a seamless and continuous distributions of incomes, is instead understood as a deeply lumpy entity, with such lumpiness mainly taking the form of institutionalized groups […] that constitute prepackaged combinations of valued goods" (Grusky and Ku 2008:7). Elsewhere in the stratification literature, occupations have been described as the most basic production unit and rent-seeking institutions (Grusky and Sørensen 1998; Grusky 2005; Weeden and Grusky 2005), and in a more aggregated form, act as proxies for employment relations (Goldthorpe 2007a), social relations of production (Wright 1979), and skill requirements (Tåhlin 2007).

Although "possibly the most striking phenomenon in the British labour market […] has been the massive rise in wage inequality" (Dickens 2000:27), relatively little is known about the relationship between occupations and growing British wage inequality, unlike for the United States where a small literature has recently sprung up directly tackling the issue (Weeden, Kim et al. 2007; Kim and Sakamoto 2008; Mouw and Kalleberg 2010). In what follows, we revisit the well-known take-off in British wage inequality and provide a detailed descriptive account of its relationship to the changing occupational structure to systematically establish the basic facts. We build upon the sparse findings from previous British research to establish exactly how occupations measured at the most detailed level *structured* the 'massive rise' in wage inequality 1970s-1990s and the subsequent stabilisation in

wage inequality 1990s-2000s. We then go on to assess the extent to which these descriptive trends can be 'explained away' by other well-known labour market changes to more fully establish the role of occupations as a *source* for growing wage inequality. We then examine what our findings for the 'micro class' structure imply for the 'big class' structure using the NS-SEC schema.

OCCUPATIONS AND TRENDS IN BRITISH WAGE INEQUALITY

How do occupations *structure* changes in overall wage inequality? Traditionally, stratification theory, with its focus on occupations "usually motivates hypotheses about between-group inequality", and within-group inequality "is not treated as substantively interesting" (Western and Bloome 2009:293-4). Therefore, by 'structure' we mean growing wage inequality should be largely *between* occupations and not *within* them, as traditional stratification theory would predict. From the literature, we identify three mechanisms by which changes in occupations relate to changes in overall wage inequality, with the first two being components of between-occupation inequality.

The first mechanism is *by changes in the occupational structure.* Some occupations grow, some decline, and at differing rates. A strictly 'structuralist' account, views occupational groups as relatively homogonous and unchanging units, therefore any changes in overall wage inequality must stem from changes in their size. Goos and Manning (2007) examined changes in the British occupational employment structure at the most detailed level (three-digit) and find that between 1979 and 1999 there was a simultaneous decline in middle-paying occupations with a small growth in low and a relatively larger growth in high-paying occupations, a process they term 'job polarization'. They find that the 'hollowing out' of the occupational structure can explain between 33 and 56 per cent of the growth in wage inequality 1976-1995.

The second mechanism is *by changes in occupational mean wages*. Real wage growth is likely to vary by occupation: some will rise faster than others; some might even experience a fall. A widening of the distance in average wages between occupations would increase overall wage inequality, for

instance, if the wages of already high-wage occupations increased faster than middle- or low-wage occupations. Goos and Manning (2007) consider differential wage growth rates across occupations together with polarising employment patterns (they do not look at them separately), and find that growing inequality between occupations in these two ways explains between one-half and four-fifths of the growth in British wage inequality. Their results imply, then, that about 20 per cent of the growth was due to changes in average wages across occupations, and so the remainder, about 20 per cent, must be due growing inequality within occupations. Their main finding is therefore one of between-occupation inequality.

The third mechanism is *by changes in inequality within occupations* (i.e. between individuals in the same occupation). Although traditional stratification theory recognises within-occupation inequality, the expectation would be that changes in overall wage inequality mainly stem from inequality increasing between occupations given that occupations are supposed to be structural basis of the stratification system. More recent strands of stratification theory, however, such as that associated with Aage Sørensen, have suggested that there has been widespread destruction in occupation-based 'rents', what he termed 'structural locations', at all levels in the labour market as a result of an individualisation in the employment relationship whereby wages are increasingly tied to the individual productivity (Sørensen 1996; Sørensen 2000). What does this imply for the relationship between occupations and wage inequality? According to Sørensen, "consistent with the idea of a stronger link between wages and personal endowments, we also observe a marked increase in within-occupation inequality" (Sørensen 2000:1552). The result is that the labour market resembles what he once termed the 'neo-classical soup' (Goldthorpe 2000:1581).

Findings by economists often support the 'neo-classical soup' thesis in that they find a larger role for within-group inequality than between-group in accounting for trends in overall British wage inequality (Machin 2001; Prasad 2002). In a paper prepared for the National Equality Panel (NEP), Brewer, Muriel et al. (2010) find that the majority of the change in overall wage inequality between

the 1970s and the late 1980s can be accounted for by within-group inequality, whether examining occupation on its own (p. 46), or when alongside other factors (p. 61). The summary of the NEP report states "the inequality growth of the last forty years is mostly attributable to growing gaps within social groups, however those groups are defined" (Hills, Brewer et al. 2010:1). Their main story from the evidence, then, is one of within-group inequality, in contrast to Goos and Manning (2007). However, they use a coarse occupation classification system of between 8 and 11 categories. The sensitivity of results to the definition (and number) of 'groups' is an issue we return to later.

OCCUPATIONS AS A SOURCE OF WAGE INEQUALITY

How are occupations *source* of stratification? Occupations are generally used as proxies for inequality-producing processes pertaining to 'life chances'. Exactly what these processes entail are quite varied, as is the level of detail of the occupational categories in delineating such processes. One line of research purports the occupational structure at the most detailed level is the basis for the stratification system. The 'disaggregate structuration' view, as it is known, posits that occupations are deeply institutionalised rent-seeking units and are homogenous groups of people, with similar socioeconomic characteristics, performing similar kinds of work, with coherent collective identities, and provide the basis for closure, exploitation, and collective action (Grusky and Sørensen 1998; Grusky 2005). Under this view, inequalities in life chances emerge from detailed occupational groups, for instance, in terms of accreditation and licensing of occupations (Weeden 2002). A separate line of research has used detailed occupational categories to proxy for the kinds of tasks typically performed in the job, to infer the impact of patterns of demand for different kinds of labour on overall wage inequality in a more fine-grained way than coarse educational groups (Autor, Katz et al. 2006; Goos and Manning 2007). Other research still has used broader occupational aggregations, most commonly in the form of social classes. One popular 'big class' approach aggregates detailed occupations to proxy for different kinds employment relations (Goldthorpe 2007a). Under this view, there are different 'solutions' to the inherent contractual hazard in

managing the employment relationship depending on the nature of the work (the asset specificity and difficulty of monitoring) and that these differing solutions (broadly a service relationship versus a labour contract) lead to differences in income, economic advancement, and economic security (Goldthorpe and McKnight 2006).

In short, occupations proxy for many inequality-producing processes that we cannot often readily measure, but the fundamental unit of analysis is the same for each[1]. For occupations to be a source of wage inequality two conditions must be met. First, variation in occupational mean wage growth must not be explained away by other factors. If it is, occupational wages are not explaining inequalities. Previous wage inequality explanations and research has tended to focus on rising educational attainment and trade union decline. Findings from the US examining occupations at the most detailed level *and* considering other factors, found that 80 per cent of the rapid rise in US inequality 1983-1990 can be accounted for by individual-level factors, especially education, and not occupations (Mouw and Kalleberg 2010).The second condition is that the variation in within-occupation inequality growth should largely be explained away by other factors. If occupations are a fairly stable source of inequality, we would expect any growth in inequality within them to stem from their incumbents becoming more heterogeneous. There exists a bit of debate regarding the extent of the role of US residual wage inequality in explaining trends in overall wage inequality, with some research indicating that within-group inequality could be largely due to demographic changes in the labour market (Lemieux 2006). We investigate these two conditions.

DATA AND ANALYTICAL STRATEGY

The analysis proceeds in three steps. The first step is descriptive. We decompose over time trends in wage inequality into between- and within-occupation components for the whole period 1975-2008.

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[1] We are not concerned for what occupations are or what they proxy here. We simply argue that they are central to stratification research and so our goal is to establish how they relate to trends in British wage inequality.

In the subsequent two steps, the analysis is divided into two time periods: an earlier period with a 'massive rise' in wage inequality (1975-1996) and a later period with stabilisation in wage inequality for men, and slight reversal for women (1997-2008) (see varlog in Figure 1). The second step decomposes changes in wage inequality within each of these two periods into three components: a composition effect, a mean wage effect, and a within-occupation inequality effect, corresponding to the three mechanisms outlined above. The third step deals with the extent to which occupations are a source of wage inequality by building upon the descriptive trends in a multivariate way, to try and net out confounding labour market factors. The analysis for the first two steps was conducted separately by gender as trends in male and female wage inequality and occupational employment patterns differ. For the third multivariate step, we consider the whole labour market as the gender composition of occupations are treated as a source of variation in occupational mean wages and variances their own right.

Wage data comes from the New Earnings Survey/Annual Survey of Hours and Earnings (NES) creating a series covering the years 1975-2008. The NES is a compulsory survey covering 1 per cent of the labour force and contains the highest quality individual earnings data available covering such a span of time. Cases with missing data were dropped, as were those where earnings were affected by absence, and those that reported an hourly wage of zero[2]. Our measure of inequality is the variance of log hourly wages as it has the valuable property of being easily decomposed. Hourly wage rates were used to standardise for differences in usual hours between and to allow the inclusion of part-timers. One major shortcoming of the NES is that it does not contain rich demographic data; in particular it lacks a measure of education. For the multivariate analysis, we

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[2] Fortunately, the NES is a compulsory employer survey under the Statistics of Trade Act so these restrictions had little impact on the usable sample sizes. Average N=162,549.

supplement the limited demographic information in the NES with successive Labour Force Surveys (LFS) 1979-2008[3].

The NES and LFS both contain unit-group level occupation information (three digit). It is possible to use this information to construct a consistent occupation classification system. We code occupations to SOC90 throughout[4]. All in all, we are left with 366 different SOC90 occupations. Furthermore, for both surveys, sample sizes are large compared to other surveys covering a similar period, which is crucial in order to obtain reliable estimates at the three-digit occupation level.

OCCUPATIONS AND THE STRUCTURE OF WAGE INEQUALITY: DECOMPOSITION OF VARIANCE

Using a simple variance decomposition, we decompose changes in the variance of log wages into three components that relate to each of the three mechanisms by which occupations can contribute to overall wage inequality: a composition effect, a mean wage effect, and a within-occupation inequality effect. When applied to wage inequality the decomposition of variance is commonly written as (e.g. Jenkins and van Kerm 2009:57):

$$V = B + W$$

$$= \sum_j s_j r_j{}^2 + \sum_j s_j \sigma_j^2 \tag{1}$$

where V is the overall variance of log hourly wages is the sum of between-occupation inequality, B, and within-occupation inequality, W. Subscript j denotes occupation, s refers to employment share of occupation j, $r_j = (y_j - \bar{y})$ is the deviation of occupation j's mean wage from the overall mean wage, and σ_j^2 is the variance of wages within occupation j. The overall variance in log hourly wages in

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[3] The LFS does not contain wage data until 1992, hence the need to combine data sources.

[4] We experimented with several approaches to bridging occupation classifications. We settled on an algorithm developed by Kim Weeden developed for US data (Weeden 2005a; 2005b) as it seemed the most reliable. Full details of its application to British data are available from the author.

any given year is then the square of the weighted sum of deviations of occupational wages from the overall mean wage (first term) plus the sum of the weighted occupational-level variances (second term).

Much like overall inequality at a point-in-time (equation 1), *changes* in overall inequality between two time-points are also additively decomposable into between- and within-occupation components. The two time-points are denoted by subscripts b (referring to baseline year) and t (referring to b+1). Equation (2) shows that the change in the overall variance is the sum of the change in between-occupation inequality and the change in within-occupation inequality.

$$V_t - V_b = (B_t - B_b) + (W_t - W_b) \tag{2}$$

The change in the between-occupation component in equation (2) can be written as:

$$B_t - B_b = \sum (s_{jt} - s_{jb}) r_j^2 + \sum s_{jb} (r_{jt}^2 - r_{jb}^2) \tag{3}$$

The first term is a composition effect: the change in between-occupation inequality due to changes in the employment shares of occupations. The second term is a wage effect: the change in between-occupation inequality due to changes in occupational mean wages.

The change in the within-occupation component in equation (2) can be similarly written as:

$$W_t - W_b = \sum (s_{jt} - s_{jb}) \sigma_{jt}^2 + \sum s_{jb} (\sigma_{jt}^2 - \sigma_{jb}^2) \tag{4}$$

As with the change in between-occupation inequality (equation 3), the first term in equation (4) is a compositional effect and the second term is a wage effect.

The composition effect (changes in the relative sizes of high (low) mean wage (variance) occupations) can be separated out from the mean wage effect and a within-occupation effect (e.g.

Western and Bloome 2009:309-10): Given equations (3) and (4), changes in the overall variance of wages can be written as the sum of three components:

$$V_t - V_b = \delta B + \delta W + \delta C \tag{5}$$

where δB is the between-occupation effect (specifically due to mean wages), δW is the within-occupation effect, and δC is the composition effect. In equation (5), the composition effect is separated out as a component in its own right instead of being two separate components with between- and within-occupation inequality parts, as it is in equations (3) and (4). The three components in equation (5) capture the three mechanisms by which occupations can account for changes in overall inequality.

The composition effect then is written as:

$$\delta C = \sum (s_{jt} - s_{jb})(r_{jt}^2 + \sigma_{jt}^2) \tag{6}$$

The composition effect, δC, is derived from the left hand terms of equations (3) and (4) and captures change in overall inequality due to changes in the relative sizes of occupations.

The mean wage effect is written as:

$$\delta B = \sum s_{jb}(r_{jt}^2 - r_{jb}^2) \tag{7}$$

The mean wage effect, δB, is the second term of the change in between-occupation inequality equation (equation 3) and captures changes in overall inequality due to changes in the mean wages of occupations i.e. some occupations' mean wages might rise more than others and some might even fall.

Finally, the within-occupation inequality effect is written as:

$$\delta W = \sum s_{jb} \left(\sigma_{jt}^2 - \sigma_{jb}^2 \right) \tag{8}$$

The within-occupation inequality effect is the second term of the change in within-inequality equation (equation 4) and captures changes in overall inequality due to changes in the variance of wages within occupations. A rise in within-occupation inequality always increases overall inequality.

OCCUPATIONS AS A SOURCE OF WAGE INEQUALITY: MULTILEVEL GROWTH MODELS

Since our wage data source (the NES) does not contain education and other important demographic data, most multivariate regression-based decomposition methods that require individual-level wage data are ruled out (e.g. Fields 2002; Firpo, Fortin et al. 2009; Western and Bloome 2009). A preferred approach would be one similar to Mouw and Kalleberg (2010) where individual-level variables and occupation fixed effects on wages are simultaneously modelled. Instead, following Kim and Sakamoto (2008), we fit multilevel growth models at the occupation-level to net out other factors influencing growth rates in occupation-level employment, mean wages, and within-occupation inequality[5]. We constructed an 'occupation dataset' combining wage data and occupation characteristics data from the NES by occupation-year with supplementary occupation characteristics data from the LFS by occupation-year. All in all, there are 366 occupation categories ✕ 30 time points = 10,980 cases[6]. The whole period 1979-2008 is divided into the two sub-periods of, first, a period of steeply rising inequality 1979-1996, and second, a period of levelling-out in inequality 1997-2008, giving 366 ✕18 = 6,588 cases and 366 ✕ 12 = 4,392 cases respectively for each time period. Occupations are treated as longitudinal units and their growth rates in their size, mean log wages,

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[5] For full details this analytical strategy, see Kim and Sakamoto (2008) and see Singer (1998).

[6] Creating the occupation dataset means we lose a few years of data. We lose 1975-1978 as there is no double-coded file with the occupation codes used in these years in the LFS with SOC90. We lose 1980 and 1982 as the LFS was biannual until 1983. For these missing cells, we impute an average from two neighbouring years.

and within-occupation variances are modelled separately conditional on a common set of independent variables.

Our independent variables are simply the proportions of workers within a given occupation-year falling within each covariate category. We control for four broad kinds of variables that have been widely-used in existing wage inequality explanations: (1) human capital (holding a degree; within-occupation educational diversity[7]; potential labour market experience > 20 years); (2) sectoral change (manufacturing; public sector employment); (3) institutional change (collective bargaining coverage); and (4) demographic change (female; part-time work; foreign born)[8].

First, an unconditional model was estimated with time as its only independent variable. This Baseline Model is written as:

$$Y_{jt} = \alpha_j + \beta_j T_{jt} + \varepsilon_{jt}$$

and

$$\alpha_j = \alpha + u_{1j}$$

$$\beta_j = \beta + u_{2j}$$

(9)

where subscript t refers to time-points nested within occupation j, Y_{jt} refers to the dependent variable (for illustrative purposes, let's refer to Y_{jt} as the occupation-specific mean wage). Growth in occupational mean wages, Y_{jt}, is a function of the initial occupation-specific mean wage, α_j, and its yearly change, $\beta_j T_{jt}$, and an error term, ε_{jt}. The intercepts and slopes are specified as random variables. The time random effect captures variation in mean wage growth rates across occupations.

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[7] Following Kim and Sakamoto (2008), we also investigate diversity in qualifications held within an occupation. We measure educational diversity using the Herfindahl Index. Educational qualifications in the LFS are aggregated into four levels in order to make them consistent over the full span of years.

[8] We experimented with a region variable (proportion Southern England), but it was never statistically significant in any of our models, so in the name of parsimony we dropped it from our final models.

By adding independent variables to our Baseline Model, we can examine the extent to which our independent variables can account for the time variation in the intercepts and the slopes i.e. mean wage growth rates[9]. We are not substantively concerned with the coefficients themselves, and do not report them (full models available from author). Rather, we are primarily interested in their explanatory power in accounting for variation in occupation-specific employment, mean wage, and internal inequality growth rates.

RESULTS

TRENDS IN THE STRUCTURE OF WAGE INEQUALITY 1975-2008

Figure 1 presents results from a year-by-year decomposition of the overall variance in log wages separately for men and women using equation (2). The upper panel shows that when wage inequality was growing, inequality increased both between (due to widening in mean wages) and within occupations (due to internal inequality increasing). Across the whole period, the between-occupation component increased at a much steeper rate than the within-occupation component,

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[9] In practice, the baseline model is extended by adding three sets of independent variables:

$$Y_{jt} = \left[\alpha_j + \beta_j T_t + \gamma X_{jt} + \delta \left(T_t \times \overline{X}_j \right) + \zeta \overline{X}_j \right] + \left[u_{1j} + u_{2j} T_{jt} + \varepsilon_{jt} \right]$$

where,

$$\varepsilon_{jt} \sim N(0, \Sigma) \text{ and } \begin{bmatrix} u_{1j} \\ u_{2j} \end{bmatrix} \sim N \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{21} & \sigma_2^2 \end{bmatrix} \right)$$

The first set, X_{jt}, are the changes in the proportions of the independent variables. The second set, $\left(T_{jt} \times \overline{X}_j \right)$, are interactions between time and the occupation-specific means of the independent variables (means of proportions). These control for the effect of independent variables net of compositional change. The third set, $\overline{X}_j$, are the occupation-specific means of the independent variables (means of proportions). We include group-means as a way of removing possible residual correlation between the random time effects and independent variables, which are occupation-specific.

with the female trend being a bit bumpier. After 1997, wage inequality stabilised for men and reversed slightly then stabilised around the 1994 level for women. The upper panel of Figure 1 shows that in the case of men after 1997, between-occupation inequality continued to grow but its effect on increasing overall inequality was offset by a fall in within-occupation inequality resulting in a net effect of a stabilisation in overall inequality. For women after 1997, between-occupation inequality continued to rise whilst within-occupation inequality fell more steeply than it did for men, resulting in a net effect of a slight decrease in overall wage inequality during the late 1990s. Wage inequality then stabilised at this level during the 2000s.

[Figure 1 here]

The lower panel of Figure 1 shows the *relative* shares of overall wage inequality accounted for by the between- and within-occupation inequality components (i.e. 'the occupational R^{2}'). Over the whole period, the relative share accounted for by within-occupation inequality steadily fell whereas the share accounted for by between-occupation inequality steadily rose to the point that by 1997 the majority of wage inequality now occurred between occupations. Contrary to the individualisation of employment relations thesis, the share of wage inequality accounted for by differentials between occupations grew, indicating that occupations are becoming a better, not worse, predictor of wages. This is in contrast to what we might expect from Sørensen's 'neo-classical soup' assessment that "structural locations seemed less relevant for explaining the variation in earnings"(Sørensen 2000:1552) as inequality grew. The findings presented here suggest the opposite: occupations if anything have become more relevant in explaining the variation in wages as the variation in wages increased[10].

The key and perhaps surprising finding here is that, contrary to what we might expect from theories that posit occupations once better structured inequality in the labour market during a time with

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[10] Simple OLS regressions with occupation R^{2} as the dependent variable and time as the only covariate reveal a highly statistically significant and positive time trend for both men and women.

wide-spread coordinated wage-setting, the majority of wage inequality actually occurred *within* narrowly-defined occupations in the late 1970s and throughout the 1980s. It was only when inequality reached its peak and started to stability that the majority of inequality was between occupations[11].

DECOMPOSING THE 'MASSIVE RISE' IN WAGE INEQUALITY 1975-1996

Figure 1 does not inform us how the changing relative sizes of occupations are related to trends in inequality. We apply equation (6) separately to the two periods of inequality to more fully understand how occupations relate the 'massive rise' in and subsequent stabilisation in inequality. The results are in Table 1. The charts in Figures 1 and 2 shed light behind the numbers in Table 1.

[Table 1 here]

For men, the composition effect (δC) accounted for 42.9 per cent (.0645/.1503) of the rise in wage inequality 1975-1996, whereas for women it accounted for a much smaller share, around a quarter (.0356/.1324). Panel A in Figure 2 demonstrates a 'hollowing out' of middle-paying occupations with a simultaneous large growth in high-paying occupations and small but noticeable growth in some low-paying occupations. Male 'job polarization' is demonstrated quite clearly by the u-shape of the fitted line, which takes into account occupation size. For women, Panel A seems too support female 'job polarization', however, the growth in low-paying employment is much more pronounced indicated by the steeper tail of the initial 'u'. The growth in the highest-paying occupations was slightly less pronounced for women indicated by a second and inverted 'u' in the trend line. Panel B shows that there was a decline in the share of the more equal occupations and an increase in the

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[11]It is plausible that the basic result in Figure 1 could be partly attributable to the consistent classification system somehow converting within-occupation inequality into between-occupation inequality in the 1970s and 1980s. As Figure A1 in the Appendix makes clear, the basis result in Figure 1 actually *underestimates* between-occupation inequality when the occupation system is allowed to change.

share of more unequal occupations, contributing to a rise in overall male and female wage inequality. Decomposition results (not shown) indicate that the decline in middle-paying occupations were about twice as important for both the male and female compositional effects than the shift in employment to high-variance occupations/shift in employment away from low-variance occupations.

The majority of the 'massive rise' in wage inequality 1975-1996, for both men and women, derived from the second mechanism, changes in mean wages between occupations (δB). For men, δB accounted for 48.5 per cent (0.0729/0.1503). For women, δB accounted for 45.7 per cent (0.0605/0.1324). Panel C in Figure 2 indicates that, for men and women, the mean wage effect stems from already high-paying occupations experiencing the largest wage gains, and in the case of men, a slight fall in real wages for some middle-paying occupations. In short, the majority of the 'massive rise' in wage inequality was due to already high-paying occupations experiencing the greatest wage gains.

Economists have tended to find that most of the rise in wage inequality in Britain was within groups. The results in Table 1 indicate that, for women, within-occupation inequality (δw) was quantitatively as important as the changing structure of employment, accounting for a quarter of the rise in female wage inequality (.0363/.1324). For men, however, within-occupation inequality accounted for less than ten per cent (.0130/.1503). Panel D in Figure 2 sheds some light on this finding. For men, already unequal occupations became more unequal. At the same time, more equal occupations also became more equal, offsetting the growing inequality within already unequal occupations, resulting in a relatively small net overall effect of within-occupation inequality. For women, however, the trend is remarkably linear: already high-variance occupations became more unequal with a much smaller offsetting effect of the low-variance occupations becoming more equal. This is likely due to the fact that relatively fewer women than men worked in high-variance occupations in the initial period.

In sum, Table 1 and Figure 2 suggests that the rise in wage inequality was mainly due to the polarisation of the British labour market in terms of the distance in average wages between occupations reinforced by polarising employment changes. We find that within-occupation inequality played the smallest role, in contrast to the NEP report.

[Figure 2 here]

[Figure 3 here]

DECOMPOSING THE STABILISATION IN WAGE INEQUALITY 1997-2008

For the period 1997-2008, Table 1 indicates that wage inequality rose only slightly for men (one-tenth of the 1975-1996 change) and actually declined for women. How do occupations relate to these apparently small changes in overall wage inequality? For men, the small increase in overall wage inequality stemmed mainly from the changing structure of occupations and also from an increase in inequality within occupations. Panel A in Figure 3 indicates the labour market continued to polarise as middle-paying occupations shrank and Panel D indicates that high-variance occupations became more unequal. The effect of these two components was tempered by an equalizing (negative) mean wage effect. The numbers in Table 1 indicate that the small growth in wage inequality would have been around three times higher than what is observed had there not been an equalising (negative) mean wage effect (.0301+0.0198/.0161=3.1). Panel C in Figure 3 indicates that occupational mean wages became more equal: lower-paying occupations received greater wage gains than higher-paying occupations.

For women, the small decrease in overall wage inequality stemmed mainly from a similar equalising mean wage effect, but in contrast to men, an equalising within-occupation effect too. Panel C indicates that lower-paying occupations received the greatest wage gains, as with men. Panel D indicates that low-variance occupations became more unequal and high-variance occupation became more equal, but the overall net effect appears to be one of reducing inequality. Combined,

the equalising mean wage and within-occupation effects more than offset the disequalising composition. The numbers in Table 1 indicate that the small decline in wage inequality would have been twice as great as the observed decline had female employment not continued to polarise (-.0339 + -.0066/-.0197=2.1).

In sum, Table 1 and Figure 3 suggest that the small increase in male wage inequality, and the small decrease in the case of women, stem from countervailing forces. For both men and women, inequality would have continued to rise at a faster rate than it had lower-paying occupations not caught up, offsetting the continued shrinking in middle-paying employment. For women, we also found evidence that some high-paying occupation became more equal, contributing to the fall in female inequality.

SOURCES OF OCCUPATIONAL WAGE INEQUALITY 1975-2008

We now assess the extent to which the variation in occupational employment shares, mean wage, and variance growth rates can be accounted for by trends in other important labour market changes. We do this by calculating the reduction in the time random effect, σ_t^2, between the Baseline Model (with just time as an independent variable) and the Full Model (with all the independent variables have been added) as a proportion of the time random effect in the Baseline Model i.e. $(\sigma_{t\ Baseline}^2 - \sigma_{t\ Full\ Model}^2)/\sigma_{t\ Baseline}^2$. We can further calculate the 'explanatory power' individual each sets of independent variables by excluding a particular set of independent variables from the Full Model and re-estimating it. The 'explanatory power' of each set of variables is the difference between the time random effect in the Re-Estimated Model and the time random effect in the Full Model as a proportion of the time random effect in the Baseline i.e. $(\sigma_{t\ Re-estimated\ Model}^2 - \sigma_{t\ Full\ Model}^2)/\sigma_{t\ Baseline}^2$. The results of these calculations are reported in Table 2.

[Table 2 here]

The main result to note, looking at the explanatory power of the Full Models, is that the independent variables rather poorly explain the variation in growth rates for all three dependent variables across both periods, ranging from a high of around 28 per cent in the case of occupational mean wages 1979-1996, down to a low of around 2 per cent in the case of within-occupation inequality 1997-2008. This implies that occupation effects, but more specifically the things for which they proxy, are a major source of trends in British wage inequality, accounting for over 70 per cent of the variation in employment, mean wage, and internal inequality growth rates.

Mean wage growth across occupations is best explained by the independent variables, but still less than 30 per cent. Perhaps surprisingly, of the portion that can be explained, human capital is *not* the most important. Rather institutional change is more important in explaining the burgeoning gap between high- and low-wage occupations, with 10 per cent due to declining collective bargaining coverage. Human capital, sectoral change, and demographic change, each explain about 5 per cent of variation in mean wages. During the later period, variation in mean wage growth was mostly due to demographic change (13 per cent), then human capital (7 per cent) and collective bargaining coverage (5 per cent). The fact that mean wages are not very well explained by the independent variables, and that institutional variables are the most important, seem to provide some support for the 'disaggregate structuration' view that occupations are relatively coherent rent-seeking institutions.

In terms of within-occupation inequality, nearly 16 per cent of the rise period 1979-1996 can be explained by the independent variables with human capital explaining the largest share, just over 5 per cent. When within-occupation inequality began to fall 1997-2008, the explanatory power of the independent variables is very poor, collectively explaining less than one per cent. The 'disaggregate structuration' view would predict that most within-occupation inequality would stem from changes in the composition of workers within occupations, not from occupations themselves.

IMPLICATIONS OF BETWEEN-OCCUPTATION INEQUALITY FOR SOCIAL CLASS

So far we have only considered occupations at the most detailed level. A key finding from the foregoing is that the growth in wage inequality was largely between occupations. However, occupations are commonly used in their more aggregated form in terms of social classes. It stands to reason that our between-occupation story should be sensitive to how we define groups: the more fine-grained one defines groups, the more one converts within-group inequality change to between-group inequality change. This could also explain why our findings differ from the sparse previous research that paints a within-group picture.

We provide a quick check on group definition in Figure 4 which plots the yearly R^2 from OLS regressions of occupation defined at three different levels of aggregation. We aggregate our occupations to the one and two-digit NS-SEC schemas[12]. As common sense would predict, the more finer-grained the grouping, the greater the proportion of variation in wages is explained. Only when occupations are defined at the most detailed level do they account for the majority of variation in wages: this could account for why our findings differ from those of the NEP report. No matter how occupations are defined, they are becoming a better, not worse, predictor of wages over time.

[Figure 4 here]

One influential account of social class associated with John Goldthorpe and colleagues purports that broad aggregations capture differences in employment relations (Goldthorpe 2007a), which in turn determine life chances. This line of research purports that there is not much to be gained from such a fine-grained analysis, as the inequality-producing processes for which occupations proxy are just as well captured by broader aggregations of occupations in the form of social classes (Goldthorpe 2002; Goldthorpe 2007b). Another line of research, the already-mentioned 'disaggregate structuration' view, argues that social classes are best understood at the occupation-level because the inequality-

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[12] For more information on NS-SEC see Rose and Pevalin (2003). Our NS-SEC schema has 6 instead of 7 categories since our data includes employees only. We also estimated models with SOC90 1-digit categories and found qualitatively similar results.

producing process emphasised by this approach is that level. It could be that our between-occupation finding could result in greater within-class inequality, as wages between occupations within their parent classes could have diverged, resulting in less coherent classes.

We provide a quick investigation on this line of reasoning by examining the extent to which trends in wage inequality were between classes and within classes. We investigate two forms of within-class inequality: within occupations at the most detailed level but also between occupations within classes. Since we found that inequality between occupations grew in importance, especially in terms of mean wages, the purpose of this section is to investigate whether between-occupation inequality growth was largely due to mean wages varying across occupations within big classes, or rather better captured by diverging wages between social classes themselves.

[Figure 5 here]]

Following Weeden, Kim et al. (2007) we decompose trends in British wage inequality into three components: a between-class component (BC), a within-class between-occupation component (BC/WO), and a within-occupation component (WO). The BC component is calculated by subtracting the variance of the residuals 'explained' by big classes in a wage regression from the total variance in log wages in a given year. The remaining variance – the component 'unexplained' by big class categories – is the proportion of total inequality occurring within classes. The WO component is the variance of the residuals from regressing log wages on occupation. The WC/BO component is calculated by subtracting the variance of the residuals from both regressions. The results in Figure 5 reveal that the between-occupation story portrayed in Figure 1 could quite easily be described as a between-class one, with a steeply rising BC component and a falling relative share in the WC/BO component as inequality grew[13].

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[13] In further analysis (not shown) we find that only one class – the higher managerial and professional class – account for the largest fraction of changes in between class inequality. Available to as an online supplement.

CONCLUSIONS

We started out by arguing that occupations are central unit of analysis in stratification research in that they are supposed to structure and are a source of economic inequality. We have demonstrated that the rise in British wage inequality was largely between occupations, not within them, contrary to Sørensen's 'neo-classical soup' prediction. Occupations structured the growth in wage inequality 1975-1996 largely by high-wage occupations receiving the greatest rapid wage gains, with polarising employment patterns being almost as important. Wage inequality stabilised 1997-2008, primarily because the wages of low-wage occupations caught up, offsetting a continued polarisation in employment. Our main finding is that occupations appear to proxy for an important source of wage inequality. We demonstrated that the 'occupation effect' cannot be 'explained away' by their changing composition. Our findings support the 'disaggregate structuration' view' whereby occupations are deeply coherent rent-seeking units, in particular high-wage occupations 1975-1996 have been very successful in creating and capturing rents. However, in contrast to 'disaggregate structuration' which purports inequality-producing processes are best captured at the occupational, not class level, we show that our between-occupation story can more or less be described as a between class one. We find that a growth in wage inequality implies a strengthening, not weakening, of the big-class structure. As inequality grew the role played by occupations within big classes became less relevant in explaining overall inequality, echoing Goldthorpe's assertion that that adding in detailed distinctions between occupations within big classes into the analysis provide "a source of occupational variation on a class theme" (Goldthorpe 2002:213). Since we have demonstrated occupations – whether at the most detailed level or in more aggregated form – are central to movements in British economic inequality, we finish by stating that future research should try to pin down exactly what occupations proxy.

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TABLES

TABLE 1. Decomposition of change in variance of log hourly wages 1975-2008

	Total $V_t - V_b$	δC	δB	δW
1975-1996				
Men	.1503	.0645	.0729	.0130
Women	.1324	.0356	.0605	.0363
1997-2008				
Men	.0161	.0301	-.0338	.0198
Women	-.0197	.0210	-.0339	-.0066

Source: NES.
Notes: Three-year moving-average. Full-time and part-time workers aged 18-65 whose earnings were not affected by absence.

TABLE 2. 'Explanatory power' of predictors on the variation in occupational employment, mean wage, and inequality growth rates 1979-2008

|	Baseline	Full Model (Prop. Explained[a])	Baseline + human capital (Prop. Explained[b])	Baseline + sectoral change (Prop. Explained[b])	Baseline + institutional change (Prop. Explained[b])	Baseline + demographic change (Prop. Explained[b])
1979-1996						
Occupational employment growth rates	.00157	.00144 (.08280)	.00146 (.01274)	.00147 (.02071)	.00148 (.02548)	.00147 (.02304)
Occupational mean log wage growth rates	.00142	.00102 (.28169)	.00109 (.05411)	.00110 (.06299)	.00116 (.09087)	.00109 (.05963)
Within-occupation inequality growth rates	.00178	.00150 (.15730)	.00162 (.05570)	.00157 (.03622)	.00157 (.03906)	.00153 (.01659)
1997-2008						
Occupational employment growth rates	.00289	.00287 (.00694)	.00287 (.00000)	.00288 (.00347)	.00287 (.00000)	.00288 (.00346)
Occupational mean log wage growth rates	.00219	.00159 (.27397)	.00175 (.07397)	.00159 (.00000)	.00171 (.05480)	.00188 (.13046)
Within-occupation inequality growth rates	.00043	.00042 (.02326)	.00042 (.00000)	.00042 (.00000)	.00042 (.00000)	.00043 (.02325)

Source: NES and LFS.
[a] $(\sigma^2_{t\ Baseline} - \sigma^2_{t\ Full\ Model})/\sigma^2_{t\ Baseline}$
[b] $(\sigma^2_{t\ Re-estimated\ Model} - \sigma^2_{t\ Full\ Model})/\sigma^2_{t\ Baseline}$
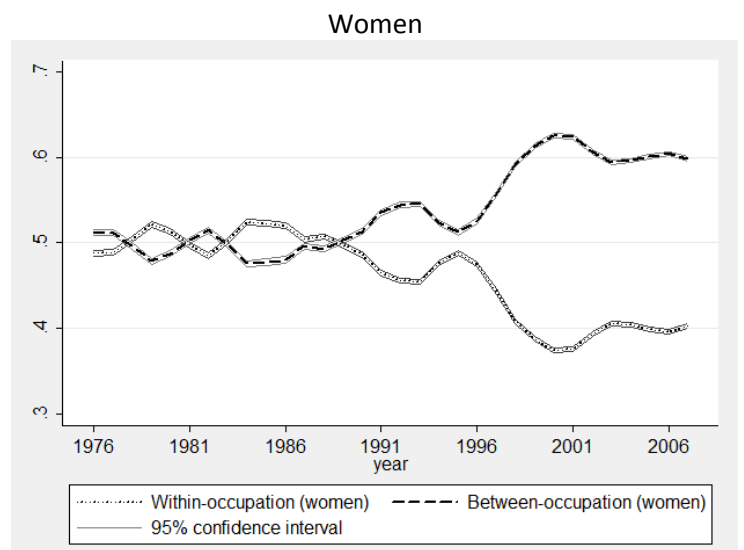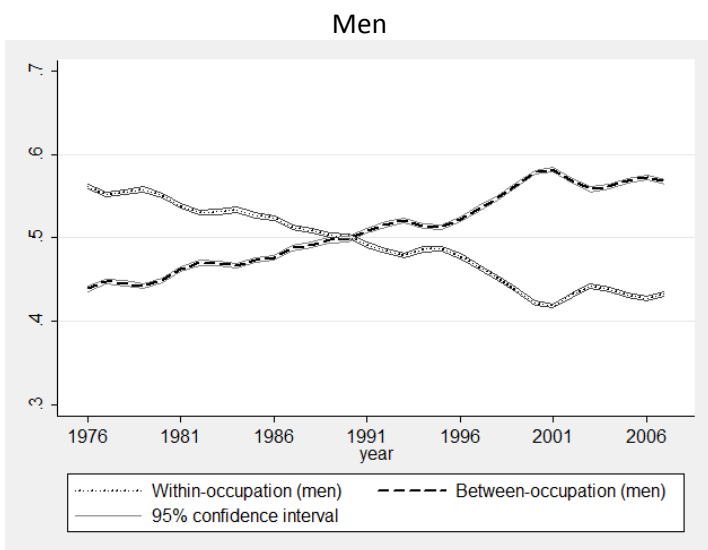
FIGURES

FIGURE 1. Trends in the structure of wage inequality 1975-2008
A. Levels
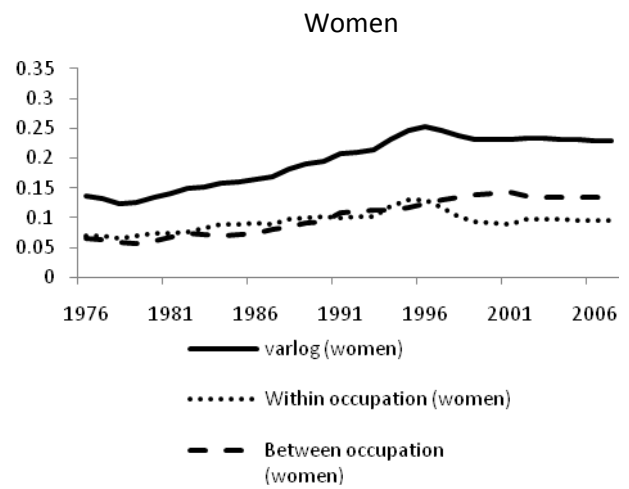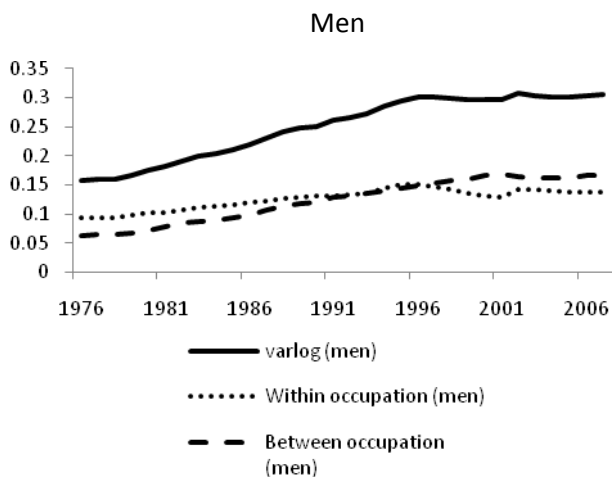
Men

Women

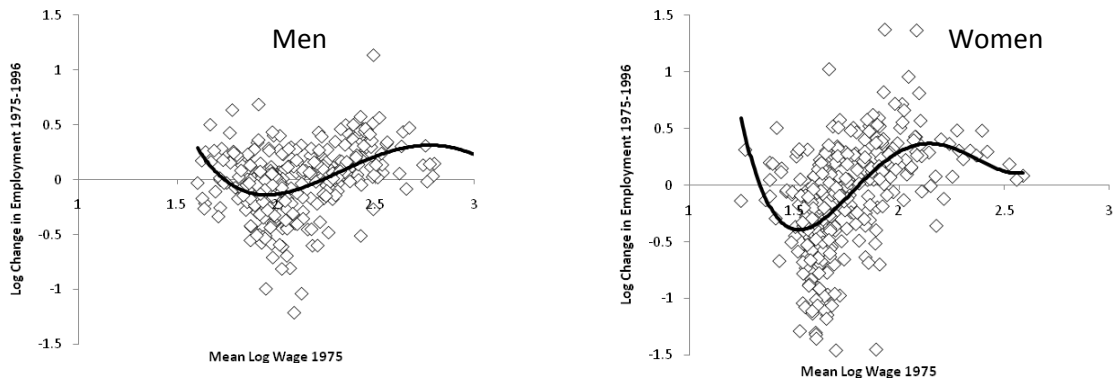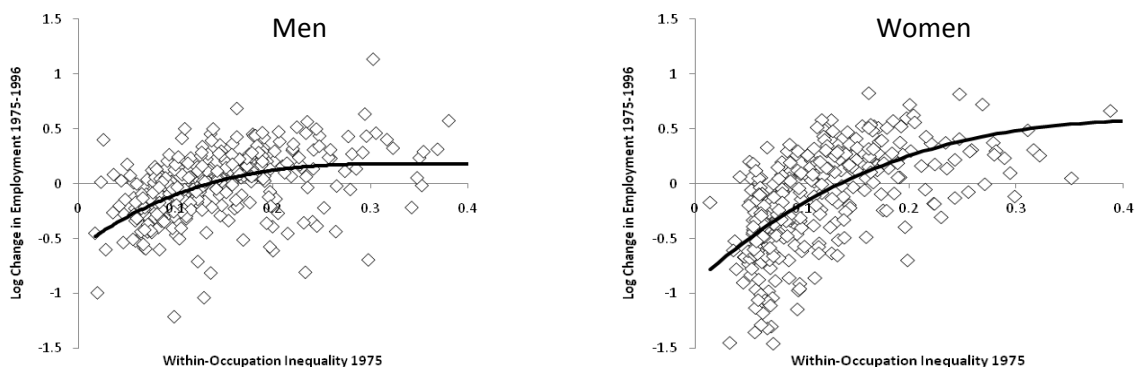
B. Relative shares

Men

Women

Source: NES.
Notes: Three-year moving-average. Full-time and part-time workers aged 18-65 whose earnings were not affected by absence.

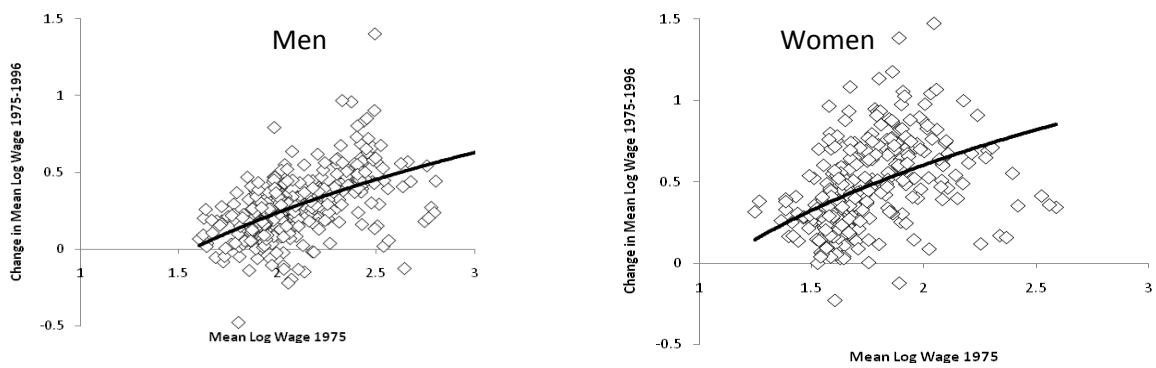FIGURE 2. The structure of occupations and the rise in wage inequality 1975-1996

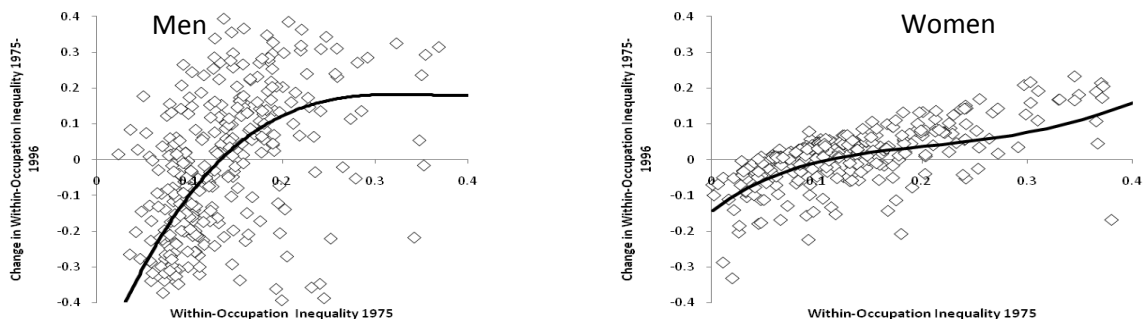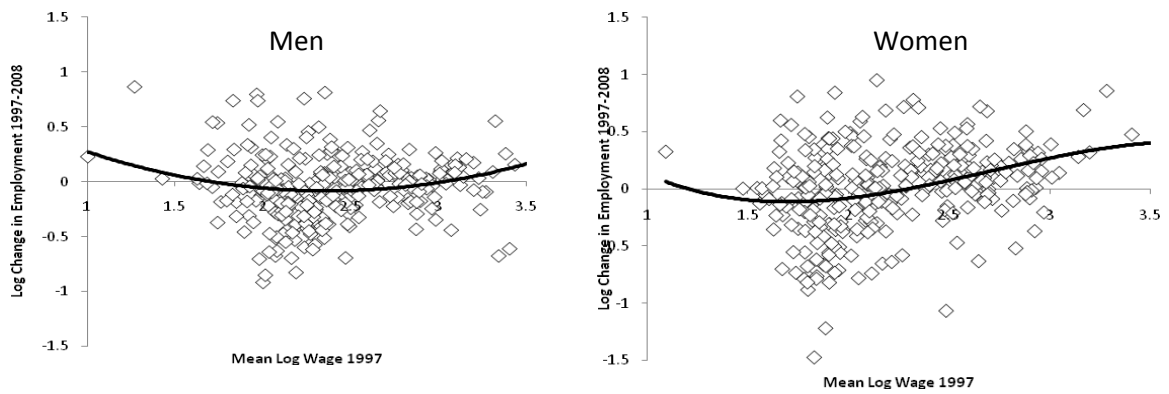A. Occupational mean wages and log employment change

B. Within-occupation inequality and log employment change

C. Occupational mean wages and relative wage growth

D. Within-occupation inequality and within-occupation inequality growth
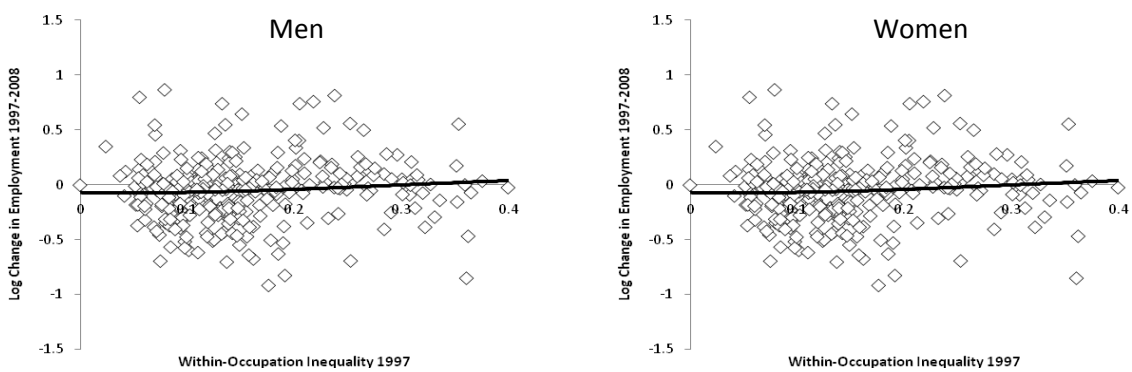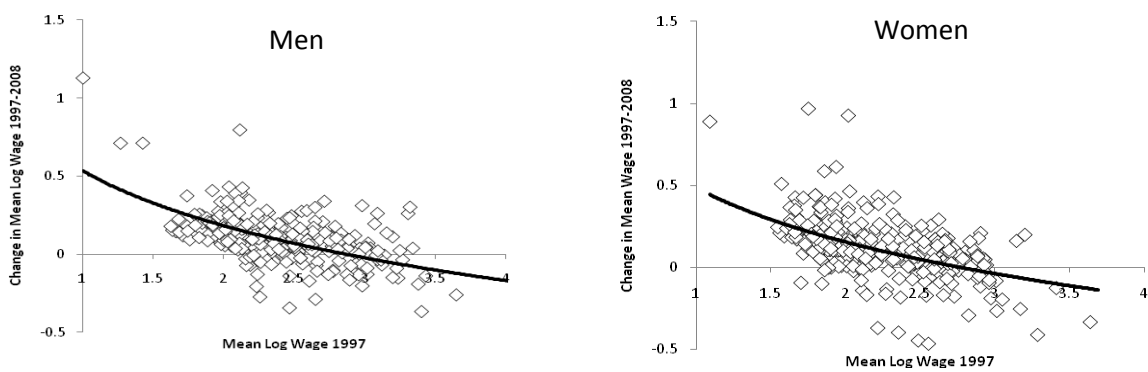

Source: NES.
Notes: Three-year moving-average. Full-time and part-time workers aged 18-65 whose earnings were not affected by absence. Trendline weighted by occupation size in 1975.

FIGURE 3. The structure of occupations and the stabilisation of wage inequality 1997-2008

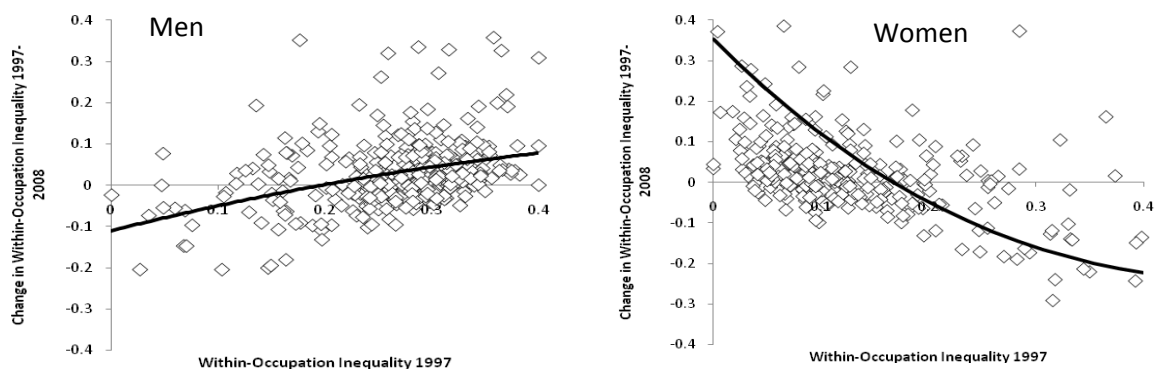A. Occupational mean wages and log employment change

B. Within-occupation inequality and log employment change

C. Occupational mean wages and relative wage growth

D. Within-occupation inequality and within-occupation inequality growth

Source: NES.
Notes: Three-year moving-average. Full-time and part-time workers aged 18-65 whose earnings were not affected by absence. Trendline weighted by occupation size in 1997.

FIGURE 4. The changing proportion of the variance in log hourly wages accounted for by occupation defined at different levels of aggregation 1975-2008
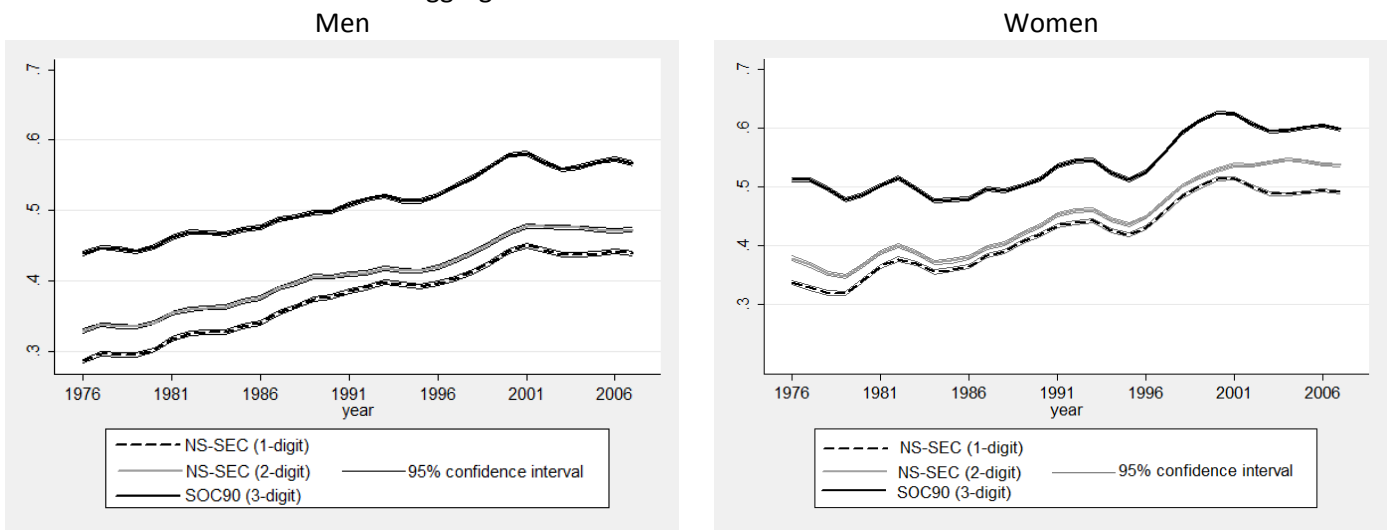
Notes: Three-year moving-average. Full-time and part-time workers aged 18-65 whose earnings were not affected by absence. NS-SEC (1-digit) has 6 categories, NS-SEC (2-digit) has 30 categories, and SOC90 (3-digit) has 366 categories.

FIGURE 5.Decomposition of overall wage inequality into BC, WC/BO, and WO components,
1975-2008
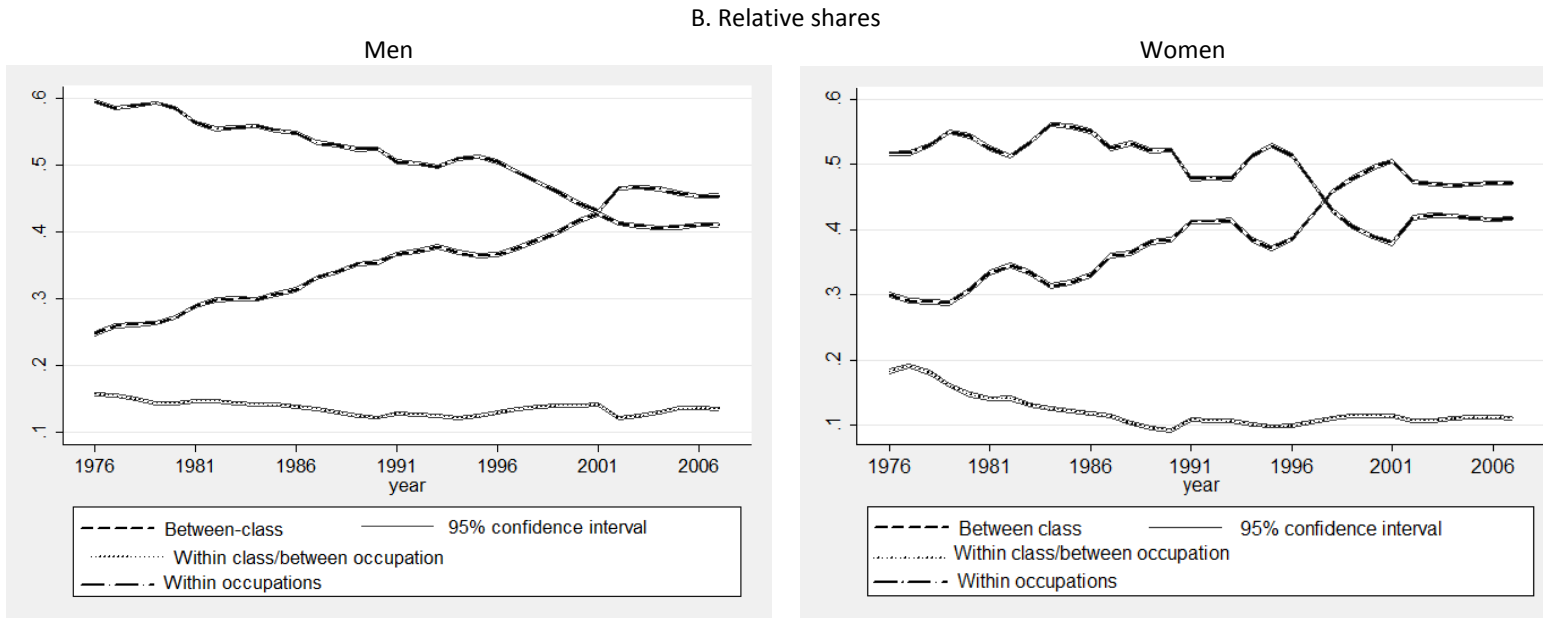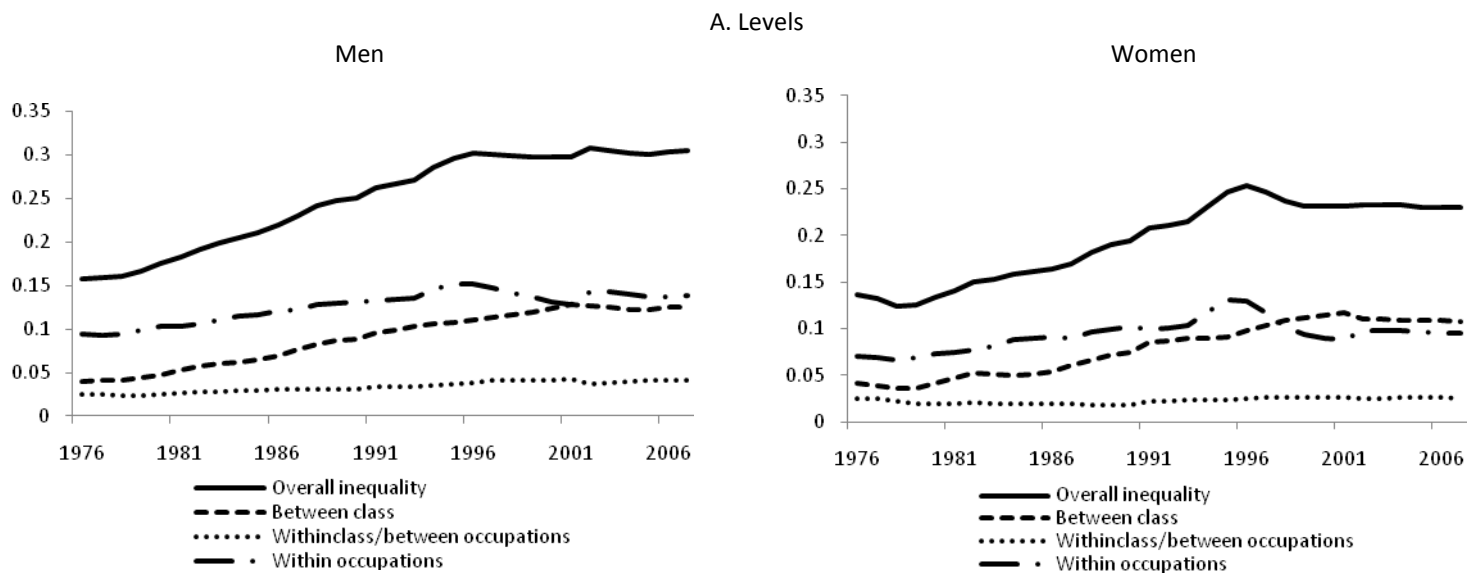
A. Levels

Men

Women

B. Relative shares

Men

Women

Source: NES.
Notes: Three-year moving-average. Full-time and part-time workers aged 18-65 whose earnings were not affected by absence.

APPENDIX

TABLE A1. Descriptive statistics for occupations 1979-2008

	1979			1996			2008		
	Mean (SD)	Min	Max	Mean (SD)	Min	Max	Mean (SD)	Min	Max
Mean wage	8.2382 (2.3901)	4.2008	18.6846	12.1182 (6.0303)	4.8027	60.7437	13.4469 (5.7077)	6.0803	46.6737
Mean log wage	2.0024 (0.253)	1.3363	2.7738	2.3299 (.3982)	1.4327	3.8590	2.4422 (0.3392)	1.7795	3.6013
Within-occupation inequality	.14355 (.0831)	.0192	1.0424	0.1484 (0.0845)	.02123	.54338	.1539 (.0866)	.0228	.62240
Employment share × 100	.2732 (.4688)	.0019	3.6700	.2732 (.5306)	.0024	4.891	.2732 (.6233)	.0016	.65420
% Degree or more*	.0824 (.1282)	.0000	1.0000	.1683 (0.2358)	.0000	.9867	.2310 (.1062)	.0000	1.0000
% Educational diversity*	.5516 (.1315)	.1300	.7358	.5722 (.1338)	.0009	.7299	.6922 (.0245)	.0000	.7396
% Manufacturing	.4526 (.3242)	.0000	0.9729	.3988 (0.3614)	.0000	1.0000	.3337 (.3145)	.0000	.9385
% Services	.4529 (.3110)	.0046	1.0000	.4970 (0.3651)	.0000	1.000	.5321 (.3183)	.0189	1.0000
% Finance	.06236 (.1045)	.0000	.8443	.0976 (0.1622)	.0000	.9445	.1338 (.1661)	.0000	.9084
% Collective bargaining	.4667 (.2084)	0.0370	.982	.3318 (0.2129)	.01111	.9812	.3398 (.2098)	.0000	.9902
% Public sector	.3732 (.2798)	.01080	1.0000	.2379 (0.3016)	.000	.9966	.1995 (.2678)	.0000	.9981
% Female	.2783 (.2486)	.0008	.9544	.2977 (.2999)	.0000	.9984	.3289 (.2685)	.0000	.9875
Part-time	.1058 (.1272)	.0001	.7706	.1352 (.1712)	.0000	.8937	.1685 (.1570)	.0000	.8128
% Age > 45	.3243 (.1189)	.0433	.7730	.3317 (.1102)	.0369	.7623	.4053 (.1312)	.0741	.7888
% Foreign-born*	.0510 (.0741)	.0000	.2560	.0653 (.0534)	.0000	.5350	.1088 (.0695)	.0000	.4407
N	366			366			366		

Source: NES; *LFS.

Notes: Three-year moving-averages. Full-time and part-time workers aged 18-65 whose earnings were not affected by absence.

FIGURE A1. The changing proportion of the variance in log hourly wages accounted for by 3-digit occupation: consistent classification vs. nonconsistent classification 1975-2008
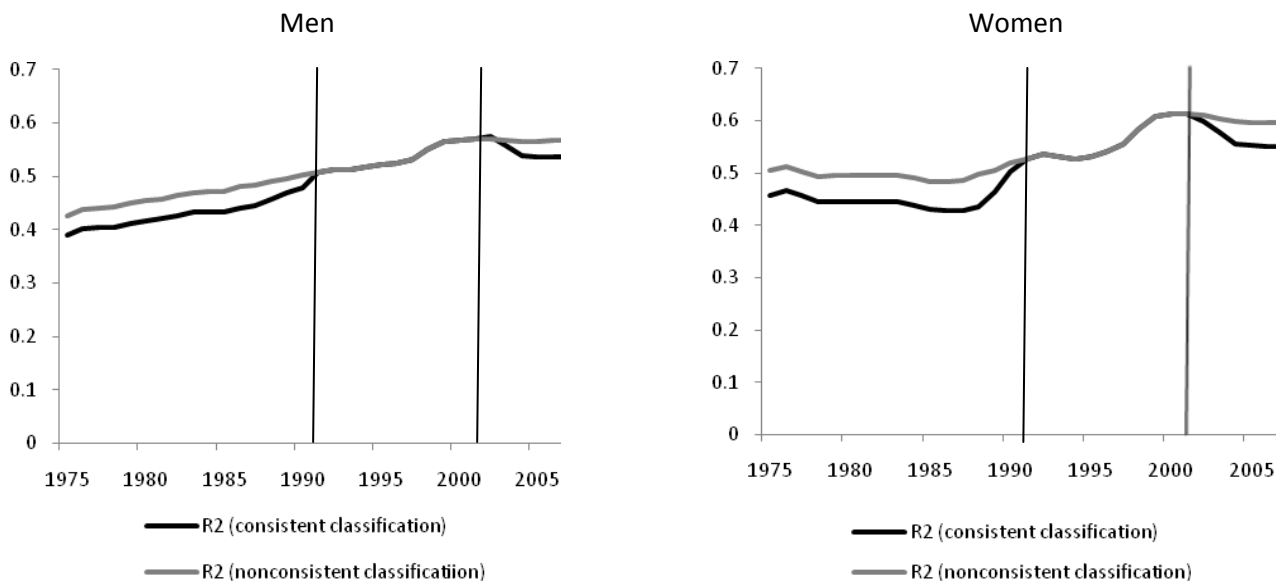
Source: NES.
Notes: Three-year moving-average. Full-time and part-time workers aged 18-65 whose earnings were not affected by absence. The vertical lines indicate breaks in the occupation classification system.