The Geography of Employment Polarisation in Britain

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July 2007

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Institute for Public Policy Research

Challenging ideas – Changing policy

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Acknowledgements
I would like to thank Steve Gibbons, Diane Perrons, Ian Gordon, Vassilis Monastiriotis, Howard Reed and Henri de Groot for their comments on various drafts of this paper. I have also benefited from comments by session participants in the RSAI:BIS conference in Stratford-upon-Avon (18 August 2005), an Office for National Statistics (ONS) workshop in London (17 February 2006) and the European Regional Science Association (ERSA) conference in Volos, Greece (2 September 2006). Last but not least, I would like to thank Tomas Hellebrandt, Robert Gilhooly and Felix Ritchie from the Virtual Microdata Lab at the ONS for their assistance with the New Earning Survey (NES) dataset. Georgina Kyriacou at ippr copy edited the paper.

For this research, I have been funded as a PhD scholar from the State Scholarships Foundation (IKY, Greece).

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Executive summary

In the last quarter of 2006, employment in the UK reached a record high of over 29 million. But it is important to consider the quality of the new jobs that have been created, as well as their number. Although the average quality of jobs in the UK has increased overall, recent evidence (Goos and Manning 2003) suggests that *polarisation* of employment has emerged in Britain in recent decades – there has been a growth in the number of high-paid and low-paid jobs relative to middle-ranking occupations. This paper examines the *geographical pattern* of employment polarisation across the British regions – and is the first piece of empirical research to look at this specific issue.

The paper reviews the different methodological approaches to, and the existing evidence on, job polarisation. Several US studies on this topic have found substantial evidence for increased employment polarisation in the US between the mid-1970s and the 1990s. Goos and Manning (2003) find evidence of increased employment polarisation in Britain in the period 1975 to 1999 across different occupations and industries. Using regression techniques they identify a 'U-shaped' relationship between employment growth and job quality (measured by pay): that is, greater employment growth in high-paid and low-paid jobs accompanied by relative shrinkage in employment in middle-paid jobs.

How can job polarisation be explained? Autor *et al* (2003) argue that technology can substitute for human labour in routine tasks but not in non-routine tasks. Non-routine tasks are found predominantly in high-skill and low-skill, rather than medium-skill, occupations. Building on this, Goos and Manning (2003) argue that the non-routine tasks that cannot be substituted by technology are found increasingly in high-paid 'cognitive' jobs in areas like management, financial services and the creative industries but also in low-paid manual jobs like cleaning and bartending. These theories have been very influential but do not have a specific spatial aspect to them and thus do not lend themselves easily to research on the geographical aspects of employment polarisation.

Other disciplines, such as urban sociology and geography, have offered explanations that rely more on spatial factors. Notably, Sassen (1991) has suggested that the changing nature of the global economy leads to the formation of 'world cities' whose economies are boosted by the growth of the financial services and new economy sectors. Although these world cities are characterised by great dynamism and increased prosperity, at the same time social and economic polarisation emerges because, in Sassen's words, 'high income residential and commercial gentrification is labour-intensive and raises the demand for maintenance, cleaning, delivery and other types of low wage workers'. In a similar vein, Manning (2004) has developed a model that predicts that demand for low-skilled workers is increasingly linked to the non-traded sector of the economy and is increasingly dependent on physical proximity to high-skilled workers. This model performs well when tested on data on US cities.

The empirical work in this paper extends the work of Goos and Manning (2003) to look at regional geographical patterns in employment polarisation. The analysis uses data on employees aged between 16 and 64 from the New Earnings Survey (NES), which started in 1975 and has information on approximately 160,000 employees each year. It is an employer-based survey with a panel element in which the same individuals are tracked from year to year. However, because the occupational coding that the Office for National Statistics uses for NES changed in 1991, this paper has had to base its main

results on the period 1991-2001. The eleven Standard Statistical Regions (SSRs) of Britain are used as the main regional classification.

There are several different aspects to the working conditions of any job, and therefore job quality can be measured in several different ways. In this paper, I use pay as a proxy for job quality. The 3-digit Standard Occupational Classification (SOC90) is used to classify employees in the NES into 366 different occupations. Within each occupation the median pay level is used as a measure of average job quality for that occupation. Employment polarisation is then defined as an increase in the number of individuals employed in low-paid and high-paid occupations relative to 'average-paid' occupations.

My initial results show that many of the lowest-paid occupations experienced substantial growth in the share of all employees they employed between 1991 and 2001 – for example sales assistants (up 47 per cent relative to total employment growth) and bar staff (up 32 per cent). At the same time, many of the highest-paid occupations have also experienced an increase in their share of employment – for example marketing and sales managers (up 54 per cent) and financial institutions managers (up 73 per cent).

To look at the data in more detail, I use regression analysis and other techniques to estimate the amount of employment polarisation into high-paid and low-paid jobs. Each of the 366 occupations is ranked from worst to best according to median hourly pay and then grouped into 10 equally sized 'job quality categories'. 'Job quality category 1' is the lowest-paid category, and 'job quality category 10' the highest. For Britain as a whole for 1991-2001, my results show that the share of high-quality jobs rises, as does the share of low-quality jobs (albeit to a lesser extent), while the share of jobs of middling quality declines. Looking within each region, there is a general pattern (with the exception of East Anglia) of rising shares for the high-paid and low-paid jobs and falling shares for the middle jobs. This pattern is strongest in London. A correlation analysis of job quality categories 1 and 10 (the lowest and the highest) shows that the region with the strongest correlation between the two categories is London.

The dependent variable in the regressions is the percentage growth in employment share for each occupational cell between 1991 and 2001. The explanatory variable is the rank of the occupational cell by pay, ranging from 1 to 366. The square of the rank is also included (i.e. a quadratic specification).
The regression results for the whole of Britain verify Goos and Manning's (2003) findings for the emergence of employment polarisation in Britain – there is a 'U-shape' relationship between growth of the employment share of each occupation and its initial ranking in 1991. A similar 'U-shape' is confirmed for every region of Britain, though in some regions the relationship is stronger than others. It appears that London is the region with the strongest U-shape, followed by the West Midlands and the South East. The weakest U-shapes are found for Wales and the North of England. A robustness check shows that the employment polarisation for London is, statistically speaking, significantly stronger than for any other region.

It is necessary to ask whether London is a special case in terms of having stronger employment polarisation than anywhere else in Britain, or if my analysis just picking up an *urban* effect. I investigate this issue by breaking down the NES data differently, into metropolitan and non-metropolitan areas, and running the regression separately for each group of areas. The results suggest that London *is* a special case – I am unable to find any evidence of stronger employment polarisation for urban areas as a whole, compared with non-urban areas.

Further analysis of the differences between London and the rest of Britain according to different worker characteristics produces two additional findings. First, for women, there was strong employment polarisation between 1991 and 2001 in London, but no statistically significant increase in polarisation outside London. Second, the growth in low-paid part-time jobs that occurred in the national economy between 1991 and 2001 does not explain the increase in employment polarisation over this time. Employment polarisation is overwhelmingly driven by changes in the composition of full-time job occupations. Overall, employment opportunities in the lowest paid jobs, mainly associated with consumption and leisure-related services offered at the local level to affluent workers, are growing faster in London than in the rest of Britain.

Looking at the earlier period of NES data between 1975 and 1990, there is some evidence that employment polarisation increased over this period for Britain considered as a whole, but not for London. The London labour market seems to have operated very differently during the 1970s and 1980s than during the 1990s. This is an important area for future research and plausible explanations such as increased international migration to London in the 1990s should be investigated further.

Ranking occupations according to the incidence of low pay in each occupation (rather than by average pay) does not change the results much for the period 1991-2001. A robustness check using data from the Labour Force Survey instead of the NES for 1993-2000 shows evidence of employment polarisation for London, but the evidence is much weaker for the rest of Britain.

1. Introduction

One of the main economic challenges for developed countries is how to increase employment, and governments have directed a vast amount of resources and policy thinking towards meeting this goal. The UK government can feel some satisfaction, as total employment has reached a record high of 29.04 million[1] and the working age employment rate increased to 74.5 per cent in the last quarter of 2006 (up from 70.4 per cent in 1992). While increasing the employment rate is a clear sign of success, the importance of the quality of the new jobs that are created should not be underestimated. Although there is an overall increase in the quality of employment, evidence has been found that a growing number of people are employed in low-paid jobs. It appears that our economy needs not only more managers, engineers and programmers, but also more sales assistants, waiters and cleaners.

The empirical evidence comes mainly from research in the US (Bluestone and Harrison 1986, Costrell 1990, Ilg 1996, Wright and Dwyer 2003, Autor et al 2006) but it has been shown recently that this might be applicable to European countries too. Two recent OECD reports (2001, 2003) found an increase in employment shares of high- and low-paid jobs and shrinkage in middle-paid jobs for the UK, Netherlands, Denmark and Belgium. Goos and Manning (2003) produced similar evidence and argued that polarisation in employment has emerged in Britain in recent decades, with more growth occurring in high-paid and low-paid jobs than in middle-ranking occupations.

However, an important question that has not been explored so far is the geography of these changes. This paper aims to address this issue, through empirical examination of the patterns of employment polarisation at the regional level in Britain over the past decade.

The paper starts with a brief review of the employment polarisation literature. This section reviews contributions to the 'job quality debate' that examine the theoretical and empirical basis for proliferation in low-wage employment. In the empirical part of the paper, econometric techniques are used to investigate spatial patterns of job polarisation in Britain. Specifically, I examine whether employment polarisation happens within regions or just across regions, and whether it is a predominantly urban phenomenon. New Earnings Survey (NES) microdata that span a long time period and are workplace-based are used for this purpose.

The main finding is that all regions experienced some degree of employment polarisation during the 1990s. London appears to have experienced greater employment polarisation compared to other regions.

The paper also investigates if there is an urban specificity in these processes by examining whether employment polarisation is stronger in metropolitan areas than in areas that are less urbanised. The main hypothesis here is that low-quality jobs, defined either as low-paid or low-skilled, depend increasingly on the growth in high-quality jobs. The presence of a growing high-income workforce in the economy generates demand for consumer services, leading to an increase in low-skilled, service-related employment. As these services apply mainly to the non-traded sector of the economy, this hypothesis implies close physical proximity of the low-skilled and high-skilled jobs. If large metropolitan areas have a higher share relatively of high-income workforce

[1] As measured from 1971, the period for which comparable figures have been available.

compared to the other geographical areas, this would lead to proliferation of low-wage service employment in these areas.

The empirical results do not entirely support this hypothesis, although there is evidence of strong employment polarisation in London compared to other regions. Therefore, the paper also addresses the differential performance of London in terms of employment polarisation. Analysis for different subgroups of the labour force such as male and female workers, as well as full-time and full-time male workers, is presented. It is suggested that the increasingly polarised female employment in London contributes more to the pattern that arises for all workers: employment polarisation is stronger for London than rest of Britain when examining all workers. In relative terms the distinction between London and rest of Britain is greater for women than men. In the following section, results from other time periods are presented for purpose of comparison, together with robustness checks and suggestions for future research. Conclusions are presented in the final section.

2. Theories on the emergence of employment polarisation

This section reviews the main contributions to the job polarisation literature before moving on to analyse spatial aspects of this polarisation in Britain.

Researchers and policymakers have focused on two main questions relating to employment polarisation: first, whether job polarisation is really happening and second, the causes of it. A third, related, question arises regarding the implications of polarisation for the economy and corresponding policy solutions, but this is a subject for future research.

Interest in employment polarisation has created a vibrant debate in academic and social policy circles, better known as the 'job quality' debate (Baumol 1968, Bluestone and Harrison 1986, 1988a, 1988b, Kosters and Ross 1987). Baumol (1968) instigated the discussion by arguing that technological progress favours specific sectors in the economy, with adverse effects on the survival of sectors that have limited scope for productivity increases, which may shrink or in extreme cases vanish completely. Alternatively, if the level of output of sectors less favoured by technology is to be maintained, then a growing share of the labour force would have to be employed in them. Baumol argues that maintaining such a relative output ratio could only happen if there were either price-inelastic and/or income-elastic demand (in the retail sector, for example), or government support (for hospitals, for example).

In the 1980s and 1990s a number of researchers, using two main approaches, examined whether job polarisation was emerging in United States. Under the first approach, low and high cut-off points are assigned to the earnings distribution, and the number of workers falling in each earnings stratum – that is, above the high cut-off point, between the high and the low cut-off points and below the low cut-off point – are counted each year.

Developing this methodology, Bluestone and Harrison (1986, 1988a, 1988b) argued that the number of low-paid jobs in the US increased between the mid 70s and the mid 80s. Plotting the low-wage share of the year-round full-time workforce over time for 1963 to 1986, a U-shaped curve emerged, with levels falling up to 1969 and rising after 1978 (1988b). This pattern was observed to different degrees for most demographic groups, most regions and most sectors of the economy. Controlling for business cycles, they tested for the determinants of low-wage proliferation and found rising productivity to be associated with declines in the low-wage share, while the fall in manufacturing employment led to a higher low-wage share. Baby booms and increased female labour force participation were not significant as independent variables. All the above factors accounted only for 40 per cent of the variation in the cyclically adjusted low-wage trend and Bluestone and Harrison (1988b) therefore point to institutional explanations for the remainder of the rise in the low-wage share.

Other researchers have also estimated net employment gains straight from the earnings distribution (Kosters and Ross 1987 for the US; Hamnett and Cross 1998 for London; Fitzner 2006 for the UK). However, there has been criticism of such an approach. For example, Costrell (1990) points out that it is sensitive to deflators and the endpoints used and therefore suggests an alternative that is independent of the earnings distribution. Specifically, he categorises industries according to average pay (in the mid 1980s) and subsequently estimates the net employment gains in these industry cells. Using this more conventional ranking of job quality, he presents empirical evidence for

the US (for the early 70s to mid-80s) that new jobs have been created increasingly in industries that pay lower wages.

In a similar vein, Ilg (1996) uses occupation-industry cells and ranks them according to pay in order to group them into high-, middle- and low-wage categories. In the US in the early 1990s the high-wage and to a lesser degree the low-wage categories gained employees while the middle-wage category declined. More recently, the OECD Employment Outlook reports of 2001 and 2003 showed that in the 1990s the UK, Netherlands, Denmark and Belgium experienced growth in the high- and low-wage sectors, while there was a decline in the middle-wage sector. Of note, for the period 1993 to 2001 in the UK, growth was stronger in the low- than the high-wage sector (OECD 2003).

Wright and Dwyer (2003) argue that examining different job categories, as classified by pay, is a preferable method as it portrays the earning potential embodied in the jobs rather than simply the changing patterns of individual earnings. Comparing the 1960s with the 1990s, they consider the possibility of elements of a 'servant' class arising in the future, as employment growth in the 1990s was mainly in well-paid high-tech jobs and in low-paid jobs in the retail and personal services sectors. Additionally, they provide evidence of increasing polarisation according to race in employment growth in the US.

In one of the few pieces of research focusing on Britain, Goos and Manning (2003) take a nuanced view of technological progress to account for the increased employment polarisation. They found evidence of increased polarisation in Britain in the period 1975-1999, using occupation and occupation-industry[2] categories. Using regression analysis, they found a U-shape curve relating employment growth to job quality measured by pay: in other words, greater employment growth in high-paid and low-paid jobs, accompanied by relative shrinkage in employment in average-paid jobs. Furthermore, they found evidence that employment polarisation alone can account for between roughly 30 and 50 per cent of the rise in wage inequality in Britain in recent decades, measured as the 90-50 and 50-10 percentile wage differentials respectively.

Acknowledging the limitations of pay as a measure for job quality, researchers have attempted to incorporate additional job characteristics into their analysis. Notably, Gittleman and Howell (1995) use labour segmentation theory. They found that the two highest 'contours' of job categories, created using cluster analysis, in terms of job quality[3], were gaining employees in US in the 1980s, the two middle ones were losing and the lowest two remained roughly at the same level. Similarly, Meisenheimer II (1998) argues that focusing only on pay might portray service jobs as bleaker than they are (also see OECD 2001). He also considers job characteristics such as employee benefits, job security, occupational structure and occupational safety to point out that the shift to services does not mean a shift to bad jobs. However, even using this enhanced job quality measure, Meisenheimer's research shows that the service industry includes not only some of the 'best jobs' but also some of the 'worst jobs'.

[2] This classification has both occupation and industry disaggregations. For example, it distinguishes between a manager in a fast food outlet and a manager in an IT company.

[3] Besides pay, this includes factors such as benefits (health insurance, pensions), skill requirements, working conditions, employment status, hours worked and institutional setting.

The most notable explanation so far to account for the emerging employment polarisation is based on research by Autor et al (2003) in the US, who start from the premise that technology can substitute for human labour in routine tasks but not in non-routine tasks. The latter, however, are not only found in high-skilled occupations but also in the low-skilled ones that will not become obsolete with technological progress. They argue that the concept of skill-biased technological change (SBTC)[4] (see Card and DiNardo 2005) that predicts a rise in the demand for skills, as productivity of the high-skilled increases, needs refining in order to account for the processes affecting the bottom tail of the skill distribution.

Building on this proposition, Goos and Manning (2003) argue that the non-routine tasks, which cannot be substituted by technology, are increasingly found in high-paid cognitive jobs, such as managerial, financial and creative occupations, but also in low-paid manual jobs like cleaning and bar work. In contrast, technology has managed to replace human labour in middle-wage jobs that involve routine tasks, whether cognitive (for example, clerical jobs) or manual (for example, factory jobs). Therefore, technological progress favours employment growth in both high- and low-paid jobs, while disfavouring the middle-paid jobs, and a polarisation of work emerges.

Although a number of subsequent papers elaborated on this initial proposition from Autor et al and provided further evidence (Spitz 2005 for Germany, Autor et al 2005, 2006, for the US), there was no spatial dimension to the technological progress on which it was based and this aspect of employment polarisation has remained largely neglected.

In this paper, therefore, I will refer to research from disciplines other than economics – mainly from urban sociology and geography – that have also examined the issue of employment polarisation and offered a number of important theories with more insight into the spatial dimension (Friedman and Wolf 1982, Mollenkopf and Castells 1991, Sassen 1991). Specifically, it has been suggested that the changing nature of the global economy leads to the formation of 'world cities', whose economies are boosted by the growth of the financial services and the new economy sectors[5]. Although, these world cities are characterised by great economic dynamism and prosperity, they also feature social and economic polarisation. Saskia Sassen (1991) has been of the most prominent researchers to develop this argument, the main idea being that the proliferation of a high-income workforce in the large metropolitan centres generates a consumer demand for goods and services that are supplied by low-paid workers.

In more detail, Sassen (1991, 2001) argues that there has been a change in contemporary social and employment norms that tends to increase the number of low-paid jobs needed by the new growth sectors and to shape work processes in more informal and casual forms of employment. Specifically, globalisation and deregulation of financial markets have boosted producer services and the finance sector, resulting in major increases in their profits. These new growth sectors concentrate in global cities, where global command functions are strategically situated to take advantage of the available infrastructure and facilities. The consequent expansion of the high-income

[4] This is the leading proposition put forward as an explanation to the rising in equalities in earnings that occurred in the 1980s and 1990s. It says that technological change is biased towards higher skills and therefore technologically-driven increases in productivity of high-skilled labour lead to higher demand for skills and higher wages.

[5] These include newer, high-growth industries and business sectors on the cutting edge of technology, such as biotechnology, IT and the Internet.

workforce has led to residential and commercial gentrification and engendered a new culture of consumption in these cities, associated with high demand for expensive, non-standardised, non-mass-produced goods and services. In Sassen's words, 'high income residential and commercial gentrification is [labour] intensive and raises the demand for maintenance, cleaning, delivery, and other types of low-wage workers' (2001: 286).

It is only very recently that attempts have been made to empirically verify whether the proliferation of an urban high-income workforce can have positive effects on the employment prospects of low-skilled workers at the local level. Manning (2004) has developed a model that predicts that demand for low-skilled workers is increasingly linked to the non-traded sector of the economy and is increasingly dependent on physical proximity to more skilled workers. The mechanism is consumer demand based on the inequality in earnings between the high- and low-skilled. Manning found supporting evidence when the model was tested on a panel of 242 American cities between 1994 and 2002. Specifically, the employment-population ratio of low-skilled workers was found to be higher in cities with higher proportions of skilled workers.

3. Examining employment polarisation in Britain

The work of Goos and Manning (2003) considered employment polarisation in Britain at the national level only. The empirical analysis below extends their approach and methodology to explore regional and broader geographical patterns in employment polarisation. The available data sources are presented first, followed by empirical investigation.

Data sources

The main surveys in the UK that produce microdata on labour statistics are the New Earnings Survey (NES) and the Labour Force Survey (LFS). The NES is used for the purposes of this research, as it is more appropriate, with information on wages as far back as 1975. The LFS, though more representative as a sample, does not have information on earnings until 1993. It is also residence-based and therefore therefore commuting is less of an issue when trying to examine the co-location of high-paid and low-paid jobs.

The NES is the largest survey on labour statistics with information on approximately 160,000 employees each year. It is an employer-based survey and covers employees whose National Insurance (NI) number ends with a specific pair of digits, which amounts to approximately 1 per cent of the NI pool. The same pair of digits is used each year and therefore in the panel data of the survey (the New Earnings Survey Panel Data or NESPD), individuals can be tracked over the years.

There are some disadvantages to the NES, however. For example, it does not cover employees whose weekly pay is below the lower threshold for paying National Insurance contributions, which means there is an under-representation of low-paid workers[6]. This is problematic, especially as it means many part-time employees are excluded. The NES also misses employees who change jobs between January, when the sampling frame is conducted each year and April, when the actual survey takes place.

Another problem arises from the fact that in 1991 the Office for National Statistics (ONS) changed the occupational coding it used for the NES (to 'SOC90'), after which it was not possible to make a full comparison with the earlier codes. For this reason, this report mainly focuses on the period 1991-2001, the latest available time series data from NES that has a consistent occupational coding over a long timescale. For comparison purposes, the years 1975-1990 are also examined. Results for 1975-2001 have been produced using a probabilistic mapping algorithm[7], although these results should be considered with some caution and used only for comparison purposes.

To look at geographical disaggregation, the 11 Standard Statistical Regions (SSRs) of Britain are used as the main reference point. The NES areas are smaller geographical units and are aggregated to compile these 11 regions. Larger clusters, such as Metropolitan and non-Metropolitan Britain as well as London and Rest of Britain, are composed from these NES areas in order to investigate broader spatial patterns in employment polarisation. For all the results in this paper, the sample of the NES employees is restricted to those of aged between 16 and 64.

[6] Of course, the informal sector, which includes a significant part of the low-paid workers is not covered either.

[7] Devised by Steve Gibbons

Defining job quality

First, it is important to examine the concept of 'job quality'. There is an interesting literature on various definitions of job quality and corresponding measurements (see Gittleman and Howell 1995, Meisenheimer 1998, OECD 2001). Besides pay, a long list of job characteristics including job security, employee benefits, health and safety in the workplace, work organisation and job satisfaction are all important determinants of job quality. Nevertheless, pay remains important and has been considered to be a simple proxy for job quality (Wright and Dwyer 2003). It is a key attribute and it is imperative that it is examined on its own. Pay determines to a large extent the income of the worker and as a result his or her standard of living, while at the same time at the macro level it affects the wage inequality of the economy. Furthermore, to the extent that pay is correlated with skill level, looking at employment changes in the wage distribution can provide information on the employment prospects of different skilled groups.

For these reasons as well as availability of data, this paper follows the approaches of Ilg (1996) and Goos and Manning (2003) and uses median pay in order to rank occupations and classify them in 'job quality categories'. Employing the three-digit standard occupational classification (SOC90) for the basis year 1991, a ranking of 366 occupation cells according to median hourly pay is obtained (see Tables 1 and 2). A ranking of the occupations according to the incidence of low pay is also attempted as an alternative to the main ranking according to median pay. It should be stressed that a low or high 'job quality category' corresponds only to pay and nothing more. So, for example, care occupations, which require great skill, rank poorly due to their financial recompense[8].

Employment polarisation is defined as a proportionally large number of individuals employed in low-paid and high-paid occupations in the labour market relative to 'average-paid' occupations. So it is necessary to investigate whether employment in the occupation cells classified as low- and high-paid has grown alongside a reduction in the size of mid-pay occupation cells.

In this section results are presented according to the median pay ranking. This occupation pay rank does not change much over time: the correlation coefficient of the rank in 1991 and 2001 is 0.95. The few changes that do occur are mainly in occupations with small samples and they do not much affect the regression results of the following sections, which are weighted for size.

Table 1 shows occupations that are at the bottom of the pay ranking in 1991, along with their employment growth over the following 11 years. It can be seen from the table that 'job quality category 1' is made up mainly of occupations that are related to low-skill services, as well as care occupations. Many of these, especially those that employ large numbers of people, grow faster over this 11-year period. For example, the bar staff occupational cell increased its employment share by 32 per cent and childcare occupations by 20 per cent. The sales assistant category, which employes the most people of all 366 occupations, increased its share by 47 per cent.

Table 2 presents the highest-paid occupations. Most of these are in business and finance as well as the new economy sectors. Most experienced an increase in employees

[8] Therefore, a low-skill job in the context of this paper should be better seen as one that requires few qualifications, and a high-skill job one that requires more.

between 1991 and 2001, with the exception of educational occupations. The occupational categories that experienced most growth were marketing and sales managers (employment share rise of 54 per cent) and financial institutions managers (73 per cent).

Most of the occupation cells at the lowest end of the pay scale are labour intensive. A simultaneous increase in the employment shares of both the highest paid and the lowest paid occupations in the same geographical area would be consistent with the hypothesis of a growing high-income workforce boosting the demand for low-paid services. The rest of this paper goes on to investigate this in more detail.

Empirical investigation

This paper uses regression analysis and other methodologies to estimate the amount of employment polarisation into low-paid jobs and high-paid jobs.

Each of the 366 occupation cells under the three-digit SOC90 classification is ranked from worst to best according to median hourly pay and then grouped into 'job quality categories', with each category containing 10 per cent of the employees nationally for 1991. On this basis, 'job quality category 1' contains workers from the lowest paid occupations comprising 10 per cent of all workers in Britain in 1991. If in 2001 the number of workers in these specific occupations has increased or decreased relative to workers in other occupations, then 'job quality category 1' will form a larger or smaller share of the labour force than the initial 10 per cent. Similarly, if in one region the 'job quality category 1' forms a larger part than 10 per cent, this means that the workers of the lowest paid occupations are overrepresented in this region.

Tables 1 and 2 show, respectively, the occupations that constitute the bottom and the top 'job quality categories' according to pay.

The percentage point change of the employment share of the different job quality categories is presented in Table 3 and Figure 1. Over the period 1991-2001 for the whole of Britain, it can be seen that the share of good jobs increased, as did to a lesser extent the share of bad jobs, while the share of mid-quality jobs declined. This finding is very similar to those of Goos and Manning (2003).

It is interesting to see what happens at the level of the different regions. Generally, with the exception of East Anglia, high- and low-paid jobs are increasing their share and the mid-paid share is decreasing. Out of all the regions, London has the greatest growth in high-paid jobs but also a significant increase in low-paid jobs. This pattern is weaker for the other regions and for some the growth in low-paid jobs is very small. In Figure 1, the changes in Britain overall, London and the South East are compared.

Table 4 shows the employment shares of job-quality categories 1 (lowest pay) and 10 (highest pay) annually from 1991 to 2001. Using correlation coefficients, it was investigated whether the lowest and highest pay categories are moving together and if this relationship is stronger for some regions than others. The correlation was shown to be strongest for London with a coefficient of 0.95, followed by the South West with 0.87. This simply tells us that there is more co-movement of employment in job quality categories 1 and 10 for London than for the other regions. Specifically, the employment share of job quality category 1 was 9.1 per cent of the London labour force in 1991,

which rose steadily each year, until it reached 11 per cent in 2001. Job quality category 10 experienced a similar but faster growth from 14 per cent in 1991 to 19.4 per cent in 2001. This simultaneous increase in the lowest and highest paid occupations over this 11-year period shows that our result is not sensitive to the selection of two specific points in time.

Regression analysis of employment polarisation

The dependent variable in this paper's regressions is the percentage growth of the employment share of the occupational cell, as discussed above. The regressor is the rank of the occupational cell according to median pay in the initial year of the period under analysis (1991). Regressions are weighted by occupational cell size in the initial year. Using a quadratic form in the regression, a U-shape relationship of the change in employment and rank can be detected. Experimenting with higher degree polynomials has not given statistically significant results for the higher degree coefficients, for example when including a cubic term. Therefore this paper focuses on the quadratic regression presented below and in a subsequent section the results from a higher degree polynomial and a kernel density regression are presented as a check on robustness.

$$\Delta n_i = \beta_0 + \beta_1 q_{i0} + \beta_2 q^2_{i0} \quad (1)$$

(Δn_i : percentage growth in employment share of occupational cell i;
q_{i0}: rank according to pay in 1991 of occupational cell i)
(see Table 5)

The national regression for 1991–2001 verifies the findings of Goos and Manning (2003) of an emergence of employment polarisation in Britain. Their study used log median wages as regressors and examined an earlier time period (mid 1970s to late 1990s). In this paper's regressions, the coefficient of the rank (β_1) is negative and the coefficient of the square of the rank (β_2) is positive, implying a U-shape relationship between growth of employment shares of the occupations and the initial occupation pay rank (taken in 1991).

This is the case for the whole Britain and the 11 Standard Statistical Regions to which separate regressions have been applied. The linear and the quadratic terms are significant for all regions, although for some regions the quadratic regression seems to have more explanatory power than others. Higher values for the quadratic term and lower values for the linear term indicate a stronger U-shape and therefore stronger employment polarisation. The significance of these coefficients and the R^2 provide information on the explanatory power of the employment polarisation proposition.
It appears that London is the region with the strongest U-shape, followed by the West Midlands and the rest of the South East. In contrast, the North and Wales appear to have flatter U-shapes and the evidence for employment polarisation is weaker for these regions. In Figure 2, which shows fitted regressions curves for all regions, the curve for London stands out in terms of steepness, but it is harder to tell the difference between the other regions.

Figure 3 presents scatter plots of the growth of employment share by occupation and pay rank for London and the South West. The U-shape curve is evident for both

regions, although the increased polarisation for London is hard to notice just from the scatter plots unless the size of the occupational cells in 1991 is taken into consideration.

As London appears to be distinct from the other regions in terms of the magnitude of its coefficients and their high explanatory power, it is necessary to test the hypothesis. When doing a regression with London as the basis allowing for interactions of the coefficients for the other regions, the β_2 coefficient for London is significantly different than those for East Midlands (10 per cent significance level), Yorkshire (10 per cent), the North West (5 per cent), the North (1 per cent) and Wales (1 per cent). This suggests a 'London specificity' approach (which is further tested below).

A pooled regression with regional fixed effects is given in the last row of Table 5. However, the regional fixed effects for the regions are not found to be jointly significant.
$\Delta n_{ij} = \beta_{j0} + \beta_1 q_{ij0} + \beta_2 q^2_{ij0}$
(β_{j0}: regional dummy variable)

In sum, this analysis shows that employment polarisation appears in all regions but to different degrees. The empirical evidence does not support the theoretical possibility that employment polarisation can arise at the national level only, because some regions are gaining high-paid jobs and others are gaining low-paid jobs. London is found to have the strongest employment polarisation; this is explored further in the following section.

Urban-specific or London-specific?

Explanations that rely solely on technological progress, like the one proposed by Autor, Levy and Murnane (2003), do not have a spatial element and therefore may account for the national job polarisation but not for the distinct strong pattern of polarisation that has emerged for London. Therefore, explanations with a spatial mechanism should also be used to account for geographical patterns.

To address whether employment polarisation is urban-specific, stronger in areas that are predominantly metropolitan, the NES areas have been classified as metropolitan and non-metropolitan, and separate quadratic regressions applied. Here, 'metropolitan' Britain consists of Greater London (33 local authorities) and the six former metropolitan counties of the West Midlands, South Yorkshire, West Yorkshire, Greater Manchester, Merseyside, and Tyne and Wear. In 1991 these areas accounted for 32 per cent of the British population. 'Non-metropolitan' Britain encompasses the remaining 58 NES areas.

The results are presented in Table 6. The regressions predict a steeper U-shape curve for employment growth for metropolitan than non-metropolitan Britain. Nevertheless, both the quadratic and the linear term are not statistically different across the two. This applies to a large extent for all workers and the various subgroups of the labour force that have been looked at (men, women, full-time workers, full-time male workers). As a result, evidence to support the urban specificity proposition is not found from these regressions.

The differential performance for London is now addressed. Table 7 shows similar separate regressions for London alone and for Britain excluding London ('rest of Britain'). As expected, the U-shape curve predicted for London is much steeper than

that for the rest of Britain, indicating stronger employment polarisation in London. This is the case for all workers and the various subgroups examined, though to differing degrees (Figures 4i-4iv).

The differences in the coefficients of the linear term (β_1) and the quadratic term (β_2) between London and the rest of Britain are much more notable than between metropolitan and non-metropolitan Britain (Table 6). Hypothesis testing verifies this; specifically, the hypothesis that the coefficients of the linear and the quadratic term are jointly equal for London and the rest of Britain is rejected at the 5 per cent significance level. This applies for all the subgroups examined. The coefficient of the square of the rank (β_2) was found to be significantly different between London and the rest of Britain for all workers, for women and for full-time workers.

Examining the various subgroups of the labour force using the regression tables also reveals interesting patterns. There is no employment polarisation among female workers in the rest of Britain – as shown by the way the curve is slightly J-shaped and the linear and quadratic terms are not significant. Nevertheless, in London there is increased employment polarisation among women, as shown by a strong U-shape curve. For men too, the U-shape curve is steeper for London than for the rest of Britain. However, in relative terms the distinction between London and rest of Britain is greater for women than men. Therefore, it seems that the increasingly polarised female employment in London contributes more here to the pattern that arises for all workers.

Some interesting observations can be made, too, when looking at full-time employment only. It needs to be asked whether the polarising pattern also applies for full-time workers only. It is commonly asserted that where polarisation occurs, it may be due to increased employment of part-timer workers in low-paid jobs. However, my findings refute that polarisation is a phenomenon driven by the part-time sector. Applying similar regressions for the full-time workers sub-group, employment polarisation is observed at the national level as well as at the London level and at the rest of Britain level. In Figure 4iv, London is shown to have greater employment polarisation for full-time workers than the rest of Britain. Nevertheless, when we exclude full-time female workers from the sample, the relative growth of employment in low-paid occupations compared with average-paid occupations appears to be the same in London and the rest of Britain (Fig.4v).

A similar analysis considering only part-time employees has been attempted, with the caveat that there is under-sampling of the part-time workers in the NES dataset. For this group, the quadratic regression appears to have very low explanatory power and the coefficients are insignificant. Checking for a linear relationship by omitting the quadratic term in the regression specification (1), a significant negative relationship is found between the pay rank of the occupation and the growth of the employment share[9]. In other words, there were more part-timer employees in low-paid occupations and fewer part-timer employees in high-paid occupations in 2001 compared to 1991. This was the case for both London and the rest of Britain.

This analysis has shown that although it is true that there has been an increase in low-paid, part-time jobs, the occurrence of employment polarisation is not dependent on this being the case, as polarisation can also arise regarding full-time workers. This finding is strengthened by looking at occupation in terms of labour-hours rather than

[9] Results are available from the author on request.

number of employees. In the regression specification, the dependent variable is now the percentage growth in the share of the labour-hours of the occupation, out of the total number of labour-hours. The results are roughly the same (Table 8), with polarisation again occurring. London still appears to experience higher employment polarisation than the rest of Britain, although the significance of this differential performance is in this case weaker (p-value is just 0.13 when comparing the quadratic terms).

The above analysis suggests that employment opportunities in the lowest paid jobs, which are mainly associated with local consumer and leisure-related services aimed at affluent workers, are growing faster in London than in the rest of Britain. If it is expected that low-skilled workers would fill these positions, then it follows that employment prospects for the low-skilled are growing faster in London (of course, this argument ignores supply-side considerations).

Other time periods and robustness checks

I have also experimented with other time periods and have obtained qualitatively similar results. Specifically, for the periods 1992–2001 and 1991–2000, London appeared to experience stronger employment polarisation than the rest of Britain.
It is interesting to examine whether employment polarisation occurred in earlier decades, and look at its geographical patterns. To that end, similar quadratic regressions were employed for 1975–1990, presented in Table 9. This uses 428 occupations in total, using the KOS (Key list of Occupations for Statistics) coding. Although employment polarisation appears to emerge nationally, the evidence is weaker for London. The quadratic regression does not perform well for London, as the linear term is not significant and the quadratic term is only weakly significant. Therefore, there is the possibility that employment polarisation does not adequately describe the processes in London for 1975–1990 and alternative explanations should be examined, such as skill-biased technological change or Hamnett's account (1996) of the 'professionalisation' of London.

International migration could be key to the differential performance between the two decades; as Buck *et al* (2002) suggest, the absence of abundant migrant labour in London in the 1980s may explain why London did not experience a 'global city' type polarisation like that which occurred in New York. Buck *et al* argue that the increased influx of foreign workers into UK in the 1990s may have changed that situation and 'contributed to a faster rate of consumer service employment growth during [that] decade' (2002: 362). May *et al* (2007, forthcoming) have developed this notion and theorised that there is a new migrant division of labour emerging in London, which they back by evidence from interviews with low-paid migrant workers. Another plausible explanation might be based in the partial success that the UK government had in the 1990s, bringing previously economically inactive people back into employment. Whether or not this might explain the spatial patterns that emerged will be left to future research.

Regional regressions for the period 1975–2001 have also been performed, producing evidence of employment polarisation for all regions, with the strongest appearing for London and the West Midlands[10]. But, as previously explained, the lack of a fully

[10] Results are available from the author on request.

consistent mapping of the occupational codes from before 1990 to after that year has made it necessary to focus this research on the period 1991–2001.

Figure 1 should make clear why a quadratic regression provides the best fit but I have also experimented using higher degree polynomial regression specifications. Repeating the exercise for London and the rest of Britain with higher degree polynomials, the higher degree coefficient is never significant (see Table 10 for a third degree polynomial). In Figure 5, a kernel estimate regression of the mean change in employment share of the occupations on the rank is presented. Both curves have an approximate U-shape and it can be seen that the London curve is above the rest of Britain curve at the point of both tails, revealing stronger relative employment growth for the low-paid and high-paid occupations.

An alternative method for the ranking of occupations has also been tried, looking at the incidence of low pay. Occupations have been ranked according to their percentage of employees earning less than the national median pay in 1991. The lower is the percentage, the higher the rank of the occupation. For the few occupations that had no employees in that category, their rank was determined by the percentage of individuals earning less than double the national median pay in 1991. The correlation of the rank obtained this way and the rank obtained by the median pay of the occupation is remarkably high (0.973). As expected, applying similar quadratic regressions, the results do not change much (see Table 11). Employment polarisation is found to be stronger for London than the rest of Britain. The significance of the difference now is weaker, as the p-value when comparing the linear and the quadratic terms jointly between London and the rest of Britain is 0.11.

Finally, the main regression was repeated for London and the rest of Britain using the LFS dataset, intended as a check on robustness. Pay data from the LFS is available from 1993 onwards and in order to have a consistent occupational coding (SOC90), the period 1993–2000 has been used. The results are presented in Table 12. Employment polarisation appears to emerge for London but evidence is much weaker for the rest of Britain. This might be due to the shorter time period that the LRS regression covers – eight years, compared with eleven in the NES regression. Also, we use a reduced number of occupational groupings in the regression due to the smaller sample size of the LFS.

4. Concluding remarks

Although employment growth is a clear sign of the success of government policies, the quality of the jobs generated and the possible emergence of employment polarisation should also be part of the discussion. In this paper, the spatial patterns of employment polarisation in Britain have been examined. Rather than some regions gaining high-paid jobs and other regions gaining low-paid jobs, employment polarisation is found to emerge in all regions to some extent. London appears unique in terms of the magnitude of its employment polarisation. It experiences disproportionately higher growth in the employment share of both high-paid jobs and low-paid jobs compared to other regions. In that respect, employment opportunities in the lowest paid jobs, mainly associated with local consumer and leisure-related services, are growing faster in London than in the rest of Britain. If it is expected that low-skilled workers would fill these positions, then it follows that employment prospects for the low-skilled are growing faster in London.

An explanation based solely on technological progress, like that made by Autor *et al* (2003), does not have a spatial element and therefore it may account for job polarisation that emerges nationally but not for the distinct stronger pattern of polarisation present in London. Therefore, to account for the geographical patterns observed, explanations with a spatial mechanism should also be examined alongside Autor *et al*'s proposition.

The empirical evidence does not support an urban-specific thesis for increased employment polarisation in areas that are predominantly metropolitan. Other explanations, like world city or global city propositions based on consumption-driven demand, or international outsourcing of mid-paid occupations being stronger in London, might account more for the distinct employment polarisation patterns in these areas, but further research is needed. Empirical analysis of various subgroups of the labour force can reveal interesting points about the spatial patterns of employment polarisation; employment polarisation seems not to be driven solely by the part-time sector, as it also emerges for the full-time workers sub-group. Additionally, it appears that the increasingly polarised female employment in London contributes more to the pattern that arises for all workers. Last but not least, it has been shown here that employment polarisation emerged in London in the 1990s, and not before, which points to international migration being as an important factor in understanding polarisation, which warrants further investigation.

TABLES

(Shading in the tables is for visual aesthetic purposes. In Tables 1 and 2, highlighting indicates specific points of interest.)

Table 1. Lowest occupations in terms of median wage in the UK, 1991

Job pay rank 1991	Label of occupation cell	Job quality category 1991	Median wage 1991	Employment share (%) in 1991	Growth of share 1991–2001	Growth rank
1	Hairdressers, barbers	1	3.44	0.189	-5.79	218
2	Bar staff	1	3.70	0.636	31.89	300
3	Petrol pump forecourt attendants	1	3.82	0.091	-38.74	68
4	Kitchen porters, hands	1	3.92	0.704	-23.34	136
5	Waiters, waitresses	1	3.99	0.406	15.92	273
6	Launderers, dry cleaners, pressers	1	4.06	0.221	-33.27	88
7	Other childcare and related occupations	1	4.09	0.624	29.06	297
8	Counterhands, catering assistants	1	4.15	0.950	-0.12	234
9	Cleaners, domestics	1	4.17	3.348	-24.74	128
10	Sales assistants	1	4.21	4.055	47.11	323
11	Sewing machinists, menders, darners and embroiderers	2	4.24	0.696	-59.91	17
12	Dental nurses	2	4.29	0.111	23.46	289
13	Retail cash desk and check-out operators	2	4.30	0.693	-8.40	210
14	Hotel porters	2	4.43	0.043	-8.67	208
15	Shelf fillers	2	4.45	0.226	26.66	294
16	Other health associate professionals	2	4.47	0.030	83.77	347
17	Domestic housekeepers and related occupations	2	4.52	0.025	158.41	363
23	Beauticians and related occupations	2	4.69	0.033	38.90	310
26	Care assistants and attendants	2	4.82	1.103	83.84	348
29	Receptionists	2	4.89	0.635	38.79	309
43	Educational assistants	2	5.14	0.245	240.26	366

Note: The data are from the NES dataset referring to 3-digit occupational cells of the SOC90 classification. Wages are median real hourly wages deflated for 2001 prices.
Highlighting indicates occupations of substantial size that experience high employment growth.

Table 2. Highest occupations in terms of median wage in the UK, 1991

Job pay rank 1991	Label of occupation cell	Job quality category 1991	Median wage 1991	Employment share (%) 1991	Growth of share 1991-2001	Growth rank
366	General managers; large companies and organisations	10	31.24	0.103	115.92	359
362	Treasurers and company financial managers	10	19.50	0.334	73.11	342
360	Medical practitioners	10	17.87	0.384	25.18	291
359	Management consultants, business analysts	10	17.53	0.107	98.55	351
354	Bank, building society and Post Office managers (except self-employed)	10	16.40	0.337	32.15	301
353	Computer systems and data processing managers	10	16.19	0.327	75.44	344
352	Higher and further education teaching professionals	10	16.15	0.882	-27.15	111
351	Solicitors	10	15.97	0.178	57.17	330
350	University and polytechnic teaching professionals	10	15.90	0.265	103.10	353
348	Special education teaching professionals	10	15.58	0.186	0.25	236
344	Secondary (and middle school deemed secondary) education teaching professionals	10	15.20	1.744	-2.31	229
343	Electrical engineers	10	15.12	0.176	-13.70	188
340	Software engineers	10	14.71	0.221	154.95	362
338	Primary (and middle school deemed primary) and nursery education teaching professionals	10	14.45	1.459	14.20	271
335	Underwriters, claims assessors, brokers, investment analysts	10	13.96	0.472	27.94	295
334	Electronic engineers	10	13.87	0.112	-40.66	62
333	Marketing and sales managers	10	13.76	1.534	54.29	327
332	Personnel, training and industrial relations managers	10	13.64	0.242	71.78	340
317	Other financial institution and office managers	9	12.48	0.927	73.03	341
312	Other managers and administrators	9	12.31	1.510	-1.21	231
308	Police officers (sergeant and below)	9	12.14	0.755	6.03	256
305	Computer analysts/programmers	9	11.95	0.766	39.64	311
303	Production, works and maintenance managers	9	11.82	1.166	6.77	259

Note: The data are from the NES dataset referring to 3-digit occupational cells of the SOC90 classification. Wages are median real hourly wages deflated for 2001 prices.
Highlighting indicates occupations of substantial size that experience high employment growth.

Table 3. Percentage point difference in employment share by 'job quality category', 1991–2001

Job category	Great Britain	London	South East	East Anglia	South West	West Midlands	East Midlands	Yorkshire & Humb.	North West	North	Wales	Scotland
1	1.25	1.87	1.03	-0.13	2.00	1.19	1.89	1.31	1.04	1.13	0.33	0.44
2	0.60	2.07	0.52	0.42	0.91	0.70	-0.89	-0.15	0.37	0.04	0.07	0.65
3	1.68	0.19	1.06	-0.01	1.55	1.38	2.85	2.55	2.33	3.24	2.44	2.37
4	-1.23	-2.98	-1.59	-0.16	-1.04	-0.55	-1.00	-0.85	-0.30	0.20	-1.37	-1.49
5	-1.27	-1.58	-1.29	-1.38	-1.70	-1.12	-0.81	-1.06	-1.39	-1.86	-0.44	-0.98
6	-2.47	-3.59	-2.44	-2.29	-2.89	-3.55	-1.80	-1.66	-2.06	-1.32	-1.95	-1.88
7	-1.83	-1.99	-1.52	-1.53	-1.00	-2.12	-1.62	-2.42	-2.15	-1.52	-1.29	-2.55
8	-0.69	-0.74	-0.61	1.48	-0.42	-0.20	-1.78	-1.47	-0.47	-1.90	-0.39	-0.60
9	1.28	1.33	1.60	1.13	1.09	1.40	1.53	1.89	0.73	0.38	0.97	1.56
10	2.69	5.42	3.24	2.48	1.51	2.88	1.63	1.86	1.89	1.61	1.64	2.47

Source: NES dataset.

1. Each of the 366 occupation cells (3-digit SOC90) is ranked from worst to best according to median hourly pay in 1991 and then grouped into 'job quality categories' so that each category contains the 10 per cent of the employees nationally for 1991. On this basis, job quality category 1 contains workers from the lowest paid occupations and category 10 of the highest paid ones. While the employment share of each category is approximately 10 per cent for GB in 1991, it can be less or more for the individual regions depending if that category is under- or over-represented in the region.

Table 4. Employment shares of least-paid and highest-paid jobs, 1991–2001

	Category	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	*Correlation*
London	1	9.14	9.30	9.52	10.08	10.11	10.05	10.41	10.73	10.36	10.98	11.02	*0.95*
	10	13.99	14.91	15.50	15.88	16.38	16.86	17.32	17.61	17.97	18.15	19.41	
South East	1	11.08	11.61	11.75	12.25	12.31	12.31	12.19	11.86	11.99	11.82	12.12	*0.35*
	10	11.05	11.45	11.33	11.14	11.89	12.25	12.84	12.64	13.17	13.51	14.28	
East Anglia	1	11.47	11.63	12.18	11.69	11.94	11.14	10.88	12.05	12.08	11.94	11.34	*-0.27*
	10	8.31	8.97	9.14	9.45	9.30	9.73	10.28	9.55	9.68	10.41	10.79	
South West	1	11.94	12.20	12.19	12.53	13.00	12.58	12.76	12.67	12.96	13.77	13.94	*0.87*
	10	9.68	9.94	10.13	10.40	10.52	10.55	10.40	10.24	10.18	10.66	11.18	
West Midlands	1	11.02	11.33	11.66	11.51	11.60	11.38	12.03	11.81	12.10	11.44	12.21	*0.58*
	10	8.61	9.17	9.65	9.50	9.56	9.37	9.30	9.64	10.04	10.91	11.49	
East Midlands	1	10.54	11.10	10.99	11.57	11.02	11.24	11.78	12.02	12.34	12.63	12.43	*0.64*
	10	8.25	8.62	8.09	8.56	8.58	8.39	8.10	8.34	8.56	9.38	9.87	
Yorkshire	1	12.06	12.30	12.58	12.93	12.49	12.74	14.02	14.05	12.90	12.72	13.37	*0.40*
& Humberside	10	8.43	9.12	8.86	8.78	9.16	9.13	9.16	9.43	9.84	9.85	10.29	
North West	1	11.29	11.68	12.00	11.75	11.47	11.58	12.02	11.93	11.81	11.75	12.34	*0.60*
	10	8.79	8.94	9.19	9.42	9.48	9.84	10.05	9.72	10.40	10.46	10.68	
North	1	13.13	12.81	13.14	13.98	13.64	13.81	14.17	14.50	14.73	14.01	14.26	*0.70*
	10	6.99	8.06	6.78	8.08	8.01	7.76	8.15	8.28	8.46	8.49	8.60	
Wales	1	12.75	13.42	13.29	13.74	13.76	12.76	12.94	13.35	13.28	12.81	13.13	*-0.13*
	10	8.00	8.36	7.71	8.14	8.09	7.33	8.32	8.50	9.02	9.83	9.71	
Scotland	1	12.31	12.25	12.78	13.48	13.40	13.23	13.36	13.21	12.94	12.81	12.72	*0.35*
	10	8.95	8.09	9.32	9.63	9.62	9.77	10.11	10.33	10.94	10.89	11.40	

Source: NES dataset.
Notes: The employment shares of the job quality categories 1 (lowest pay) and 10 (highest pay) are tracked annually between 1991 and 2001. The correlation coefficient shows if there is co-movement of the two for each region.

Table 5. Regional regressions and regression for Britain with regional fixed effects, all workers, 1991–2001

Regression specification	Available occupations	Geographical scale	β_0 (const.)	β_1	β_2 (x100)	R^2
3-digit occupations (total: 366)	366	Great Britain	18.51 (1.50)	-0.4089 (-2.49)	0.124 (3.52)	0.12
	347	Greater London	35.82 (1.59)	-0.7841 (-3.11)	0.241 (3.91)	0.20
	354	Rest of South East	15.62 (1.35)	-0.4187 (-3.09)	0.137 (3.66)	0.11
	328	East Anglia	6.30 (0.74)	-0.2880 (-2.18)	0.115 (2.51)	0.04
	344	South West	20.93 (1.30)	-0.4294 (-2.22)	0.130 (2.53)	0.07
	352	West Midlands	20.58 (1.91)	-0.4673 (-3.57)	0.148 (3.93)	0.09
	352	East Midlands	15.22 (1.13)	-0.3202 (-1.94)	0.096 (2.16)	0.04
	355	Yorkshire & Humberside	15.79 (1.29)	-0.3469 (-2.43)	0.107 (2.77)	0.05
	356	North West	15.74 (1.31)	-0.3251 (-2.30)	0.097 (2.49)	0.04
	337	North	14.38 (1.30)	-0.2747 (-1.93)	0.080 (1.87)	0.02
	334	Wales	8.40 (0.77)	-0.2252 (-1.59)	0.077 (1.88)	0.02
	355	Scotland	14.22 (0.88)	-0.3538 (-1.94)	0.114 (2.39)	0.05
	3,814	GB with regional fixed effects	18.19 (3.79)	-0.4253 (-7.54)	0.135 (8.93)	0.07

Notes: The data are from NES referring to 3-digit occupational cells from the SOC90 classification (total 366). Regressions are weighted by occupational cell size in 1991.
$\Delta n_i = \beta_0 + \beta_1 q_{i0} + \beta_2 q_{i0}$
(Δn : percentage growth in employment share of occupational cell i;
q_{i0}: rank according to pay in 1991 of occupational cell i)
T-statistics in parentheses. Coefficients of β_2 are multiplied with 100.

Table 6. Regressions metropolitan vs. non-metropolitan Britain, 1991–2001

Regression specification	Available jobs	Geographical scale	β_0 (const.)	β_1	β_2	R^2
All workers	366	Great Britain	18.51 (1.50)	-0.4089 (-2.49)	0.124 (3.52)	0.12
All workers	366	Non-metropolitan	14.86 (1.26)	-0.3457 (-2.60)	0.107 (3.03)	0.09
	363	Metropolitan	25.46 (1.77)	-0.533 (-3.40)	0.158 (4.09)	0.16
Male	360	Non-metropolitan	41.71 (3.64)	-0.6489 (-5.07)	0.176 (5.31)	0.18
	360	Metropolitan	57.96 (4.39)	-0.8533 (-6.07)	0.223 (6.50)	0.23
Female	314	Non-metropolitan	-1.48 (-0.12)	-0.1670 (-0.79)	0.095 (1.34)	0.07
	300	Metropolitan	7.07 (0.46)	-0.4446 (-1.88)	0.212 (2.63)	0.14
Full-time workers	366	Non-metropolitan	14.94 (1.64)	-0.3790 (-3.97)	0.123 (4.59)	0.14
	363	Metropolitan	21.20 (2.26)	-0.5060 (-5.25)	0.160 (6.23)	0.20
Full-time male	359	Non-metropolitan	28.38 (3.05)	-0.4984 (-4.72)	0.144 (5.03)	0.14
	360	Metropolitan	37.42 (4.16)	-0.6285 (-6.24)	0.176 (6.56)	0.16

1. NES data refer to 3-digit occupational cells from the SOC90 classification (total 366). Regressions are weighted by occupational cell size in 1991.
$\Delta n_i = \beta_0 + \beta_1 q_{ai} + \beta_2 q_{ai}$ (Δn : percentage growth in employment share of occupational cell i; q_{ai}: rank according to pay in 1991 of occupational cell i); t-statistics in parentheses.
2. 'Metropolitan Britain' consists of Greater London (33 local authorities) and the six former metropolitan counties West Midlands, South Yorkshire, West Yorkshire, Greater Manchester, Merseyside, Tyne & Wear. The rest of the 58 NES areas consist the 'non-metropolitan Britain' part.
Coefficients of β_2 are multiplied with 100.

Table 7. Regressions London vs. rest of Britain, 1991–2001

Regression specification	Available jobs	Geographical scale	β_0 (const.)	β_1	β_2	R^2
LHS: % employment growth	366	Great Britain	18.51 (1.50)	-0.4089 (-2.49)	0.124 (3.52)	0.12
All workers	366	Rest of Britain	15.79 (1.36)	-0.3561 (-2.74)	0.109 (3.18)	0.09
	347	London	35.86 (1.59)	-0.7844 (-3.11)	0.241 (3.91)	0.20
Male	363	Rest of Britain	47.84 (4.42)	-0.7020 (-5.97)	0.184 (6.13)	0.20
	337	London	45.40 (2.12)	-0.8750 (-3.54)	0.261 (4.18)	0.19
Female	326	Rest of Britain	-2.11 (-0.17)	-0.1588 (-0.79)	0.090 (1.38)	0.07
	248	London	25.90 (1.04)	-1.0193 (-2.45)	0.508 (3.34)	0.17
Full-time workers	366	Rest of Britain	17.08 (1.89)	-0.3977 (-4.32)	0.126 (4.94)	0.14
	344	London	14.18 (1.15)	-0.5787 (-3.97)	0.208 (5.26)	0.25
Full-time male	362	Rest of Britain	33.57 (3.77)	-0.5402 (-5.54)	0.150 (5.75)	0.15
	334	London	18.95 (1.53)	-0.6037 (-3.77)	0.208 (4.58)	0.19

Notes: The data are from NES referring to 3-digit occupational cells from the SOC90 classification (total 366). Regressions are weighted by occupational cell size in the initial period. $\Delta n_i = \beta_0 + \beta_1 q_{ei} + \beta_2 q_{ei}^2$ (Δn_i : percentage growth in employment share of occupational cell i; q_{ei}: rank according to pay in 1991 of occupational cell i); t-statistics in parentheses.
Coefficients of β_2 are multiplied with 100.

These notes are similar for the following Tables 8-12. Coefficients of β_2 are multiplied with 100.

Table 8. Regressions with dependent variable the employment share of the occupation in terms of labour-hours, London vs. rest of Britain, 1991–2001

Regression specification	Available jobs	Geographical scale	β_0 (const.)	β_1	β_2	R^2
LHS: % employment growth	366	GB	21.66 (1.98)	-0.5410 (-4.57)	0.176 (5.66)	0.21
All workers	366	Rest of Britain	20.35 (1.90)	-0.5114 (-4.39)	0.168 (5.41)	0.18
	345	London	29.18 (1.70)	-0.7765 (-3.95)	0.258 (5.13)	0.26

Source: NES

Table 9. Regressions London vs. rest of Britain, 1975–1990

Regression specification	Available jobs	Geographical scale	β_0 (const.)	β_1	β_2	R^2
LHS: % employment growth	428	GB	22.66 (2.78)	-0.4068 (-3.74)	0.099 (3.47)	0.06
All workers	427	Rest of Britain	26.47 (3.22)	-0.4401 (-4.07)	0.105 (3.71)	0.06
	391	London	1.02 (0.09)	-0.2414 (-1.49)	0.082 (1.77)	0.05

Source: NES

Table 10. Regressions with cubic term, London vs. rest of Britain, 1991–2001

Regression specification	Available jobs	Geographical scale	β_0 (const.)	β_1	β_2 (x100)	β_3 (x100)	R^2
LHS: % employment growth	366	Great Britain	10.84 (0.71)	-0.0774 (-0.21)	-0.13 (-0.55)	0.000487 (1.17)	0.13
All workers	366	Rest of Britain	7.10 (0.50)	0.0228 (0.06)	-0.18 (-0.77)	0.000562 (1.32)	0.11
	347	London	36.56 (1.27)	-0.8140 (-1.43)	0.26 (0.80)	-0.000046 (-0.08)	0.20

Source: NES

Table 11. Regressions using an alternative rank of occupations based on the incidence of low pay, London vs. rest of Britain, 1991–2001

Regression specification	Available jobs	Geographical scale	β_0 (const.)	β_1	B_2	R^2
LHS: % employment growth	366	Great Britain	12.79 (1.06)	-0.2814 (-1.97)	0.086 (2.32)	0.05
All workers	366	Rest of Britain	10.23 (0.91)	-0.2327 (-1.70)	0.072 (1.98)	0.04
	347	London	27.48 (1.19)	-0.6030 (-2.28)	0.189 (2.87)	0.11

Source: NES

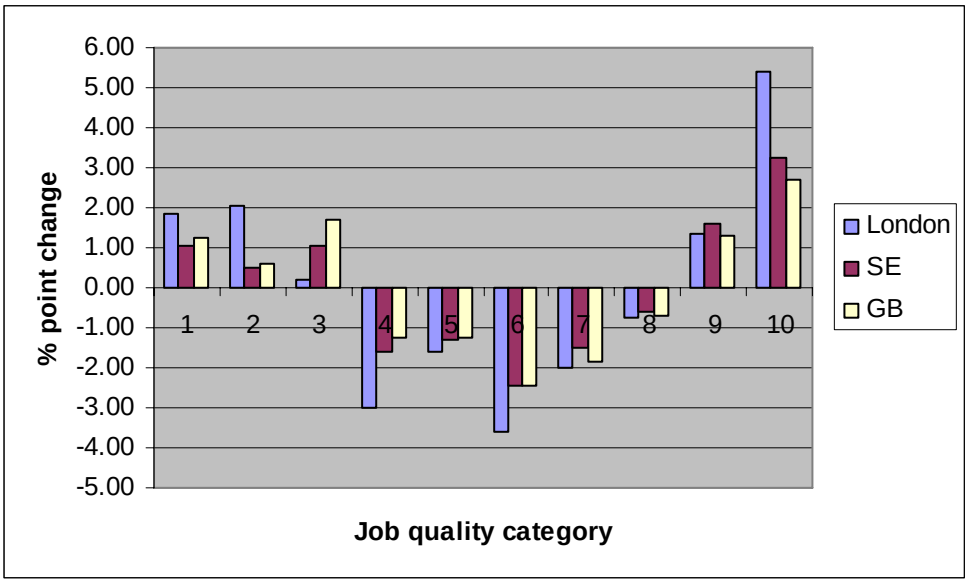
Table 12. LFS dataset: Regressions London vs. rest of Britain, 1993–2000

Regression specification	Available jobs	Geographical scale	β_0 (const.)	β_1	B_2	R^2
LHS: % employment growth	351	GB	4.53 (0.65)	-0.1351 (-1.54)	0.047 (1.94)	0.03
All workers	351	Rest of Britain	3.65 (0.53)	-0.1156 (-1.32)	0.041 (1.68)	0.02
	308	London	12.66 (1.54)	-0.3506 (-2.70)	0.129 (3.15)	0.05

Source: Labour Force Survey

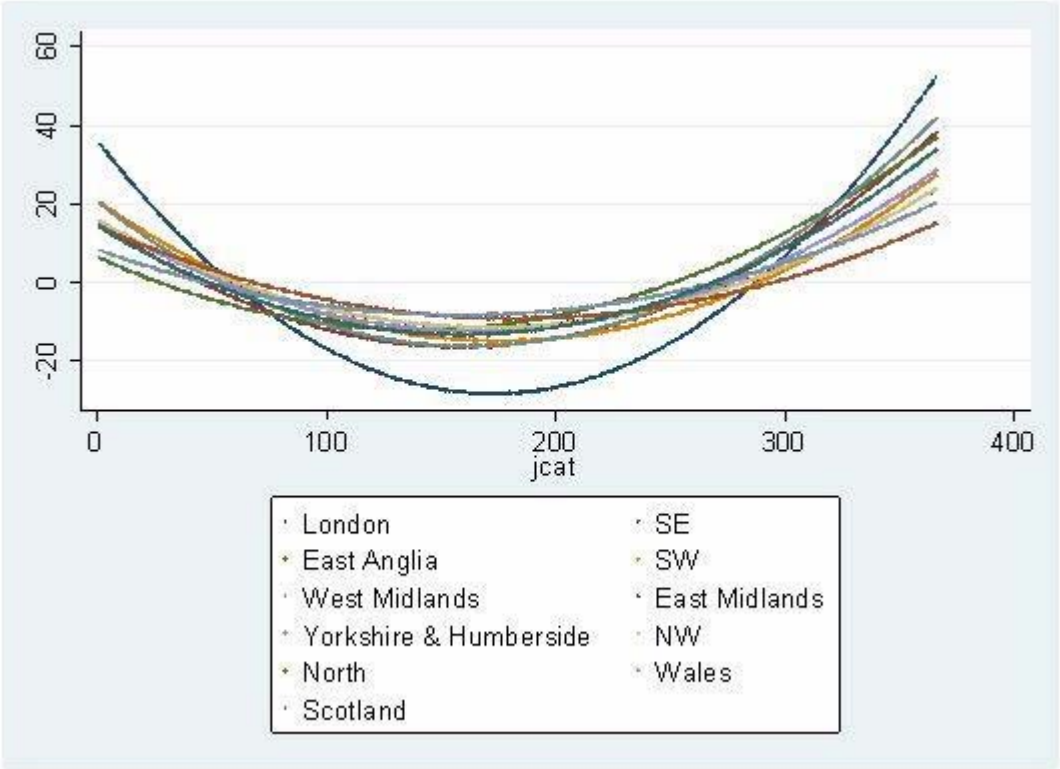
FIGURES

Figure 1. Percentage point change in employment shares of the job quality categories: London, South East and Great Britain, 1991–2001



Source: NES dataset.
Each of the 366 occupation cells (3-digit SOC90) is ranked from worst to best according to median hourly pay in 1991 and then grouped into 'job quality categories' so that each category contains the 10 per cent of the employees nationally for 1991. On this basis, job quality category 1 contains workers from the lowest paid occupations and category 10 of the highest paid ones. While the employment share of each category is approximately 10 per cent for GB in 1991, it can be less or more for the individual regions depending if that category is under- or over-represented in the region.

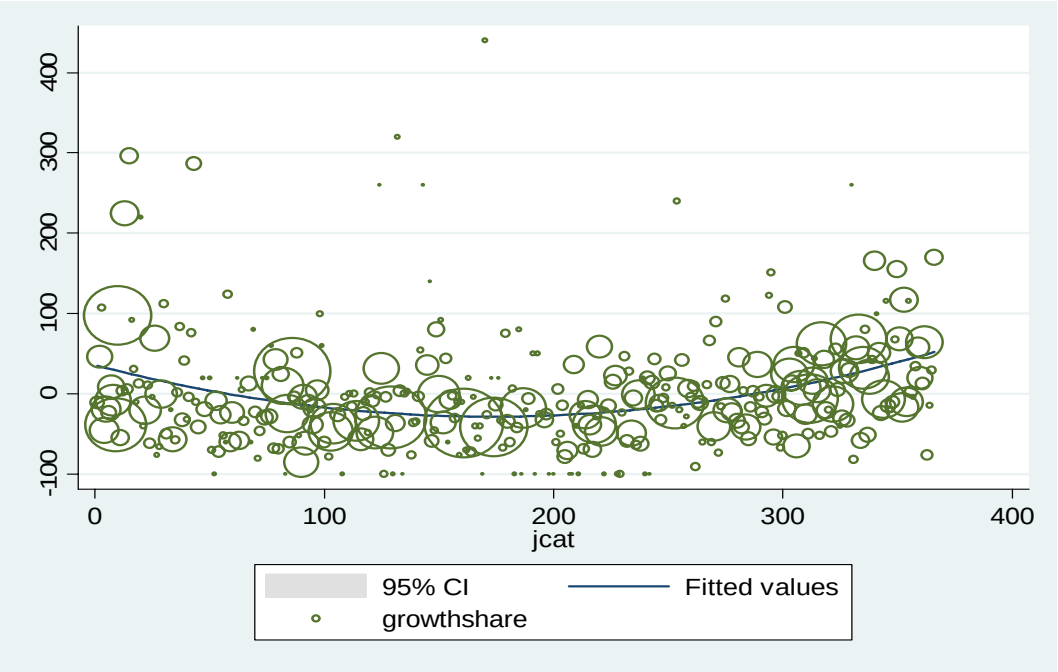
Figure 2. Fitted regional regressions, 1991-2001



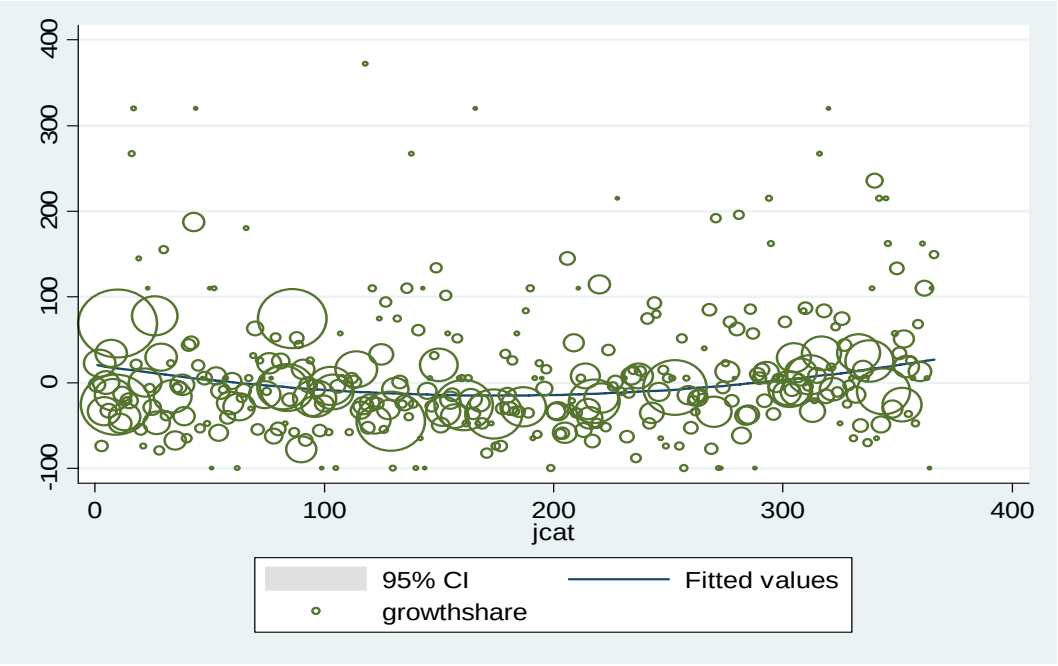
Source: NES
Note: London's curve is the one with the lower minimum.

Figure 3. Scatter plots of percentage employment growth (1991-2001) and job quality rank in 1991,

a) London



b) South West



Source: NES.
Size of circle corresponds to initial occupational cell size (3-digit SOC90). Fitted values of the regressions are shown with the continuous line. The ranking of the 366 occupation cells according to median hourly pay is obtained for 1991. In these graphs, the x-axes correspond to exactly the same occupations for London and the South West.

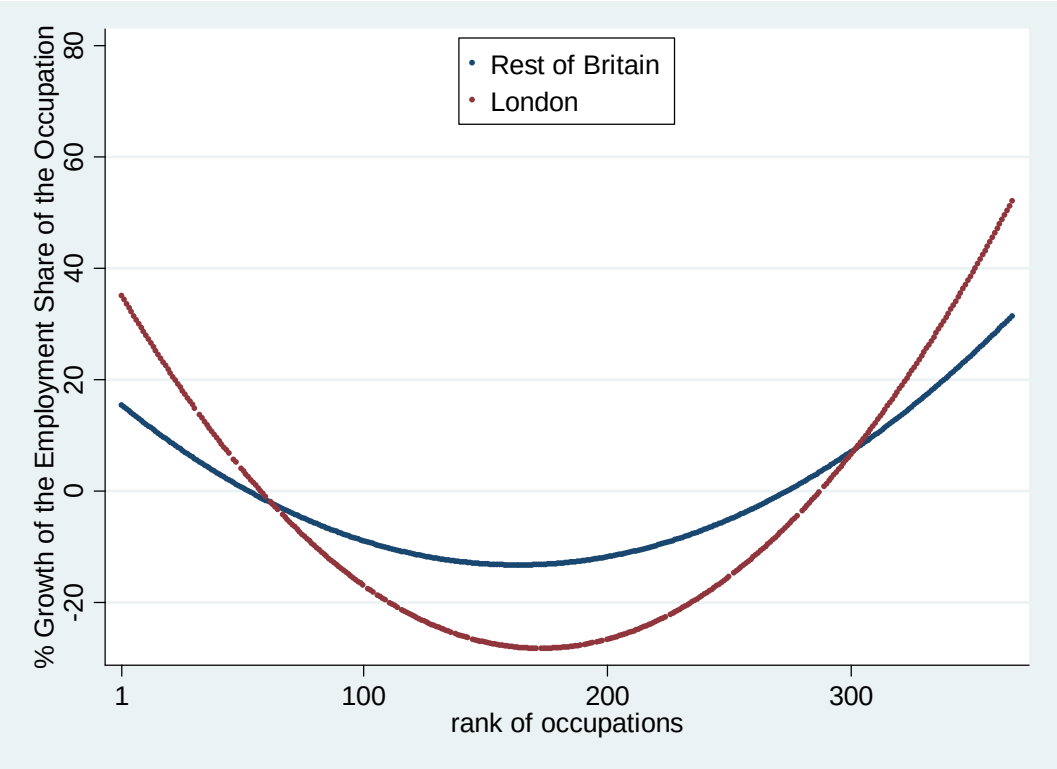
Figures 4a-4e: Fitted regressions for various subgroups of the labour force, 1991–2001

Growth of employment share 1991-2001 against job quality rank in 1991; NES data.
Notes:

1. London's curve is the one with the lower minimum in all 5 graphs that follow.

2. In the following five graphs, the x-axes correspond to exactly the same occupations for London and the Rest of Britain and the fitted values are shown only for occupations that exist in the sample. This is more noticeable for the female demographic group (and especially for London) that there are many missing occupations. These missing occupations spread all over the occupation pay rank and do not affect the analysis.

Figure 4a: All workers



Figures 4ii-4v: Different demographic groups

Figure 4ii: Male workers

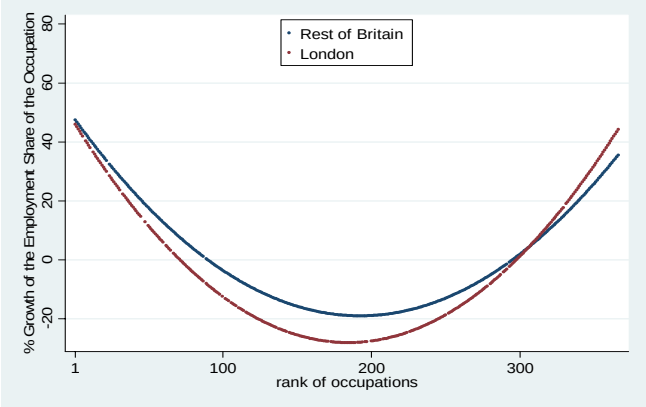


Figure 4iii: Female workers

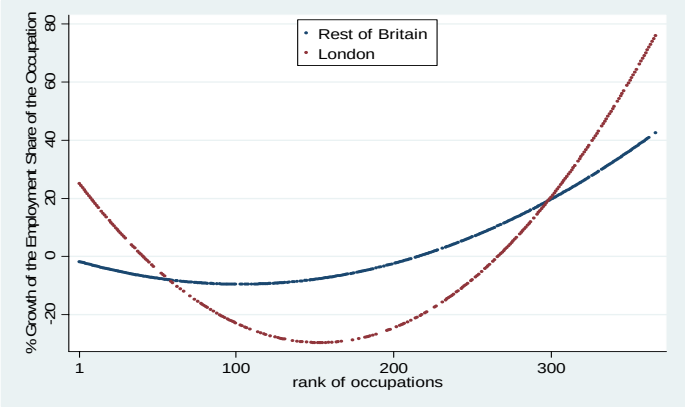


Figure 4iv: Full-time workers

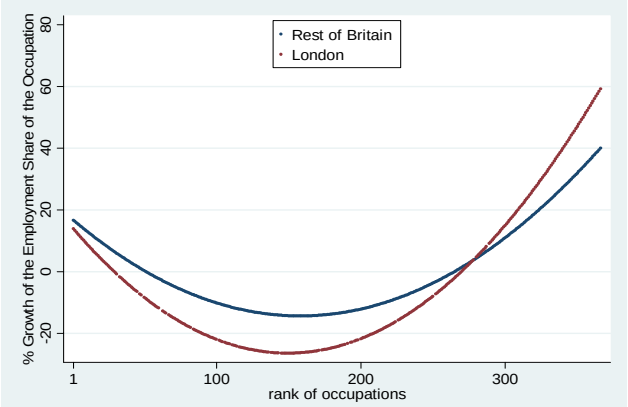


Figure 4v: Full-time male workers

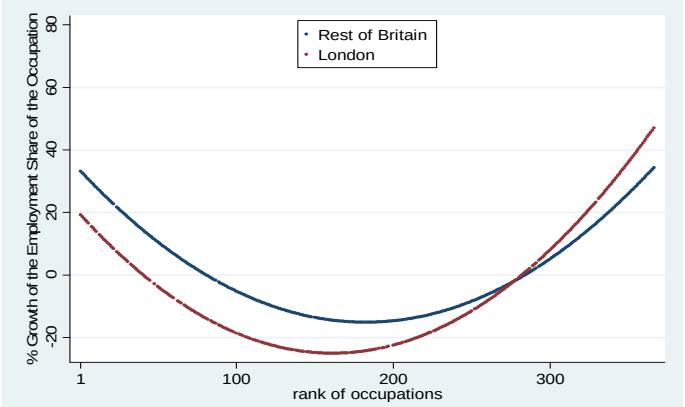
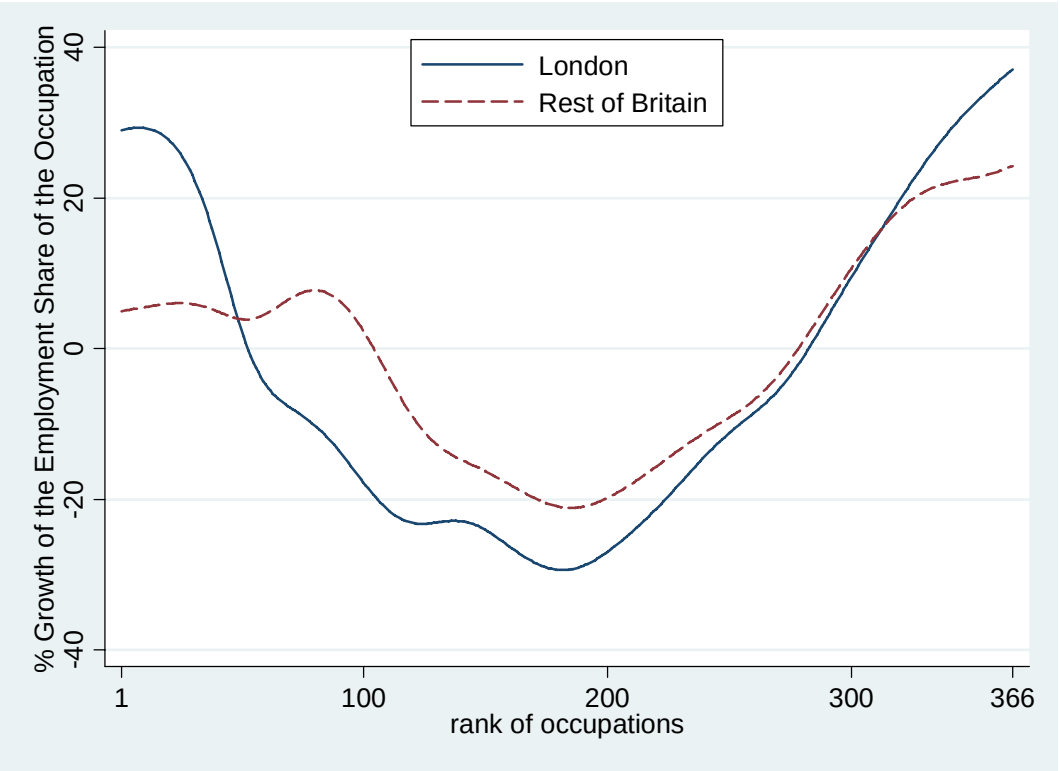


Figure 5: Smoothed changes of employment shares of the occupations (1991–2001) with rank of occupations in 1991



Source: NES
Nadaraya-Watson Kernel regressions, with a bandwidth of 20 and a Gaussian Kernel.
X-axes correspond to exactly the same occupations for London and the rest of Britain.

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