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Low pay, progression and local labour markets

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A thesis submitted in partial fulfilment of the University's requirements for the Degree of Doctor of Philosophy

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Applicant:

Sanne Velthuis

Project Title:

Local labour markets and progression among low-paid workers

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Abstract

Low-pay and limited opportunities for progression are major contemporary concerns in UK labour markets. A number of individual and job-related factors have been shown to influence the likelihood of low-paid workers advancing to higher-paid employment. However, the effects of the characteristics of the local labour market in which workers live are under-explored. This gap is addressed through examining two specific local labour market factors which theory suggests may impact on progression from low pay. Existing studies find that on average workers in (large) cities experience faster progression – cities act as 'escalators'. This research tests whether such an effect also exists for low-paid workers. First transitions from low pay to higher pay are analysed initially using a national low pay threshold, finding a size effect particularly concentrated on London. However this measure is sensitive to existing geographic wage variations. When using an alternative occupation-based measure of wage progression, little evidence is found that those in (larger) cities see their pay grow more quickly. The second empirical chapter responds to concerns about the potential effect of job polarisation on social mobility and the ability of low-paid workers to move up the occupational ladder. The results show that the extent of 'hollowing out' of the local occupational structure during the 2000s had little effect on occupational mobility for those starting in low-paid occupations, suggesting that fears over the impact of job polarisation on the upward mobility of low-paid workers may have been overstated. Taken together, the research suggests that the two main local labour market characteristics considered – size and the degree of polarisation – do not have a substantial impact on progression from low pay, at least in relative terms and when defining local labour markets as Travel-To-Work-Areas. The thesis suggests that the issue of limited mobility from low pay effects all areas of the UK. The policy implication of this is that addressing the lack of advancement from low pay requires a consideration of the individual, sectoral and institutional factors which are constraining progression. Further work should investigate potential other local labour market processes that may be contributing to the lack of progression that many low-paid workers currently experience.

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Chapter 1 Introduction

1.1   Low pay as a social and policy concern

Over the last thirty years researchers have documented significant changes in the organization of work and employment in advanced capitalist economies. Among wider concerns about growing employment insecurity and job polarisation, one issue that has received growing interest in recent years is the prevalence of, and impacts associated with, low-paid work, both in the UK (Lloyd, Mason and Mayhew, 2008; Lloyd and Mayhew, 2010; Wright and Sissons, 2012; Wilson, Gardiner and Krasnowski, 2013; D'Arcy, 2018) and in other European countries (Bolvig, 2004; Blázquez, 2006; Theodos, 2006; Cappellari, 2007; Pavlopoulos and Fouarge, 2010; Mosthaf, Schnabel and Stephani, 2011; Collins, 2015; Vacas-Soriano, 2018). The proportion of British workers earning less than two-thirds of the median hourly wage – the most commonly used definition of low pay – has remained stuck at around one in five for the past twenty years, a higher rate than in many other developed countries such as Germany, France, the Netherlands, Denmark and Spain (Corlett and Whittaker, 2014; OECD, 2015). While the introduction of the National Living Wage in 2016 has resulted in a slight reduction of the number of low paid workers over the last few years, there are still projected to be around four million workers in low pay by 2020 – equivalent to about 15.4 per cent of workers (D'Arcy, 2018).

For some workers, low pay is a short, transitory experience. Others, however, can remain stuck in low-paid jobs for lengthy periods of time (D'Arcy and Hurrell, 2014; Kumar, Rotik and Ussher, 2014). As well as the overall level of low paid work in the UK, the relative lack of progression from low-paid to higher-paid work is therefore a concern (Taylor, 2017). Not all low paid workers have low household incomes, because there are often additional sources of income in the household, such as from another earner, but they do face a greater risk of poverty than other workers (MacInnes *et al.*, 2014). Moreover, low earnings can restrict people's capacity to save for retirement, meaning that long periods spent in low pay can increase the risk of poverty in later life (Turner, 2015). However, the nature of wage progression among low-paid workers and the factors enabling and limiting this are only partially understood. Improving our understanding of pay progression is important in helping to inform how those on low wages can move up in the labour market and thereby reduce the risk of poverty, as well as move into more fulfilling, higher-skilled work.

The fact that a substantial number of UK workers appear to be stuck in jobs with limited opportunities for advancement has important implications not just for the well-being of these

employees, but also for the wider policy aims of the UK government, such as reducing the amount spent on in-work benefits. Policymakers have historically been primarily concerned with moving those out of work into employment, with less consideration given to the types of jobs people do or how much they get paid. More recently, the issue of progression from low-paid work has been receiving greater policy attention (DWP, 2017; Taylor, 2017). One of the aims of Universal Credit – the combined in-work benefit that is currently being rolled out across the UK – is to support and encourage workers below a certain weekly earnings threshold to take steps to increase their earnings (DWP, 2010, 2011).

The link between in-work progression and social mobility has additionally been recognised (Social Mobility Commission, 2016). With the number of skilled and semi-skilled jobs in the middle of the wage distribution declining in recent years relative to the number of jobs at the bottom, there are concerns that those looking to escape low wages may find it increasingly difficult to advance to better-paid employment (Crawford *et al.*, 2011; McIntosh, 2013; Social Mobility Commission, 2016). There is, however, little empirical evidence on this point to date.

The relatively high incidence of low pay among British workers is the result of a number of factors, including employer business strategies, competitive economic pressures, wage-setting institutions, skills formation, employment regulation and welfare and labour market policies (Grimshaw, 2011). For instance, in many countries flexible labour market policies were adopted during the 1990s as a way to adapt to (perceived) reductions in demand for low-skilled workers and thereby keep unemployment rates low. These policies often allowed wages for the lowest-skilled workers to fall or remain low, thus contributing to rates of low pay (ibid.). At the same time, institutional norms about the appropriate rate of pay associated with certain job tasks, seniority, or responsibility remain important in setting wage rates. The way labour market experiences are structured by age, ethnicity (Netto *et al.*, 2014), disability (Rigg, 2005) and gender (Perrons, 2009) are also important in understanding the unequal risks faced by different groups when it comes to low pay and a lack of progression. Although there have been improvements in the position of women in the labour market, female workers are still more likely to be found in low-paying occupations and are less likely to progress (Corlett and Whittaker, 2014).

Low pay and progression may also have a spatial dimension. Low-paid work , when measured by a national earnings threshold of two-thirds of median wages, is more prevalent in some areas of the UK than in others, reflecting spatial differentials in earnings (Stewart, 2011), and geographic

imbalances in economic activity within the UK more widely (Gardiner *et al.*, 2013). Low paid workers make up 12 per cent of workers in London but as much as 27 per cent in the North East (Corlett and Whittaker, 2014). Moreover, the regional disparities in low-pay which previous studies have described obscure even more pronounced intra-regional variations between local labour markets (Cooke and Lawton, 2008).

Rates of progression, too, are subject to spatial variations at the regional level. For instance, a study found that the proportion of individuals stuck in low pay – defined as less than two-thirds of median hourly pay for the UK – for ten years or more was significantly higher in Yorkshire, Wales, and in the North East of England, than in London and the South East (Hurrell, 2013). This raises the question of whether, and how much, place matters when it comes to determining the likelihood of low-paid workers progressing to better jobs.

Research suggests that workers in cities tend to experience slightly faster wage growth on average (Glaeser, 1999; Yankow, 2006; D'Costa and Overman, 2014; De la Roca and Puga, 2017), as well as faster occupational advancement (Champion, Coombes and Gordon, 2014; Gordon, Champion and Coombes, 2015). This suggests that workers in larger urban areas may have an advantage when it comes to progressing out of low pay, but the extent to which this relationship between local labour market size and density and wage growth holds for workers at the lower end of the wage distribution has not been explored in detail. A separate literature describes how job polarisation – the gradual decline in the share of employment in 'middling' occupations relative to low-skilled and high-skilled occupations (Autor, Katz and Kearney, 2006; Goos and Manning, 2007) – has affected regions and cities to different degrees (Dauth, 2014; Autor, Dorn and Hanson, 2015; Lee, Sissons and Jones, 2015; Terzidis, Van Maarseveen and Ortega-Argilés, 2017). This has led to concerns about the possible impact of job polarisation on the upward occupational mobility of workers in low-paid jobs (Crawford *et al.*, 2011; Holmes and Tholen, 2013; Social Mobility and Child Poverty Commission, 2016). To date, however, few researchers have tried to assess whether the hollowing out of the occupational structure has made it more difficult for workers in low-paid jobs to move into higher-paid occupations.

The aim of this thesis is to fill these two gaps in the literature by analysing longitudinal data on workers and their earnings and occupational status to find out what influence, if any, local labour market characteristics have on workers' chances of escaping low wage employment. It does this by answering two main research questions:

1) Do workers in (larger) cities experience faster progression from low pay?

2) Does the degree of job polarisation in the local labour market have an effect on the occupational progression of workers starting off in low-paid jobs?

In answer to the first question, the findings presented in this thesis provide little evidence that low-paid workers experience faster wage growth in (larger) cities, at least when using my preferred measure of wage progression. This suggests that the processes argued to underpin the 'urban wage growth premium' (Glaeser and Mare, 2001; De la Roca and Puga, 2017) are of limited applicability to those employed in relatively low-paid jobs. With regard to the effect of job polarisation on occupational progression, contrary to predictions by some that the move towards an hourglass-shaped occupational structure is likely to reduce the upward mobility of those in low-paid occupations (Holmes and Tholen, 2013; McIntosh, 2013; Clayton, Williams and Howell, 2014), no evidence is found that low-paid workers are less likely to move into higher-paid occupations in areas which saw a stronger degree of job polarisation during the early 2000s. While this may be a comforting finding, there is equally little evidence that living in an area with a larger share of higher-skilled jobs has much of a positive effect on the upward occupational mobility of low-paid workers. The findings additionally emphasise the fact that patterns of occupational mobility are complex and varied, with few workers moving in a simple linear fashion from low-paid to middle-wage to high-paid occupations. Overall, the main conclusion that can be drawn from the research is that the size and occupational structure of the local labour market appear to have only a limited effect on progression from low pay, at least when defining local labour markets as Travel-To-Work-Areas which, admittedly, may not correspond very closely to the actual local labour markets of most low-paid workers.[1] Despite this limitation, the findings of the thesis suggest that living in an area which, on the face of it, provides some of the conditions that might be considered conducive to career progression – a high density of employment and a good balance between low-skilled, middle-skilled and high-skilled jobs – is not enough in itself to ensure that those in low-paid work are able to advance into better-paid jobs. Important other barriers to in-work progression need to be addressed if the UK's low pay progression problem is to be solved.

1.2   Defining low-paid work

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[1] As will be discussed in more detail in section 3.3.2.

Low-paid employment can be defined in a number of ways. Most definitions classify workers as low- or higher-paid according to their earnings, using absolute or relative measures of low pay. Absolute measures of low pay are often based on an estimation of the level of earnings workers and their households require to have a reasonable standard of living. Several US studies have used absolute measures based on the official poverty line (see Andersson *et al.* 2005). In the UK, the voluntary Living Wage, calculated by the Living Wage Foundation[2], is sometimes used in research as an absolute definition of low pay (e.g. Hurrell, 2013). Such measures are useful because they allow fluctuations in the number of low-paid workers over time to be interpreted simply as changes in the number of people whose wages are falling behind what is deemed necessary, on average, to achieve an acceptable standard of living.

A potential downside of absolute measures of low pay is that they do not say anything about how the wages of low-paid workers are changing relative to the average. If the wages of those at the bottom are rising, but not as fast as the earnings of the rest of the workforce, low-paid workers may nonetheless feel worse off compared to others. This is why most research defines low pay in relative terms (Grimshaw, 2011). Some relative measures define the low-paid as a certain proportion of the earnings distribution, for instance the lowest decile or quintile (Dickens, 2000). Although such measures can be used to examine how many workers move up or down between earnings categories, under this type of definition low-paid workers always account for a fixed percentage of all workers and so it is less useful for analysing changes in the amount of low-paid work over time.

A more widely used definition, therefore, is the one adopted by the Organisation for Economic Co-operation and Development (OECD), who define low pay as less than two-thirds of median hourly earnings for full-time employees (OECD, 2015). The advantage of this definition is that it tells us something about how low-paid workers fare in relation to the earnings of the 'average' worker in the UK, and it allows for cross-country comparisons. Using hourly earnings, rather than weekly or annual earnings, also means that this definition does not conflate wage rates with differences in working hours. Corlett and Whittaker (2014) and Hurrell (2013) use a similar definition but including part-time as well as full-time workers. This is arguably a more appropriate measure, as just over half

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[2] The calculation of the Living Wage is based on research into what members of the public feel is a minimum acceptable standard of living, conducted by the Centre for Research in Social Policy. As well as reflecting rises in living costs and any changes in what people define as a minimum standard of living, it also takes account of wider trends in wage levels to prevent the Living Wage rising too far out of line with general pay trends. There is a separate Living Wage for London, calculated by the Greater London Authority (CRSP, 2014).

of the UK's low-paid workforce is made up of part-time employees (Corlett and Whittaker, 2014). Because of these advantages, this threshold has almost become the norm in studies of low pay – the majority of quantitative studies of low-pay which are reviewed in this thesis adopt the two-thirds of median hourly pay benchmark. For this reason, it is also used in this thesis as a definition of low-paid work.

There are, however, disadvantages to using a single, nationally-defined low pay threshold when making comparisons between different geographic areas. These are discussed in detail in chapter four but in brief relate to the fact that regions and local areas tend to have different wage levels, which means that a national wage threshold intersects the wage distribution of each local labour market at a different point. As shown in chapter four, this affects the estimated wage growth of low-paid workers in each area. For this reason, the second part of chapter four develops an occupation-based definition of low-paid employment. Under this definition, low-paid workers are defined as those employed in specific sets of occupations associated with relatively low levels of pay. An advantage of this definition is that it allows a similar group of workers (in terms of the types of work they do) to be compared across areas. Another important advantage is that wage growth estimates based on this definition are not skewed by geographic wage variations.

Chapter 5 uses a similar occupation-based definition as that used in chapter 4 to examine mobility from relatively low-paid occupations to higher-paid occupations. Occupations are defined as 'low-paid' or 'higher-paid' on the basis of the median hourly wage of workers in each occupation. While this means that, on average, workers in low-paid occupations will have a lower hourly wage than workers in higher-paid occupations, because the pay of workers within the same occupational group tends to vary, this may not always be the case. The occupations defined as low-paid also tend to be lower-skilled occupations. They include jobs like retail cashiers and check-out operators, housekeepers, labourers, waiting staff and bartenders.

1.3   What is progression?

Progression is a general term used to refer to improvements in the labour market position of individual workers, including transitions to higher rates of pay, to more highly skilled work, from temporary to permanent employment, or from part- to full-time work. In qualitative research several of these facets are often considered together, highlighting the relationships between these transitions (James and Lloyd, 2008; Lloyd and Payne, 2012). Quantitative work on progression has,

however, tended to focus on one measure at a time. An extensive body of literature has examined wage mobility among low-wage workers (Gosling *et al.*, 1997; Stewart and Swaffield, 1999; Mosthaf, Schnabel and Stephani, 2011; Knabe and Plum, 2013; Cai, 2014). A separate group of studies has focused on transitions from temporary to permanent employment (e.g. Booth, Francesconi and Frank, 2002; Gash, 2008; Fuller and Stecy-Hildebrandt, 2014). Other studies have explored occupational progression, some focusing on mobility from low-paid or low-skilled occupations (Bukodi and Dex, 2009) and others examining mobility among the entire workforce (Härkönen and Bihagen, 2011; Rhein and Trübswetter, 2012; Champion, Coombes and Gordon, 2014).

In this thesis progression is analysed in two main ways. Firstly, improvements in pay are examined in chapter 4, where both transitions from low pay to higher pay, and annual wage growth are considered. In chapter 5, the focus is on occupational advancement from low-paid occupations to a number of other, higher-paid, occupational categories.

1.4   Thesis structure

The next chapter starts of by providing the context for the rest of the thesis by describing the major changes that have shaped the UK labour market over the past four decades and which have given rise to the current employment structure: one characterised by relatively low levels of employment protection, high levels of low-paid work, and relatively low rates of wage progression for low-paid workers. It then reviews literature on low pay and progression, identifying the important factors existing studies have found to be associated with the likelihood of moving out of low pay, and in addition discusses recent strands of research relating to the link between spatial labour market differences and individual-level outcomes such as wage growth and occupational mobility. At the end of chapter 2, the two broad research questions that are examined in in this thesis are set out.

Chapter 3 outlines the methodological approach taken in this thesis, explaining why a quantitative, rather than a qualitative approach, was chosen, and describing briefly the main datasets and methods used in the subsequent two chapters. The first of the empirical chapters, chapter 4, focuses on the first broad research question set out at the start of this chapter: Do workers in (larger) cities experience faster progression from low pay? Chapter 5 focuses on the second research question by exploring whether there is any evidence that the hollowing out of intermediate occupations has had an impact on the ability of low-paid workers to advance to higher-paid occupations. Chapter 6

summarises the findings from the research, draws lessons from both set of findings and discusses the implications for theory, policy and for further research about low pay and progression.

Chapter 2   Literature review

2.1   Low pay and progression in the UK

The UK has one of the highest rates of low paid work in the developed world, with the proportion of employees earning below two-thirds of the median hourly wage having increased from 15 per cent in the mid-1970s to more than 20 per cent in the mid-1990s and through the 2000s (Corlett and Whittaker, 2014). Despite a recent fall in this proportion, almost two in five workers are still low-paid according to this threshold (D'Arcy, 2018). Moreover, as is discussed below, progression from low-paid jobs to higher-paid employment is lower in the UK[3] than in many other comparable countries. To explain this researchers have pointed to labour market changes in recent decades, as well as to the UK's (neo-)liberal framework of labour market policy and practice, which it is argued has contributed to rising wage inequality, an increase in labour market insecurity, and reduced stability of the gradual progression previously associated with internal labour markets.

As well as placing issues of low pay and progression in the context of wider labour market changes, the ability of low wage employees to move out of low pay needs to be seen in light of the particular conditions and constraints at work in the firms and sectors employing large numbers of low-paid workers. Jobs in firms in low wage sectors, such as retail, restaurants and hotels, call-centres and food processing plants, often provide limited prospects for advancement due to their flat organisational structures, while in other firms processes of delayering have reduced the number of intermediate-level positions, thus making it more difficult for entry-level workers to progress (Grimshaw *et al.*, 2002). The likelihood of progression also depends to some extent on the characteristics of workers, such as their skills levels and orientation to career development.

Within this context, the literature review is divided into six sections: In the next section (2.2) a brief history of labour market change from the late 1970s to the present is provided, emphasising the path pursued by the UK in reforming its labour market in response to industrial shifts and global

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[3] This chapter reviews literature which, for the most part, relates to the United Kingdom as a whole, although occasionally findings refer only to Great Britain or the individual nations of the UK (England, Scotland, Wales and Northern Ireland). Throughout this chapter, where broader findings or policy-related points relevant to the entire United Kingdom are discussed, I use the term 'UK'. When reference is made to specific data or facts that apply to a particular part of the UK (such as England or Great Britain) rather than to the whole of the UK, an effort is made to specify this, where pertinent.

competition. The next section (2.3) reviews evidence which shows that many advanced economies, including the UK, have seen employment concentrate increasingly in low-paid and high-paid occupations, a process referred to as job polarisation. Section 2.4 discusses how employers have adapted to, as well as shaped, changing economic conditions, and how in doing so their workforce practices have influenced the career advancement options open to workers in low wage sectors. The next section (2.5) outlines the three main policy areas that interact with the low wage labour market – the minimum wage, skills policy, and the welfare system, while section 2.6 summarises existing quantitative research on wage progression among low-paid workers in the UK. In section 2.7 the geographic dimensions of labour market change are discussed and key literatures which explore, in various ways, the connection between the character of the geographic area in which workers live and labour market outcomes such as pay, pay growth, and occupational mobility. The insights from these literatures provide clues about the extent to which local labour market characteristics may be expected to impact on the progression of workers – whether measured in terms of wage growth or occupational advancement. Section 2.8 sums up the key findings from the literature review and discusses the implications of the issues described for low paid workers and their chances of advancing to higher wages and/or better jobs. Finally, section 2.9 sets out how the knowledge contained in the existing literature can be built on by addressing two key research questions, the first related to the effect of local labour market size on progression from low pay, and the second related to assessing the impact of job polarisation on the occupational advancement of low-paid workers.

The literature review was conducted using a variety of search terms and relied on the Google Scholar search engine as well as popular databases such as Academic Search, IngentaConnect and Mendeley to identify relevant literature. No systematic approach to finding literature was used. Where books or articles mentioned other relevant research, an effort was made to trace these additional sources so these could be included in the literature review. As a result the literature review encompassed a wide range of different literatures from diverse disciplines including social policy, economics, business studies, and economic and urban geography.

2.2   Industrial change and labour market reform

For the UK and many other countries, the decades since the late 1970s have been characterised by significant economic and social changes. One of the most important shifts has been the gradual decline of employment in manufacturing industries and a restructuring towards service sector

employment (Crompton, Gallie and Purcell, 2002). In common with other European countries and the United States, between the mid-1950s and the end of the twentieth century the UK saw the proportion of workers employed in manufacturing decline due to processes of de-industrialisation, while the share of service jobs increased dramatically (Feinstein, 1999). According to England and Wales Census figures, services made up 49 per cent of employment in 1961, 61 per cent in 1981 and 81 per cent in 2011. During the same period, the share of workers in manufacturing fell from 36 per cent in 1961 to only 9 per cent in 2011 (ONS, 2013a). This shift away from manufacturing employment and towards services is illustrated in figure 2-1.

Figure 2-1: Percentage of working people employed in manufacturing and services, England and Wales, 1981 to 2011
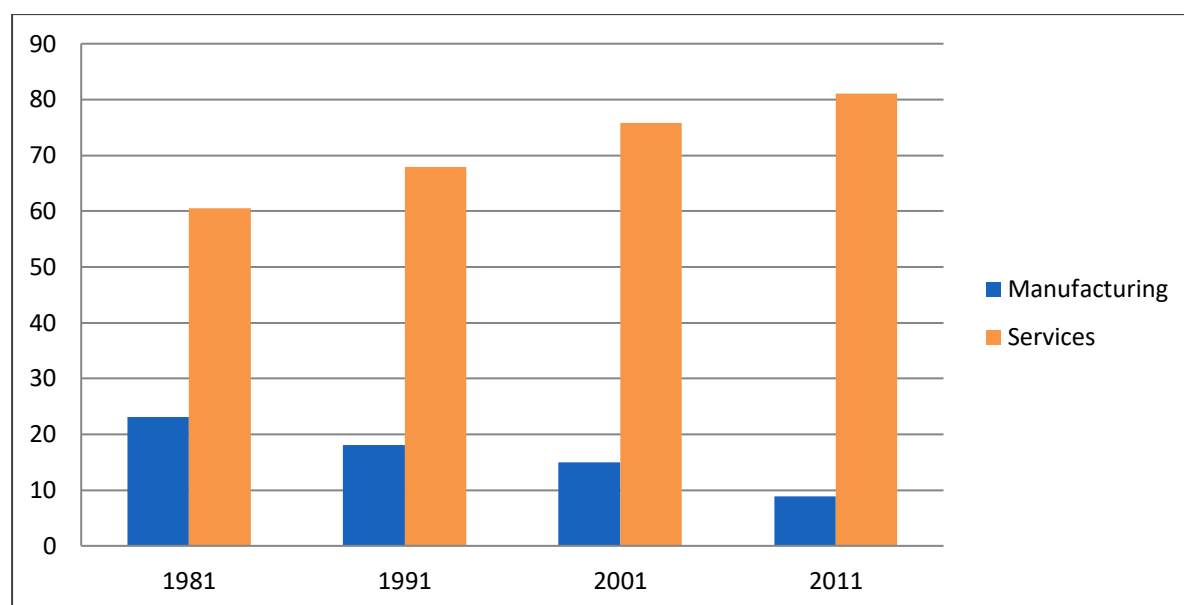
Source: ONS (2013a)

The growth of service employment during this transition included an increase in both 'high-end' professional and managerial occupations, as well as 'low-end' jobs in personal and consumer services – many of which were filled by women entering the labour force (Fagan, Rubery and Smith, 2003; Fagan, Halpin and O'Reilly, 2005).

As well as a transformation of the industrial make-up of the economy, the shift to what has been labelled the 'Post-Fordist' economy (Amin, 2011) entailed important changes to firms' production strategies and organisational structures as they adapted to a period of greater economic instability (following the relatively stable two decades following the Second World War). From the early 1970s onwards, the increasing globalisation of economic production and finance and the rise of new

information technologies made markets more volatile. At the same time, competition in national and international markets intensified. In response to these changing conditions, firms in the UK began to seek more flexible systems of production and workforce management to be able to adapt to fluctuations in demand and improve competitiveness (ibid.).

It is argued that the economic forces of 'flexible capitalism' (Sennett, 2011) transformed the nature of employment, for everyone from low-skilled service workers on temporary contracts, to those in traditionally more secure white-collar occupations. According to sociologists like Beck (2000), the demands of international competition have resulted in rising work pressure and increasing work intensification, and workers across the developed world have been argued to face a new era of risk and insecurity. The rise in low paid work can therefore be seen as part of a wider trend of declining employment security as a result of globalisation and industrial change.

Although a move towards greater labour market flexibility took place across the advanced capitalist world, the UK differed from countries in continental Europe in the specific ways in which it was pursued. The 'varieties of capitalism' literature describes how business strategies and employment relations are shaped by the political-economic framework and the institutional arrangements within different countries (Rueda and Pontusson, 2000; Hall and Soskice, 2001; Thelen, 2001; Hall and Gingerich, 2009). The 'coordinated market economies' of Germany, Switzerland, the Netherlands, Denmark, Norway and Sweden have tended to be characterised by a higher degree of strategic cooperation between individual firms and between employers and workers, through negotiations between employer associations and trade unions, often at a sectoral level (Hall and Soskice, 2001). These forms of non-market coordination led firms to pursue increased flexibility through adapting and reforming, rather than deregulating, employment relations, amid a continued commitment to coordination at the multi-industrial level (Thelen, 2001). In the UK, on the other hand, similar to other 'liberal market economies' such as the United States, Canada, Australia and New Zealand, non-market coordinating institutions were never as strongly embedded and a private ordering of employment relations was dominant. This resulted in a trend towards the deregulation of the labour market "in the interest of competitive flexibility" (Davies and Freedland, 2007, p. 243).

Keen to remove perceived 'rigidities' preventing efficient labour market operation, the Conservative government elected in 1979 embarked on an extensive programme of labour market reform, which in large part consisted of the removal of various protective rights. Arguably most important among the measures taken were steps to circumscribe the extent of collective bargaining through a series

of legislative moves that limited the powers of the trade unions, such as the repeal of the statutory recognition of unions by employers, restrictions on the rights to industrial action, and the introduction of provisions to enable employers to sue unions for damages caused by industrial action (Howell, 2005). An extensive programme of privatisation additionally made it more difficult for centralised wage bargaining to take place (Deakin and Reed, 2000). Consequently, levels of unionisation declined markedly throughout the 1980s and 1990s, contributing to increasing wage inequality (Machin, 1997; Card, Lemieux and Riddell, 2004). The diminished bargaining strength of UK unions has been argued to be a factor in the relatively high rates of low paid employment compared to other countries where higher rates of collective wage bargaining have been maintained (Gautié and Schmitt, 2010; Grimshaw, 2011; Bosch, 2015). Between the mid-1970s and the mid-2000s, the UK labour market saw a larger increase in low wage work than Germany, France, Denmark, and the US (Mason and Salverda, 2010)[4].

As well as a shift away from collective or centralised wage setting, the 1980s saw the Conservative government implement a series of measures which diminished the degree of employment protection enjoyed by workers, such as extending the period of qualifying service before an employee could claim unfair dismissal, and removing the burden on employers to prove fairness of dismissal (Deakin and Reed, 2000). Although the New Labour government (1997-2010) subsequently (re-)introduced some protective legislation (Shackleton, 2007), it remained committed to a regulatory regime that fostered competitive flexibility (Davies and Freedland, 2007). Today the UK continues to be among the countries with the lightest employment protection in the OECD, both when it comes to the protection from dismissal afforded to workers, and the ease with which employees can be hired on non-permanent contracts (OECD, 2013).

Although the deregulatory measures instigated by the Conservative government during the 1980s and maintained (for the most part) by subsequent administrations have made the UK labour market more flexible – and may have contributed to a relatively low unemployment rate during the 1990s compared to other European countries (IMF, 2003), the British free-market model has been criticised for placing too much emphasis on competing on the basis of low wage levels and poor working conditions, rather than on the basis of high skills and high-value added production (Rubery,

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[4] Out of the six countries considered by Mason and Salverda (2010), only the Netherlands recorded a rise in low pay incidence of the same magnitude as the UK during the same period. Although the extent of collective bargaining in the Dutch labour market did not decline nearly as strongly as in the UK, Dutch unions did adopt a deliberate strategy of wage moderation during the 1980s to combat high levels of unemployment (Visser, 1998).

1994). There is a contention that, compared to other countries, a larger proportion of UK economic activity is made up of low specification, low value-added production and services leading to lower investment in training and workforce development (Wilson and Hogarth, 2003). Such institutional differences between 'employment regimes' in European countries can to some extent even be detected at the level of particular industries and occupations. The retail sector in UK is characterised by relatively lower-skilled work and less job stability compared to Germany (Carré *et al.*, 2010). In a 2011 study, the café sector in UK was found to have lower levels of value-added per employee, less coverage by collective agreements on pay and conditions, more product standardisation, greater exercise of control over the work process, and lower rates of pay, compared to Norway and France (Lloyd and Payne, 2016).

The UK system of employment regulation is moreover argued to have contributed to increasing job insecurity and work intensity, as employers are able to make use of a more relaxed regulatory regime in order to 'pass on' competitive pressures and insecurity to workers (Burchell, Lapido and Wilkinson, 2005). Evidence shows that for the majority of workers, jobs became less stable between 1975 and 1993 (Gregg and Wadsworth, 1995) and that between the late 1970s and the early 1990s labour market entrants and those returning to work from unemployment were increasingly less likely to find stable full-time work as more and more of these workers entered into part-time or temporary jobs (Gregg and Wadsworth, 2000). The proportion of employees working part-time (less than 30 hours per week) rose from 21 per cent in 1981 to 26.5 per cent in 2000, and the proportion of temporary jobs increased from 4 per cent in 1981 to 8 per cent in 2000 (McGovern, Smeaton and Hill, 2004). More recent data show that, since the early 2000s, the percentage of part-time workers has remained more or less stable at just over a quarter, and that the percentage of temporary workers decreased somewhat since the year 2000 and has fluctuated around the 6 per cent mark for the last fifteen years (ONS, 2018a).

Whereas coordinated market economies are characterised by a more rigid division between labour market 'insiders' (those enjoying full-time, permanent employment) and 'outsiders' (those relegated to temporary, insecure employment in the secondary labour market) (Häusermann and Schwander, 2010; Kahn, 2012), in the UK this distinction is arguably less pronounced as external labour market conditions have become increasingly embedded and reflected in internal labour markets (Grimshaw and Rubery, 1998). As a result, not only has permanent employment lost some of its former security, the "broad and long promotion ladders" previously associated with internal labour markets in manufacturing, services and the public sector were weakened and fragmented during the 1980s as

employers sought to improve efficiency and reduce costs through restructuring and downsizing (Hudson, 2005, p. 79). Others have pointed out that in the UK internal labour markets have never been as strong as in countries such as France and Italy, and that industrial restructuring has led to a furthering of competitive labour market conditions in a system that was already characterised by more truncated journeys to higher status positions within occupations (Marsden, 2007).

A further difference between the United Kingdom and other European countries is related to the industrial structure of its labour market. As shown in figure 2-2, compared to some of its European neighbours, the UK has a relatively large share of employment in industries associated with low rates of pay: wholesale and retail, and the accommodation and food service industry.

Figure 2-2: Employment in wholesale and retail and in accommodation and food services as a percentage of employment in all industries, selected European countries, 2014
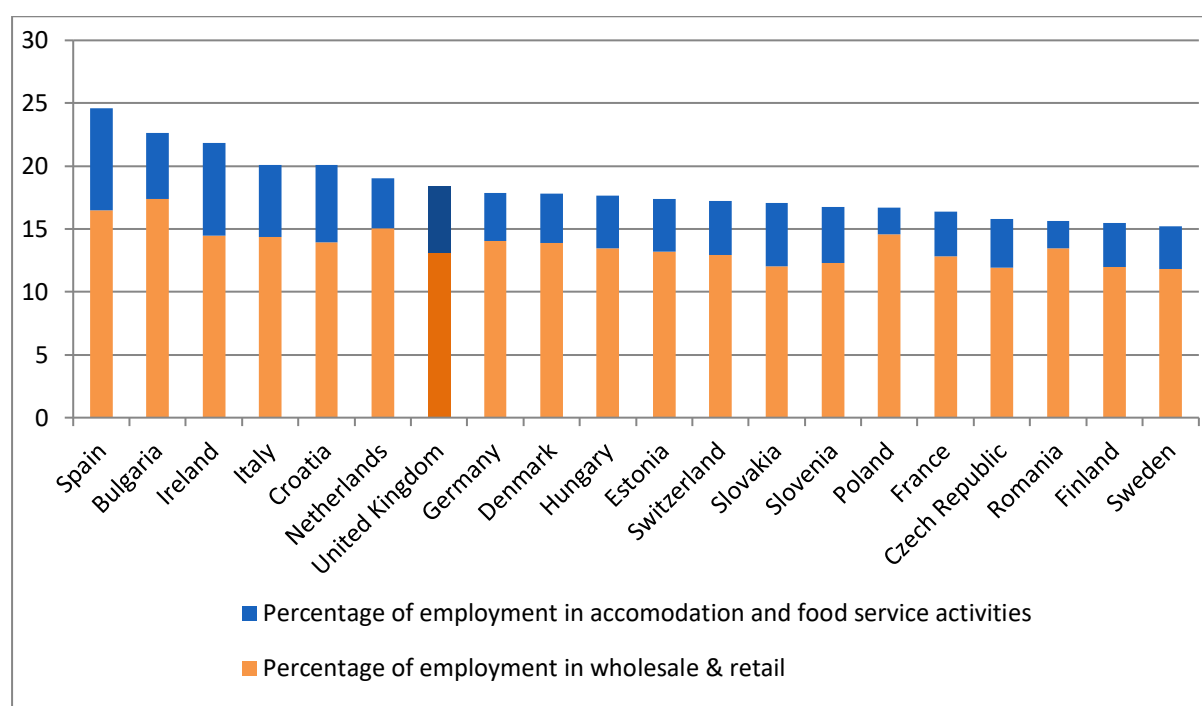
Source: Eurostat: LFS series - detailed annual survey results. Employment by sex, age and economic activity (lfsa_egan2)

Not only does the UK employ relatively large shares of workers in what might be considered 'low-paid' industries, the wages of workers in these industries are moreover particularly low in the UK compared to most other European countries. The difference between median hourly pay for workers in wholesale and retail and in accommodation and food service industries and workers in all industries is larger in the UK than in almost all countries for which industry-level hourly pay data is available in Eurostat (see figure 2-3). This finding helps to explain why, in comparison to other countries, low pay in the UK is particularly concentrated in particular service industries: retail trade,

catering and hospitality, and personal services made up 47 per cent of low paid jobs in the UK in 2001, compared to 32 per cent in France, 38 per cent in the Netherlands and 31 per cent in Germany (Salverda and Mayhew, 2009).

Figure 2-3: Median hourly pay in wholesale and retail and accommodation and food services as a percentage of median hourly pay for all industries, selected European countries, 2014
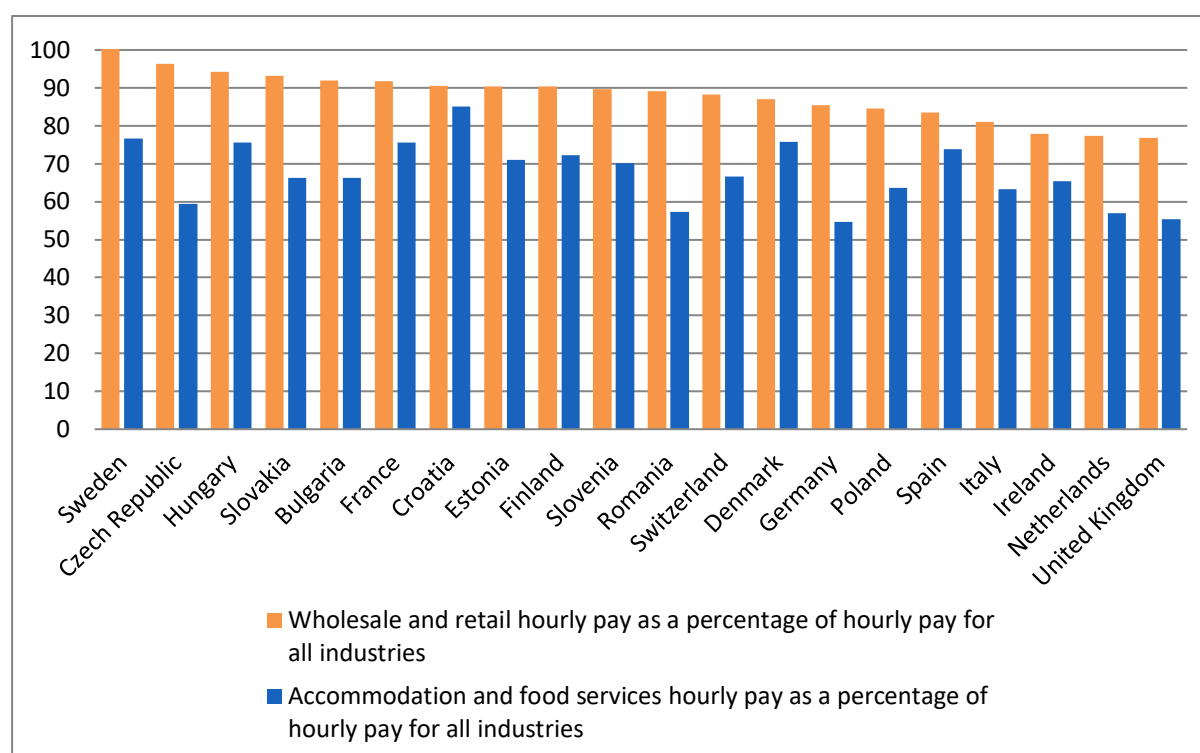
Source: Eurostat: Structure of earnings survey 2014. Mean hourly earnings by sex, age and economic activity (earn_ses2014)

The UK's concentration of low-paid employment in industries that tend to be characterised by weak internal labour markets means that low-paid workers in the UK are less likely to advance to higher-paid jobs than in most other European countries, as shown in figure 2-4. Between 2004 and 2011 the UK had the fourth lowest rate of progression out of low pay among 22 European countries, with just 37 per cent of workers escaping low wages, compared to more than 65 per cent in Belgium, Norway, and Sweden. The issue of progression out of low-paid employment is therefore of particular importance in the UK.

Figure 2-4: Progression rates (%) out of low pay among full-year, full-time workers in selected European countries, 2004-2011
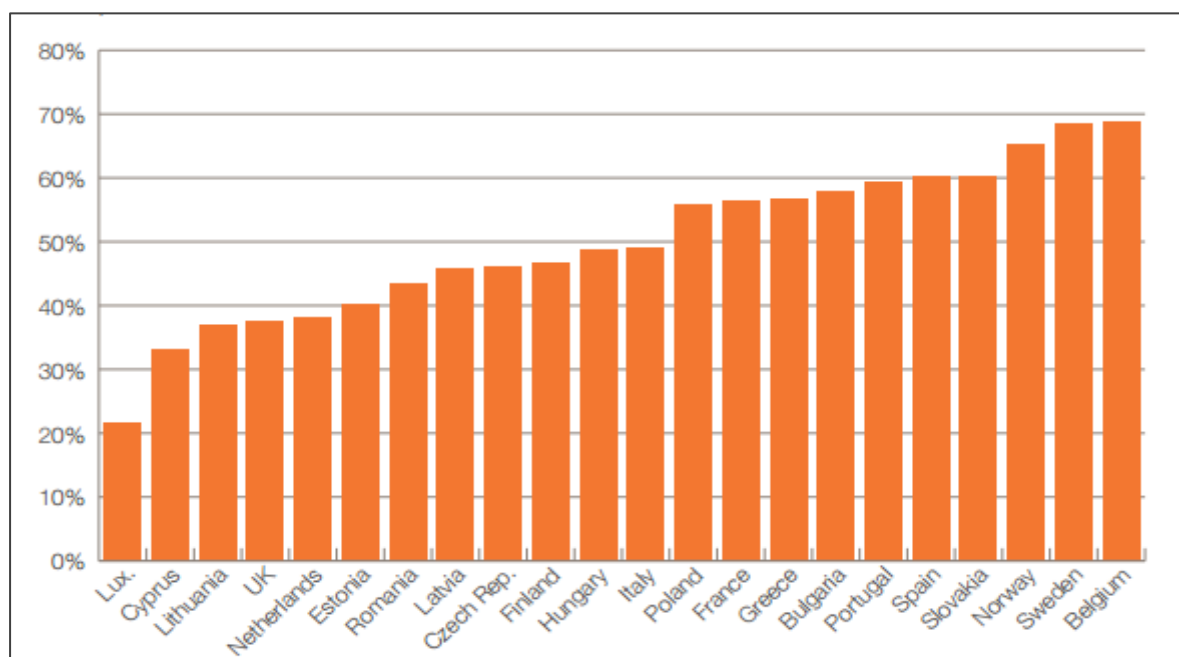
Source: Copied from Thompson and Hatfield (2015), figure 3.3. Note: Includes those who were full-year, full-time employees in both year one and year four of the EU-SILC. 'Low pay' was defined in each country as two-thirds of median annual earnings for full-year, full-time employees.

2.3   Job polarisation

Available evidence strongly suggests that the marked changes to the institutional and regulatory structures of the British labour market described in the previous section played a role in bringing about the sharp rise in wage inequality seen over the last few decades (Gosling and Lemieux, 2004). Unlike in other industrialised countries such as France, Germany and Italy, the gap between the wages of high and low paid British workers increased sharply during the 1980s and to a slightly lesser degree during the 1990s (ibid.). Although from the late 1990s lower tail wage inequality (the ratio of wages at the 50th percentile to wages at the 10th percentile) stopped rising and has even decreased somewhat (Van Reenen, 2011; Gregg, Machin and Fernández-Salgado, 2014), wage inequality remains high in the UK compared to other European countries (Salverda and Mayhew, 2009).

Aside from institutional reforms, another important explanation for rising wage inequality is the way in which the relative demand for labour across different skill classes has changed over the course of the last few decades. Many advanced capitalist economies have seen a growth in high-skilled occupations, as well as a – usually somewhat smaller – rise in low-skilled occupations, a process

referred to as job polarisation (Goos, Manning and Salomons, 2014). There is evidence that the continuing shift away from manufacturing employment and towards service sector jobs has been one factor in the changing relative employment shares of low-, middle- and high-income jobs (Goos and Manning, 2007). However, as well as the effect of between-industry shifts in employment, Goos and Manning find that job polarisation has occurred *within* each industry, suggesting there is more going on than a shift from manual to non-manual jobs alone.

The most prominent explanation for the polarisation of labour markets is the way that the increasing use of computer technology has affected demand for different types of skills. Although it was initially argued by US economists that technological change works in favour of high-skilled workers and lowers demand for low-skilled workers (Autor, Katz and Krueger, 1998; Berman, Bound and Machin, 1998), more recent evidence from the US (Autor, Katz and Kearney, 2006; D. Autor and Dorn, 2013), the UK (Goos and Manning, 2007), and other countries (Goos, Manning and Salomons, 2014; Michaels, Natraj and Van Reenen, 2014) suggests technology has tended to replace human workers in middle-skilled manual and clerical occupations that tend to involve a lot of routine tasks. Demand in many low-skilled occupations has been largely unaffected by technological change as many of these jobs do not involve a significant component of routine work and cannot easily be replaced by computers or machines.

Goos and Manning's analysis of UK occupations reveals that the fastest-growing occupations between 1979 and 1999 were software engineers, computer analysts, and management consultants, as well as care assistants, hospital ward assistants and hotel porters, while moderately-skilled manual occupations such as machine setters and print-workers saw the strongest falls in employment shares (Goos and Manning, 2007). This broad pattern of falling employment in intermediate-skilled occupations and rising demand for both high-skilled workers and low-skilled service workers performing non-routine tasks has characterised not just the UK but most other European countries, although the degree of polarisation has varied between countries (D. Autor and Dorn, 2013; Goos, Manning and Salomons, 2014; Michaels, Natraj and Van Reenen, 2014).

As well as technological change, several other factors have been said to underlie the shifting occupational distribution in developed societies. The offshoring of low- and moderately-skilled manual labour to countries with lower wages has also been argued to have played a role, although opinions differ on how large the effects of offshoring and competition from emerging economies have been (Crinò, 2009; Goos, Manning and Salomons, 2014). Additionally it has been posited that

the growth in low-skilled service jobs can be partly explained by the increased spending on personal services by a growing proportion of high-earning skilled workers (Mazzolari and Ragusa, 2013). Relatedly, increasing female participation in the labour force may have contributed to the growth of jobs at the lower end of the distribution, although this probably only accounts for a relatively modest part of the increase in what the authors of an oft-cited study term 'lousy' jobs (Goos and Manning, 2007).

It has, however, been argued that the methods used to identify employment polarisation may overestimate the extent to which jobs in the middle of the wage distribution are in fact disappearing, as it does not take into account the fact that the relative wages of particular types of jobs are likely to change over time. Looking at changes in employment by wage percentile between 1981 and 2004 suggests that the overall number of jobs in the middle of the earnings distribution has not declined as much as is implied by the proponents of the job polarisation thesis (Holmes 2010). However, even if wage adjustments are to some extent offsetting the effects of occupational polarisation, it is clear that the structure of jobs is changing.

This has led some commentators to raise concerns about the implications of this 'hollowing out' of the labour market, suggesting that a fall in the number of intermediate jobs relative to the number of low-paid jobs may lead to fewer medium-paid job opportunities for low-wage employees to aspire to and therefore make upward mobility more difficult (Crawford *et al.*, 2011; McIntosh, 2013). As Holmes and Tholen (2013) postulate:

"Before the decline of routine jobs, which tend to be medium skilled and better paid, lifecycle career progression may have involved transitions [from lower-paid, lower-skilled jobs] into more skilled routine jobs. However, as the low-paid jobs grow and middle wage jobs decline, such transitions become increasingly difficult. One possibility is that this creates a bottleneck where upward mobility becomes more infrequent for those trapped in the lowest wage jobs." (Holmes and Tholen, 2013, p. 2)

A recent report by the Social Mobility Commission also raises the issue of the comparatively low and declining number of intermediate jobs in Great Britain, stating that the disappearance of 700,000 better-paid, intermediate-skilled jobs means that there will be fewer employment opportunities for low-paid workers to "aspire and get promoted into" (Social Mobility Commission, 2016, p. 127). Despite this apparent concern, thus far few attempts have been made

to empirically assess whether employment polarisation does have a negative impact on the ability of low-paid workers to move up the earnings distribution.

Although very little research has directly examined the link between job polarisation and progression from low pay, there are several studies which are of relevance to this question. Research by Bukodi and Dex (2009) using data from the National Child Development Study and the British Cohort Study suggests that upward mobility from low-paid occupations declined between the early 1990s and the early 2000s, as the younger cohort captured in the British Cohort Study were less likely to have progressed from a low-paid occupation to a higher-paid occupation by the age of 33 than the National Child Development Study's older cohort of individuals. However, the question of what caused this decline in career mobility is not addressed. In contrast, Rhein and Trübswetter (2012) do explicitly examine the correlation between occupational mobility and changes in the occupational structure of the British labour market. They find that changes in the occupational structure between 1993 and 2008 are positively correlated with rates of occupational mobility, suggesting that structural change in occupations may have led to increased movement between different types of jobs. However, they do not make specific reference to job polarisation, nor do they differentiate between the direction of occupational mobility (upward or downward), meaning not much can be concluded from this study about the effect of structural labour market change and progression.

Contributions that have explicitly addressed the question of how job polarisation is related to changes in occupational mobility have tended to focus on the mobility of the routine workers who are most likely to have been affected by the decline in middle-income jobs (Autor and Dorn, 2009; Holmes, 2011; Cortes, 2012; Fedorets *et al.*, 2014). These studies suggest that the decline of routine-intensive occupations has been accompanied by increased mobility out of these occupations and into lower-skilled and higher-skilled occupations, with younger workers and female workers being more likely to move into occupations higher up the skill and earnings distribution than older male workers (Autor and Dorn, 2009; Cortes, 2012).

Evidence for increased flows out of intermediate occupations is also found in a recent report by Eurofound (Eurofound, 2017), which in addition provides some evidence about the effect of job polarisation on occupational mobility from low-paid to middle-paid occupations. Here the authors look at year-to-year changes in employment in wage quintiles across selected European countries, over the period 2007-10. They decompose the overall employment change in each quintile into the amount of change accounted for by increased/decreased flows into that quintile by individuals who

were previously unemployed or inactive, change accounted for by increased/decreased flows into that quintile by workers who were previously in a different quintile, and change accounted for by increases/decreases in the proportion of workers who remain in the same quintile as the previous year. They find that, in most countries, declining employment in middle-wage occupations was accounted for mostly by an increase in the number of workers flowing out of the middle quintile (i.e. workers being displaced from middle-wage jobs). But in Spain, France, and Poland declining middle-wage employment was also accounted for by a decrease in the number of previously low-wage workers moving into middle-wage jobs. In the UK, at least for the period 2007-10, no evidence for such a decrease in mobility from low-wage to middle-wage employment was found. This is, however, a relatively short, and perhaps somewhat unusual period, centring on the financial crisis and recession of 2008-09. The authors suggest that a longer-term analysis would provide more insight, but explain that a lack of suitable data means that following a similar approach but over a longer time span is challenging (Eurofound, 2017, p. 35).

A last contribution which sheds light on upward mobility from low-paid jobs in the context of job polarisation is Holmes and Tholen (2013). While devoting most of their analysis to displaced routine workers in the UK, the authors dedicate part of their study to mobility patterns among low-skilled service workers, aiming to uncover the ways in which patterns of occupational mobility have changed by comparing mobility rates between three time periods: 1992-1994, 2001-2003 and 2008-2010. Each of these time periods is characterised by a declining employment share in routine occupations. Occupations are divided into six groups: professional, managerial and intermediate occupations (all categorised as high-skill non-routine occupations); routine occupation; service occupations; and non-routine manual occupations (these last two categorised as low-skill non-routine occupations). They find that, compared to the period 1992-1994, the period 2001-2003 was characterised by modest increases in transitions from service occupations to intermediate occupations, professional occupations, and managerial occupations. Interestingly, transitions from service occupations to routine occupations also increased, despite the fact that the number of jobs in the latter declined during this period[5]. In the period 2008-2010, however, this pattern of increased upward mobility from low-skilled service occupations into routine as well as non-routine occupations reversed, as low-skilled service workers were instead more likely to transition into unemployment and inactivity. The authors suggest this may have been an effect of the recession that occurred

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[5] Another trend they observe is that transitions from service occupations to routine occupations were increasingly likely to involve movements into administrative occupations rather than manual routine jobs in later periods (Holmes and Tholen, 2013).

around this time. Shifting patterns of career mobility were moreover found to be related to changes in the composition of workers – in terms of education and age – within various occupational groups. These findings suggest that changes in rates of occupational mobility are likely to be influenced by a range of factors, making it difficult to determine the extent to which changes in mobility patterns are a result of the polarisation of the occupational structure. Perhaps the most important insight offered by the authors is that "not all routine or service occupations are the same", and that patterns of career mobility depend strongly on the way different occupations are linked together by overlaps in skills, hiring practices and career ladders within particular industries, as well as the choices and preferences of workers (Holmes and Tholen, 2013, pp. 38–39). In other words, the effect of labour market polarisation on job mobility is mediated by the particular career trajectories of workers in different occupations and industries. However, little is known about the occupational trajectories of workers starting off in low-wage jobs with Holmes and Tholen (2013) being the only existing study to devote any attention to occupational mobility among this group of workers, at least in the UK. It is also worth bearing in mind that looking only at net employment figures overlooks substantial expected replacement demand for workers even in occupations which have been forecast to see a net fall in numbers of jobs (McIntosh, 2013). Most likely, therefore, there will continue to be prospects for low-paid workers to move into middling jobs, although how many such intermediate positions are available will depend on the particular industry and occupation of workers.

The opportunities open to workers are likely to be influenced by the changing relative demand for differently skilled workers in their local area. Because of regional and spatial variations in the industrial make-up of labour markets, the degree of job polarisation tends to vary across regions and cities, as demonstrated in international literature (D. Autor and Dorn, 2013; Dauth, 2014; Senftleben-König and Wielandt, 2014; Terzidis, Van Maarseveen and Ortega-Argilés, 2017). Research suggests the same is true in the UK (Jones and Green, 2009; Lee, Sissons and Jones, 2013; Clayton, Williams and Howell, 2014). In chapter 5, the implications of these geographic variations in polarisation for progression among low-paid workers will be explored and the effect of local level job polarisation on upward mobility from low-paid occupations will be estimated.

2.4   Changes in the organisation of work

As well as the changing occupational structure of the labour market and shifts in the wage distribution, the last several decades have seen significant changes in the organisational structures and employment practices of firms and public sector organisations. These have impacted on the

experiences of low-paid workers and their opportunities to progress to higher-paying jobs. Drawing on research into low-wage work, this section will discuss the ways in which employers in a variety of industries have adapted their workforce management strategies to facilitate greater numerical flexibility in their workforces by making use of outsourcing, subcontracting, and temporary employment agencies.

As is reflected in the examples and case studies referred to below, a large proportion of low-paid employment is concentrated in a few key industries. The hotels and restaurant industry, wholesale and retail, and administrative and support services combined represent 53 per cent of all workers with earnings below the low pay threshold (Corlett and Whittaker, 2014). As such low pay and progression are, to some extent, issues specific to certain sectors, notably hospitality and retail. There are a number of reasons why the advancement of low-paid workers may be more difficult in these sectors specifically. In the case of retail, the fact that this sector employs large numbers of part-time workers (Grugulis and Bozkurt, 2011) and pressure on wage costs due to the labour-intensive nature of employment coupled with sometimes intense price-competition (Devins, Stewart and Iles, 2010) go some way to explaining why there are relatively few opportunities for low-paid workers to advancement to higher-paid roles. With regards to hospitality, the reliance on flexible labour driven by the need to control costs and respond to demand fluctuations are similarly unconducive to long-term human resource policies (Soltani and Wilkinson, 2010).

Some of these 'sector-specific' issues have been highlighted in research looking at low-paid work and progression, and they feature in the discussion below. But at the same time a lack of progression among low earners is an issue in many industries, and is not confined to the typical 'low-wage sectors' often mentioned in research on low pay (D'Arcy and Hurrell, 2014). Moreover, there are similarities between sectors in the nature of barriers faced by low-paid workers looking to progress, and in the employment practices that contribute to these barriers, as will be discussed below.

2.4.1 Flexible, non-standard, and precarious employment

Changing economic conditions during the 1980s and 1990s led many organizations to re-evaluate their employment practices. The standard employment relationship centred on regular full-time work with a high degree of security began to be questioned as flexible systems of workforce management were deemed increasingly essential to economic competitiveness. At the same time, labour market deregulation and technological improvements in communication and information

systems made it easier for firms to separate work tasks and deploy or redeploy workers according to fluctuating demand (Monastiriotis, 2005). As a result, during the 1980s and 1990s, temporary, fixed-term, part-time, and other non-standard forms of employment became more prevalent in the UK and other countries, something which led to growing concerns about a permanent shift towards more precarious employment conditions (Felstead and Jewson, 1999; Kalleberg, 2009; Standing, 2011).

The extent to which developed economies are experiencing an inexorable shift towards more flexible, insecure labour markets has since been subject to debate (Doogan, 2001; Auer and Cazes, 2003; Fevre, 2007). Recent trends in the number of temporary workers indicate that predictions made towards the end of the 20th century of a large-scale disappearance of stable, permanent employment and an unprecedented increase in insecurity (Beck, 2000) somewhat overstated the problem. Although temporary employment did increase between the mid-1980s and late 1990s, in the decade that followed the number of temporary workers gradually fell again[6]. However, the recession of 2008/09 appears to have once again sparked an expansion of insecure employment, as the proportion of workers on temporary contracts has increased, and there are signs that zero-hours contracts (employment contracts that do not guarantee a minimum number of hours) are on the rise (Clegg, 2018). Figures also show a small rise in the proportion of people working part-time, as well as increased underemployment with the numbers of workers wanting more hours rising from 6.9 per cent in 2007 to 9.7 per cent in 2014 (Emmerson, Johnson and Joyce, 2015). Recent findings suggest that those in weak regional economies have been particularly affected by the rise in involuntary temporary employment (Green and Livanos, 2015).

Research highlights the prevalence of insecure working conditions in various low wage industries. A study of employment relations in retail establishments in the UK, France and Germany found that in all countries, the use of part-time and shift working had increased as part of the drive for greater flexibility among retail managers (Baret, Lehndorff and Sparks, 2000). A growing use of temporary workers was also reported in several case studies in the food processing industry, fuelled by increasing fluctuation in product demand from retailers and their tendency to place more short-term orders (James and Lloyd, 2008). The use of temporary staff also appears to be increasing in public

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[6] Of course having a permanent contract does not necessarily guarantee job security, especially since labour market deregulation during the 1980s and 1990s has made it easier for employers to dismiss workers (Deakin and Reed, 2000; Heyes and Lewis, 2013). And insecurity may pertain to other aspects of work besides the contractual arrangement, for instance the level of control workers have over the order, pace and content of their jobs (Overell *et al.*, 2010).

services, such as teaching, care and social work (Kirkpatrick and Hoque, 2006). Qualitative studies have described the uncertainty faced by such temporary workers and their inability to plan for the future given the insecure nature of their employment (Conley, 2002). While such examples have given rise to concern about the apparent rise in labour market insecurity, others have emphasised that the flexibility enjoyed by UK businesses to adapt working hours and wages may have helped them to retain staff during the recession, thereby limiting increases in unemployment (Berkeley, Jarvis and Begley, 2012).

Although low pay and insecurity should not be conflated, there is a degree of overlap between them, with temporary and zero-hours contracts being more commonly found in low-wage sectors (MacInnes et al., 2014). There is a clear relationship between non-standard working arrangements and 'bad job characteristics', such as a lack of employee benefits, low pay, and a lack of recognized career or promotion ladders (McGovern, Smeaton and Hill, 2004). Temporary workers typically receive less training and their wages are lower on average than those of other workers (Corlett and Whittaker, 2014), even after they move into permanent employment (Booth, Francesconi and Frank, 2002). A comparative study of nine post-industrial economies has moreover found that labour market outsiders on non-standard contracts are less likely to receive promotions by their employers, with the gap being highest in the UK and US (Häusermann and Schwander, 2010). Research has additionally shown that periods of unemployment, as well as frequent involuntary job moves, tend to reduce chances of escaping low pay (Hurrell, 2013) which is perhaps unsurprising given that non-permanent workers are likely to experience a lower degree of job stability and therefore a higher risk of falling into what has been termed a 'low pay, no pay cycle' (Stewart and Swaffield, 1999).

2.4.2   Outsourcing, subcontracting and the fragmentation of work

Along with an increased use of various types of non-standard employment arrangement, the practice of outsourcing gained popularity in the 1980s (Davis-Blake and Broschak, 2009) as a way for firms to focus on their 'core competencies' while cutting down on staff costs by contracting out non-essential processes (Marchington et al., 2004). Outsourcing can enable employers to benefit from (spatial or other) differentials in wage levels, or put downward cost pressure on their suppliers and service providers that is passed on to their workers (Flecker, 2009). The enhanced outsourcing options available to employers can therefore be seen as correspondent with the search for greater organisational flexibility and competitiveness, but they may also weaken the bargaining power of

workers, and could lead to increased disparities in terms of employment and working conditions between core employees and workers in outsourced services. Not only could this lead to tensions in cases where contract staff work alongside and perform the same duties as directly employed staff but are subject to different pay and conditions (Rubery *et al.*, 2009), there have been concerns that external restructuring "may intensify the segmentation of labour markets and lead to a fragmentation of employment both in the private and the public sector" (Flecker, 2009, p. 251).

One prevalent example of the fragmentation of organisational boundaries is the 'outsourcing of staffing' through the use of employment agencies to supply temporary, or sometimes permanent, staff (Davis-Blake and Broschak, 2009). By making use of agencies, firms are able to outsource recruitment and any potential difficulties associated with finding suitable staff, as well as manage workforce numbers more flexibly avoiding the costs associated with dismissing workers. While outsourcing and the use of employment agencies can be driven by a need for specialised skills which are too costly or inefficient for an organisation to house internally – in which case the contracted employees typically enjoy a relatively high degree of control over their work and often command high wages, the outsourcing of many low-level services such as catering, security and cleaning is typically associated with a greater degree of insecurity of employment and a more limited ability for workers to acquire skills and progress to other positions (Marchington *et al.*, 2004). For instance, in a study of low-paid workers in the UK food processing industry, many of those employed through agencies were reported to be ineligible for promotional opportunities until they made the transition to a permanent position with the company – something which could sometimes take up to two years (James and Lloyd, 2008).

Similar exclusions of agency staff from training and development opportunities were found in call-centres (Lloyd *et al.*, 2008), and barriers to progression have also been found to result from the outsourcing of cleaning services in NHS hospitals. A study identified a lack of communication to staff employed by private cleaning contractors about training and progression routes, and unwillingness on the part of these private firms to lose their staff led to a very limited rate of progression among cleaners despite them being eligible for training in theory (Grimshaw and Carroll, 2008). However, in some cases new organisational forms can lead to positive outcomes for workers, for instance where an activity or process that was peripheral to one employer is transferred to an organisation for which it is a core part of business, and can thus offer more skill development and promotion opportunities for workers employed in this area (Marchington *et al.*, 2004). An example of this is when security services within a hospital are outsourced to a private security firm. Whereas security

guards may not have many opportunities to advance within the hospital itself, when part of a larger private company with potential job openings at multiple sites, they may find it easier to find a higher-paid position.

2.4.3   Organisational structures, training and opportunities for progression

As well as the outsourcing of many activities to external contractors, the evolution of new models of work organisation over the last few decades have emphasised a shift from formalised hierarchical structures to flatter organisational forms. This has resulted in a reduction in middle order jobs in many organisations, another factor which may have contributed to the way the labour market has polarised between low-paid and high-paid employment (Kalleberg, 2011). Such processes of occupational delayering in organisations in manufacturing, the public sector and in service industries have reduced the number of mid-level jobs available for entry-level staff to be promoted to and as such have contributed to the fragmentation of internal labour markets (Hudson, 2005). A study of employment reorganisation in retail, customer service and local government illustrates how the removal of layers of supervisory, team leader, and low-level management positions resulted in a big leap between entry-level positions and the next layer in the occupational hierarchy, which was found to discourage some staff from attempting to progress (Grimshaw *et al.*, 2002).

However, many firms in low wage sectors such as hospitality or retail have always been characterised by relatively flat organisational structures, meaning that these organisations struggle to offer promotional opportunities to more than a small number of entry-level staff . The limited nature of openings for internal progression was highlighted in a study exploring the experiences of room attendants in the hotel industry (Dutton *et al.*, 2008), as well as by research in the call centre industry (Lloyd *et al.*, 2008). Frustration at a perceived lack of career progression opportunities has also been identified as one of the factors contributing to low overall levels of job satisfaction among retail employees (Whysall, Foster and Harris, 2009), which is likely to be related to the fact that retail firms tend to have particularly 'flat' organisational structures with relatively few higher-paid positions compared to the large proportion of low-paid shop-floor staff.

In other organisations and sectors, despite there being some promotional prospects open to low-paid workers, positions just above entry-level often pay little more than the lowest-paid employees. A study of the café sector, for instance, found that supervisory and assistant manager posts are still quite widespread, but the gap between the wages paid to entry-level staff and those in supervisory

positions has narrowed to the extent that supervisors were often paid at the same rate, or only a very small amount more, than regular customer service assistants (Lloyd and Payne, 2012). To escape low pay therefore often required progressing to the level of store manager, something which only a minority of entry-level staff felt confident about being able to achieve given the shortage of openings at this level and the requirements placed on workers to be eligible for promotion. Those who had made it to the level of store manager had often had to relocate to other stores, and many had taken more than 7-10 years to get to the position they were in (ibid.).

This is not to say that employers in low wage sectors are by definition not committed to career development. In several of the cafés and sandwich shops mentioned above training and development systems were in place, and managers were keen to give entry-level staff a chance to progress (ibid.). Similarly, despite their general low levels of pay, large multi-national fast-food chains such as McDonalds tend to have training and development structures in place and so are able to offer opportunities for advancement to some workers, a survey of McDonald's staff in Australia suggests (Gould, 2011). However, it appears that despite the intentions of management to promote career paths and workforce development, only a limited proportion of workers progress in a way that allows them to escape low pay, as illustrated by the finding that only 18 per cent of low-paid workers who started off working in '*unlicensed restaurants and cafés*' – the sector that includes cafés and fast food outlets such as McDonalds –had managed to escape low pay ten years later (D'Arcy and Hurrell, 2014). This indicates that the employment structures in these industries are often not conducive to enabling progression on a large scale.

Moreover, research suggests that in industries with relatively flat organisational structures workers often have to be able to be mobile across different sites in order to access promotions as job openings at a more senior level may only come up at other locations or require a move to a regional or national head office (Grimshaw *et al.*, 2002; Lloyd *et al.*, 2008; Lloyd and Payne, 2012). Accessing such geographically dispersed opportunities can be especially difficult for those who have young children to look after. Therefore, this issue tends to affect women disproportionally.

In sectors, such as manufacturing or public services, where historically low-skilled workers were able to progress up the organisational hierarchy through apprenticeships, on-the-job training, and internal job ladders, processes of occupational delayering have tended to make incremental promotion based on on-the-job training more problematic. In these organisations the larger gaps between entry-level and more senior positions means that the gradual acquisition of skills through

performing a job over a period of time is often not (seen as) enough to qualify a worker for promotion (Grimshaw *et al.*, 2002). Hence, employers are in some cases recruiting suitably skilled workers for mid- and high-level positions externally instead of providing training to enable entry-level staff to progress to more senior positions (James and Lloyd, 2008). In other cases, however, employers have moved to the provision of formalised training schemes due to concerns that the reduced chances of promotion offered to entry-level staff may contribute to low morale and higher turnover. Concerns over the ability to retain and attract workers might however be more prominent in areas where there are labour shortages, while in areas of relatively high unemployment employers may not have problems filling vacancies despite deteriorating employment conditions and withdrawal of training and progression opportunities (Grimshaw *et al.*, 2001).

On the whole, qualitative research suggests that the provision of training in low wage settings tends to be rather limited and that accessing training can be difficult for some workers even where it is provided. For example, although it has been found that some hotels provide training to room attendants, not all do, and where courses are provided take-up among cleaning and housekeeping staff is often limited due to workers not being given time during their shifts to fit in training (Dutton *et al.*, 2008). Some retail establishments have also been found to limit access to training to full-time staff members only, with part-timers not viewed as suitable for development (Mason and Osborne, 2008). The fact that the chances of accessing training and development opportunities are not evenly distributed across different types of workers is confirmed by quantitative research which shows that those in low-skilled jobs, temporary and part-time employees and women with young children are significantly less likely to receive work-related training than men and those in higher-skilled, stable jobs (Lindsay, Canduela and Raeside, 2012; Sutherland, 2014). A study of low paid workers in four different public and private organisations also indicated that in several cases the absence of a formal and transparent process for determining access to training often led to low skilled staff being screened to determine their suitability for training and career development on the basis of individual discretion by managers, with only a select few workers given the chance to develop (Grimshaw *et al.*, 2002).

This has led to concerns that in many organisations employing low wage workers a 'winner-takes-all' approach to training and career development has become the norm, and that as a result many workers feel demoralised about their chances of advancement (ibid.). The above findings do indeed suggest that internal labour markets, particularly in low wage industries, have begun to function more like external labour markets, with the limited access to training and promotions leading to

greater competition between workers for these scarce opportunities, rather than advancement being governed by transparent and predictable career paths. Even where formalised career development systems are in place, the structure of employment in certain low wage industries tends to mean that only a relatively small proportion of individuals manage to make their way up the hierarchy to attain jobs with significantly higher levels of pay, and these workers are more likely to be the ones able to commit to working full-time and be geographically mobile. This indicates that, not only do opportunities for career development depend on the sector that workers are employed in, certain types of workers tend to lose out in the 'contest' for training and development opportunities.

The limited prospects for advancement offered by many low wage industries may explain why some workers featured in the research discussed above report being keen to find employment in other sectors (Lloyd *et al.*, 2008; Lloyd and Payne, 2012). Indeed, evidence suggests that low-paid workers in hospitality and retail tend to have better chances of progressing if they switch to employment in other parts of the economy (Hurrell, 2013). But the success of such a move will of course depend on what kind of other employment opportunities exist in the local labour market.

2.5   Policies related to low pay and progression

Low pay has not always received a great deal of attention as a policy issue in the UK, apart from in relation to minimum wages. During the time of the last Labour government (1997-2010), raising the skill levels of low paid workers was seen as the main way to improve their position in the labour market, but the focus on supply-side issues – related to the characteristics, abilities and motivations of workers and jobseekers – left the implications of the high number of low wage jobs in the UK and the limited opportunities for better-paid employment available to workers stuck in these jobs largely unexplored. For instance, little effort was made to understand how demand for more highly skilled and well-remunerated jobs in low-wage sectors could be stimulated, with policymakers accused of relying on a largely unsubstantiated belief that "increasing the supply of skilled and educated labour will, of itself, encourage employers to upgrade their products and production strategies" (Keep and Mayhew, 2010, p. 567). More recently however, a tentative understanding has emerged that, unless the factors underlying the high levels of low paid work and lack of progression opportunities in the UK are addressed, welfare policy is unlikely to achieve its aim of 'making work pay' and reducing reliance on in-work benefits (Hirsch, 2018). For this reason, the UK government has in recent years

focused on increasing the wages of the lowest-paid through increasing the minimum wage, and has begun to explore ways to encourage in-work progression.

2.5.1 The National Minimum Wage and the National Living Wage

After the abolition of the UK Wage Councils, the introduction of a National Minimum Wage (NMW) in 1999 ensured that a wage floor was established protecting workers from extreme low pay. It is estimated that the minimum wage increased the hourly pay of around 5 per cent of workers when it was first introduced, with women making up the majority of beneficiaries due to their greater likelihood of being low paid (Grimshaw, 2011). The introduction of the NMW played an important role in the levelling off – and according to some accounts slight narrowing – of lower-tail wage inequality since the late 1990s (Butcher, Dickens and Manning, 2012). As a result, while upper tail wage inequality continued to rise from the late 1990s until the onset of the 2008-9 recession, lower tail wage inequality remained more or less stable (Van Reenen, 2011; Gregg, Machin and Fernández-Salgado, 2014), and, consequently, the proportion of low paid workers has also stayed more or less flat between 1996 and 2013 (Corlett and Whittaker, 2014).

However, while the NMW has been successful in tackling extreme low pay and partially reversing a trend of rising wage inequality at the bottom of the earnings distribution, it is not clear how much it has done to address the wider problem of low-paid work in the UK. Several studies have found non-existent or very limited spillover effects on the wages of workers paid just above the minimum wage (Dickens and Manning, 2004a, 2004b; Stewart, 2012), although more recent findings indicate that spillovers may have been more substantial than previously thought (Butcher, Dickens and Manning, 2012). On the other hand, research has pointed to a compression of wages at the low end of wage scales in many fast food outlets, pubs and supermarkets due to employers either eliminating pay scales or reducing the difference between the wages of their lowest-paid staff and those of supervisors or team leaders (Grimshaw, 2011). This suggests that with regard to reducing the overall numbers in low pay, the effect of the minimum wage has been rather limited, as is confirmed by the fact that the proportion of employees below the low pay threshold has remained virtually unchanged since the mid-1990s (Corlett and Whittaker, 2014).

However, after a decade of more or less keeping pace with median earnings (LPC, 2015), the UK Government has recently introduced a new National Living Wage for workers aged 25 and over. The National Living Wage, in effect a higher minimum wage for those over the age of 25, was set at £7.20

in 2016, representing a substantial increase from the previous minimum wage rate for adult workers. Since 2016, the National Minimum Wage[7] has increased at a relatively steep rate, now standing at £7.83 per hour, and is projected to reach at least £8.50 by 2020 (Cribb, Joyce and Norris Keiller, 2018). To date, the effect of this new higher minimum wage rate has been to reduce the number of workers classed as being low-paid under the commonly-used threshold of two-thirds of median hourly pay from 19 per cent in 2016 to 18 per cent in 2017 (D'Arcy, 2018). What effect the policy will have on low pay dynamics over the longer term is less clear. Although the increase in the minimum hourly wage has been welcomed by many, there have been concerns that in sectors where low paid workers make up a large proportion of the workforce such a large rise might lead to adverse employment effects (Cribb, Joyce and Norris Keiller, 2018), and that the new rate will prove especially problematic for the care sector (D'Arcy and Kelly, 2015). Additionally, since in-work social security payments constitute a significant share of income for many low-income households, the cuts to in-work tax credits announced simultaneously with the new National Living Wage mean that it might not do much to address the problem of in-work poverty (ibid.). And importantly, it is not clear that a higher minimum hourly wage rate will do much to help those in low-wage work advance to higher-paid jobs[8].

2.5.2   Skills

A second important way in which policy has sought to address the problem of low pay is through encouraging workers to improve their skills. Given that higher skills are linked to better outcomes in the labour market, the last three UK governments have focused on raising the skill levels of individuals in an attempt to address the size of the low wage workforce. A range of initiatives were introduced under the New Labour government, the most important of which was the Train to Gain programme which was launched in 2006 (Ray, Foley and Hughes, 2014). Train to Gain was abolished in 2010, but improving the qualifications of workers – through adult apprenticeships, basic English and maths training and assistance from the National Careers Service – has remained an objective

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[7] The National Minimum Wage is now called the National Living Wage for workers aged 25 and over.
[8] The projected increases in the National Minimum Wage will of course mean that those over the age of 25 whose earnings are currently below this level will over time have less far to travel to exceed the low pay threshold (provided that this doesn't increase in line with the rise in the minimum wage due to spillover effects higher up the earnings distribution), which will obviously have implications for measured rates of progression from low pay dynamics. However, beyond receiving an initial boost to their earnings, it does not seem likely that minimum wage workers will experience faster wage growth as a result of the steeper increases of National Living Wage.

under the Coalition government (2010-2015) and current Conservative government (HM
Government, 2014; DfE, 2018).

However, some have questioned the merits of concentrating only on improving worker's skills,
arguing that unless the demand for skills by employers is addressed at the same time, the provision
of training to low-paid workers alone will not bring about a significant reduction in the proportion of
workers in low wage jobs (Keep and Mayhew, 2010; Lloyd and Mayhew, 2010). Improving the skills
of low wage employees is therefore likely to only be a partial answer to the problem of low pay and
lack of progression (Lloyd and Mayhew, 2010; Wright and Sissons, 2012). Moreover, it has been
posited that workers in some local labour markets may perceive little incentive to engage in
education and training as the likelihood of attaining 'good' jobs or promotions appears very limited
to them given the opportunities in their local area (Keep and James, 2010).

The fact that low-pay sectors such as retail and hospitality are characterised by high levels of skills
under-utilisation (Wright and Sissons, 2012) moreover suggests that a substantial proportion of
more highly skilled workers in these sectors may end up stuck in low paid jobs despite their
qualifications. This has led researchers to posit that the relative decline of medium-skilled routine
occupations during a time of increased educational attainment among young people has led to an
increasing proportion of well-qualified labour market entrants unable to find good quality jobs and
working in low-skill, low-wage occupations (Holmes and Mayhew, 2012). As well as the supply of
skills, the demand for and utilisation of skills by employers therefore needs to be addressed.

2.5.3   Welfare reform

As part of the UK's quest for a more flexible, competitive labour market, as well as in an effort to
bring down welfare spending, social security for those out of work has undergone significant reform
over the last few decades. This has resulted in a system that emphasises moving unemployed
claimants back into work as quickly as possible, with less regard for the quality of jobs or the longer-
term earnings potential they offer. Under the Conservative governments led by Thatcher (1979-
1990) and Major (1990-1997) unemployment benefits were reduced sharply to provide greater
incentive for the jobless to search for, and take up employment. Starting with the 1989 Social
Security Act, and followed by the 1996 introduction of Jobseekers Allowance, the conditions
attached to receipt of unemployment benefit were made more stringent with claimants being

required to conduct specified amounts of job search activity (Erskine, 1997; Walker and Wiseman, 2003).

This trend towards increased conditionality – also labelled 'activation' – was extended under the New Labour government (1997-2010). Unemployment policy during the Blair era, although in some cases involving training and support to increase the employability of the individual, very much followed a 'work first' approach (Walker and Wiseman, 2003). Despite some significant changes, policy under the Conservative-Liberal Democrat Coalition government (2010-2015) largely continued in the same vein. Although the Work Programme – a programme of support for those deemed to be further from the labour market – contains targets related to job retention rather than being concerned only with placing participants in work, the dominant focus of welfare policy has remained the supply-side of the labour market (McQuaid and Fuertes, 2014). The availability of job opportunities in the labour market, and, crucially, opportunities that offer reasonable wages and prospects for advancement, has received little attention in comparison.

More recently, however, interest in issues beyond labour market attachment and employment retention has begun to increase. This is partly due to the introduction of Universal Credit – a new unified system of working-age benefits which is currently in the process of being rolled out. Universal Credit replaces six working-age benefits – Child Tax Credit, Housing Benefit, Income Support, income-based Jobseeker's Allowance (JSA), income-related Employment and Support Allowance (ESA), and Working Tax Credit –and will become the main working-age benefit for those on a low-income. When fully rolled-out, an estimated seven million families will be in receipt of the new benefit (Brewer, Finch and Tomlinson, 2017), of which a substantial proportion will be in work.[9]

The stated aim of Universal Credit is to tackle poverty, worklessness and welfare dependency (DWP, 2010). Specifically, it aims to not only create stronger and clearer financial incentives for out-of-work individuals to take up employment, but also to incentivise those already in work but on a low income to increase their earnings. This is done, firstly, by smoothing the rate at which benefits are

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[9] It is hard to estimate exactly what percentage of Universal Credit claimants will be in work when it is fully rolled out, but in 2015-16, an approximate three million in-work families were in receipt of tax credits. Assuming that all of these families will eventually be moved onto Universal Credit, this means that the seven million projected Universal Credit claimants will include around three million claimants who live in a family in which someone is in work. Of course, we don't know what proportion of these individuals will be low-paid workers, as employed individuals may be in receipt of Universal Credit because they have low hourly earnings, because they work few hours, or because the other adults in their household do not work.

withdrawn as claimants earn more in order to remove the 'cliff-edge' effects of legacy benefits and tax credits based on strict thresholds of earnings and working hours (House of Commons Work and Pensions Committee, 2016). Secondly, benefit conditionality is extended to those who are in work but deemed to be capable of earning more by increasing their hours or finding better-paid work (DWP, 2011). Additionally, under Universal Credit claimants receive a single monthly payment, rather than several separate (weekly) payments as is often the case for claimants currently receiving multiple benefits. The move to a single monthly payment is argued to be more akin to what individuals would receive if they relied only on income from employment, thus, purportedly, easing the move from benefits to financial self-sufficiency through work.

The current design of Universal Credit has, however, been the subject of substantial critique from academics and anti-poverty campaigners. The single monthly payment mechanism has been criticised by those pointing out that about half of low-income households in work receive more than one salary payment per month, whether because they get paid weekly or fortnightly or because they work more than one job, thus calling into question the extent to which Universal Credit actually mirrors the experience of most workers on a low income (Millar and Bennett, 2017; Summers, 2018).[10] Since its initial design, there have additionally been substantial cuts to entitlements, most importantly through large reductions in the 'work allowance', or the amount that can be earned before the benefit starts to be withdrawn. For childless claimants without disabilities, the work allowance was eliminated altogether in 2016, meaning that their benefit amount will be reduced from the moment they start earning. This cut reduces work incentives compared to the original design of Universal Credit, although, overall, work incentives remain stronger than under the legacy benefit system it replaces (Browne, Hood and Joyce, 2016). However, due to the complex ways in which Universal Credit differs from current tax and benefits eligibility for different household types, some households will see their work incentives improve, while for others they will weaken (ibid.). The notion that Universal Credit will improve incentives to take up work or increase earnings across the board is, therefore, not true.

Aside from the issues inherent in the design of Universal Credit, its implementation has been plagued by problems resulting in delayed payments and uncertainty for many claimants, and has proceeded at a much slower pace than planned. Importantly, there is evidence that some of the

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[10] Acknowledging that the single monthly payment can cause issues for some claimants, the Department for Work and Pensions has since introduced the option to request Alternative Payment Arrangements, including the possibility of increasing the frequency of payment.

features of delivery – such as the five week waiting period for new claimants and the way sanctions are applied – have resulted in hardship for many claimants (Barnard, 2019). This calls into question the effectiveness of the policy in fulfilling its purported aim of "tackling poverty" (DWP, 2010).

One of the main features of Universal Credit, and the aspect that will perhaps have most impact on the issue of in-work progression, is the introduction of 'in-work conditionality'. Unlike the legacy benefit system, Universal Credit imposes on claimants who are *already in work* an obligation to take action to increase their earnings. The stated aim of this policy is to "push claimants […] to work more and reduce their dependency on benefits"(DWP, 2011). The DWP has acknowledged that the success of this policy will depend, at least in part, on improving the opportunities for low-paid employees to progress. It has, therefore, invited ideas on how to support progression for low-paid employees in receipt of Universal Credit (DWP, 2013; UKCES, 2014b), including a series of pilot schemes to address barriers to work and support in-work progression for those in low-paid jobs (DCLG, 2017). These examples indicate that there is increased awareness of progression from low pay as an important issue with relevance to welfare reform policy. Yet at the same time, the main focus of the in-work conditionality regime is on encouraging claimants to increase the number of hours they work each week, rather than move into higher-paid work (SSAC, 2017). What effect the roll-out of Universal Credit will have on wage progression – understood as an increase in hourly pay – therefore remains to be seen. Although the DWP has conducted a randomised control trial of the in-work progression programme based on a small-scale pilot (DWP, 2018), this only evaluated the relative effectiveness of three differing levels of support and conditionality, and did not compare workers who were subject to conditionality and/or support against those not subject to *any* level of conditionality and support. This makes it difficult to draw conclusions about the potential impact of the in-work conditionality aspect of Universal Credit as compared to the current welfare regime.

Aside from the particulars of the Universal Credit system, the mere fact that the UK operates a system of in-work benefits constitutes an important part of the context in which low pay and in-work progression need to be understood. Any system in which the entitlement to, and amount of, in-work benefits or tax credits is conditional on earnings has an impact on the financial incentives to engage in paid work and to increase earnings for households in receipt of such benefits. Firstly, by topping up low pay, in-work payments lower the reservation wage of workers – that is, the lowest wage for which it would be worthwhile for someone to move from reliance on out-of-work benefits to full- or part-time employment. This has the effect of increasing the number of people in work, particularly in relatively low-paid jobs (Paul, 2016). At the same time, workers who are in receipt of

in-work benefits face the prospect of losing these benefits – either abruptly or gradually – as they earn more, therefore making the financial gains from wage progression less pronounced than they might otherwise be. This means that the motivation to seek out progression may be less strong for low-paid workers who are in receipt of in-work benefits or tax credits than those who are not. It is, however, important to remember that individuals may have many different reasons to seek progression (or refrain from doing so), and not all of these will be monetary in nature.

2.6 Quantitative evidence on progression among low paid workers in the UK

Section 2.4 discussed how workforce management practices and employment structures in low wage industries influence the opportunities for, and barriers to, career advancement for low-paid workers. To get a more accurate idea of the extent to which British low wage workers experience progression, how this has changed over time, and how the likelihood of progression is affected by the characteristics of workers as well as the types of firms they work for, the following four sections will review quantitative research on progression among low-paid workers. The focus is on studies using data from the UK, although at times findings from other, comparable countries are considered. The review covers research published over the last eighteen years (1998-2015), and although not all of the studies covered refer to progression explicitly – some make reference to wage mobility or wage growth; others refer to low pay dynamics – all are concerned, in some way or another, with the question of to what extent low-paid individuals manage to improve their wages over time. As mentioned in the introduction, in the literature 'low pay' is defined in various ways. In the following four sections, the term is used to refer to an hourly wage of less than two-thirds of median hourly earnings for all workers, unless otherwise indicated. Table 2-1 summarises the most influential studies of low pay dynamics in the UK which are discussed in more detail in sections 2.6.1 to 2.6.4.

Table 2-1: Key quantitative studies of low pay dynamics in the UK

Author(s)	Year	Data source	Key finding(s)	Factors associated with progression from low pay
Dickens	2000	New Earnings Survey Panel Study	Considerable persistence in low pay: just under half of workers in bottom wage decile in 1993 were (still) there one year later.	Gender
Dickens	1997	New Earnings Survey Panel Study	Mobility from lower to higher wage deciles is greater over longer time periods.	Gender
Gosling *et al.*	1997	British Household Panel Survey	Considerable churn between low and higher pay, as well as between low-paid work and	Qualifications, job tenure, periods of unemployment.

			non-employment.	
Phimister and Theodossiou	2008	British Household Panel Survey	The introduction of the minimum wage decreased male-female differences in expected low pay durations and exit probability to higher pay, although women remain less likely to move to higher-paid work.	Gender, qualifications, working part-time, living in social rented accommodation
Hurrell	2013	New Earnings Survey Panel Study	Only 18 per cent of those in low pay in 2002 were consistently in higher-paid work during the last three years of the subsequent 10 year period.	Age, gender, working for central/local government, working part-time, employer size, working in low-wage industries, working in sales & customer service, process, plant and machine operative, and elementary occupations.
D'Arcy and Hurrell	2014	British Household Panel Survey	Among workers in low pay in 2001, almost a third spent less than half the years between 2001 and 2011 in work, limiting their chances of progression.	Age, ethnicity, qualifications, disability, single-parenthood, living in social housing, employer size, working part-time
Kumar *et al.*	2014	Understanding Society	The proportion of workers who escape low pay over a ten year period has fallen slightly since the 1990s.	Age, qualifications, region, work-limiting health conditions, having children (for women), being a lone parent (for women), job satisfaction working part-time, working in the public sector, working in a low-wage industry

2.6.1 How many workers are 'stuck' in low pay?

Research conducted over the last few decades has revealed that, although for the majority of UK workers being low paid is a relatively short-lived experience, a substantial minority of workers remain stuck on low wages for an extended period of time. In an early study of earnings mobility among low-paid workers, Dickens (2000) uses data from the New Earnings Survey Panel Dataset (NESPD) to compute transitions between hourly earnings deciles, as well as transitions from employment to unemployment, and finds a considerable degree of persistence at the bottom of the wage distribution, with 48 per cent of male workers and 44 per cent of female workers in the bottom decile in 1993 still there a year later. In a separate paper (Dickens 1997) the author analyses

transitions between wage deciles and between employment and worklessness over a five-year period and finds that mobility is higher over this longer time period for both men and women. However, many appear to move out of employment and as a result only about 29–31 per cent of workers in the bottom decile actually move up the distribution during this period.

Gosling *et al.* (1997) use data from the British Household Panel Survey (BHPS) and find that, of men in the bottom wage quartile in 1991, over half (52 per cent) were low paid in 1994, with 30 per cent having moved to higher quartiles and 13 per cent having moved out of work. Among women, 44 per cent of those in the bottom quartile in 1991 were also there in 1994. Analysing the wage trajectories of these workers in more detail reveals that, of 52 per cent of male workers who were low paid in 1991 and 1994, only 35 per cent were low paid in each intervening year, while the remainder had at least one year of higher pay or non-employment during this three-year period.

This indicates that low pay dynamics are not always characterised by steady wage progression, but can be subject to upward and downward movements in pay over time, as well as movements in and out of work. To reflect this, Hurrell (2013) has more recently devised a typology of the wage trajectories of initially low paid workers using low pay data across ten waves of the NESPD. Defining low paid workers as those with hourly earnings below two-thirds of the median for all workers, the paper labels as 'stuck' those who only held low-paid jobs throughout the ten years between 2002 and 2012, 'cyclers' those who earned above the low pay threshold at least once during the period, and 'escapers' those with earnings above the threshold in 2010, 2011 and 2012. It was found that, out of those who were low paid in 2002, 27 per cent were continuously in low paid work until 2012 and so classified as stuck, while a further 46 per cent had cycled in and out of low pay without making a sustained transition into higher-paid work, and 18 per cent had escaped low pay consistently during the last three years of the period (Hurrell 2013). Subsequent analysis of BHPS data by D'Arcy and Hurrell (2014) points to a substantial group of low-paid workers who spend more time out of work than in work. Almost a third of low paid workers in their sample spent less than half the years between 2001 and 2011 in work, and consequently had very slim chances of progression.

When it comes to trends in low pay persistence over time, Dickens presents some evidence that wage mobility slowed between the mid-1970s and early 1990s, and particularly in the early 1980s (Dickens 2000). This is consistent with findings from Hurrell (2013) which indicate that the share of workers stuck in low pay for ten years or more increased between 1975 and 1982, although from the early 1990s until the early 2000s it appears to have fallen again. Of those who were low paid in 1990,

approximately 13 per cent had managed to escape by the year 2000, but of those who were in low pay in 2002, 18 per cent had escaped by 2012 (Hurrell, 2013). Using the same definition of 'escapers', 'cyclers' and 'stuck' as above, but a different low pay threshold (20 per cent above the minimum wage) Kumar *et al.* however find the proportion of 'escapers' fell slightly over the period from 1990 to 2000, while the proportion of 'cyclers' increased. It might be that the choice of low pay definition explains the difference between these seemingly conflicting findings. Although the evidence about whether the problem of persistent low pay has worsened in recent years is mixed, findings clearly suggest that a significant minority of workers remain stuck in low-pay.

2.6.2   Causes of persistent low pay: worker characteristics and state dependence

Gosling *et al.* (1997) argue that there are two possible explanations for the fact that a considerable proportion of low paid workers find themselves stuck in this situation over longer periods. It could be that certain characteristics of workers – such as their qualifications, age, or gender – make low pay more likely. Since many of these characteristics persist over time, these workers are therefore also more likely to remain low paid over the longer run. Or, it could be that being low paid at any one point *in and of itself* increases the probability of low pay in subsequent periods. With regards to the first possibility, there is indeed evidence to suggest that certain individual characteristics make being stuck in low pay more likely. We will turn to the effect of these personal or demographic characteristics first.

Age is found to be a significant factor in explaining the likelihood of escaping low pay in several studies. Hurrell (2013) indicates that older low paid workers are less likely to see progression from low wages than are younger groups. Using data from the BHPS (2001-2011), D'Arcy and Hurrell (2014) similarly find that age is negatively correlated with the probability of progression from low pay. A second important factor is gender. Phimister and Theodossiou (2008) find that, controlling for other characteristics, men have a higher probability of exiting low pay and moving into higher-paid employment, both before and after the introduction of the minimum wage in 1999. Kumar *et al.*'s (2014) analysis of data from the BHPS and the UK Household Longitudinal Study data reveals that being female is significantly correlated with the likelihood of being stuck in low pay (defined as hourly wages up to 20 per cent of the minimum wage), even when controlling for other characteristics. The same study also finds an effect of ethnicity on the probability of escaping low wages, with workers of Asian ethnicity less likely to progress out of low pay than white workers

(although no such effect is found when it comes to the likelihood of being stuck[11]). Having a work-limiting disability or health condition is similarly found to make progression from low pay less likely (Kumar *et al.* 2014), something which is also found in a study that used Labour Force Survey data to focus on the labour market experience of disabled workers specifically (Rigg, 2005). Being a lone parent, too, is negatively associated with progression (D'Arcy and Hurrell, 2014). Lastly, the amount of education workers have undertaken, whether measured in terms of the number of years spent in education, or in terms of their highest obtained qualification, affects their progression, with more highly educated workers being more likely to escape low wages (Gosling *et al.*, 1997; Stewart and Swaffield, 1999; Phimister, Theodossiou and Upward, 2006; Kumar, Rotik and Ussher, 2014).

As well as personal characteristics, several job-related factors have also been found to be important in explaining progression outcomes. Part-time workers are on average more likely to remain in low pay for extended periods than full-time workers (D'Arcy and Hurrell, 2014; Kumar, Rotik and Ussher, 2014). Working for a larger organisation (with more than 1000 employees) is positively associated with progression (D'Arcy and Hurrell, 2014) while being employed in a small workplace makes it more likely that workers remain in low pay (Kumar, Rotik and Ussher, 2014). Lastly, employees who receive job-related training appear to experience higher wage growth than those who don't (Hurrell, 2013), although Pavlopoulos et al. (2009) find that job-related or firm-specific training is only effective for workers at the intermediate and the higher education levels while having no noticeable effect on the upward wage mobility chances of lower-skilled workers.

Of course some workers have little desire to pursue progression opportunities, either because they are relatively satisfied with their current job conditions or because they don't feel that the extra responsibilities that come with a more senior position are worth the increase in pay, something which not infrequently comes up in qualitative research with low-paid workers (e.g. Lloyd and Payne 2012). The impact of worker attitudes on progression from low pay is not always easy to analyse in quantitative research. However, Kumar *et al*. (2014) find that workers who reported at the beginning of the analysis period that they want a new job have higher average rates of escaping from low pay. Regression results reported in the same study show, however, that there is not a straightforward relationship between job satisfaction and progression, with both those very satisfied with their job and those very dissatisfied with their job having a lower chance of escaping low pay compared to those who are neither satisfied nor dissatisfied (Kumar *et al.* 2014). These findings do not say

[11] Being 'stuck' in low pay is not the obverse of progressing out of low pay, because workers may also leave employment.

anything about the direction of causality, however, and it is certainly possible that workers feel dissatisfied with their jobs precisely *because* they perceive limited opportunities for progression. A further finding relating to the effect of attitudinal factors or personality traits on low pay mobility is that low wage workers with a stronger internal locus of control – a psychological term referring to the extent to which someone feels they have control over their own life – are more likely to progress (Schnitzlein and Stephani, 2016).

As well as certain personal or job-related characteristics making it more likely that someone remains at the bottom of the wage distribution, it is also possible that the experience of being low paid in and of itself makes escaping from low wages less likely. To provide an measure of this, Gosling *et al.* (1997) estimate separately the unconditional probability of being low paid in any given year, given characteristics such as age, education, and so on, as well as the conditional probability of low pay given these characteristics *and* given low paid status in the year before. The results show that adding information on low paid status in the initial year into the model markedly increases estimated low pay probabilities in subsequent years, especially for women. This indicates that personal characteristics only account for some of the observed persistence in low pay, and points to the fact that the correlation in low paid status over time is likely to at least be partially due to the nature of low paid work itself – although the authors point out that certain unobserved characteristics of workers, such as their motivation or ambition, could also have an effect.

Stewart and Swaffield (1999) explore further the degree to which persistence in low pay over time is due to some kind of inherent effect of being low paid on workers' subsequent chances of escaping low pay – in other words, the *state dependence* of low pay – as opposed to being due to certain unmeasured worker characteristics. The individuals who are low paid at the start of the analysis period may differ from the rest of the sample in certain attributes which are not captured by the control variables, such as attitudes or levels of motivation, that affect their chances of progression. This unobserved heterogeneity of low-paid versus non low-paid workers may therefore account for the higher probability of these individuals falling into low pay in the first place, as well as their greater likelihood of remaining low paid over a longer period.

In order to control for this unobserved heterogeneity and estimate the degree of 'true' state dependence, the authors employ a probit model with endogenous selection to account for any unobserved characteristics. Using a low pay threshold of two-thirds of median hourly pay, they estimate the amount of genuine state dependence of being low paid to be 76 per cent. In other

words, according to this estimation around three-quarters of the average probability of being low paid in any one year can be explained by having been low paid in the previous year (Stewart and Swaffield 1999)[12]. The authors argue that this is consistent with several labour market theories, for instance the possibility that being low paid signals to employers that a worker is less productive, therefore limiting employment offers and hence their likelihood of finding better-paid work. Or, it could be that being in a low paid job gives workers less opportunity to develop their skills, thus reducing their future wage growth (Stewart and Swaffield 1999).

2.6.3   Sectors and occupations

While these labour market theories go some way towards explaining why there appears to be a large amount of state dependence in low pay, the research above does not explore the extent to which the tendency for workers who are low-paid in one period to remain low-paid in subsequent periods could be explained by other factors, such as the sector that workers are employed in or the types of occupations they hold. Analysis by several authors suggests that both of these are important, which is perhaps unsurprising given the observations made in the previous section about the concentration of low pay in particular sectors and occupations.

Controlling for other factors, Hurrell (2013) finds that workers who remained in the manufacturing, mining and quarrying industry, in wholesale and retail, and in accommodation and food services for the ten year analysis period were less likely to experience progression compared to workers who did not work in these sectors or worked in them for shorter periods. Mosthaf *et al.* (2011) find that attaining a higher-paid position is less likely if workers are employed in firms manufacturing food products and beverages, in hotels and restaurants and in firms providing other service activities. There is also evidence that certain occupations are associated with a reduced chance of progression (Lee, Green and Sissons, 2017). Using German data, Heinze and Gürtzgen (2010b) find that female workers are more likely to remain low-paid if they work in a service occupation or qualified blue-collar occupation. In the UK, workers starting off in caring and leisure occupations, in sales and

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[12] On a side note, the authors also find that the marginal effects of the explanatory variables in the model are considerably smaller using the bivariate probit model with endogenous selection compared to a univariate model which only includes observed characteristics. In other words, ignoring the endogenous selection (i.e. the fact that the low-paid workers in the sample at year t-1 were not selected at random from the population but already possessed certain characteristics that increased their propensity towards low pay) leads to an overstatement of the estimated effects of the personal and workplace characteristics on the conditional probability of remaining low paid.

customer services were more likely to be stuck in low-paid if they remained in these occupations over the ten year period considered (Hurrell 2013).

2.6.4   The role of place

The studies discussed above find some limited evidence that geographic factors are important in influencing progression from low pay. Kumar (2014) finds evidence of a regional effect on the likelihood of long-term low pay, with workers in the North-East, the North-West, Yorkshire, as well as Scotland, Wales or Northern Ireland more likely to be stuck in low pay for ten years than workers in London. These effects hold even after controlling for the effect of working in low wage sectors. D'Arcy and Hurrell however find that, although those who escape low pay are less likely to live in the North East of England or the West Midlands, region does not have a significant effect on progression in their regression model once other variables are included (D'Arcy and Hurrell 2014). The fact that the evidence on regional effects is mixed may be an indication that what makes a difference is not so much the region workers reside in, but differences between types of labour markets. But, apart from a single study exploring low pay dynamics in rural and urban labour markets (Phimister, Theodossiou and Upward, 2006) which is discussed in more detail below (section 2.7.2), none of the above studies have an explicit focus on exploring the potential impact of local labour market factors on progression in the UK.

2.7   Local labour markets and progression from low pay

There are important reasons for exploring the role of geographical differences when studying labour market processes. As described in the previous chapter, labour markets are subject to regional and intra-regional variations, which reflect differences between both economic activity and workers in different places and impact on the labour market outcomes of these workers. Over the last few decades a number of economists have become interested in studying the interactions between local labour markets, the characteristics of the workers within these, and the performance of local economies in terms of employment, productivity, and wages (e.g. Rice, Venables and Patacchini, 2006; Glaeser and Gottlieb, 2009; Krugman, 2011; Moretti, 2011). These studies have highlighted how spatial differences between economies and labour markets can influence the experiences and behaviours of workers – to move or to stay, to seek work or study, and how these behaviours can in turn influence labour markets.

Aside from the fact that there are important local variations in labour market performance and wage dynamics, it makes intuitive sense to analyse labour market issues on a local scale since most workers seek employment within, and similarly employers tend to recruit workers from, a restricted geographic area (Martin and Morrison, 2003). When it comes to workers looking to progress, the local labour market is therefore also likely to be the site in which low-paid employees search for higher-paid employment opportunities. Findings by several economic geographers and spatial economists, although these do not concern low-paid workers specifically, suggest that the size and structure of the local labour market in which workers are situated influences their occupational advancement, wage growth, and job mobility (Glaeser, 1999; Glaeser and Mare, 2001; Wheeler, 2006; Baum-Snow and Pavan, 2012; Champion, Coombes and Gordon, 2014; Gordon, Champion and Coombes, 2015).

2.7.1   Spatial labour market inequalities in the UK

The UK labour market has never been uniform, and hence the impact of the national scale changes described in the first part of this literature review have varied greatly across space. The widening of labour market inequality during the 1980s and 1990s did not just increase the gap between different groups of workers, but also between regions, exacerbating the division between the relatively prosperous southern and eastern regions of England, and the relatively depressed regions of the North (Martin, 1988). Structural changes in the economy since the 1970s saw employment in manufacturing fall across all regions of Great Britain, but to a much greater extent in northern regions of England, Scotland and Wales than in the south of England. This led not just to increases in 'official' unemployment in these regions, but also growing hidden unemployment as those who lost their jobs transferred onto sickness benefits (Beatty and Fothergill, 2005). Meanwhile, the expansion of knowledge-intense service sector employment was predominantly concentrated in the South of England rather than in the north of the country, meaning that the total number of jobs rose by 22 per cent in the South against only 6 per cent in the North between 1971 and 2009 (Rowthorn, 2010).

It is not surprising, therefore, that Gardiner *et al.* (2013) see the weaker economic and labour market performance of the North of England as being linked to the unfavourable industrial structure of northern regions compared to London and the South East. Literature on local economic competitiveness similarly explains the success of some local economies as the being result of having

the 'right kind of jobs', notably high concentrations of employment in high value added sectors, such as knowledge-intensive business services (Jones, 2013). However, although sectoral specialisation is undoubtedly still an important explanation of spatial inequality, evidence suggests that regional differences in job quality are not driven primarily by differences in industrial structure, but by differences in the occupational structure *within* industries (Jones and Green, 2009). The occupational structure in London and the South East is characterised by a high-skill bias within all sectors, while the opposite is the case in Wales, the North East, and Northern Ireland (ibid.).

As well as regional disparities, important *intra*-regional differences in labour market performance (Hincks, Webb and Wong, 2013), the supply of and demand for skills (Green and Owen, 2006), and productivity growth (Jones, 2013) are also evident. An important finding in this regard is that that cities tend to have higher average wage levels than rural areas, as shown in research from a variety of countries (Gould, 2007; Baum-Snow and Pavan, 2012; De la Roca and Puga, 2012; D'Costa and Overman, 2014). These higher wage levels are said to be the consequence of agglomeration economies, with the greater spatial concentration of economic activity in cities argued to increase the productivity of workers (Krugman, 2011; Combes *et al.*, 2012; Kline and Moretti, 2014).

As well as wage levels, the degree of job polarisation has been shown to vary between local labour markets (Dauth, 2014; Lee, Sissons and Jones, 2015; Terzidis, Van Maarseveen and Ortega-Argilés, 2017). Focusing on British cities, Lee *et al.* (2015) show how average wages, wage inequality and labour market polarisation tend to be correlated. In general, cities with the greatest bias towards high-skilled occupations also tend to be the ones with the most polarised labour markets, with London and several other cities in the South-East of England having both a large proportion of high-skilled jobs and a substantial number of low-skilled jobs (Lee, Sissons and Jones, 2015). This has been explained by some academics as being partly the result of the increased demand for personal services by high-income professional and managerial workers working in large, successful cities such as London, combined with an influx of migrants willing to take up low-paying service jobs (Gordon and Kaplanis, 2014). But the relationship between polarisation and high skills bias does not hold everywhere, and there are some cities that have a high share of high-skilled jobs without having a very polarised labour market, and some cities that are polarised without having a high degree of skills bias (Lee, Sissons and Jones, 2013).

Research suggests that there is a relationship between the overall degree to which employment in a city has polarised, and the degree to which this polarisation is driven by growth in the share of

workers in low-paid – as opposed to high-paid – occupations. Over the ten years up to 2011, cities that saw the largest employment falls in occupations around the middle of the wage distribution tended to see a greater shift towards employment in low-paid, rather than high-paid, occupations (Clayton, Williams and Howell, 2014). Luton, Coventry, Birmingham, Peterborough and Stoke-on-Trent saw their share of low pay occupations increase the most out of all cities, and also experienced some of the largest declines in the share of employment in intermediate occupations (ibid.). This raises the question of whether workers in these cities have found it more difficult to progress from low-paid jobs to higher-paid employment.

A final issue that has received some attention in relation to the labour market outcomes of low-paid workers is the effect of immigration on local labour markets. Overall, the evidence suggests that immigration has not had a large effect on either employment or pay within the native UK workforce as a whole (Dustmann *et al.*, 2003; Dustmann, Fabbri and Preston, 2005; Wadsworth, 2010), but this general finding may obscure impacts on particular skill groups or within particular local labour markets. A study examining the long term economic impacts of migration on British cities suggests that a higher share of migrants within the local economy has a small positive effect on wages, particularly for high-skilled UK-born workers (Nathan, 2011). However, it was found that in local economies with particularly high levels of migrant workers some intermediate- and low-skilled natives may be locked out of employment (ibid.). The author stresses, however, that long term patterns of industrial change also help explain these negative employment effects on lower-skilled natives, and that the increasing casualisation of entry-level jobs in weaker local labour market could additionally play a role.

2.7.2   Spatial differentials in wage growth and occupational advancement

Although there is little evidence on the relationship between local labour market characteristics and the earnings of low-paid workers specifically, there is a body of research that has examined the effect of local labour market characteristics on differences in wages, wage growth and occupational progression among the working population as a whole. Although there are a number of important differences between low-paid workers and other workers – in terms of gender, age, skills, experience and human capital, some of the insights from these studies are likely to be relevant for progression among the low-paid, so it is worth considering their findings as well as the methods used.

This literature is composed of two main strands: work by spatial or urban economists in the US, the UK and elsewhere that has focused on spatial disparities in wages and wage growth (e.g. Glaeser, 1999; Glaeser and Mare, 2001; Wheeler, 2006; Yankow, 2006; Combes, Duranton and Gobillon, 2008; Matano and Naticchioni, 2011; D'Costa and Overman, 2014; De la Roca and Puga, 2017); and a series of studies by British geographers, following the work of Fielding (1992), examining the links between geography, mobility and occupational advancement.

The first strand of work focuses predominantly on the contrast between urban and non-urban labour markets. The idea examined here is whether cities, by virtue of having large, thick labour markets, enable faster wage growth for workers who live there (looking at the entire workforce, so including both low-paid, and non-low-paid workers), compared to non-urban labour markets (Glaeser, 1999; D'Costa and Overman, 2014; De la Roca and Puga, 2017). The second strand departed from a slightly different perspective, focusing on the extent to which the South East of England, as the dominant (economic, cultural and political) region in the UK, facilitates higher rates of occupational advancement than elsewhere (Fielding, 1992). More recently, researchers in this field have begun to investigate whether other UK cities also share this 'escalator effect' found in London and its surrounding region (Champion, Coombes and Gordon, 2014), which has led them to compare urban- and non-urban labour markets, in a similar way to the spatial economists.

Cities, wages and wage growth

Evidence from the field of spatial and urban economics suggests that the wages of urban workers tend to grow more quickly than those of non-urban workers. This is the case in the US (Glaeser, 1999; Glaeser and Mare, 2001; Baum-Snow and Pavan, 2012), France (Combes, Duranton and Gobillon, 2008; Combes *et al.*, 2012), Germany (Möller and Haas, 2003), and Spain (De la Roca and Puga, 2017). Two main theories are proposed to explain this 'urban wage growth premium'. The first suggests that workers' exposure to diverse urban environments and frequent interactions with skilled individuals increases the rate at which they accumulate human capital (the 'learning' hypothesis) (Glaeser, 1999; Glaeser and Mare, 2001). The second explanation suggests that the thick labour markets found in cities enable more efficient matching between workers and employers, leading to faster wage growth (the 'matching' hypothesis) (Wheeler, 2006; Yankow, 2006). Findings by Wheeler (2006) suggest that the positive effect of urban location on wage growth is driven primarily by wage growth linked to job changes, rather than growth experienced on-the-job. This conclusion is supported by the finding that young, male workers in urban areas change jobs more

frequently than workers in non-urban and rural areas (Yankow, 2006), and that, when they do so, they are more likely to change industries, at least in the early stages of their careers (Wheeler, 2008). In contrast, Baum-Snow and Pavan (2012) find that differences in the amount of wage growth accumulated on the job account for more of the wage gap between small and large cities than differences in the amount of wage growth attained through switching employers[13].

Although most evidence on the urban wage growth premium relates to the US and selected European countries, in the UK, too, findings indicate that wages grow slightly faster in larger cities. D'Costa and Overman (2014), using data for the period 1998-2008, find that working in London is associated with a 1.4 percentage point higher annual rate of wage growth compared to working in rural areas, whereas working in a large city (defined as a Travel-To-Work-Area with 250,000 to 1 million inhabitants) is associated with 0.4 percentage point higher annual growth in wages. The authors are sceptical, however, about the extent to which this wage growth premium is due to a causal effect of being located in a larger or denser labour market, and argue that this effect arises for the main part because cities attract more highly skilled, able and motivated individuals who have inherently faster wage growth than other workers. When controlling for the effect of unobserved worker characteristics by using worker fixed-effects, they find no significant evidence of an urban wage growth premium (D'Costa and Overman, 2014). On the other hand, these same authors find that when urban workers are compared to those who have *never* worked in a city (as opposed to all those who currently work in a rural area including those who at some point in the past may have worked in a city), there is a small wage growth premium associated with working in an urban labour market (of around 0.9 percentage points per year) which moreover seems to persist even after these workers have moved to a rural area (D'Costa and Overman, 2014). In other words, by taking into account the possibility that non-urban workers who lived in a city in the past may still benefit from that experience when they no longer live in an urban labour market, the authors produce results that do support the idea that cities are associated with higher wage growth, in contrast to their earlier findings in the same study. De la Roca and Puga (2017), using Spanish data, similarly find that working in bigger cities (Madrid or Barcelona) is associated with higher earnings growth even when controlling for unobserved time-invariant worker heterogeneity by using worker fixed-effects.

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[13] They also find that this holds for US workers with college degrees as well as workers with high school diplomas only, but that within job wage growth is more important for the more highly educated workers than for workers without post-compulsory education.

D'Costa and Overman (2014) find that, for their entire sample of workers, the urban wage growth premium is primarily the result of faster within-job earnings growth, consistent with the learning hypothesis. When repeating the analysis using a sample of younger workers, however, the results suggest that small cities have a small positive effect on within-job wage growth, and big cities and London provide an advantage in terms of between-job wage growth. From these findings it appears likely that both learning and job matching play a role in enabling workers to progress more quickly in large urban labour markets, although the importance of each may vary between different cities and between groups, with between-job earnings growth being perhaps more important for younger workers.

Evidence suggests that the size and density of the local labour market is more important for the progression of younger workers. This can be concluded from the fact that most of the US studies identifying an urban wage growth premium (e.g. Glaeser and Mare, 2001; Wheeler, 2006; Yankow, 2006; Baum-Snow and Pavan, 2012) use data from the National Longitudinal Study of Youth, which follows a sample of workers aged 14-21 at the start of the survey over the subsequent 15 years. Moreover, when D'Costa and Overman (2014) restrict their sample to young, male workers only (aged between 16 and 21 at the beginning of the ten year analysis period), they find evidence that the urban wage growth premium is substantially higher than for all workers, even when controlling for unobserved characteristics. For these workers, compared to working in a rural area, working in a small city is associated with a 2.1 percentage point higher annual growth in hourly earnings, working in a big city with a 1.8 percentage point higher annual wage growth and working in London with a 2.3 percentage point higher annual wage growth (ibid.).

The finding of a positive association between urban labour markets and wage growth is in line with the results from an analysis of low pay dynamics in rural and urban labour markets. Aiming to explore whether denser urban labour markets lead to faster rates of progression among low-paid workers than rural labour markets, Phimister *et al.* (2006) estimate a transition rate model to four types of exit from low pay, namely, to higher-paid jobs, unemployment, out of the labour force, and self-employment. The results suggest there are urban-rural differences in the impact of certain variables on transition rates to higher-paid jobs as well as to economic inactivity. Overall the authors find evidence that urban workers have a slightly higher probability of moving to higher-paid jobs, and that the duration of low pay in urban areas is somewhat shorter. More detailed analysis of different groups of workers indicates that urban-rural differences in the typical low-pay experience are concentrated among certain types of individuals, notably young workers and women without

qualifications. For instance, low-educated young women have a significantly longer expected duration in low pay in rural labour markets than in urban labour markets (ibid.).

Escalator regions and the wider opportunity structure of local labour markets

Much of the work on the urban pay premiums has been rooted in spatial economics. However there are different disciplinary perspectives on the opportunity structure of labour markets. Of relevance here is the work of economic geographers who have tended to take a different approach to the study of (local) labour markets. Particularly in early literature, authors emphasised the socio-political constitution of labour markets. Far from functioning like the markets conceptualised by neoclassical economics – neutral spheres within which labour is exchanged for wages in a transparent and unproblematic way – local labour markets are often structured or even segmented by race, gender and class (Haughton and Peck, 1996; Peck, 1996). Historically and spatially contingent institutions, norms and practices shape who seeks particular types of work, as well as who is deemed by employers to be suitable for particular types of work. For instance, Peck (1996) draws on theories of labour market segmentation (Doeringer and Piore, 1985) to describe how, in various places and at various times, institutional barriers and conventions have served to restrict access to 'good' jobs to certain privileged groups while largely excluding other groups of workers. Labour market divisions are perpetuated not just by formal and informal practices on the demand side, but also by the social "actions of those finding their way into different kinds of jobs" (Peck, 1996). In a related example, McDowell (2002) describes how the career aspirations and, thus, employment outcomes, of young working class men in British cities are shaped by their ideas about masculinity and which types of work constitute "better work for a man" (p. 51).

This literature draws attention to the fact that local labour markets are defined by much more than just their size, being shaped by demographic differences, industrial heritage, locally-specific cultural norms, and a range of gender, ethnic and religious divisions that play out in different ways across different places. In doing so, it also makes apparent that drawing a clearly delineated boundary around a local labour market is, conceptually, limited. Not only do workers not stick to a defined geographical area when looking for work, as discussed in section 3.3.2, even if this was the case, workers do not move around freely within these boundaries. Instead, local labour markets tend to be segmented in various ways, and importantly, the nature and strength of this segmentation be shaped by spatial structures (Peck, 1989).

The work of Gordon, Coombes and Champion on 'escalator regions' (2014; 2015a; 2015b) bridges that of the spatial economists, and the more conceptually nuanced work of the economic geographers discussed above. Unlike the spatial economists, Gordon et al. see local labour markets not as a set of uniform 'containers', differentiated only in terms of size, within which labour market processes take place (Peck, 1989). Instead, they theorise that the local labour market could have an effect on occupational progression in a variety of ways, including:

> "(a) as the context for pre-labour-market socialisation, with different community, labour market, and family influences affecting educational achievement and motivation;
> (b) through the effect of the scale and mix of local jobs on the availability/value of opportunities for on-the-job development of human/social capital;
> (c) the local chances of converting such assets into an appropriate job, given the relation between labour-market tightness and employers' hiring standards; and
> (d) the varying risks of getting 'bumped down' the job ladder (and then losing human capital) in local economies with differing degrees of exposure to redundancies."
> (Gordon, Champion and Coombes, 2015, p. 591)

In their empirical analysis, however, they do not examine this full range of potential influences, but instead concentrate mostly on item (b). They use the commonly-used definition of local labour markets as Travel-To-Work-Areas and analyse occupational advancement across English cities. An initial paper (Champion, Coombes and Gordon, 2014) takes as its starting point an influential study that suggests that working in London and the South East of England provides greater opportunities for workers to advance their careers, acting as a so-called 'escalator region' (Fielding, 1992). The authors seek to find out whether this so called 'escalator effect' is a region-specific effect – applicable only to the South East, or an urban effect – in which case it may apply to England's 'second-order' cities[14] too. When examining rates of occupational advancement in London and second-order cities they find that the latter, on average, lag well behind London in terms of transitions to higher-paid occupations and actually perform no better than the rest of the country[15]. In a subsequent paper, they do however find a positive association between occupational advancement rates and the size of the local labour market that extends beyond London (Gordon,

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[14] These are: Birmingham, Manchester, Leeds, Newcastle, Bristol, Sheffield, Liverpool, Nottingham, and Leicester.
[15] The exception to this are workers who migrate into second-order cities from elsewhere, who do experience faster rates of advancement in these cities.

Champion and Coombes, 2015), indicating that the escalator effect is not just confined to London. This finding is consistent with the broad conclusion that working in a larger city has a small positive effect on progression.

Interestingly, the authors find that rates of occupational progression are not just affected by the size and density of the local labour market, but also by the share of jobs in higher level occupations and dynamic knowledge-intensive sectors, factors not controlled for in the work of Glaeser, de la Roca and Puga, and D'Costa and Overman. Of course, this result pertains to workers across the full occupational spectrum, and it is unclear to what extent these factors might influence progression among low-paid workers who are more likely to be found at the lower end of the occupational hierarchy[16]. Nonetheless, it does highlight the fact that, as well as the characteristics of workers and the sheer number of jobs workers have access to, the 'opportunity structure' of the local labour market may also be important in determining occupational progression (Gordon, Champion and Coombes, 2015).

In their analysis of the urban 'escalator effect', Gordon *et al.* (2015) draw on the same notion of urban labour markets facilitating accelerated human capital accumulation as found in Glaeser (1999), which is an aspect that will be explored in chapter 4. However, as well as being influenced by the spatial proximity of other firms and workers, human capital development at a local level is likely to be influenced by the provision of training by employers. Research has shown this varies spatially and is related to labour market density, but in the opposite way to how density is argued to influence human capital accumulation (and thus earnings) according to the argument made by Glaeser. Brunello and Gambarotto (2007) find that, in the UK, higher employment density *decreases* the likelihood of workers receiving employer-provided training – controlling for full- or part-time status, qualifications, occupation and industry, although this effect is weaker for areas with a higher average firm size. They explain this as the result of employers in dense labour markets being reluctant to invest in training due to fears that workers will be poached, or simply leave for other jobs, reducing the extent to which the firm benefits from the training. This indicates that there may be multiple, and sometimes contradictory forces at play in the relationship between labour market characteristics and worker progression.

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[16] Worker characteristics (whether observed or unobserved) apart from graduate status are also uncontrolled for in this analysis.

Gordon et al's (2015) framework also highlights that the tightness of the local labour market may also play a role in determining the ease with which individuals are able to secure jobs, and the quality of work – in terms of skill-level and pay – they are able to obtain. In areas of labour shortage workers may be in a better position to find work, and better quality work, than in areas with an abundant supply of workers and a lack of vacancies. Living in a tighter labour market may therefore help workers progress. Evidence from Denmark suggests that this is indeed the case. Bolvig (2004) finds a negative relationship between the unemployment rate in the local labour market relative to the national average, and the likelihood of progressing from a low wage to a higher wage at the same firm, indicating that tighter labour market conditions are conducive to within-firm progression (perhaps because employers in such areas prefer to retain and develop incumbent workers for higher-paid roles than attempt to recruit workers in the external market). A higher relative unemployment rate also seemed to reduce the likelihood of workers moving to another low-paid job with a different employer, suggesting that workers in slacker labour markets tend to change jobs less frequently (ibid.).

Lastly, point (d) in the framework set out on p. 62 can be linked back to the earlier-mentioned finding concerning the negative effect of periods of unemployment and involuntary job moves on the likelihood of escaping low pay (Hurrell, 2013). Rather than referring to redundancy in particular, this point could perhaps be amended to exposure to involuntary job separations in general, reflecting the fact that many workers experience a loss of employment not through being made redundant, but for other reasons, such as a temporary contract coming to an end without having secured another job[17].

Considering these different ways in which local labour markets could influence progression highlights the complex nature of the interactions between the wage trajectories of workers and the local environment in which they are situated. The above four points also underline that, aside from the contrast between urban and rural labour markets, several other local labour market characteristics may be relevant, such as the occupational and industrial composition of employment, the tightness of the local labour market, and the security of employment. These factors are therefore included in the regression modelling for both of the empirical chapters in this thesis.

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[17] The Labour Force Survey reveals that out of 1.3 million people who experienced an involuntarily job separation in 2013, 69 per cent were dismissed or made redundant, and 31 per cent lost their job due to a temporary contract coming to an end (ONS, 2013b).

2.8   Summary and conclusions

The British labour market has been affected by many of the changes that have affected other European countries – a gradual decline of manufacturing employment and a restructuring towards service jobs, increased international competition, and technological innovations – however the institutional context of the UK and the policy approach taken by successive governments has produced a rather different set of labour market outcomes than in many comparable countries. Declining union power, limited centralised coordination, and the erosion of employment and wage protection mechanisms were important factors in fuelling rising inequality at the bottom of the wage distribution and the growth in low-skilled, low-paid service jobs during the 1980s and 1990s. As a result, the UK has a higher share of low-paid jobs than many other countries. In addition, mobility out of low pay is lower in the UK than in most European nations (Thompson and Hatfield, 2015). The gradual reduction of intermediate-level jobs has only added to concerns about the prospects of those in low pay to progress to better-paid jobs, although explicit research on the effect of labour market polarisation on wage mobility at the bottom of the labour market is lacking.

Qualitative research documents changes in the organisation of work – such as delayering, outsourcing, and the use of flexible employment strategies. It also highlights some of the difficulties low-paid workers face when it comes to internal progression within workplaces, especially in sectors characterised by a high proportion of low wage jobs. Evidence shows that although not all employees want to progress, for those that do accessing in-work training is often difficult, and where promotion opportunities existed these often entail full-time working hours and sometimes require relocating to a different store, branch or office. This partly explains why that women are less likely to escape low wages than men, and why progression rates are higher for younger workers – who may find it easier to be mobile as they are less likely to have children or caring responsibilities (D'Arcy and Hurrell, 2014).

The emphasis that employers place on developing their low-paid workforce and enabling them to advance also varies. In some organisations, awareness among managers that a lack of prospects for promotion negatively affects staff morale and increases turnover has resulted in greater efforts to promote career development. However, numerous case studies illustrate that in many firms, the structure of employment limits the amount of internal progression that can realistically be achieved, given the small number of intermediate- and high-level jobs relative to the number of low-paid staff.

This appears to be a problem particularly in retail and in the food and accommodation industry, something which is confirmed by quantitative research suggesting that workers have a lower likelihood of escaping low pay if they remain employed in these sectors (D'Arcy and Hurrell, 2014).

In instances where workers have limited opportunities for progressing within their workplace, the sorts of jobs available to workers in their local area may become more important in determining their chances of escaping low wages. This means that the industrial and occupational composition of local labour markets, as well as the number and density of potential employment opportunities surrounding workers, could have an effect on the likelihood of progression out of low pay. Spatial variations in sectoral and occupational specialisation have resulted in an uneven distribution of low-, medium-, and high-paid jobs across regions and cities (Jones and Green, 2009; Clayton, Williams and Howell, 2014). Moreover, the impact of industrial change, globalisation and automation has differed between the regions and cities of the UK. Over the last few decades, labour markets in London and the South East of England have generally performed better than those in the North of England and in Wales, Scotland and Northern Ireland, which have continued to struggle to adjust after a period of sustained de-industrialisation. But the story isn't as simple as a divide between a prosperous, employment-rich South and a declining North, as there are important differences between local labour markets within regions, too.

Over the last ten years or so all cities have seen their labour market polarise between high and low paid jobs, but the evidence suggests that the extent to which regional and local labour markets have been affected by job polarisation varies (Clayton, Williams and Howell, 2014; Dauth, 2014; Lee, Sissons and Jones, 2015). The relative decline in the number of intermediate jobs over the past several decades could have an effect on the ability of low-paid workers to advance into higher-skilled, higher-paid employment, but this question has not been investigated empirically to date.

Aside from the local share of employment in intermediate and higher-paid occupations relative to low-paid occupations, a further factor that may be important in shaping opportunities for progression out of low pay is the size of the local labour market. There is evidence that, across the UK, those who live in cities tend to earn more than similar workers who live outside of metropolitan areas (D'Costa and Overman, 2014). Not only do urban workers enjoy a wage premium, their wages also appear to grow slightly faster than those of non-urban workers, suggesting that cities may offer an advantage in terms of progression. However, to date research in this area has not tended to focus on the effect of labour market size and density on those at the lower end of the pay distribution.

Given the increasing focus on promoting progression from low pay in the UK, identifying whether low-paid workers benefit from the urban wage growth premium could offer important insights for policy in this area.

To address these gaps in the literature, this thesis investigates the impact of local labour market size, and of the degree of job polarisation in local labour markets, on progression among low-paid workers. This investigation will add to theoretical knowledge about the factors that shape progression from low pay – specifically, whether a lack of mobility out of low-paid employment ought to be conceptualised as a product of a certain type of local labour market which offers limited opportunities for workers to move up, or whether it is best explained by the skills, abilities and aspirations of individuals or the nature of the industries in which low-paid workers tend to be found. From a practical perspective, examining the impact of labour market characteristics on progression may also help identify whether there are certain geographic areas which are more conducive to progression than others, and whether there are parts of the UK where a lack of progression is a particular problem warranting place-based policy intervention.

2.9   Research questions

The previous two chapters have set out why progression from low pay is a matter of concern in the UK, and summarised what is known about progression among low-paid workers in the UK. Compared to previous decades, as well as to many comparable countries, low pay is widespread and progression from low-paid work is limited in the British labour market. Section 2.6 discussed how the likelihood of progression depends partly on the individual characteristics of workers, as well as their job characteristics. Secondly, it depends on where they work. Progression is less likely in smaller organisations, and in certain sectors such as retail and hospitality. The employment practices and business strategies of firms matter, too, with qualitative studies highlighting variations in access to training and management emphasis on workforce development.

This chapter has explained why, in addition to the individual and job-related factors, certain characteristics of the local labour market may play an important role, too. Yet, apart from a few exceptions (e.g. Phimister *et al.* (2006)), to date there has been little research that explicitly explores the impact of local labour market characteristics on progression among low-paid workers. This research attempts to fill this gap by addressing the following broad research questions:

1) Do workers in (larger) cities experience faster progression from low pay?
2) Does the degree of job polarisation in the local labour market have an effect on the occupational progression of workers starting off in low-paid jobs?

These questions follow from the literature that is reviewed in this chapter which has focused largely on average effects but which has not explicitly addressed the important issue of low pay and progression. The first question is related to the finding identified in previous studies that workers in (large) cities experience faster wage growth (Glaeser, 1999; Wheeler, 2006; D'Costa and Overman, 2014) and occupational advancement (Champion, Coombes and Gordon, 2014; Gordon, Champion and Coombes, 2015). However, unlike most of the existing research, which examines the effect of agglomeration on all workers, the question explored here is the extent to which this finding applies to low-paid workers specifically. While there is some evidence that low-paid workers in urban areas find it easier to escape low pay than similar workers in rural areas (Phimister, Theodossiou and Upward, 2006), the nature of the relationship between local labour market size and progression from low pay is still relatively unexplored. Chapter 4 investigates this link in detail by examining how the probability of moving from low-paid work to higher-paid work is affected by the size of workers' local labour market.

The second question arises out of the fact that employment growth in the UK over the past few decades has been concentrated in high-paid and low-paid occupations while employment in intermediate occupations appears to have declined (Goos and Manning, 2007; Holmes, 2010; Goos, Manning and Salomons, 2014), raising concerns about the ability of low-paid workers to move up the occupational ladder (Crawford *et al.*, 2011; McIntosh, 2013; Clayton, Williams and Howell, 2014). Chapter 5 provides an assessment of whether job polarisation has an effect on the upward mobility of low-paid workers by analysing the degree of polarisation across local labour markets in England and Wales and estimating the effect of local differences in polarisation on occupational advancement from low-paid to higher-paid occupations.

Although these two research questions have a different focus – the first revolving around notions of agglomeration and the urban wage growth premium, and the second focusing on occupational mobility and job polarisation – they both explore the impact of the local labour market context on the outcomes experienced by workers in low-paid jobs, which is an under-explored area of research. The two questions are examined using similar research methods, which are detailed in the following chapter.

Chapter 3 Methodology

3.1   Introduction

The overarching aim of this thesis is to explore the effect of a specific set of local labour market characteristics on progression among low-paid workers. Chapters 4 and 5 each focus on a separate research question (outlined in 2.9 above) related to this broad aim. The methods used in the two chapters have a number of similarities, as well as some key differences. Both chapters rely on a quantitative approach, and both make use of longitudinal survey data to analyse progression from low-paid work. Another similarity is that in both chapters individual-level data is linked to area-level data about key features of workers' local labour market areas, in order to assess the effects of these local labour market characteristics on progression. This chapter provides an overview of the general methodological approach of the research, introduces the main datasets used, and discusses the methodological issues that were relevant to both of the chapters. More specific points of detail regarding how the methods are used in the each of the two empirical investigations are provided in chapters 4 and 5.

The chapter is structured into six main sections. In the first section, the general methodological approach is discussed, ethical considerations are outlined and the scope of the research is set out. Section 3.2 provides details of the datasets used in the thesis and section 3.3 deals with definitions. The next section, 3.4, consist of a more detailed explanation of the methodology underpinning the empirical analysis across the two separate empirical chapters, and a discussion of several methodological issues relevant to both chapters. A brief summary and conclusion section closes the chapter.

3.1.1   Scope of the research

This thesis addresses two main research questions:

1) Do workers in (larger) cities experience faster progression from low pay?
2) Does the degree of job polarisation in the local labour market have an effect on the occupational progression of workers starting off in low-paid jobs?

To answer these research questions, this thesis uses longitudinal survey data on workers' pay, employment and demographic characteristics. Longitudinal data has the central advantage of containing multiple observations for each respondent enabling the measurement of changes in earnings and occupations over time. This worker-level data is matched to area-level data describing core features of the local labour markets in which workers live. Using this linked data, the relationship between several local labour market characteristics and the progression outcomes of workers are analysed using bivariate and multivariate estimation techniques (regression modelling).

3.1.2   Research philosophy and general methodological approach

To investigate the research questions outlined in the previous chapter a quantitative, rather than a qualitative, approach was taken. Specifically, the research uses large-scale survey data and analyses this data using descriptive and inferential statistical techniques. These methods are informed by a broadly positivist tradition of social scientific research. A central principle of positivism is that knowledge should be grounded in observation (Blaikie, 2007). This principle, originally a response to rationalist philosophers dominant during the Enlightenment era who held that knowledge could be derived from 'self-evident dictates of pure reason' (Halfpenny, 2015, p. 16), has meant positivist research tends to place much importance on rigorous empirical analysis (Johnson, P. and Duberley, 2000; Corbetta, 2003). A second feature of positivism is an aim to identify empirically established regularities (Blaikie, 2007). According to the dominant positivist account of science during the mid-twentieth century, statistical regularities (correlations or other patterns of association) are the basis of finding general 'laws'. Specific events and phenomena are then explainable by referring to them as instances of these general laws (Peet, 1998)[18].

Social science research practices that evolved out of this positivist tradition have undergone many changes over recent decades, but the focus on uncovering regularities and patterns using observational or experimental data persists. Positivist research tends to use a combination of deductive and inductive reasoning to move between empirical research and theory. Empirical observation forms the basis of developing theories about the relationships which govern social behaviour. On the basis of these theories, implicit or explicit hypotheses are often developed, which can be tested, usually (but not always) using quantitative methods. On the basis of the results of these tests theories are rejected, retained, or adapted (Bryman, 2012). To conduct this type of

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[18] This is called the deductive-nomological model of explanation (Peet, 1998).

empirical analysis invariably involves the operationalisation of concepts, that is, the translation of theoretical concepts thought to be important in explaining a particular phenomenon into measurable indicators (Bryman, 1988).

It was felt that, in order to answer the research questions that are the focus of this thesis, a positivist approach using quantitative methods was most suited. A quantitative approach has the ability to reveal regularities – in this case between particular local labour market characteristics such as size, tightness, or occupational structure and the wage growth experienced by low-paid workers – and is therefore able to suggest whether a relationship exists between these variables. Through use of statistical techniques, it can also provide an indication of how confident we can be that this relationship really exists rather than being an accidental feature of the data sample that is analysed. Uncovering patterns of earnings and occupational advancement among workers in different local labour market areas is a useful addition to existing knowledge – derived from both quantitative and qualitative research – about the factors that influence progression from low pay. In this way it can provide clues about thus far relatively unexplored potential causes of differences in low pay persistence that are likely to interact with the barriers to, and enablers of, progression identified in previous research.

While taking a positivist methodological approach has a number of strengths – the ability to capture structural characteristics of local labour markets, the ability to document general patterns between these characteristics and the labour market outcomes of workers and the ability to generalise (within a margin of confidence) these findings to the population as a whole – it also has some weaknesses. Perhaps the most important of these is that it does not facilitate a detailed understanding of the subjective experiences of the individuals studied (Corbetta, 2003). This means that the findings presented in this thesis do not provide insights about the extent to which the workers which constitute the population of interest feel they are low-paid, about what they understand 'progression' to mean, about how important they feel it is to progress nor about what, in their experience, are the most important barriers to doing so. An individual's motivation to progress in their career is likely to be an important determinant of whether they manage to improve their earnings and occupational position, yet this aspect is difficult to analyse using the quantitative methodology employed in this thesis. To gain an understanding of workers' perceptions, attitudes and experiences of trying (or not) to attain progression, an interpretivist epistemological stance and a qualitative methodology would have been more appropriate (Bryman, 2012; Punch, 2014), as was taken in several of the studies reviewed in the first chapter (e.g. Hoggart *et al.*, 2006; Tomlinson,

2006a; Warhurst, Lloyd and Dutton, 2008; Kumar, Rotik and Ussher, 2014). Despite these limitations a positivist-inspired methodology is nonetheless felt to be the most appropriate approach to answer the research questions.

The capacity of quantitative methods to generate valid knowledge rests on finding appropriate and precise indicators for the theoretical concepts that are thought to be important in explaining the phenomena under study (Gerring, 2011). When these concepts are somewhat abstract it can be difficult to find empirical measures that neatly correspond to them. This is the case, for example, with the notion of a 'local labour market', as there is no universally agreed empirical definition of a local labour market. In these instances, theoretical arguments, as well as examples of previous research, are drawn on to argue that the chosen measures do a good job of capturing the most important features of the concepts in question. In cases where the gap between the theoretical concepts and empirical measures used to represent these is large (e.g. in the case of the tightness or buoyancy of the local labour market), multiple measures are used in an effort to determine how sensitive the results are to the way the concept is operationalised. If the results are not substantially altered by using an alternative measure, this is a sign that the measures in question have a satisfactory degree of validity (Punch, 2014).

3.1.3   Ethical considerations

In accordance with good practice ethical approval was sought and obtained before the research commenced. This was done, following Coventry University policy, through the on-line ethical approval system "CU Ethics Online". As the empirical research consisted of the analysis of secondary survey data, the main ethical considerations related to the protection of respondents' identity. This was done in two main ways. Firstly, certain protocols, specified by the data owners, were adhered to in order to ensure that data was accessed in a secure way that minimised as much as possible the risk of the data entering the public domain. Some of the datasets used in the analysis were obtained through the UK Data Service under a Special Licence (the Understanding Society datasets and Annual Population Survey datasets used in Chapter 4) as they contain information that could potentially be used to identify respondents. For this reason, these data were kept at all times on a password-protected computer or laptop which was kept at Coventry University and which were not connected to the internet except through a secure LAN network, in accordance with the Good Practice Guide for handling microdata published by the UK Data Archive (2014). The two other main datasets used

in the research, the ONS Longitudinal Study and the Quarterly Labour Force Study, are classified as Secure Access datasets. The nature of these datasets is such that they can only be accessed through special infrastructure provided by the data owners and/or data managers. The Labour Force Survey was accessed through the UK Data Service's Secure Lab, and the ONS Longitudinal Study was accessed through the ONS Secure Research Service (previously the Virtual Microdata Laboratory) in Pimlico, London. Carefully designed rules govern the use of this data in order to ensure the possibility of disclosure of personal information is minimized. For results derived from both the Special Licence datasets and the Secure Access datasets, it was ensured that any outputs from the research – journal papers, presentations, and this thesis itself – contain no information which could be used to establish the identity of respondents. For instance, when results are presented in the form of a table, no values are reported that are based on fewer than ten observations. Care is especially taken when data are presented about particular local labour market areas, especially smaller areas, to make sure that these are not disclosive, and in general when presenting data about local labour market areas these are mostly grouped together into categories (with a few exceptions).

3.2   Data

The research makes use of several survey datasets. The two main datasets used in this thesis to analyse progression among low-paid workers are Understanding Society, which is used in chapter 4 to analyse the effect of labour market size on wage progression, and the ONS Longitudinal Study for England and Wales (LS), which is used in chapter 5 to analyse occupational mobility. The British Household Panel Survey (BHPS) is also used for a small portion of the analysis presented in chapter 5. Below, a short summary of each dataset is provided along with an explanation for why these datasets were chosen.

3.2.1   Understanding Society

The main dataset used in chapter 4 is the UK Household Longitudinal Study (UKHLS), more commonly known as Understanding Society (University of Essex, 2015). Understanding Society is a nationally representative survey of individuals aged 16 and over and their household members, managed by the Institute of Economic and Social Research at the University of Essex. The study started in 2009, following the discontinuation of the British Household Panel Survey (BHPS) which ran from 1991 until 2008. Although other panel datasets are available that could have been used, such as the BHPS, the Longitudinal Labour Force Survey or the New Earnings Survey Panel Dataset

(NESPD), Understanding Society has a number of advantages over these alternatives. Firstly, unlike the NESPD it collects data from individuals who are not in employment as well as those in employment, which is helpful for analysing transitions from low pay into unemployment or economic inactivity. It also contains a far wider range of variables than the NESPD which only captures only a limited amount of information about workers. Secondly, unlike the Labour Force Survey it follows individuals over a period of multiple years; at the time of analysis there were five annual waves available within Understanding Society which allowed for analysis of low pay transitions over a much longer period than would have been possible with the LFS (which only records individuals over five quarters). Although the research for this thesis mainly consists of analysis of year-to-year transitions, at several points transitions over a longer time period are considered. Thirdly, unlike the BHPS, Understanding Society has a much larger sample size which was felt to be important to ensure there was a large enough sample of low-paid workers from different types of local labour market areas, as well as to conduct disaggregated analysis (of different age groups, occupational groups, workers who stay with/move between firms, etc.). Finally, the data in Understanding Society is more current than the BHPS.

Understanding Society does not just collect information about individuals, but about all members of the household. This enables analysis of household characteristics and circumstances, such as household income, family composition, and so on. When individual respondents leave a household they are 'followed' to their new household and information is collected from their new household members. As with all longitudinal surveys, attrition is an issue in Understanding Society. Each year, some individuals drop out of the survey (because respondents chose to terminate their participation, due to death or because a move prevented them from being tracked). Additionally there are some individuals who were not interviewed every year (thus leaving gaps in their data across waves). Whereas in Wave 1 39,044 individuals supplied a full interview, by Wave 5 this had reduced to 26,318 (Knies, 2015). Attrition not only reduces the effective sample size in each wave of the study, it may also result in attrition bias if the respondents who attrite are not randomly distributed across the sample. For this reason the descriptive analysis made use of the longitudinal weights provided within Understanding Society to adjust for the unequal probability of attrition among respondents, as well as for unequal selection probabilities, differential nonresponse, and potential sampling error (Knies, 2015).

Respondents are asked questions on a broad range of topics, for the purposes of this study the questions relating to their employment were most relevant. Understanding Society contains data on

employment status, job spells, working hours, earnings, occupation and industry of employment and employer size. The survey also records when individuals change jobs, which allowed for analysis of whether wage progression at the individual level occurs through switching jobs or through internal promotion with the same employer. A disadvantage of the Understanding Society is that information on earnings is self-reported by respondents rather than supplied by employers as in, for instance, the New Earnings Survey Panel Dataset. Self-reported earnings are known to be generally less reliable than earnings data from employers' administrative systems (ONS, 2014a).

As well as employment-related data, the survey also contains a wide range of information that was used to construct a set of control-variables, including information on gender, age, ethnicity, disability or long-term illness, education level, household composition, etc. Importantly, each respondent also has a geographical identifier allowing identification of their region, local authority, Travel-To-Work-Area (TTWA) and output area of residence, which enabled information on local labour market characteristics to be matched in for each respondent. To obtain these geographic identifiers a Special Licence application was submitted to the UK Data Service as this information is not available under the standard End User Licence.

The Understanding Society sample was not randomly selected from across the UK but was drawn from a selection of 2,640 postcode sectors (the Primary Sampling Units [PSUs]). To select the 2,640 PSUs, postcode sectors were sorted by region and then further divided into 108 sub-strata based on the proportion of household reference persons classified as non-manual workers, population density (households per hectare), and ethnic minority density (Knies, 2015). This ensured that the survey covers all regions of the UK and has a representative spread of households from different types of areas.

Although the relatively large sample size in comparison to other panel surveys such as the BHPS means that Understanding Society affords greater potential for analysis at sub-regional levels, it nonetheless does not have a sufficiently large sample to produce consistently reliable estimates for individual geographical areas smaller than government regions. Petersen and Rabe (2013) therefore advise that the sub-regional geographical identifiers provided are "more suitably used for external linkage of contextual information than as units of analysis in themselves" (p. 18), and this is the approach that was taken here. Local labour market areas were categorised according to their size, tightness, or degree of polarisation (depending on the focus of the investigation), and the effect of these local labour market-level variables on progression was examined.

3.2.2 ONS Longitudinal Study

Chapter 5 focuses on the effect of job polarisation on occupational advancement among low-paid workers. To analyse occupational progression it was necessary to obtain worker-level data from which mobility from low-paid occupations to, a) routine occupations and b) other higher-paid occupations could be calculated. Because the majority of workers do not change occupation very frequently, it was important to be able to follow workers over a relatively long time period. For this reason, Understanding Society was felt to be less suitable for analysing occupational mobility. It was also important to have a large sample so that potentially subtle differences in occupational mobility between less- and more-polarised areas could be picked up. The ONS Longitudinal Study (ONS LS) meets both of these criteria . The ONS LS is based on a one per cent sub-sample of the UK Census for England and Wales, resulting in a large dataset of over 500,000 individuals. As sample members are selected on the basis of having been born on one of four dates in the year, it is a simple random sample which is representative of the population of England and Wales, including in terms of geographic coverage (ONS, no date a). Each ONS LS sample member is tracked from Census to Census resulting in a large longitudinal dataset with waves spaced ten years apart. For this chapter occupational mobility was analysed from 2001 to 2011, a sufficiently long period to be able to pick up a substantial amount of movement between occupations.

The ONS LS does not contain information about earnings, but as the focus of the analysis is on occupational advancement this was not problematic[19]. Information on a respondent's demographic characteristics (age, gender, ethnic group, etc.) was collected, as well as a number of employment-related aspects, such as working hours, industry of employment, and workplace size, and on their household composition. This data was used to construct a number of control variables used in the regression analysis.

Although the sample size of the ONS LS is much larger than that of Understanding Society, the sample is still not quite sufficient to allow analysis at small geographic scales, particularly as some local labour market areas are relatively small and sparsely populated. Therefore, the Labour Force

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[19] For the purposes of Chapter 5, occupations required to be grouped into categories based, in part, on the median wage associated with each occupation. Because the ONS LS does not contain data on wages, the LFS was used to determine the median hourly wage for each occupation. This is described in full in section 5.5.4.

Survey was used to construct area-level variables relating to the degree of local job polarisation, using multiple quarters of data, which were then merged into the ONS LS dataset. More information about the Labour Force Survey and how it was used is presented in Chapter 5.

3.2.3   British Household Panel Survey

Although the ONS LS is the most suitable dataset for assessing the impact of local job polarisation on occupational advancement, it has a disadvantage in that it only captures respondents' status once every ten years. This means that changes occurring over a shorter space of time can't be analysed. This is why the first part of the analysis for chapter 5 makes use of data from the British Household Panel Survey (BHPS). The British Household Panel Survey is a nationally representative longitudinal survey of individuals aged 16 and over and their household members, carried out from 1991 to 2008 by the Institute of Economic and Social Research at the University of Essex. It was the precursor to Understanding Society, and has a very similar design. The BHPS contains 18 yearly waves. Moreover, when the BHPS came to an end in 2008, the majority of participants (around 6,700 out of the approximately 8,000 respondents in wave 18) were added to the Understanding Society sample from its second wave onwards. As such, BHPS respondents could be tracked from 1991 until the fifth wave of Understanding Society, which was collected in 2013-14, meaning a total of 23 yearly waves of data could be analysed. This long time-span enabled an analysis of worker's occupational trajectories over time, as well as making it possible to compare occupational mobility between different periods. Moreover, workers' occupation was recorded using the 1988 version of the International Standard Classification of Occupations (ISCO-88) for all waves, which made it straightforward to capture occupational changes consistently across time.

3.2.4   Time periods

The datasets in the two chapters cover different, yet overlapping, time periods. For the analysis in chapter 4 data covering the period 2009-2014 is used. This period coincided with the aftermath of the financial crisis of 2008-9 and the ensuing recession. Although growth returned by the end of 2009, it took until 2014 before the economy had recovered back to its pre-recession levels (ONS, 2018b). The period under investigation in chapter 4 may therefore not be representative of 'normal' labour market conditions. For instance, overall rates of wage growth are low. In fact, as shown in figure 4-27, median wage growth for low-paid workers in the Understanding Society sample was slightly negative in real terms during the period 2009-14. This will have had an impact on the measured rate of wage progression. It is also possible that the recession may have had the effect of

attenuating any positive impact associated with living and working in a bigger urban labour market on the wage growth experienced by low-paid workers. Yet the reasons for the existence of an urban wage growth premium suggested by the literature relate to fundamental properties of urban labour markets – their dense concentration of both employment opportunities and opportunities for human capital development – that seem unlikely to completely disappear in a recession or early recovery.

The data used in chapter 5 covers a longer time period than that used in chapter 4, namely the period 2001 to 2011. During most of this ten-year period the UK economy experienced growth, although the last few years of the period were marked by recession. Again, this may have had an impact on the rates of occupation advancement observed over this period. Specifically, we would expect progression into higher-paid occupations to occur at a slower rate than during a period of sustained growth. Yet a considerable proportion of workers still experienced upward occupational transitions, as shown in chapter 5. Additionally, the question under investigation in chapter 5 is related to job polarisation – a process which continued during and after the recession in much the same way as it had done in the years prior to it (Salvatori, 2015).

3.3   Definitions

3.3.1   Defining progression from low pay

As explained in chapter 1, there are a number of possible ways to define low-paid work. One popular approach is to use a wage threshold, another is to focus on particular occupations (or industries) associated with low wages. In this thesis both approaches are used, with chapter 4 making use of several pay thresholds, as well as an occupational definition, and chapter 5 exclusively relying on occupational analysis.

When it comes to defining what constitutes progression, there are similarly a range of options. Existing literature has examined changes in earnings (Gosling *et al.*, 1997; Stewart and Swaffield, 1999; Phimister, Theodossiou and Upward, 2006; Mosthaf, Schnabel and Stephani, 2011; Knabe and Plum, 2013), transitions from temporary to permanent employment (Booth, Francesconi and Frank, 2002; Gash, 2008; Fuller and Stecy-Hildebrandt, 2014), or occupational progression (Bukodi and Dex, 2009; Holmes and Tholen, 2013; Champion, Coombes and Gordon, 2014). Not only does the precise measure used in such research vary, so too does the time period over which progression is analysed.

In many studies of wage transitions, workers are followed from one year to the next (Phimister, Theodossiou and Upward, 2006; Knabe and Plum, 2013; Gürtzgen and Heinze, 2016), although in others the period over which they are examined is much longer, ranging from three years (Gosling *et al.*, 1997), to six years (Andersson, Holzer and Lane, 2005), to as long as 18 years (Culliney, 2016). The time period over which progression is studied has implications for the observed transition rate out of low pay, with both wage and occupational mobility being higher when measured over longer time periods (Dickens, 2000).

The first measure of progression used in this thesis is one of wage mobility. This measure, which serves as the dependent variable used in the first part of chapter 4, is whether a respondent transitions between low pay and higher pay, based on a particular low pay threshold (the main one being two-thirds of median hourly pay for all UK workers). This is the approach taken in most previous studies of low pay dynamics (e.g. Gosling *et al.*, 1997; Stewart and Swaffield, 1999; Heinze and Gürtzgen, 2010; D'Arcy and Hurrell, 2014; Thompson and Hatfield, 2015)[20]. Workers are said to have experienced pay progression if they have moved from low-paid employment in the initial year (referred to as time *t-1*) to higher-paid employment in the following year (referred to as *t*), and are defined as not having progressed if they are still low-paid at *t*, or they are recorded as unemployed or economically inactive. Although this binary measure of progression is imperfect, it is argued to be a good indicator of real advances in workers' position in the wage distribution given that the majority (77 per cent) of transitions from low to higher pay are associated with at least a 15 per cent real-terms increase in hourly earnings, while only 36 per cent of those who remain low-paid receive the same wage increase (according to analysis of Understanding Society data).

The use of a low pay threshold is a commonly accepted way to define low pay both in the academic and policy-oriented literature. However, it has some potential weaknesses when it comes to assessing progression across different local labour markets. Therefore the second part of chapter 4 makes use of a continuous measure of wage growth among workers in low-paid occupations. The reason for adopting this alternative measure is that defining progression based on a nationally-defined wage threshold does not take account of the fact that wage levels tend to vary between local areas. This, as is discussed in detail in chapter 4, has important implications for the number of workers who are measured as having progressed in different areas.

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[20] A second, related, approach examines the duration of low pay spells, as, for example in Phimister *et al.* (2006), Pavlopoulos and Fouarge (2010) and Bolvig (2004).

The second measure of progression used in this thesis is related to occupational mobility. This is the main definition of progression used in chapter 5, and concerns mobility from a set of occupations defined as 'low-paid' to occupations defined as 'higher-paid'. The reason for focusing on occupational progression rather than wage progression is that chapter 5 explores the effect of job polarisation, a process related to occupational change, meaning that its impact might therefore be most directly perceptible when examining occupational mobility. Here, occupations refer to two-digit occupational groups in the Standard Occupational Classification defined in the year 2000 (SOC2000)[21]. Five low-paid occupational groups are defined, selected on the basis of having relatively low median hourly earnings: Caring personal service occupations, Leisure and other personal service occupations, Sales occupations, Elementary administration and service occupations, and Elementary trades and related occupations. The higher-paid occupations are sub-divided into multiple categories detailed in section 5.5.4 of chapter 5. Because the focus of the chapter is on assessing the impact of the decline in intermediate occupations with a high intensity of routine tasks, these routine occupations are treated as a separate category. The remaining occupations are separated into associate-professional occupations, managerial occupations and professional occupations. Occupational mobility is measured over a ten year period, from 2001 to 2011, and workers who move from a low-paid occupation in 2001 to a higher-paid occupation in 2011 are defined as having progressed.

3.3.2   Defining local labour market areas

Deciding on a definition of local labour markets is not entirely straightforward as no single definition exists. For most of the empirical analysis in Chapters 4 and 5 local labour markets were defined as Travel-To-Work-Areas. TTWAs are produced by the Office for National Statistics in association with researchers at Newcastle University by analysing commuting patterns based on Census data. They are widely used in research regarding changing local labour market conditions or the impact of local labour markets on earnings or income (e.g. McCulloch, 2003; Kaplanis, 2010; D'Costa and Overman, 2014; Gagliardi, 2014). The principle behind Travel-To-Work-Areas is that most jobs within them are filled by residents of that area (demand-side self-containment) and most of the resident working

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[21] The standard occupational classification (SOC) is a commonly used classification of occupational information for the UK, developed by the Office for National Statistics.

population work in the area (supply-side self-containment) (McCulloch, 2003)[22]. The boundaries of TTWAs are constructed so that roughly three-quarters of the people who work in these areas also live in them, although for areas with a working population of more than 25,000 self-containment rates of at least 66.7% are accepted (ONS, 2007). For chapter 4, the 2001 definition of Travel-To-Work-Areas is used, whereas chapter 5 uses the 2011 definition. The main change between the 2001 and 2011 Travel-To-Work-Areas was an increase in the average size of TTWAs. This occurred through several instances of two TTWAs merging to form one area – mostly in rural areas – and through the enlargement of most of the largest TTWAs (mainly surrounding the Core Cities[23]). As a result, the TTWAs surrounding large cities under the 2001 definitions were, on average, somewhat smaller than under the 2011 definitions. The geographical area covered by the London TTWA, on the other hand, was about 20 per cent larger in 2001 than in 2011 (Coombes, 2015). In chapter 5, the 2011 TTWA boundaries are used. In this chapter, the occupational structure of the local labour market is analysed to produce a measure of job polarisation. Because this involves breaking down employment in each area into detailed occupations, a relatively large sample of workers is required in each local area. Therefore, for the purposes of chapter 5 most TTWAs are combined into larger Super-Travel-To-Work-Areas or STTWAs. More details about which TTWAs were aggregated into larger STTWAs is provided in section 5.5.6.

Being underpinned by the principle of self-containment and based on commuting flows makes TTWAs theoretically more suitable as a definition of local labour markets than using areas defined by administrative boundaries. However, part of the analysis in chapter 4 was repeated at the level of Local Authority Districts[24] to see whether similar results were obtained when using an alternative spatial unit. Local Authority Districts have the advantage of being somewhat smaller on average than Travel-To-Work-Areas, which means they may in some cases be a better fit for the actual local labour market areas of low-paid workers. This is because workers with hourly wages of below two-thirds of the median tend to travel significantly smaller distances than workers in higher-paid

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[22] The boundaries of TTWAs are constructed so that roughly three-quarters of the people who work in these areas also live in them, although for areas with a working population of more than 25,000 self-containment rates of at least 66.7% are accepted (ONS, 2007).

[23] The Core Cities are a group of ten large cities in England, Wales and Scotland outside of London, namely: Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield. More detail in provided in chapter 4.

[24] Local Authority Districts (or LADs) is a generic term used to cover London boroughs, metropolitan districts, unitary authorities and non-metropolitan districts in England; counties and county boroughs in Wales; council areas in Scotland; and district council areas in Northern Ireland. During the period 2009-2015[24] there were 380 Local Authority Districts in Great Britain.

employment. In the period 2009 to 2013 (waves 1, 2 and 4 of Understanding Society, the only waves in which this information was recorded), the average distance travelled to work by low-paid workers was 5.6 miles, whereas for non-low-paid workers the average commuting distance was 12 miles. This suggests a considerable difference in the scale of local labour markets for low-paid workers compared to other workers. However, unfortunately it was not possible to conduct the analysis in chapter 5 at geographies smaller than TTWAs because of sample size issues.

3.4   Empirical strategy

The empirical work in each chapter consists of a combination of univariate and bivariate analysis and multivariate regression modelling. The descriptive (bivariate) analysis serves to examine the data and to provide an initial sense of the relationships between various local labour market characteristics and patterns of progression from low pay. These relationships are then examined in greater detail through estimation of a number of multivariate regression models, which allow the effect of individual and employment-related characteristics to be controlled for in an attempt to isolate the effect of local labour market context on the probability of escaping low pay.

3.4.1   Modelling strategy

The relationship between the probability of escaping low pay and the local labour market context is examined through a series of econometric models. The explanatory variables that form the focus of each chapter vary, but the same basic model is used throughout and can be represented as:

$$P[y_{it} = 0 | y_{it-1} = 1] = \beta x_{it} + \theta z_{it} + u_{it}$$

Where the left-hand term represents the probability (P) of individual i being higher-paid ($y = 0$) at time t given the fact that the are low-paid at time $t - 1$ ($y = 1$), where 'higher-paid' and 'low-paid' are defined either in terms of hourly wages or in terms of occupation. The vector x_{it} contains a range of personal and job-related characteristics (specified in sections 4.3.3 and 5.5.8) which act as controls, the vector z_{it} contains the relevant area-level explanatory variables under investigation in each of the two chapters, and θ the corresponding coefficients. The last term in the equation, u_{it}, represents the composite error term which is composed of certain individual-specific but time-invariant unobserved characteristics, and, where relevant, a time-varying idiosyncratic error.

$$u_{it} = \alpha_i + \varepsilon_{it}$$

Variants of the above general model were estimated – with different explanatory variables z_{it} and control variables x_{it} – using different types of regression techniques. In chapter 4, the main type of regression model estimated are panel data models with random effects, meaning that the time-constant unobserved worker characteristics α_i are assumed to be randomly distributed and therefore uncorrelated with any of the covariates in the model. The implications of this assumption are discussed in more detail in the next section. The chapter uses both linear and discrete-outcome (specifically probit[25]) panel models. In chapter 5 no use was made of panel data techniques as the dataset used has only two waves, which means the estimation of panel data models was not possible. The analysis in this chapter makes use of (binomial) logit models and a multinomial logit models.

Having established the basic form of the model used as the foundation for each of the three parts of the empirical research, there are several issues that need to be considered to ensure that the results are reliable and do not suffer from any substantial bias. These issues are introduced and briefly discussed below, but any issues relevant to the specific research problems in each chapter are dealt with in greater detail in each of the two empirical chapters.

3.4.2 Correlation between unobserved heterogeneity and explanatory variables

The main part of the analysis for chapter 5 consists of the estimation of cross-sectional regression models. Where panel data models were used in chapter 4, these took the form of random effects estimators. Both of these estimators require an assumption that the unobserved effects α_i are independent of the explanatory variables in all time periods. This is a strong assumption, which can often lead researchers to prefer fixed effects specifications (where possible). In fixed effects estimation all time-constant effects, including unobserved individual characteristics, are eliminated through time-demeaning the data, meaning that the estimator only measures the effect of *changes* in the explanatory variables over time on the dependent variable. For example, in the case of the

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[25] To estimate models with binary dependent variables, a probit function is often used to ensure the estimated value of the dependent variable (representing, in this case, the probability of escaping low pay) takes on a value of between zero and one, rather than estimating a linear probability function which would result in the dependent variable being able to take on values of below zero and above one.

effect of living in a large city versus a smaller rural labour market, a fixed effects estimator would measure the effect of a change in the local labour market that a worker lives in on the wage growth she or he experiences. The first issue with fixed effects estimation in the context of a dependent variable which measures a change over time (e.g. a change in pay or in occupation) is that as a minimum, three observations of the same individual (and thus at least three waves of data) are required in order to have at least two observations of the dependent variable (and thus the possibility of observing a change in the explanatory variables between the first and second observation). As the data analysed in chapter 5 only makes use of two waves of data, estimating a fixed effects model – or indeed any type of panel data model – was not possible here. Fixed effects models could theoretically have been used in chapter 4, but the second issue with fixed effects estimation is that any time-constant variables in the model are effectively eliminated, allowing only the effect of time-variant variables to be estimated. This is a problem because there is very little variation over time in the local labour market characteristics of low-paid workers, since a) the characteristics of local areas are relatively stable over time, and b) workers very infrequently move between different local labour market areas. As can be seen in table 3-1, only in 1.57 per cent of observed cases in the first five waves of Understanding Society do workers in low pay move to a different Travel-To-Work-Area from one wave to the next.

Table 3-1: Geographic mobility between TTWAs among workers in low pay at *t-1* based on low pay threshold of two-thirds of median hourly pay

	Number of observations	% of observations
Destination at *t*		
Still in same TTWA	11,976	98.43
Moved to different TTWA	191	1.57

Source: Understanding Society waves 1-5. N = 12,167.

As a result, estimating the effect of local labour market context on transitions from low to higher pay through fixed effects is practically infeasible. Alternatives to fixed effects, such as the correlated random effects approach (also known as the Mundlak-Chamberlain approach (Wooldridge, 2009)), similarly require there to be a substantial amount of within-panel variation in the explanatory variables and are therefore also impractical. For this reason a random effects approach was necessarily chosen in chapter 4, while in chapter 5 use was made of standard logit and multinomial logit estimators. Under this specification it is important to consider whether the unobserved heterogeneity of workers could reasonably be assumed to be uncorrelated with the explanatory variables.

In both chapters an effort is made to control for most of the variables that could reasonably be expected to have an effect on workers' wage growth – from personal characteristics such as age, gender and ethnicity, household circumstances such as single-earner status and the presence of children, job characteristics such as working hours and occupation, to workplace characteristics such as size, industry and union recognition (see sections 4.3.3 and 5.5.8). As such, any unobserved differences between workers are likely to be relatively small[26]. The most important worker characteristics which are unobserved but could have an effect on the likelihood of escaping low pay are hard-to-measure attributes like motivation and ability. If these attributes are correlated with the explanatory variables – labour market size, job polarisation – then the estimated effects of these variables will be biased.

It is theoretically possible that there is a correlation between these sorts of unobserved characteristics of workers and one or more of the explanatory variables. For instance, the results in D'Costa and Overman (2014) indicated a degree of 'sorting' of workers between urban and rural labour market according to their unobserved characteristics. If this is the case for the low-paid workers in the sample, then the size of the local labour market is likely to be endogenous. Similarly, the other explanatory variables examined could suffer from this type of endogeneity. In each of the next three chapters, it is therefore established how likely it is that the explanatory variables used in each of the specific research problems under investigation are correlated with unobserved worker characteristics. But for the majority of the analysis, the sorting of low-paid workers between local labour markets according to unobserved characteristics is argued to be a negligible issue, precisely because it appears from the data that workers in low-paid jobs do not tend to be very geographically mobile and therefore only very rarely move between local labour markets. There thus appears to be

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[26] One possible limitation of these control variables is related to differences within ethnic groups. It could be that, although ethnicity is controlled for by inclusion of dummy variables for major ethnic groups (*white*, *Asian*, *Black/Caribbean* and *Other & mixed)* the distribution of workers in the different labour market size categories is subject to variations within these broad ethnic groups. It is known that the ethnic make-up of the population in London differs from that in most other areas of Great Britain, not just when it comes to differences between the above-mentioned broadly-defined ethnic groups, but also, for instance, when it comes to the distribution of individuals from Indian, Pakistani and Bangladeshi backgrounds within the broader group of Asian ethnicities (ONS, 2012b). To test whether the results are robust to such within-ethnic group variations between local labour market size categories, as part of the analysis for each of the two empirical chapters alternative regression were performed with a more detailed set of ethnic group dummy variables instead of the broader ethnic groups used in the majority of the analysis. The results in each case were not greatly altered (more details to be found in each of the subsequent two chapters).

a limited potential for low-paid workers to "self-select" into certain types of local labour market based on their unobserved attributes.

3.4.3   The 'initial conditions' problem

Much of the existing literature on low pay dynamics is concerned with measuring the potential stepping-stone effect of low-paid work (Stewart and Swaffield, 1999; Uhlendorff, 2006; Stewart, 2007; Knabe and Plum, 2013; Cai, 2014). The question examined in many of these studies is whether low-paid employment gives workers a better chance of obtaining a higher-paid job compared to being out of work, and the analysis in these investigations therefore involves estimating the likelihood of being higher-paid as a function of a worker's status in the previous period (usually either low-paid or unemployed). A key issue in these studies is what is known as the initial conditions problem (Heckman, 1981): the fact that selection into the initial state (low pay or unemployment) is likely not to be exogenous, but related to one or more unobserved characteristics of the individuals in question. For instance, those who in a previous period were unemployed may have less advantageous unobserved attributes (e.g. unmeasured ability, motivation, or interpersonal skills) than those who were employed in the previous period. Ignoring this endogenous selection could therefore lead to an overestimation of the effect of respondents' status at $t-1$ on the probability of low pay at t and researchers therefore take steps to account for this endogenous selection (Stewart and Swaffield, 1999; Uhlendorff, 2006; Stewart, 2007).

In this analysis, however, the research questions being addressed do not have to do with comparing the effect of previous experience of low pay or unemployment on the probability of moving into higher pay, but with comparing the effect of living in particular types of local labour markets on this probability, for workers who are low-paid at $t-1$. The question is therefore whether selection into the initial low-paid state is endogenous with respect to the type of local labour market that the worker resides in. This would be the case if differences in local labour market conditions meant that in some areas the likelihood of being employed at $t-1$ is much greater than in others (conditional on observed characteristics). This would mean that a worker who, based on their unobserved abilities, would be likely to be out of work if they lived in one area, but in work in another area. However, it is shown in both chapter 4 and 5 that, once observed characteristics are controlled for, the likelihood of being in work in the initial period is more or less the same across the different types of local labour market areas under investigation. This suggests that there is little correlation between unobserved worker characteristics, at least as related to the probability of initial employment, and

the area-level explanatory variables under investigation in each chapter (local labour market size in chapter 4, and local job polarisation chapter 5).

3.4.4 Attrition bias

A key limitation of longitudinal data is the problem of non-response and attrition. Not only does attrition reduce the effective sample size, it may also introduce bias in estimated results if panel dropout is non-random. As workers need to be observed both at *t-1* and at *t* in order for the dependent variable (measuring the progression experienced by workers) to be observed, the effective sample for analysis consists not of all workers who are low-paid at *t-1*, but only of those workers who are in the sample at both *t-1* and *t*. If attrition is not random, then this sub-sample of workers will not be a representative sample of low-paid workers and as a consequence estimates based on this sample could be biased (Wooldridge, 2010). Another way to think about attrition bias is therefore as a form of selection bias, since selection into the sample at wave *t* is conditional on respondents not having dropped out between *t-1* and *t*. Selection bias occurs if selection is correlated with the error term in the model we wish to estimate (ibid.). In the case of random effects estimation, in which the error term is made up of two elements: time-constant unobserved characteristics of workers (c_i), and an idiosyncratic error term (u_{it}), this means that bias may occur if attrition is dependent on either of these two factors.

The extent of attrition in the Understanding Society sample is considerable, especially in the first two waves. Table 3-2 shows the sample of low-paid workers in each wave and indicates what proportion of the sample drops out after each wave.

Table 3-2: Attrition among sample of low-paid workers in Understanding Society, waves 1-5

Wave	Number of low-paid workers in sample	Number of these workers who attrite in the next wave	Attrition as a percentage of sample
1	5,005	1,292	25.8
2	3,858	788	20.4
3	3,423	544	15.9
4	3,254	467	14.5
5	2,994	-	-

In addition to respondents who drop out of the sample, there is also a small proportion of individuals who are defined as low-paid at *t-1* but who, despite stating they are still in paid employment at *t*, do not provide information on their earnings or working hours. For these workers an hourly pay rate can therefore not be calculated and as a result, it cannot be determined whether these workers have moved into higher-paid jobs at *t* or whether they remain low-paid. This affects just over 3 per cent of workers who are recorded as low-paid at *t-1*. In contrast, attrition in the Longitudinal Study sample used in chapter 5 is much lower at only 13.5 per cent. Moreover, an occupation is observed for all those recorded as being in paid employment, meaning that all workers can be classified as being in a low-paid occupation or a higher-paid occupation in the second observation (*t+10*, given the waves are spaced ten years apart).

A study of low pay transitions by Cappellari and Jenkins (2008) using BHPS data concluded that attrition (when this was strictly defined as panel dropout) did not lead to any significant bias in the estimated coefficients of their model. When non-response on earnings was included in the definition of attrition, however, the authors found evidence that attrition was non-ignorable. As both the dataset used in this study, and the model that is estimated, differ from those in the Cappellari and Jenkins paper, it is hard to say whether the same conclusions apply here. Testing for the endogeneity of attrition is therefore important, especially in the case of chapter 4 given its higher rate of attrition. Therefore, in section 4.5.3 an endogenous sample selection model is estimated to test whether endogenous attrition introduces bias into the results. More detail about the methodology behind this test is provided in chapter 4.

3.4.5   Strict exogeneity assumption

Random-effects estimation rests on the so-called strict exogeneity assumption. This assumption states that, once the independent variables at time *t* and unobserved individual effects are controlled for, neither past nor future values of the independent variables have a partial effect on the dependent variable at time *t*:

$$Cov(x_{is}, u_{it}) = 0, s, t = 1, \dots T$$

Where s is any time period other than *t*.

The strict exogeneity assumption can be separated into two parts. Firstly, for it to hold, past values of any of the covariates cannot be correlated with the likelihood of escaping low pay in the present (once all variables in x_{it} and z_{it} have been controlled for), and secondly, the likelihood of escaping low pay in the present cannot be correlated the covariates in future periods. When assessing the impact of local labour market variables (size, degree of polarisation, the number of jobs within a certain radius), this assumption would be violated if the value of these variables in previous periods, as well as in the present period, have an effect on transitions from low pay. Additionally, strict exogeneity would not hold if whether a worker makes a transition to higher pay has an effect on their decision to stay in the same labour market or move to a different local labour market (of a smaller or larger size, a lower or higher degree of polarisation, or a greater/smaller number of accessible jobs). Each of the two subsequent empirical chapters therefore provide a discussion of whether strict exogeneity could be assumed to hold in relation to the specific research problem under investigation.

3.5   Summary and conclusions

This chapter has explained why the research questions at the centre of this thesis meant a quantitative research design was most appropriate, and has described the overall methodological strategy of the research, which centres around analysing transitions from low-paid to higher-paid employment and examining to what extent such transitions are affected by the size of the local labour market, and the degree of job polarisation evident in the local occupational structure. Given its relatively large sample size, good range of potential control variables, and wage information about workers, Understanding Society was chosen as the main data source for chapter 4. For chapter 5, on the other hand, the Longitudinal Study was chosen as the main dataset as this allows workers to be followed over a longer time span, and the fact that its sample size is even larger than that of the Understanding Society survey ensured that a sufficient amount of occupational mobility could be observed. In both chapters, information from other datasets (the Annual Population Survey and Labour Force Survey) is used to construct variables capturing certain aspects of workers' local labour market characteristics.

For chapter 4, the main definition of being low-paid is having hourly wages of less than two-thirds of the median for all employees, and progression is said to have occurred if workers move from being low-paid in a given year to having exceeded the low pay threshold in the following year. To

supplement this threshold-based definition, which suffers from its inability to take into account geographic variations in wage levels, a second approach used in chapter 4 is to examine *wage growth* for workers in low-paid occupations. In chapter 5, low-paid work is defined as employment in one of five two-digit SOC2000 occupational groups, and workers are said to have experienced occupational progression if they have moved from one of these five low-paid occupations to an occupation in one of the higher-paid occupational categories.

This chapter additionally explained how, as well as exploring the relationship between particular local labour market characteristics and progression descriptively, regression models are estimated to assess the effect of living in a particular type of local labour market on progression while holding other factors constant. The most important methodological issues that need to be taken into account when estimating these models were discussed, including possible correlation between the explanatory variables and unobserved heterogeneity, the conditions which need to hold to ensure strict exogeneity, and the potentially endogenous nature of attrition. These issues will be dealt with in more detail in each of the next three chapters, which will also provide more specific descriptions of the empirical strategy pursued to explore the research questions at the heart of each chapter.

Chapter 4 Local labour market size and progression from low pay

4.1   Introduction

Existing research provides a good understanding of how worker characteristics and job and employer characteristics influence the likelihood of escaping low pay (Andersson, Holzer and Lane, 2005; Pavlopoulos, Muffels and Vermunt, 2009; Mosthaf, Schnabel and Stephani, 2011; Stephani, 2013; D'Arcy and Hurrell, 2014; Kumar, Rotik and Ussher, 2014). However, less is known about the effect of local labour market characteristics on the prospects for wage progression for the lowest paid. One characteristic which the evidence suggests may be influential is the size of the local labour market. Research within spatial economics has shown that workers tend to experience quicker wage growth in (large) cities (Wheeler, 2006; De la Roca and Puga, 2012; D'Costa and Overman, 2014), although estimates of the magnitude of the effect differ. Gordon *et al.* (2015) also suggest that living in cities is associated with a greater likelihood of occupational advancement. This chapter explores whether living a large, urban labour market has a positive effect on wage progression for those in low-paid jobs. In contrast to previous work which simply compared wage progression in rural and urban areas (Phimister, Theodossiou and Upward, 2006), the relationship between the size of the local labour market and earnings growth is explored in more detail. The importance of the way in which low pay and progression are measured, given geographic wage differences, is moreover highlighted and shown to have an important impact on the findings from the analysis.

The chapter is structured as follows. Section 4.2 reviews literature concerning the link between cities and wage growth and spells out the potential implications for wage progression among low-paid workers. The gaps in existing studies related to the link between city size and progression from low pay are outlined, and the research questions that formed the basis of the empirical investigation are presented. In section 4.3 the methodology behind the empirical analysis is discussed, including the issues surrounding choosing an appropriate definition of low pay and progression. In section 4.4 descriptive results are presented and section 4.5 extends this by presenting the results from panel data regression models of the likelihood of escaping low pay. These results suggest that workers in London are substantially more likely to make a transition from low pay – defined as less than two-thirds of the median hourly wage rate for all UK workers – to higher pay. In section 4.6, however, the limitations of relying on a nationally-defined wage threshold to define low pay are discussed, and an alternative approach is presented which fails to find any evidence that workers in cities are more likely to experience wage progression. The implications of these two contrasting sets of findings are discussed in section 4.7.

4.2   Summary of the literature

As discussed in chapter 2, several studies from the field of spatial economics suggest that the wages of urban workers tend to grow more quickly than those of workers not living in cities (Wheeler, 2006; Glaeser and Resseger, 2010; Baum-Snow and Pavan, 2012; De la Roca and Puga, 2012). Most of these studies relate to the US, but there is also some evidence that in the UK wages tend to grow faster in cities (D'Costa and Overman, 2014). There are two central explanations discussed in the literature for why cities seem to offer an advantage in terms of career progression. Theories of human capital accumulation suggest that being situated in a larger, denser labour market means workers are surrounded by larger numbers of other workers from whom they are able to learn new skills more quickly (Glaeser, 1999). Theories of matching, discussed in Wheeler (2006), advance that the large concentration of employers and jobs in cities makes it easier for workers to move between employers in an effort to find jobs that better match their skills and ambitions, increasing the rate at which they are able to attain higher-paid job matches. According to both theories, not only should workers experience higher rates of wage progression in cities than in small towns or rural areas, but workers in larger cities should progress more quickly than workers in smaller cities.

These two mechanisms underpinning faster wage growth may not, however, be equally strong for all workers. There is evidence that it is higher-skilled workers, and particularly those with higher cognitive rather than manual skills, for whom agglomeration delivers the greatest remunerative advantage (Bacolod, Blum and Strange, 2009). Since most low-paid workers are likely to be employed in occupations that are relatively low in cognitive skills, this raises the question of whether low-paid workers benefit from higher wage growth in cities in the same way as has been indicated is the case for other workers.

To this point most studies related to the urban wage growth premium have focused on all workers, with no distinction being made between employees at different points in the wage distribution. An exception is Matano and Naticchioni (2016), who present evidence suggesting that in Italy the wage growth premium is, perhaps surprisingly, stronger for workers at the bottom of the wage distribution than at the top. But this finding is based on an analysis of workers who relocate from rural to urban areas, and these mobile workers are may differ in unobserved ways from the overall population. There is relatively little evidence about whether living and working in a city aids the progression of low-paid workers in general. Stephani (2013) presents some evidence that German

low-wage workers employed in highly urbanised areas[27] experience higher wage growth than low-wage workers in less urbanised areas. Cappellari and Jenkins (2008) include two geographical dummy variables in their models of low pay transitions - one indicating residence in London and one in the South-East of England – and find that workers who were low-paid in the previous year are less likely to be low-paid in the current year if they live in London, suggesting residence in London reduces low pay persistence. But as spatial influences on low pay transitions are not the main focus of their study they do not explore this finding further.

A study by Phimister *et al.* (2006) is perhaps the only one that explicitly explores the effect of local labour market size and density on movements out of low pay. However, as discussed in chapter 2, the authors only distinguish between urban areas and rural districts, limiting the ability to make assessments about the size of urban labour markets. Theories of agglomeration that inform much of the research on urban wage (growth) premiums, stress the role of city size, with the positive effect on earnings growth increasing with the size of the agglomeration (Yankow, 2006; Glaeser and Resseger, 2010). Moreover, as will be explained in more detail, the use by Phimister *et al.* of a standard national wage threshold may have implications for the robustness of their findings.

A focus on differently-sized cities is also found in a related body of work by Champion, Coombes and Gordon (2014; 2015), who study occupational advancement in British cities. They find a significant, if modest, association between occupational advancement over the decade between 1991 and 2001, and labour market size. Gordon *et al.* (2015) also find that local unemployment rates affect the likelihood of a worker making an upward occupational transition, although this effect appears to be a consequence of geographically mobile workers who move from slacker labour markets to tighter labour markets and as they do so manage to move up the occupational ladder. There is less evidence that the tightness of the local labour market has an effect on the advancement of workers who remain in the same location.

Labour market conditions are not included as a control variable in most of the literature examining the effect of city size on wage growth, but there are good reasons to believe that the tightness of the local labour market may play a role in determining the ease with which individuals are able to

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[27] Highly urbanised areas are defined according to the German BIK classification system which categorises areas based on population density, the average living space per dwelling, the number of owner-occupied homes, and the number of one-person households. Although the author finds that low-paid workers in highly urbanised areas enjoy wage growth that is approximately 2 per cent higher than that of workers in non-urbanised areas.

secure better-paid jobs. In areas of labour shortage workers may be in a better position to find work, and better quality work, than in areas with an abundant supply of workers and a lack of vacancies. Similarly, employers in tight labour market areas may be more motivated to train up existing workers to fill job openings rather than higher workers in the external market. Evidence from Denmark concerning low-paid workers suggests that this is the case. Bolvig (2004) finds a negative relationship between the unemployment rate in the local labour market (relative to the national average), and the likelihood of progressing from a low-paid to a higher-paid position at the same firm. This suggests that tighter labour market conditions are conducive to within-firm progression. A higher relative unemployment rate also seemed to reduce the likelihood of workers moving to another low-paid job with a different employer, suggesting that workers in slacker labour markets tend to change jobs less frequently and thus remain in the same job-paid job for longer periods of time (ibid.).

The findings from the research discussed above provide the context for the research questions which are explored in this chapter. These are:

- Are low-paid workers more likely to progress into higher-paid work in large urban labour markets?
- If a positive effect of labour market size on progression from low pay is found, does this effect differ between London and other British cities?
- What can be said about the mechanisms through which urban labour markets can improve progression: is there evidence to support the notion that cities offer workers greater opportunities for learning and development on the job, or that higher rates of progression in cities are the result of workers being more likely to switch to better jobs in dense urban labour markets?

The three questions are examined through modelling the relationship between local labour market size and transitions from low to higher pay. This analysis extends the existing literature in several ways. There is a paucity of studies which address the relationship between labour market characteristics and improvements in low-paid workers' labour market position. In particular, for all workers there is some evidence that city size matters but there is little evidence of the extent to which this finding relates to low-paid workers. One exception is Phimister *et al.* (2006). However, in contrast to this study which simply compares rural and urban areas, here a distinction is made between cities of different sizes. Moreover, to better isolate the effect of local labour market size, differences in the tightness of local labour markets are controlled. Additionally, a distinction is made

between transitions from low pay that occur within the same firm, and transitions between-firms. This allows insight into the extent to which cities support workers escape low pay by making it easier to find a better-paid job with a different employer or by improving the wage growth that workers can achieve within their current workplace. This is a point of important theoretical consequence. Lastly, an important contribution is made by highlighting the need to take into account geographic variation in wage levels when defining low pay and measuring wage progression.

While this chapter adds to existing literature in important ways, there are local labour market aspects which are not examined in the analysis. For instance, local labour markets are likely to differ in the extent to which they experienced economic growth over the period under investigation. While growth may be correlated with local unemployment to some degree – and thus picked up by the variable used to proxy the tightness of the local labour market – to account for the effect of economic growth on wage progression more fully a different approach would be needed. While this is a potentially important question, it is one that is not explored here. This is an important caveat as local labour market size may be correlated with growth – for instance, the economy of London grew more quickly over the period 2009-2014 than all other city regions and the UK as a whole.[28] This means that any effect associated with living in London could be due to its size, or its stronger economic performance. Yet, as the analysis below shows, when accounting for local differences in wage levels, no significantly higher wage progression is found for London workers compared to those living in smaller local labour markets, suggesting that even despite its stronger growth, the London labour market did not produce higher wage growth for its low-paid workers.

4.3   Data and methods

The analysis was performed using the first five waves of Understanding Society. The sample was restricted to individuals of working age (aged 16 to 64) living in Great Britain, as comparable data on local labour market size was not available for Northern Ireland. The sample contains 156,201 person-year observations for 49,511 unique respondents. Out of these 49,511 respondents, 10,102 were in low-paid employment during at least one wave (observed over a total of 18,534 person-year observations). Understanding Society respondents who were previously part of the BHPS sample

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[28] See ONS (2018) Regional gross value added (balanced) by combined authority, city regions and other economic and enterprise regions of the UK.

were excluded from the current research to simplify the application of weights[29]. For the purposes of the analysis, workers (both low-paid and higher-paid) are defined as those who report their main activity to be paid employment. Those whose main activity is self-employment, full-time education, retirement, or looking after family or the home are not counted as workers, even if individuals in these categories do sometimes report earnings from employment.

The majority of the analysis uses Travel-To-Work-Areas (TTWAs) as the spatial unit of analysis. Using the geographical identifiers available in Understanding Society, each respondents' Travel-To-Work-Ares of residence was identified. In this chapter the 2001 version of TTWAs is used, which contains 224 TTWAs in Great Britain. Although a more recent definition of TTWAs is available, based on the 2011 Census, this wasn't available in the Understanding Society datasets at the time of analysis.

The size of local labour markets was defined on the basis of the number of employees within each Travel-to-Work-Area, based on data from the Annual Population Survey (a combined dataset based on the quarterly Labour Force Survey aimed to provide reliable estimates of employment at local authority level). The average number of employees over the period 2009 to 2014 was calculated for each TTWA in Great Britain[30], and based on this TTWAs were divided into four size categories as described in table 4-1. The first category contains just one Travel-To-Work-Area, London, as this is by far the largest local labour market area in the UK containing over 4 million employees. The second

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[29] Longitudinal weights are provided within Understanding Society to enable analysis of more than one wave accounting for the fact that certain types of respondents are more likely to attrite between waves than others (Knies, 2015). The weights are based on the probability that an individual who was observed in wave 1 remained in the sample at wave 2, given their age, gender, ethnicity, and other characteristics. This way it is possible to ask a question such as 'what proportion of workers who were low-paid at *t-1* are still low-paid at *t*?' and obtain representative estimates even if, for instance, a disproportionate number of younger, female workers (who are more likely to be low-paid) have dropped out of the study between *t-1* and *t*. The application of longitudinal weights is, however, complicated by the fact that former BHPS sample members only entered the Understanding Society sample from wave 2 onwards. Longitudinal weights for wave 2 are not provided for former BHPS respondents as it does not make sense to adjust for attrition between wave 1 and wave 2 given that these respondents were not present in the study at wave 1. As a result, two separate sets of weights are provided within the survey: one set for Understanding Society respondents which have been present from wave 1 and which thus takes wave 1 as the base year from which weights are calculated; and one set which takes wave 2 as the base year for the entire sample of respondents which are observed in wave 2, including both original Understanding Society respondents and former BHPS respondents. As such, conducting a weighted analysis of pooled low pay transitions including transitions from wave 1 to wave 2 as well as transitions between wave 2 and 3, wave 3 and 4, and so on, would have become rather complicated if former BHPS respondents were to have been included.

[30] Unfortunately this data is not available for Northern Ireland within the Annual Population Survey.

category comprises the nine English 'second-order cities' examined by Champion *et al.* (2014), plus Glasgow, Edinburgh and Cardiff. Ten out of these twelve cities – Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Nottingham, and Sheffield – are part of the Core Cities Group, a collaborative group of large regional cities outside of London formed to promote common interests and drive regional growth. As such this category was labelled 'Core Cities'. The two cities which are not part of the official Core Cities Group, Leicester and Edinburgh, are of a similar size and have similar characteristics as the other cities in the category, which is why they were included. The third category (Smaller Cities) contains all other Travel-To-Work-Areas with more than 100,000 workers which are not part of the Core Cities category. The fourth and last category (Non-cities) includes all remaining Travel-To-Work-Areas. A few of the Travel-To-Work-Areas in this last category are centred around settlements that have city status – such as Chichester or Salisbury – but these are in reality relatively small towns and the TTWAs around them contain large non-urban areas. A point of detail is that although the TTWAs in the Smaller Cities category are, for the most part, substantially smaller (in terms of worker numbers) than the TTWAs in the Core Cities category, there is a small degree of overlap in size between the two categories, with a few TTWAs in the Smaller Cities category having a higher employee count than the smallest Core City[31]. This is due to the fact that some TTWAs encompass more than one city or large town, increasing the number of workers captured within these TTWAs without having the same concentrated density of employment that characterises the Core Cities. A full list of TTWAs in the Core Cities and Smaller Cities categories is provided in appendix A.

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[31] Specifically, there are four TTWAs in the Smaller City category (Guildford & Aldershot, Warrington & Wigan, Luton & Watford and Southampton) which are larger than the smallest Core Cities. The first three of these, however, are comprised of a number of large towns rather than being centred on one central city. The Southampton TTWA is the exception to this, but the city of Southampton itself is not particularly big. The large size of the TTWA in terms of the number of workers stems from the inclusion of Eastleigh, Romsey, Totton and Winchester in the TTWA).

Table 4-1: Travel-To-Work-Area size categories used in chapter 4

Category	Size (number of workers)	Description	Number of TTWAs	% of sample of low-paid workers based on threshold 1[32]
London	More than 4,000,000	Greater London	1	9.2
Core cities	300,000 to 900,000	TTWAs centred around large cities such as Leeds, Sheffield, and Glasgow.	12	19.2
Smaller Cities	100,000 to 400,000	TTWAs centred around small to medium-sized cities such as Bournemouth, Derby, and Wakefield.	60	44.2
Non-cities	Less than 100,000	TTWAs centred around towns such as Barnstaple, Llandudno and Inverness, and rural TTWAs such as South Holland and Lochaber.	151	27.5

A potential problem with using Travel-To-Work-Areas to define local labour markets is that they are demarcated on the basis of commuting patterns for all workers and tend to cover relatively large areas. As discussed in the previous chapter, low-paid workers tend to commute much shorter distances than workers who are not low-paid. Due to these shorter commuting ranges low-paid workers living on the peripheries of cities may be are unable to access the larger quantity and density of jobs available within the central parts of the city in question. To test whether the results are sensitive to this issue, the regression analysis was repeated using Local Authority Districts[33], which tend to be considerably smaller than Travel-To-Work-Areas .

Local Authority Districts were divided into the same size categories as were applied to Travel-To-Work-Areas, with the London category now containing 33 local authorities, and the Core Cities category including the metropolitan districts of Manchester, Liverpool, Sheffield, Newcastle, Birmingham, and Leeds, the unitary authorities of Bristol and Nottingham, the council area of Glasgow City and the City of Cardiff Council. The remaining Local Authority Districts were divided into two groups based on the number of employees they contain. LADs with at least 60,000 employees were categorised as 'Smaller cities' and LADs with fewer than 60,000 workers as 'Non-cities'.

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[32] For explanation of the low pay thresholds used in this chapter see pp. 88-92.

[33] Local Authority Districts (or LADs) is a generic term used to cover London boroughs, metropolitan districts, unitary authorities and non-metropolitan districts in England; counties and county boroughs in Wales; council areas in Scotland; and district council areas in Northern Ireland.

4.3.1 Measuring low pay

As discussed, the most common way to define low pay in the literature is with reference to a wage threshold of two-thirds of the contemporary median hourly wage for all employees (Cappellari and Jenkins, 2008; Buddelmeyer, Lee and Wooden, 2010; Mosthaf, Schnabel and Stephani, 2011; D'Arcy and Hurrell, 2014). In line with previous research, this same threshold will be used in this chapter as the first of three definitions of low pay (threshold 1). To calculate this threshold for each year, data on hourly wages were derived from the Annual Survey of Hours and Earnings (ASHE). ASHE is based on a 1 per cent sample of employee jobs taken from HM Revenue & Customs Pay As You Earn records, and is considered the most comprehensive source of data on the structure and distribution of earnings in the UK (ONS, 2014a).

The hourly pay of each worker in the sample was calculated on the basis of the variable *paygu_dv*, a derived variable indicating respondents' usual gross monthly pay for their current job, and *jbhrs*, the usual number of hours worked per week. Respondents who did not take part in a face-to-face interview, but about whom information was gathered from household members through proxy interviews, had their hourly pay set to missing as information on earnings or working hours obtained by proxy tend to be much less reliable. Not all respondents provided their gross monthly pay and their usual working hours, which means that hourly pay could not be computed for a small proportion of workers. In wave 1, 22,047 respondents were in paid employment, of which 20,086 provided both monthly earnings information and usual working hours. Trimming those with implausibly low earnings (below £2 per hour) left 19,841 respondents.

Out of the 19,841 workers whose hourly pay could be calculated, 5,005 were low-paid under threshold 1, corresponding to a weighted percentage of over 24 per cent. This is higher than estimates calculated on the basis of the Annual Survey of Hours and Earnings, where it is found that roughly 21 per cent of employees were low-paid in that year (see e.g. Corlett and Whittaker, 2014). This is likely because the earnings information in Understanding Society is not as precisely captured and is subject to a degree of underreporting[34].

In addition to the first low pay threshold of two-thirds of median hourly pay, an alternative threshold is used periodically to test the robustness of the results to the level of low pay threshold. This

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[34] The median hourly wage among those who were interviewed in 2009 is £10.29, which is somewhat lower than the £10.97 found in ASHE for the same year.

alternative threshold is an hourly pay rate of 20 per cent above the National Minimum Wage. Table 4-2 below shows the values of the two low pay thresholds for each year[35]. As can be seen, the second threshold is subject to a much steeper rate of growth than the first over the period under investigation. Although it starts off lower than threshold one in 2009, by 2014 it has surpassed it as a result of relatively sharp increases in the national minimum wage over the period.

Table 4-2: Low pay thresholds used in chapter 4

Year	Low pay threshold 1 (2/3rds of median hourly pay)	Low pay threshold 2 (20% above NMW)
2009	7.31	6.96
2010	7.39	7.12
2011	7.38	7.30
2012	7.49	7.43
2013	7.69	7.57
2014	7.70	7.80

Source: Annual Survey of Hours and Earnings, 2009-2014, Table 1.6a Hourly pay
 - Excluding overtime (£) - For all employee jobs

Because the aim of this chapter is to compare progression across local labour market areas, a potential issue is presented by the fact that wage levels vary substantially across regions and localities in Great Britain. It can be argued therefore that it is more appropriate to describe low pay in relation to wage levels in the local area, rather than at a national level. Not only do wages tend to be higher in cities than in rural areas, the UK is characterised by marked regional wage inequalities. Given geographic variations in wage levels, thresholds 1 and 2 are positioned at a different point in the local wage distribution of each Travel-To-Work-Area. As a consequence, a substantially lower proportion of workers are classified as low-paid in London compared to in a city such as Bradford, where low-paid employees make up a markedly higher proportion of the local workforce. But if the low pay threshold is viewed as way to identify a certain type of worker – someone employed in job associated with relatively low wages, as well as low status and low skill content – then the proportion of workers who earn less than some national wage threshold may not be an accurate reflection of the number of low-paid workers in a particular area. This is because workers in all occupations, including typical low-wage occupations, tend to earn more in places like London and

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[35] As interviews for each wave took place over a 24 month period, the classification of workers as low- or higher-paid is based on the year that the interview took place rather than the wave.

less in local labour markets with lower average wages. As shown in table 4-3, the median elementary worker in Glasgow earned £5.20 per hour in 2009, substantially below two-thirds of median pay for all UK workers (£7.31). But the median elementary worker in London earned £7.43, which would place them above the low pay threshold. This means that under a low pay threshold of two-thirds of median hourly pay the majority of elementary workers living in Glasgow would likely be classified as low-paid, but in London less than half of the workers in elementary occupations would be classified as low-paid. Using a single, fixed threshold to define workers as low- or higher-paid therefore prevents a like-for-like comparison of workers in similar types of jobs.

Table 4-3: Median wage by occupational group (SOC2000) (£), 2009

	Great Britain	London	Glasgow
Managers and (associate) professionals	15.00	18.05	14.09
Administrative and secretarial occupations	9.36	11.71	8.73
Skilled trades occupations	10.00	10.90	7.56
Caring, leisure and other service occupations	7.60	8.16	8.65
Sales and customer service occupations	6.80	7.10	7.37
Process, plant and machine operatives	9.47	12.57	9.81
Elementary occupations	6.58	7.43	5.20

Source: Understanding Society, waves 1-5.

For this reason, a third, locally-defined low pay threshold is used for part of the analysis (in section 4.6). The aim of this threshold is to capture the same proportion of the local wage distribution for each Travel-To-Work-Area. This third threshold (referred to as threshold 3) was defined as the 25th percentile of the hourly wage distribution[36] (for all employees) in each TTWA in the Understanding Society sample[37]. Workers are defined as low-paid in any given year if they report hourly pay of less than this threshold. By its very nature, this third threshold results in a much more similar proportion

[36] This percentile was calculated without the application of weights as no weights are applied to the regression analysis and the objective is to ensure that the share of each TTWAs workforce that is included in the sample of initially low-paid workers is as similar as possible.

[37] Because of the relatively small sample size of Understanding Society, it was considered whether to obtain estimates of the 25th percentile of the wage distribution of each TTWA from the Annual Survey of Hours and Earnings instead, as it has a larger sample. However, it was found that defining the threshold based on the ASHE did not result in an equal proportion of workers in each local labour market size category being defined as low-paid, as should have been the case given the nature of the threshold. Because the proportion of workers with wages below the threshold appeared to be driving the observed rate of escape from low pay, it was decided that using the ASHE-based thresholds would be inappropriate and so the thresholds were based on Understanding Society data instead.

of workers being classified as low-paid in each local labour market area – roughly 25 per cent in each – than when using threshold 1 or threshold 2.[38] As such, this threshold tells us about how a worker's wage changes relative to that of other workers in their local labour market.

It is worth examining the shape of the hourly pay distribution surrounding the two thresholds. This is first of all because, if a low pay threshold happens to be located at a large peak in the hourly pay distribution, then a very small shift in the location of the threshold (for instance due to a change in the median hourly wage, in the case of threshold one) could result in a large shift in the proportion of workers who are classed as low-paid. Similarly, if a large proportion of low-paid workers have hourly pay rates of just below the threshold, a very small increase in pay would result in them making a transition to higher pay.

Figure 4-1 shows the bottom of the hourly pay distribution for employees within Understanding Society, for the year 2010 (the year for which the sample size is the largest). The value of threshold one and threshold two is also shown (given that threshold three is locally specific it is not shown here).

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[38] It has to be noted, however, that the proportion of low-paid respondents in each local labour market area is not exactly 25 per cent. In smaller local labour markets, where there are fewer respondents, the number of respondents whose hourly pay is exactly the same as the 25th percentile tends to be greater as a proportion of the total number of respondents belonging to the local labour market. As these respondents are not included in the 'low-paid' category, the proportion of respondents that *is* defined as low-paid tends to be slightly lower in these smaller local labour markets.

Figure 4-1: Hourly pay distribution around the two low pay thresholds, 2010.
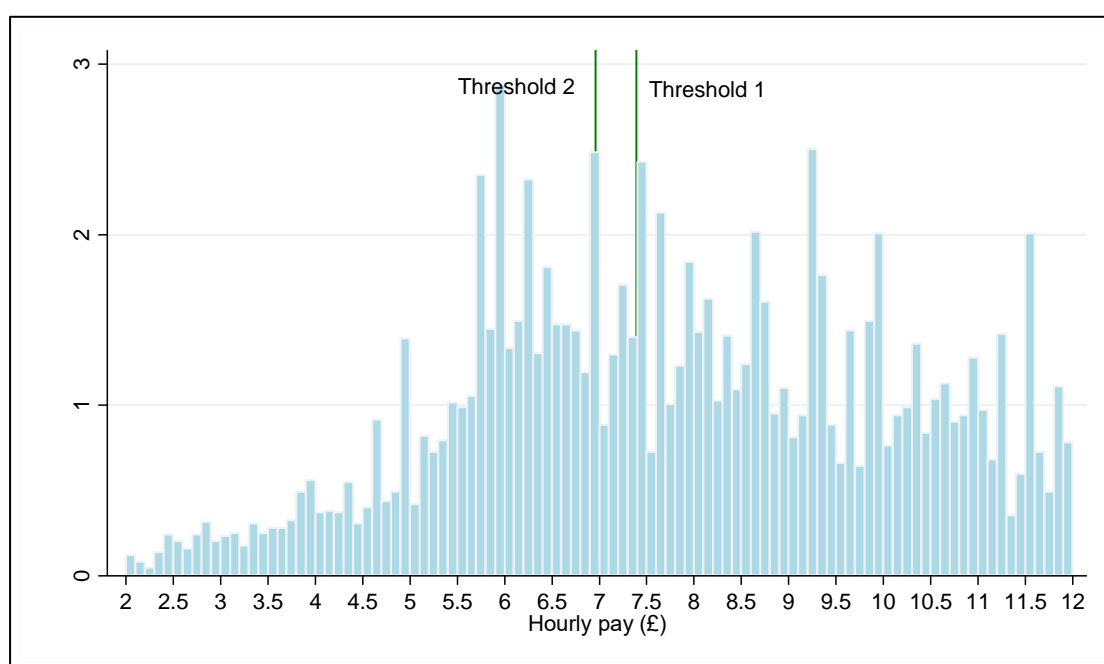
Source: Understanding Society, waves 1-2.

As shown in figure 4-1, the first two thresholds are located in a relatively dense part of the distribution of hourly pay. However, the main peak occurs between £5.50 and £6.00 per hour[39], some way to the left of both of the low pay thresholds. This means that although a sizable proportion of low-paid workers have hourly earnings that lie within £1.00 of the first threshold (between 35 and 39 per cent depending on the year), there is nonetheless a reasonable spread in the wages of low-paid workers. The proportion of low-paid workers with an hourly wage that lies within five per cent of low pay threshold one is 13 per cent on average across the six years. Under threshold 2 the proportion of low-paid workers with wages within five per cent of the threshold is 14 per cent on average, and under threshold 3 the average percentage is 15. This means that the majority of low-paid workers are not marginally low-paid, but have hourly wages that are substantially lower than the threshold, meaning that they would need to experience a considerable wage increase in order to make a transition to higher pay. We can say with reasonable confidence, therefore, that the transitions from low to higher pay described in the following chapters for the most part capture genuine pay progression rather than being the result of 'noise' in workers' reported hourly pay.

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[39] This is not surprising as the minimum wage for workers aged 22 and over was £5.73 in the first nine months of 2009 and £5.80 from October 2009.

A limitation of the data is that workers' pay in between interviews is not recorded. So, although it is possible to tell whether a worker changes jobs in between interviews or is out of work for any length of time, it is not possible to be sure whether a worker who reports being in low pay at a given interview and is also low-paid at the next interview did not at any point experience a spell of higher pay in between these two interviews. Such spells of higher pay in between interviews could occur either within the same job – for instance if a worker receives a wage rise shortly after one interview and then a wage decrease before the next interview – or if a worker has a spell of higher-paid employment in a different job in between interviews. It is, however, unlikely that such a situation will apply to many workers. And even where it does, whether this should count as genuine progression is questionable. For this reason, all workers who were recorded as being in a low-paid job at one interview and at the following interview are treated as having remained in low-paid work throughout the entire year in between those two interviews.

4.3.2   Measuring progression

A worker is defined as having progressed when she or he makes a transition from low pay to higher pay from one year to the next year (i.e. between $t-1$ and t), based on one of the low pay thresholds as defined above. As low-paid workers can also make a transition to non-employment or self-employment, transitions to five labour market states are calculated in the descriptive analysis presented below: 'low-paid' 'higher-paid', 'unemployed', 'economically inactive', or 'self-employed'. For the regression analysis a binary dependent variable is adopted instead, which takes on a value of 1 in the case of transitions from low to higher pay, and a value of 0 in the case of transitions to low pay, to unemployment, economic inactivity, or self-employment.

Initially low-paid workers who make a transition into self-employment are treated as not having progressed, regardless of their earnings in their new self-employed jobs. The reason for this is that the earnings of the self-employed are difficult to measure accurately in surveys (BIS, 2016), which means that it is much more problematic to determine with certainty whether they are low- or higher-paid. Additionally, in Understanding Society earnings information is not available for about half of low-paid workers who enter self-employment. It might not seem entirely justified to treat all transitions into self-employment as non-progression, as there may of course be workers who move from low-waged paid employment to higher-paid self-employment. However, the proportion of workers who move from low-paid employee jobs into self-employment is very small (less than 2 per cent of transitions from low pay result in self-employment at t), and so the results are not

significantly affected by the failure to account for progression among these workers. Nonetheless, the implications of the decision to treat low-paid workers moving into self-employment as not having progressed are examined below to ensure the findings are not sensitive to this decision.

Low pay transitions and spatial wage inequalities

Transition rates from low to higher pay were calculated using three different wage thresholds: two nationally-defined thresholds, and one locally-defined threshold. As will be shown below, defining low pay with reference to the national wage distribution versus the local wage distribution has implications not only for the incidence of low pay across areas, but importantly also for observed transition rates to higher pay across local labour market size categories. Due to generally higher wage levels in London, the two national low pay thresholds are positioned at a lower point in the wage distribution for London compared to other local wage distributions. As a result, the probability of crossing the low pay threshold increases for low-paid workers in London. This is because the rate of transitions to higher pay increases the lower the low pay threshold is set (see figure 4-2). This can be explained as a result of the fact that workers with earnings beneath a lower threshold require a relatively smaller increase in pay in order to cross that threshold compared to those with earnings beneath a higher threshold. Natural fluctuation in wages over time (whether real or as a result of measurement error) hence results in greater proportions of workers being observed moving into higher pay in areas where the threshold is lower. Because a lower threshold results in higher progression rates, defining a low pay threshold that sits at a relatively low point in the wage distribution for London compared to that for other local labour markets increases the estimated likelihood of progression in London relative to that in other areas. Simply put, a national threshold sets a lower bar for workers to progress to higher pay in London and other high-wage areas than it does for workers elsewhere[40].

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[40] It could be argued that adopting a national low pay threshold would have an opposite effect on observed rates of progression. The fact that the low-paid workers observed in London are positioned at a lower point in the local wage distribution compared to workers in other regions may mean their unobserved characteristics differ from those of workers in other local areas – for instance, they may have lower unobserved ability or motivation. By failing to account for these unobserved differences the models may underestimate the positive effect of living in London on the likelihood of escaping low pay. If there is such an effect of unobserved heterogeneity, however, it is likely to be outweighed by the wage level effect discussed above.

Figure 4-2: Transition rates (*t-1* to *t*) from low to higher pay under three low pay thresholds: 20th percentile, 25th percentile and 30th percentile of the local wage distribution
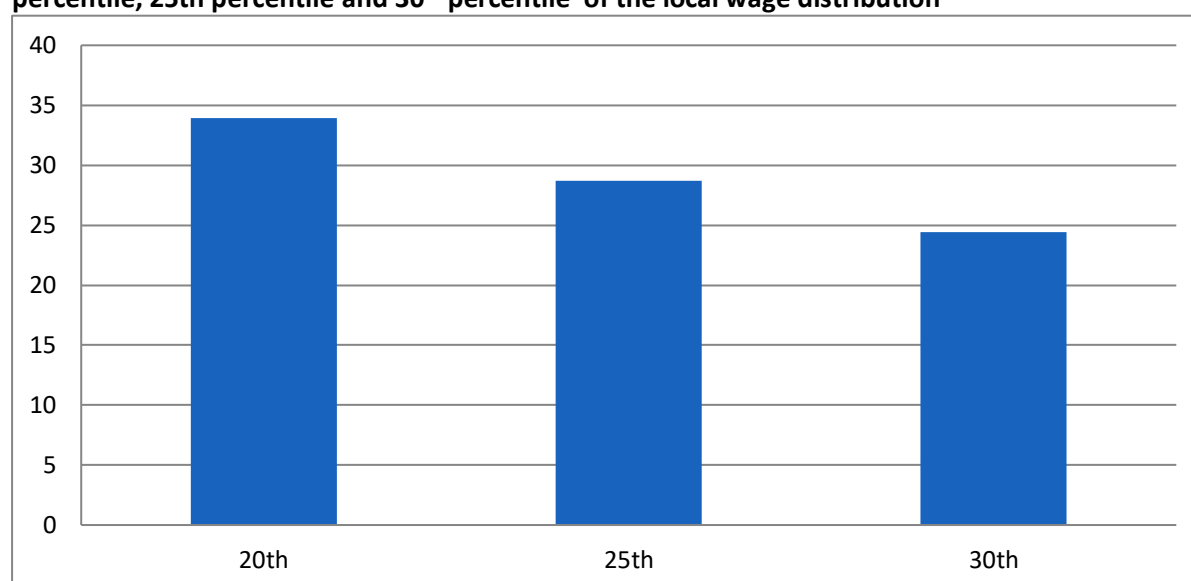
Source: Understanding Society, waves 1-5.

To illustrate the impact of using a national low pay threshold – which is insensitive to spatial wage variations – on observed transition rates to higher pay, section 4.6 presents low pay transitions under threshold 3, which is locally-adjusted. These show that defining low pay according to the local, rather than national, pay distribution, produces very different results.

Alternative definition of progression

As explained above, defining progression with reference to a specific wage threshold results in complications given wage differentials between local labour markets, therefore an alternative approach to examining progression among low-paid workers is also used. Instead of studying wage transitions of workers with pay below a threshold, section 4.6 examines *wage growth* among workers in low-paid occupations.

Low-paid occupations are defined as the five sub-major (2 digit) occupational groups in SOC2000 with the lowest median hourly wage for the period 2009-2014 (based on earnings data from the APS). These are: elementary trades and related occupations; sales occupations; elementary administration and service occupations; caring personal service occupations; and leisure, travel and related personal service occupations. Here progression is assessed by examining rates of annual wage growth of the sample of workers who at *t-1* are employed in low-paid occupations.

4.3.3   Control variables

To isolate the effect of local labour market size on the progression of low-paid workers, it is important to control as much as possible for other factors which may predict workers' probability of escaping low pay. For this reason the regression analysis makes use of a wide-ranging set of control variables. They include a number of individual, job and employer characteristics which have been found to have an effect on transitions out of low-pay in previous studies, or to affect wages more generally (the full variables are set-out in table 4-4).

As discussed in Chapter 2 individual characteristics such as sex, age, and education have been shown to significantly affect employees' likelihood of escaping low-wage jobs. After previous studies (Gosling *et al.*, 1997; Bolvig, 2004; Phimister, Theodossiou and Upward, 2006; D'Arcy and Hurrell, 2014; Kumar, Rotik and Ussher, 2014), the following commonly used individual characteristics are used: age, sex, ethnic group, and highest qualification obtained. To account for the fact that age has a non-linear relationship to earnings, age squared was also included. Given the link between long-term health conditions and wages (Contoyannis and Rice, 2001; Pelkowski and Berger, 2004), a dummy variable indicating whether or not respondents suffered from any long-term health conditions was added. Housing tenure was included for two reasons. Firstly because those living in social housing and mortgage-holders have been found to have lower rates of geographic mobility relative to private renters (Boheim and Taylor, 2002) which may inhibit the ability of workers to find higher-paid employment. Secondly because tenure can act as a proxy for certain neighbourhood characteristics that may influence earnings, given the fact that social housing tends to be located in areas of high deprivation which can be associated with lower levels of social capital and possible stigmatization by employers (Hills, 2007; Galster, 2012; Manley and van Ham, 2012).

A further variable that was added was an indicator of whether or not workers were born in the UK, as research has shown that the qualifications of immigrants tend to be less highly valued in the labour market compared to native workers (Chiswick and Miller, 2008; Drinkwater, Eade and Garapich, 2009; Barrett, McGuinness and O'Brien, 2012), which may limit their ability to progress. To account for the possible influence of household composition on the desire and ability to improve earnings variables were added for whether workers were the sole or a second earner in the household, and whether or not they had any dependent children. Workers with children may find it more difficult to progress due to the need to combine employment with childcare, limiting the number and types of jobs that are suitable and often restricting them to part-time roles with limited advancement opportunities (Mason and Osborne, 2008; Lindsay, Canduela and Raeside, 2012). As

periods spent out of work are known to have a negative effect on future earnings (Arulampalam, Gregg and Gregory, 2001; Stewart, 2007), a dummy variable was included which designated whether or not workers had had a break in employment of at least one month in the previous year[41].

In an attempt to account for some of the worker characteristics that have tended to remain unobserved in previous studies, such as motivation and attitudes towards progression, two attitudinal variables will also be included. The first of these is job satisfaction, following Kumar *et al*. (2014). The second of these attitudinal variables is an indicator of whether respondents felt optimistic about the future at the time of each interview. Although this question pertains to respondents' life in general, rather than specifically to their jobs or careers, this general attitude may nonetheless influence how respondents perform at work or how likely they are to seek out opportunities for progression in the workplace. The link between a positive attitude and the likelihood of progression was highlighted in the qualitative portion of a study by D'Arcy and Hurrell as well as in the regression analysis performed by the same authors (D'Arcy and Hurrell, 2014). Optimism is moreover considered in psychological literature to be related to locus of control (the extent to which individuals feel they have control over events befalling them) (Peacock and Wong, 1996; Klein and Helweg-Larsen, 2002; Ng, Sorensen and Eby, 2006), which has been shown to have an impact on mobility from low to higher pay (Schnitzlein and Stephani, 2016).

In many previous studies, respondents' labour market history prior to entering the sample is included among the control variables. Although Understanding Society respondents are asked for information about their labour market history, this information is only available for approximately 20 per cent of the wave 1 sample. As the inclusion of employment history variables would therefore result in a drastic reduction in the effective sample size available for the analysis, such variables were not included as part of the main set of controls. However, separate models were estimated on those individuals who did provide this information to assess the importance of this factor.

As well as the individual characteristics described above, several job characteristics were also taken into account. These are: respondents' occupation, whether they work full- or part-time, and whether they are on a permanent or temporary contract. Employer characteristics considered include the industry of their employer, the size of their workplace, and whether they work for a private or public sector employer. The last variable is added as previous research has identified that progression from

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[41] Year dummies were also added to account for any temporal variations in aggregate transition rates to higher pay.

low pay is more likely in the public sector (Kumar, Rotik and Ussher, 2014). Lastly, as union coverage has been shown to have an effect on wages and wage growth (Blanchflower and Bryson, 2002; Booth, Francesconi and Zoega, 2003), and has moreover been found to affect the likelihood of remaining low-paid (Stewart and Swaffield, 1999), a variable indicating whether or not an individual's workplace had a recognised union or staff association was also included.

A last variable included in the regression analysis is the tightness of the local labour market. The measure used for this, in the first instance, is the Jobseeker Allowance claimant count as a proportion of all working-age residents in the local labour market. Jobseekers Allowance (JSA) was the main unemployment benefit in the UK during the period of analysis.[42] Since the majority of unemployed individuals are expected to be claiming JSA, it theoretically is a good measure of unemployment, and, therefore, labour market slack. Another advantage of the JSA claimant count is that it is available at the local level, including for Travel-To-Work-Areas, meaning it can readily be included in the analysis.

However, the claimant count rate as a measure of local labour market tightness (or, more accurately, weakness) also has a number of disadvantages. The most important of these is that it only counts those out-of-work individuals who actually claim JSA. But not everyone who is unemployed will claim JSA. For one, eligibility criteria are relatively strict, meaning that some unemployed individuals will not be entitled to the benefit. Secondly, some who are eligible may choose not to claim it. In addition, the British benefit system over the last several decades has been characterised by a tendency for disadvantaged out-of-work individuals to be moved from Jobseekers Allowance onto various incapacity benefits (Beatty and Fothergill, 2005). Yet, many of these people retain the same characteristics as those officially counted as the unemployed, in that they became jobless at least in part due to deteriorating labour market conditions in their local area, and would in many cases readily take up employment if suitable work was on offer in their local labour market (Beatty *et al.*, 1997). Accounting for this 'hidden' unemployment is particularly important in the context of a study of local labour market effects because there is a distinct geographical pattern to this phenomenon, with post-industrial areas in the north of England and south Wales being particularly affected (Beatty and Fothergill, 2005).

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[42] Although JSA claimants have since 2013 been gradually moved onto Universal Credit, this only occured in 10 Jobcentres across the country initially and the number of transferred claimants in the initial year represented only a small fraction of all JSA claimants.

For this reason, the analysis will, in addition to the JSA claimant count, use a second measure of local labour market tightness/slack, which is the 'real level of unemployment' as calculated by Beatty, Fothergill and Gore (2012). More details on this measure can be found in appendix E.

To establish whether the effect of the local labour market variables is different for those who stay with the same employer compared to those who change employers, separate models are estimated for workers who remain with the same employer from *t-1* to *t*, and for workers who move between employers. This is possible because, at each interview Understanding Society respondents are asked whether they are still working for the same employer as at the last interview, and whether they are still working in the same job. Based on this it is possible to identify progression occurring within the same organisation and progression achieved through moving between employers. Certain labour market characteristics – for instance labour market size or tightness – may have a much stronger impact on between-firm wage progression than on progression within firms, while other factors may have a bigger effect on the likelihood of workers improving their pay through staying with the same employer. For instance, the number of potential other job opportunities on offer in the local area is likely to be more important in influencing the likelihood of escaping low pay through the external labour market than the internal labour market.

Table 4-4: Control variables used in regression modelling in chapter 4

Variable name	Description	Variable type
Sex	Respondents' sex	Dichotomous variable (1 if female, 0 if male)
Age	Respondents' age at the date of interview	Continuous
Age squared	Respondents' age squared	Continuous
Ethnic group	Respondents' ethnic group	Dummy variables for: *White* *Asian* (Indian, Pakistani or Bangladeshi) *Black African/Caribbean* *Other* (includes Arab, Chinese and all mixed ethnicities)
Qualifications	Highest qualification obtained	Dummy variables for: *Higher qualifications (degree or other higher qualification)* *Intermediate qualifications (A-level or equivalent)* *Low qualifications (GCSE or equivalent, other qualifications or no qualifications)*
Health	Whether respondents have any long-standing physical or mental impairment, illness or disability	Dichotomous variable (1 if respondents report a long-standing health condition, 0 if not)
Kids	Whether there are any children	Dichotomous variable (1 if yes, 0 if no)

	under the age of 16 in the household	
Housing tenure		Dummy variables for: *Owner-occupier* *Private rented* *Social rented*
Job satisfaction	How satisfied respondents felt with their job	Dummy variables for: *Satisfied (completely or mostly)* *Neither satisfied nor dissatisfied, or somewhat (dis)satisfied* *Dissatisfied (completely or mostly)*
Optimism	Whether respondents felt optimistic about the future	Dichotomous variable (1 if respondents felt optimistic about the future 'often' or 'all of the time', 0 if only 'some of the time', 'rarely' or 'never')
Break in employment	Whether respondents have spent a period out of work in the last year	Dichotomous variable (1 if yes, 0 if no)
Employment history*	The proportion of years between leaving full-time education and entering the sample that respondents have spent in employment	Continuous
Occupation	Socio-economic status of current job (SOC2010)	As above
Part-time	Whether respondents work full- or part-time	Dichotomous variable (1 if part-time = less than 35 hours per week, 0 if full-time)
Temporary	Whether respondents are on a permanent or temporary contract	Dichotomous variable (1 if temporary, 0 if permanent)
Industry	Industry of firm/organisation that respondent works for (based on SIC2007)	Dummy variables for: *Agriculture and fishing* *Energy and water* *Manufacturing* *Construction* *Wholesale & retail* *Accommodation & food services* *Transport and communications* *Administrative & support services* *Banking, finance and insurance* *Public administration, education and health* *Other services (arts, entertainment etc.)*
Workplace size	Number of employees at respondents' workplace	Dummy variables for: *Less than 25* *25 to 100* *100 to 500* *500 or more*
Public sector	Whether respondent works for a public or private sector employer	Dichotomous variable (1 if public sector, 0 if private sector)
Union	Whether there is a recognised union or staff association responsible for negotiating pay and conditions at the respondent's workplace	Dichotomous variable (1 if union is present at workplace, 0 if not)
Labour market	JSA claimant count rate in the local	Continuous variable

weakness	labour market where the worker lives	

*These variables will not be included in the main analysis but will be added in a separate model on a sub-sample of respondents for which the relevant information is available

4.4 Descriptive results

4.4.1 Labour market size and low pay transitions

Table 4-5 presents the proportion of workers who are defined as low-paid in each local labour market size category under the two low pay thresholds. The incidence of low pay is several percentage points lower in London than in the other size categories under both thresholds. Non-cities have the highest proportions of workers with earnings below the thresholds.

Table 4-5: Proportion of workers in sample who are low-paid in each size category, under two definitions of low pay (unweighted), 2009-2014

	Threshold 1 (2/3rd of median)	Threshold 2 (120% of NMW)
TTWA size		
London	18.2	13.0
Core cities	24.2	16.6
Smaller cities	23.8	15.9
Non-cities	27.8	19.0

Source: Understanding Society, waves 1-5. N = 77,708.

Table 4-6 provides a matrix of transitions between low pay at *t-1* to five labour market states at *t*, by local labour market size category. To do this, transitions were pooled across waves 1-5 of Understanding Society, and rates of transition to low pay, higher pay, unemployment, economic inactivity and self-employment were calculated for initially low-paid workers living in TTWAs belonging to each of the four size categories. In the first instance, workers with hourly pay of less than threshold 1 – set at two-thirds of median hourly pay for all UK workers – are said to be low-paid, while workers whose hourly pay is equal to or higher than this threshold are said to be higher-paid. As geographic mobility between labour markets can result in wage growth merely because of earnings differentials between cities and rural areas (D'Costa and Overman, 2014), the small proportion of observed transitions of low-paid workers moving from one Travel-To-Work-Area to

another are excluded from the analysis as well as from the subsequent analysis in this section and the next[43].

Table 4-6: Year-to-year transitions for those in low pay at time *t-1* under threshold 1 (%), pooled transitions, 2009-2014

TTWA size	Higher-paid	Low-paid	Unemployed	Economically inactive	Self-employed	Total
London	32.0	49.0	6.4	9.2	3.3	100
Core cities	26.1	60.1	5.9	6.6	1.4	100
Smaller cities	26.8	59.2	4.3	8.0	1.7	100
Non-cities	24.9	61.7	4.2	6.9	2.3	100

Source: Understanding Society, waves 1-5. N = 11,385. Difference between TTWA size categories statistically significant at 1% level (Pearson χ^2 = 81.1217, p < 0.000).

Table 4.6 clearly suggests that transitions from low pay to higher pay are related to local labour market size. The most striking difference in transition rates to higher pay, and the only one that is statistically significant (p < 0.001), is that between London and the other three categories. When workers in London are excluded, the difference between the remaining three size categories in the likelihood of moving from low pay into higher pay is no longer statistically significant (p = 0.305). In other words, in cities other than London low-paid workers do not appear to be any more likely to move into higher pay than low-paid workers in non-cities. Workers in London are the only ones who appear to be at an advantage when it comes to the probability of escaping low-waged work[44].

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[43] In the entire sample, a move between Travel-To-Work-Areas was observed for 1,809 person-year observations (1.8 per cent of all person-year observations). Out of these, 191 moves were undertaken by low-paid workers, representing 1.6 per cent of all person-year observations for low-paid workers.

[44] As explained in chapter 3, workers who make a transition into self-employment are excluded from the 'higher-paid' category, and so these results do not account for workers who manage to increase their wages to above the low pay threshold by entering self-employment. Earnings data at time *t* is not available for around half of the 247 workers who make a transition from low pay to self-employment, which, combined with the unreliable nature of the information that is provided, makes it hard to accurately measure rates of progression among this small group of workers. From the limited data that *is* available, it appears that low-paid workers moving into self-employment in London are more likely to be higher-paid at time *t* than low-paid workers who do so in local labour markets in any of the other size categories, which only emphasises the finding that rates of progression are higher for low-paid workers in London than in smaller labour markets. But even if we supposed that all low-paid workers in Core Cities, Smaller Cities and Non-cities who had entered self-employment at *t* were higher-paid, and none of the low-paid workers moving into self-employment in London managed to move out of low pay, transitions into higher pay would still be more frequent in London (at 32.0 per cent of transitions, compared to 27.2 per cent in Core Cities, 28.6 in Smaller Cities and 27.2 in Non-cities).

In table 4-7 the same analysis is performed using the second low pay threshold set at 20 per cent above the National Minimum Wage for each year. Although the proportion of transitions to higher pay is higher under this threshold than under the first, the same pattern is evident: transitions to higher pay are more frequent in London than in smaller local labour markets.

Table 4-7: Year-to-year transitions for those in low pay at time *t-1* under threshold 2 (%), pooled transitions, 2009-2014

	Higher-paid	Low-paid	Unemployed	Economically inactive	Self-employed	Total
TTWA size						
London	35.3	44.5	6.5	9.8	3.8	100
Core cities	32.1	53.1	6.2	7.0	1.6	100
Smaller cities	34.6	49.6	4.7	8.8	2.3	100
Non-cities	31.2	53.2	4.9	8.0	2.7	100

Source: Understanding Society, waves 1-5. N = 7,558. Difference between TTWA size categories statistically significant at 5% level (Pearson χ^2 = 40,9884, p = 0.024).

The above results indicate that transitions to higher pay are more frequent among low-paid workers in London than among low-paid workers elsewhere. It could be that this difference a reflection of a higher degree of wage volatility in London, in which case workers in London would be more likely to fall into low pay as well as move out of it. Table 4-8 shows transitions from higher pay in each of the four size categories. It is clear that transitions into low pay are no higher in London than in the three smaller size categories; in fact, they are lower. So workers in London appear to both be more likely to move out of low pay, and less likely to fall into it.

Table 4-8: Year-to-year transitions for those in higher pay at time *t-1* under threshold 1 (%), pooled transitions, 2009-2014

	Higher-paid	Low-paid	Unemployed	Economically inactive	Self-employed	Total
TTWA size						
London	86.8	5.4	2.2	3.5	2.2	100
Core cities	86.6	6.3	1.8	3.5	1.8	100
Smaller cities	87.2	6.4	1.5	3.2	1.7	100
Non-cities	85.6	7.4	1.3	3.8	1.9	100

Source: Understanding Society, waves 1-5. N = 38,912. Difference between TTWA size categories statistically significant at 1% level (Pearson χ^2 = 55.3025, p = 0.001).

Since the first several years of the period under consideration were marked by a recession, this may have had an effect on the overall rates of wage progression seen among low-paid workers. Examining the data does indicate that rates of transition from low to higher pay changed over the five-year period, but not in the way that might be expected. The years 2010, 2011 and 2012 see between 27 and 28 per cent of workers low-paid moving into higher-paid employment from one year to the next, but in the period 2013-2014 this falls to between 24 and 25 per cent (see table 4-9). Separating the sample into workers living in London and those living outside of London reveals that only among the latter group did progression rates fall after 2012. Transition rates to higher pay did not change significantly from year to year in London. It is not clear why transition rates to higher pay decreased after 2012 for workers living outside of London.

Table 4-9: Year-to-year transitions for workers in low pay at *t-1* under threshold 1, by year, 2009-2014

Year(t)	Higher-paid	Low-paid	Unemployed	Economically inactive	Self-employed	Total
2010	27.3	57.9	4.7	8.3	1.8	100
2011	28.4	57.3	5.2	7.3	1.8	100
2012	27.3	58.0	6.0	6.9	1.8	100
2013	24.1	61.3	3.9	8.3	2.4	100
2014	24.9	62.6	3.1	6.9	2.5	100
Total	26.7	59.0	4.8	7.5	2.0	100

Source: Understanding Society waves 1-5. Difference in transitions between years statistically significant at 5% level (p = 0.011).

4.4.2 Between-firm versus within-firm progression

So why do workers in London appear to be more likely to make a transition to higher pay? According to the 'worker-firm matching' hypothesis, the relatively high wage growth observed in large cities is the result of higher rates of inter-firm mobility. The greater density of jobs means workers can move between employers more easily, thereby increasing the likelihood of finding a higher-paid position (Wheeler, 2006, 2008). Under this hypothesis, greater mobility between employers in London than in smaller labour market would be expected. This does appear to be the case for higher-paid workers, as shown in table 4-10. For low-paid workers in London, on the other hand, the likelihood of changing employer from one year to the next is statistically no different than that for workers in the other size categories.

Table 4-10: Proportion of workers who change employers from *t-1* to *t* (%) by labour market size, for higher-paid workers and low-paid workers (under threshold 1), pooled transitions, 2009-2014

TTWA size	Workers in higher pay at *t-1*	Workers in low pay at *t-1*
London	6.8	10.1
Core cities	5.7	8.8
Smaller cities	5.7	9.4
Non-cities	5.1	9.4
Total	5.7	9.4

Source: Understanding Society waves 1-5. Weighted estimates. N = 38,295 for higher-paid workers and N = 11,168 for low-paid workers. Difference between London and remaining categories significant at 5% level for higher-paid workers and insignificant for low-paid workers.

Even if low-paid workers in London do not exhibit greater mobility between firms, perhaps they are more successful at obtaining higher-paid work when they do change employer. Unfortunately the sample does not contain very many workers who are low-paid and are also observed switching employers at least once during the period. When these workers are then sub-divided according to their Travel-To-Work-Area, the numbers in each category is consequently relatively small. The data suggest, however, that low-paid workers who change employers are most likely to escape low pay in the Core Cities rather than in London (see table 4-11). For low-paid workers in London, the likelihood of acquiring a higher-paid job when moving to a new employer is statistically no higher than for workers in smaller cities or non-urban labour markets. Due to the small sample size, and the fact that differences between workers are not controlled for, these results should be interpreted with caution. One thing to note, however, is that the estimated likelihood of moving into higher pay is substantially higher for workers who change employer than for all low-paid workers.

Table 4-11: Probability of escaping low pay, for low-paid workers (under threshold 1) who change employers from *t-1* to *t* (%), by labour market size, 2009-2014

TTWA size	Likelihood of escaping low pay (%)	N (weighted)
London	39.5	106
Core cities	46.8	177
Smaller cities	40.4	447
Non-cities	32.8	277

Source: Understanding Society waves 1-5. Weighted estimates. Difference between Core Cities and remaining categories significant at 10% level. N (unweighted) = 1,050.

What about the second possible cause proposed in the literature, the 'learning' hypothesis? According to this theory, the proximity to a large number and variety of other workers means that those who live in cities accumulate knowledge more quickly than those living in smaller, less dense labour markets (Glaeser, 1999; Glaeser and Mare, 2001). As Wheeler (2006) argues, one way to isolate this effect is by focusing only on workers who stay within the same organisation. After all, if experience in a more diverse urban setting increases human capital accumulation, this should be evident, at least to some extent, in higher rates of wage growth within firms[45]. Table 4-12 presents some evidence that low-paid workers in London are more likely to progress into higher-paid jobs when staying within the same organisation compared to low-paid workers elsewhere. This does not apply to workers in cities outside of London, however.

Table 4-12: Probability of escaping low pay, for low-paid workers (under threshold 1) who remain with the same employer from *t-1* to *t*, by labour market size (%), pooled transitions, 2009-2014

TTWA size	Likelihood of escaping low pay (%)	N (weighted)
London	37.7	771
Core cities	28.0	1,606
Smaller cities	29.5	3,683
Non-cities	27.8	2,330

Source: Understanding Society waves 1-5. N = 8,725. Weighted estimates. Difference between London and remaining labour market size categories significant at 1% level (p < 0.001). N (unweighted) = 8,725.

One possible reason for this finding is that those working in low-wage jobs in the capital are able to benefit from more opportunities for learning and skills development within the firms they work for. This is the explanation proposed by Glaeser (1999), whose arguments revolve around the increased capacity for human capital accumulation in cities. A second possibility is that low-paid workers in London simply experience higher wage growth relative to workers in other areas of the UK, regardless of changes in their human capital[46]. If this is the case, we would expect to see relatively

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[45] Of course, observing an initially low-paid worker in a higher-paid job after they have moved to a new employer does not necessarily mean that the increase in pay occurred as a result of their change of firm. They may have been given a pay rise in the last job they were in, and decided to move to a different employer only after they had already moved into higher pay.

[46] Much of the literature concerned with geographic wage disparities has tended to explain these disparities in terms of differences between workers, most importantly their human capital. There are, however, many other potentially influential factors at play in the determination of earnings at a local level, many of which do not have to do with the characteristics of workers, but with more systemic processes. Such factors can include things like productivity differentials related to technology, the strength of wage bargaining, the degree of

higher wage growth for all or at least most low-paid workers in London, even those who remain in the same jobs.

Firstly, the possibility that London-based workers tend to learn new skills more quickly than workers in other parts of the UK is examined. If this is the case it seems reasonable to expect low-paid workers in London to be more likely to move into a higher-paying job within the same organisations. To answer this question it is possible to examine cases where respondents change jobs but remain with the same employer (based on the self-reported data recorded in the variables _jbsamr and _samejob). Table 4-13 shows the probability of experiencing an internal job change in each local labour market size category, differentiating between 'upward' transitions (where workers experience an increase in hourly pay) or 'downward' transitions (where workers experience a decrease in hourly pay). The figures indicate that the likelihood of changing jobs within the same firm is no higher for low-paid workers in London than for low-paid workers in Core Cities, Smaller Cities or Non-cities, but that low wage workers in London have a slightly higher probability of making an 'upward' job move compared to workers in the other labour market size categories. The difference between London and the other categories is, however, statistically significant at the 10% level only. There is therefore some evidence that low-paid workers in London are more likely than low-paid workers elsewhere to experience an upward internal job change due to greater opportunities for learning and development, although this is not very strong.

Table 4-13: Probability of internal job change from *t-1* to *t* for initially low-paid workers (under threshold 1) who remain in paid employment at *t*, by labour market size (%), pooled transitions, 2009-2014

TTWA size	Likelihood of upward job change (%)	Likelihood of downward job change (%)	Total likelihood of internal job change	N (weighted)
London	2.9	0.1	3.0	853
Core cities	2.6	0.4	3.0	1,782
Smaller cities	2.4	0.9	3.3	4,110
Non-cities	2.2	0.6	2.8	2,570

Source: Understanding Society waves 1-5. Weighted estimates. Difference in upward job changes between London and remaining labour market size categories significant at 10% (p = 0.087). N (unweighed) = 9,776.

competition for labour, or simply the need of employers to retain and attract workers by offering them a wage that is commensurate with living costs in a particular locality.

Table 4-14 sheds more light on within-job wage progression experienced by low-paid workers in larger versus smaller local labour markets by examining rates of annual growth in (log) real hourly pay for those who remain in the same job from *t-1* to *t*. The results shown in table 4-14 indicate that workers in London who stay in the same job from year to year do though tend to experience higher rates of wage growth than workers living in the Core Cities, in Smaller cities or Non-cities. As a consequence, low-paid workers in London are also more likely to escape low pay compared to workers in all other size categories even when they remain in the same job. Although it is of course possible that for some London-based workers this higher wage growth is the result of pay rises awarded to those who have acquired new skills, it seems unlikely that all of the difference is explained by workers in London 'learning' at a quicker rate than elsewhere. It seems probable, therefore, that low-paid workers in London tend to benefit, at least to some extent, from higher general rates of within-job wage growth that do not have to do with increases in their human capital.

Table 4-14: Average real wage growth and probability of escaping low pay, for low-paid workers (threshold 1) who remain in the same job from *t-1* to *t*, by labour market size (%), pooled transitions, 2009-2014

TTWA size	Mean growth in log hourly wage† (%)	Likelihood of escaping low pay (%)	N
London	10.8	37.1	720
Core cities	7.4	27.5	1,528
Smaller cities	7.7	29.1	3,491
Non-cities	6.5	27.0	2,217

Source: Understanding Society waves 1-5. Weighted estimates. N (unweighted) = 8,264. Observations where wage growth exceeded 150% excluded from sample. Difference between London and remaining labour market size categories significant at 1% level (wage growth) and 5% level (escape probability). †Wages converted to 2014 prices.

4.5   Regression modelling

The descriptive results presented do not take into account that low-paid workers in London may differ from workers in Core Cities or in other cities in ways that make them more likely to see higher wage growth. While another issue with comparing transition rates between smaller and larger local labour markets is that labour markets of roughly similar size can differ from each other in other respects. As discussed above, the tightness of the local labour market is one potentially important factor that can be expected to influence rates of progression from low pay. To illustrate the extent to

which this is the case, appendix B presents the full transitions from low pay in Travel-To-Work-Areas with varying degrees of labour market tightness. These do indeed suggest that workers living in relatively tight labour markets are more likely to transition to a higher-paid job than workers in average or slack labour markets. To more fully examine the effect of labour market size on progression from low pay, labour market conditions and individual characteristics are therefore taken into account in the following analysis.

4.5.1   Modelling strategy and methodological issues

To assess whether the size of the local labour market has an effect on workers' likelihood of escaping low pay even when variations in labour market tightness and differences in the composition of workers are taken into account, a series of regression models are estimated to determine the relationship between local labour market size and the probability of a worker being higher paid at time *t*, given that they were low-paid at *t-1*. The sample contains all workers who were in low-paid employment at t-1, including those who make a transition to self-employment, unemployment or economic inactivity at *t* (for these workers the dependent variable is coded 0 as they are defined as not having escaped low pay)[47]. The main explanatory variable of interest is the size category of the local labour market the worker resides in. As a measure of the tightness of the local labour market, the proportion of working-age residents (aged 16-64) in the local labour market area who were claiming JSA is also included[48]. This variable is more accurately described as a measure of labour market weakness, since a higher JSA claimant proportion is an indicator of weaker labour demand relative to supply. The full model also includes the control variables set out in section 4.3.3. These consist of the individual characteristics of workers and job-related characteristics[49]. Lastly, year dummies are included to control for any year-to-year variation in macro-economic conditions and institutional effects (such as changes in the level of the minimum wage).

A series of models are estimated.
- Model 1 includes labour market size as the only explanatory variable
- In Model 2 labour market weakness is added,

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[47] Exceptions are Models 4 and 5, for which the sample was restricted to workers who are in paid employment at both t-1 and 1, this is explained subsequently.

[48] This is known as the residence-based proportion, and is the official measure for geographic areas below regional level. The data was obtained through Nomis for each year.

[49] It is the value of these job-related variables at time *t-1* which is controlled for.

- Model 3 includes the full set of control variables as well.
- In Models 4 and 5 the focus is on the difference between within-firm and between-firm progression so the sample was restricted to workers who remained with the same employer from *t-1* to t and workers who changed employer from *t-1* to *t*, respectively (thus the sample for both of these models contains only workers who are in paid employment at both *t-1* and *t*).
- Finally, Model 6 is a model of within-job progression, with the sample restricted to workers who stayed in the same job between *t-1* and *t*.

Table 4.15 summarises the six models.

Table 4-15: List of five main models estimated in regression analysis of effect of city size on wage progression among low-paid workers

Model	Sample	Controls
Model 1	All workers in low pay at *t-1*	-
Model 2	All workers in low pay at *t-1*	Labour market weakness only
Model 3	All workers in low pay at *t-1*	Labour market weakness + controls
Model 4	Workers who remain with same employer	Labour market weakness + controls
Model 5	Workers who change employers from *t-1* to *t*	Labour market weakness + controls
Model 6	Workers who remain in the same job from *t-1* to *t*	Labour market weakness + controls

The previous chapter set out a number of issues that need to be addressed to ensure consistent estimation of the effect of local labour market characteristics – in this case size – on transitions from low pay to higher pay. One issue is the assumption of strict exogeneity, which, as explained in chapter 3, states that there can be no correlation between the independent variables at previous time periods and the dependent variable in the current time period, nor correlation between the independent variables in the current time period and the dependent variable in future time periods. Hence, in the current context, the strict exogeneity assumption will be violated if past experience in a large, urban labour market makes it more likely that a low-paid worker will move into higher-paid work (even if s/he has moved to a smaller local labour market at time t), or if it is not just the size of a workers' current local labour market that has an effect on their probability of progressing out of low pay but also the length of time that the worker has spent in this particular local labour market. There are reasons to believe that both of these possibilities could be true. Findings by D'Costa and

Overman (2014) suggest that workers who have at some point lived in a city, even if they do not live there anymore, experience higher wage growth than similar other workers who have never lived in a city. In relation to the length of time spent in a local labour market, it also seems likely that if cities enable workers to develop their human capital through learning from others, this process does not take place immediately but over the course of months or years. As a result a worker who has lived in a city for longer may have a higher chance of escaping low pay than someone who has only moved there less than a year ago.

However, when workers who are observed moving between cities and non-cities are examined, there is little evidence that either of these things are true. There is no significant difference in the probability of escaping low pay between workers who have moved to London or a Core City in the last year, workers who have moved there between one and two years previously and workers who have moved there at least two years previously[50]. This suggests that the length of time spent in a city is not related to the probability of progressing to higher pay. There is similarly little sign that workers who at a previous point during the analysis period lived in a city while no longer living there currently have a higher likelihood of escaping low pay compared to those who neither previously nor currently live in a city[51]. Moreover, the number of low-paid workers in the sample who have relocated from a city to a non-city appears to be very small, meaning that any bias arising from previous city experience is likely to be limited. Nonetheless, to check the robustness of the results to the possible long-term effects of living in cities on wage growth, in section 4.6 an alternative specification is estimated in which the reference category of the local labour market size dummy variable is defined as workers who have never previously lived in a city (more details are provided below).

A violation of the strict exogeneity assumption would also occur if experiencing a transition from low pay at *t-1* to low pay at *t* makes it more likely that a worker will move to a larger labour market in the next period. Again, however, there is no evidence that workers' decisions about whether to move to smaller or larger local labour markets are influenced by whether or not they have escaped low pay. Workers who experience persistent low pay (i.e. are low-paid for at least two years in a

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[50] This is the case whether local labour markets are defined as TTWAs or as LADs.

[51] Low-paid workers who did not at any point during the analysis period live in a city have a 26 to 27 per cent chance of moving into higher pay, while workers who did at some point lived in a city (even though they no longer live there currently) have a 32 to 35 per cent chance of doing so. However, this difference is not statistically significant, whether local labour markets are defined as TTWAs or as LADs.

row) appear to be equally likely to move to a larger labour market as to a smaller labour market[52], and there is similarly no systematic tendency for workers who have escaped low pay to either move to smaller, or to larger labour markets[53].

A second issue is the potential correlation between unobserved heterogeneity and the explanatory variables, in this case, the size category of respondents' local labour market. Researchers examining the relationship between labour market size and wage growth (e.g. Gibbons, Overman and Pelkonen, 2010; D'Costa and Overman, 2014) have argued that unobserved attributes such as motivation and ability may be correlated with the size of the local labour market because more able workers 'self-select' into cities. For such self-selection to bias the estimates in a substantial way, however, the number of low-paid workers who move from non-cities into cities (or the other way around) would need to be non-negligible. While it seems probable that among more highly educated, highly skilled workers this kind of self-selection ('sorting') into large cities is a common enough phenomenon to justify the concerns, among the sample of low-paid workers this type of behaviour is not nearly as widespread, consistent with previous findings suggesting that the impact of sorting is less strong for low-paid workers than for high-paid ones (Matano and Naticchioni, 2011). Within the Understanding Society sample only 74 cases of low-paid workers moving between local labour markets in different size categories over the five-year period are observed. This equates to an average of just under 0.5 per cent of low-paid workers per wave switching between labour market size categories. Even if all of the workers moving from non-urban labour markets to a Core City or to London were among the highest-ability workers, and all of the low-paid workers moving from London or one of the Core Cities into a non-urban labour market were among the lowest-ability workers, this very small percentage of low-paid employees is unlikely to distort the results in any meaningful way[54].

Even if the 'sorting' of workers between local labour markets on the basis of unobserved ability is therefore not a serious enough issue to lead to concern, there may be other worker attributes which

[52] The proportion of persistently low-paid workers who move to a larger local labour market (0.85 per cent) is about the same as the proportion who move to a smaller local labour market (0.69 per cent).
[53] The proportions of workers who move to a differently-sized labour market following either a move into higher pay, or a further year in low pay, are so small that any bias resulting from feedback loops between previous pay transitions and current labour market size will be negligible.
[54] An additional consequence of the very small proportion of geographically mobile workers in the sample is that the conventional method of dealing with possible correlation of the covariates and unobserved heterogeneity, fixed effects estimation, is not feasible in this study. This is because fixed effects estimation relies on there being a sufficient amount of within-individual variation in the explanatory variables.

are not controlled for in the models described above. One of the worker characteristics which is not controlled for in Models 3, 4 and 5 is their labour market history before joining the Understanding Society sample. In an attempt to account for this, models were separately estimated on a sub-sample of workers for whom data on labour market history prior to wave 1 was available. In addition, section 4.5.3 presents the results from dynamic probit models in which workers' pay and labour market status at *t-2* (i.e. the year before the initial observation of low pay at *t-1*) is included as an additional regressor to control for differences in the recent labour market experience of workers between the local labour market size categories. As previous experience of low pay, unemployment or inactivity could have an effect on the probability of being higher-paid (Stewart and Swaffield, 1999; Stewart, 2007; Cappellari and Jenkins, 2008), the purpose of this control is to ensure that differences between size categories aren't driven by differences in the previous labour market state of respondents.

The last issue to be addressed is the potentially non-random nature of attrition which could lead to inconsistent estimates. To account for endogenous attrition, models with endogenous selection were estimated following the approach described in section 3.4.4 of the methodology chapter. The results from these are discussed below in section 4.5.3, and indicate that although attrition is endogenous and ignoring it overestimates the effect of labour market size on transitions from low to higher pay, the distortion is relatively small.

To simplify the interpretation of the estimation results, instead of the estimated coefficients the tables below report the average marginal effects associated with each variable. The average marginal effect indicates the average percentage-points difference (calculated over all observations) in the probability of escaping low pay between the chosen category and the reference category of the variable in question.

4.5.2   Main results

Table 4-16 shows the average marginal effects associated with each of the local labour market size categories, for each of the five models.

The results from Model 1 indicate that workers in London have a significantly higher chance of making a transition into higher pay than workers living in non-city TTWAs, mirroring the results presented above. Neither Smaller cities nor the Core cities are associated with an improved

likelihood of escaping low pay compared to non-urban labour markets, the reference category. The addition of the JSA claimant proportion as a second variable in Model 2 does not change this result, but the results of the second model do suggest that workers in slacker labour markets (with a higher proportion of JSA claimants) have a lower chance of escaping low wages compared to workers in tighter labour markets. When worker controls are added in Model 3, the positive effect associated with living in London becomes even stronger, while the marginal effect of labour market weakness decrease slightly[55]. Compared to low-paid workers in non-city labour markets, the probability of escaping low pay from one year to the next for those working in London is 15 percentage points higher (with a 95% confidence interval of between 9 per cent and 21 percentage points). Living in a Core city also has a positive average marginal effect of 4 percentage points, although this is only significant at the 10% level. Local labour markets with weaker labour demand are associated with a reduced probability of escaping low pay, with a one percentage point increase in the proportion of working-age residents who are claiming JSA being associated with a 1.2 percentage point lower likelihood of moving from low to higher pay.

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[55] A full list of average marginal effects for model 3 can be found in appendix C.

Table 4-16: Average marginal effects derived from random-effects probit estimator on transitions from low pay at *t-1* to higher pay at *t* under threshold 1, local labour markets defined as TTWAs, 2009-2014

	Model 1 (All transitions)	Model 2 (All transitions)	Model 3 (All transitions)	Model 4 (Within-Firm)	Model 5 (Between-firm)	Model 6 (Within-job)
Labour market size (TTWA)$_{t-1}$ reference category: Non-cities						
London	0.110***	0.119***	0.152***	0.139***	0.249**	0.138***
	(0.020)	(0.020)	(0.030)	(0.030)	(0.098)	(0.031)
Core Cities	-0.000	0.018	0.037*	0.027	0.143*	0.025
	(0.016)	(0.017)	(0.020)	(0.021)	(0.076)	(0.021)
Smaller cities	0.006	0.010	-0.007	-0.004	-0.046	-0.004
	(0.013)	(0.013)	(0.016)	(0.016)	(0.060)	(0.016)
Labour market weakness$_{t-1}$ (JSA claimant proportion)		-0.017***	-0.012**	-0.007	-0.049**	-0.005
		(0.005)	(0.006)	(0.006)	(0.021)	(0.006)
Controls	NO	NO	YES	YES	YES	YES
Log pseudolikelihood	-6461.67	-6455.44	-3018.81	-2767.08	-160.94	-2664.24
Observations	11,400	11,400	7,561	7,064	400	6,830

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers), except for Model 5 for which robust standard errors could not be computed due to small sample size. The results for models 4 and 5 are similar with or without controls. Without controls the average marginal effect of labour market weakness in Model 4 is statistically significant at the 10% level but when controls are added it is no longer significant (labour market size effects are virtually identical). For Model 5, leaving out controls means the marginal effect for Core Cities is not statistically significant from zero, indicating that it is important to control for differences in the composition of workers between Core Cities and the other categories.

When within-firm progression is examined (Model 4), the tightness or weakness of the local labour market ceases to have an effect. This is not surprising as the relative tightness of the local labour market can be expected to affect the ability of workers to find better-paid external opportunities to a much greater extent than the career development of low-paid employees within organisations. Mirroring the descriptive results in table 4-13, London again stands apart from Travel-To-Work-Areas in the other size categories in the advantage it appears to offer to workers in terms of moving out of low pay within the same firm. When restricting the sample to workers who switch employer in Model 5, the greatest probability of escaping low pay is once again found in London. On average, the likelihood of workers in London moving into higher pay when they change employers is about 25 percentage points higher than that of workers in smaller, non-urban labour markets (although this estimate is subject to a relatively wide 95% confidence interval of between 6 and 44 percentage points).

When restricting the sample to workers remaining in the same job between *t-1* and *t* (Model 6), the results are virtually identical to those of Model 4. Living in London is again associated with a significantly higher likelihood of escaping low pay for workers who stay in the same job from year to year, consistent with the descriptive results presented in table 4-14. The fact that controlling for individual and job characteristics and for the tightness of the local labour market does not eliminate this effect means that it is unlikely to be explained by differences in the composition of the low-paid workforce in London versus that of smaller local labour markets, or a difference in labour market conditions. Low-paid workers in London appear to experience faster on-the-job wage growth, resulting in a higher chance of escaping low pay.

In addition to the effect of city size, particularly living in London, the full regression results (reported in appendix C) confirm findings of existing literature by showing that lower-qualified workers, women, and those on part-time contracts are less likely to escape low pay. Occupation and industry of employment are also of crucial importance with highly significant effects, again confirming existing findings (Cappellari and Jenkins, 2008; Phimister and Theodossiou, 2008; Pavlopoulos and Fouarge, 2010; Knabe and Plum, 2013; D'Arcy and Finch, 2017). In addition, workers in larger firms, and those working in establishments with some recognised form of worker representation (a union or staff association) have a higher probability of moving into higher pay. Housing tenure and the presence of dependent children – are also shown to be significantly associated with moving out of low pay, with those in social rented accommodation and those with children less likely to escape low wages.

This analysis was repeated using the second low pay threshold to test whether the results are sensitive to the definition of low pay (results are in appendix D). Although the marginal effects are lower in this model, the overall results of Model 3 are consistent with those in table 4-16: a significant positive effect associated with living in London; no significant effect associated with any of the other size categories; and, a significant negative effect associated with a slacker labour market. The only difference is that in Models 5 and 6 the positive marginal effects associated with living in London disappear when the alternative low pay threshold is used. This may be due to the smaller sample of low-paid workers that is used under the second threshold.

These results suggest that being situated in a larger labour market (and specifically London) makes it more likely that low-paid workers will move into higher-paid jobs, either through staying with the same employer (in which case workers appear to benefit from higher rates of on-the-job wage growth, as well as, possibly, better internal progression opportunities) and through finding more

advantageous job matches in the external labour market. But, similarly to the descriptive evidence presented in the previous section, the findings suggest a positive effect on progression from low pay is found only in London and not in other large cities (although there is some tentative evidence of a positive effect associated with Core cities, but of a much smaller magnitude).

To test whether the above results are robust to the choice of a threshold-dependent binary dependent variable, models 1 to 6 were also estimated using the same sample of workers defined as low-paid at *t-1* under threshold 1, but with annual growth in log hourly pay as the dependent variable. Wages were adjusted for inflation using the Consumer Price Index. The results, shown in table 4-17, are in line with those presented above. Wage growth among workers staying with the same firms however remains highest in London. The results for Model 6 suggest that this higher within-firm wage growth is, to a large extent, the result of workers in London experiencing higher average pay rises within jobs.

Table 4-17: Regression coefficients random-effects estimator on growth in (log) real hourly pay from *t-1* to *t* for workers in low pay at t-1 under threshold 1, local labour markets defined as TTWAs

	Model 1 (All transitions)	Model 2 (All transitions)	Model 3 (All transitions)	Model 4 (Within-Firm)	Model 5 (Between-firm)	Model 6 (Within-job)
Labour market size (TTWA) reference category: Non-cities						
London	6.059***	6.418***	5.163***	4.679***	8.058*	4.297***
	(0.971)	(0.974)	(1.259)	(1.278)	(4.314)	(1.308)
Core Cities	0.671	1.491*	1.350	1.187	0.940	1.094
	(0.735)	(0.771)	(0.866)	(0.873)	(3.307)	(0.894)
Smaller cities	0.673	0.872	0.733	0.809	1.151	0.866
	(0.616)	(0.618)	(0.686)	(0.698)	(2.574)	(0.715)
Labour market weakness (JSA claimant proportion)		-0.749***	-0.643***	-0.587**	-0.360	-0.620**
		-(0.220)	(0.245)	(0.254)	(0.928)	(0.260)
Controls	NO	NO	YES	YES	YES	YES
R² (overall)	0.007	0.008	0.051	0.052	0.096	0.053
Observations	10,227	10,227	7,521	7,032	715	6,800

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers), except for Model 5 for which robust standard errors could not be computed due to small sample size. Observations where wage growth exceeds 150% excluded from sample.

4.5.3 Sensitivity analysis

To assess the robustness of the results presented in the previous section several sensitivity checks were performed. The first of these checks relates to the definition of local labour market areas, which is potentially important given the relatively short commuting distances of low-paid workers. The second sensitivity check is regarding the measure of labour market weakness used in the previous section. Since the JSA claimant proportion is an imperfect indicator of the relative tightness of the local labour market, an alternative measure (the real unemployment level) is tested instead to check the robustness of the results to this arguably more accurate indicator. The third and fourth sensitivity checks concern differences in both the short-term and longer-term labour market histories of low-paid workers, factors which may be important in explaining progression from low pay based on findings relating to state dependence in low pay and unemployment (Stewart and Swaffield, 1999; Stewart, 2007; Cappellari and Jenkins, 2008). Lastly, potential bias resulting from endogenous attrition is addressed at the end of this section.

Alternative definition of local labour markets

To find out whether similar results are obtained using a different definition of local labour markets, the analysis was repeated using workers' Local Authority District of residence as the geographical definition of local labour markets. The reason for this is that TTWAs tend to cover relatively large areas which may not correspond well to the functional local labour markets of low-paid workers due to their shorter commuting distances. Models 1 through to 6 were again estimated in the same way as above for table 4-16 but with this alternative definition, and the results are presented in table 4-18.

The average marginal effects for London are very similar to those in table 4-16 and again all highly statistically significant, indicating that living in London offers workers a better chance of escaping low pay regardless of how the London labour market area is defined. However, unlike in table 4-16, the results indicate that low-paid workers in Core Cities also have a higher chance of progressing into higher-paid jobs compared to similar workers not living in cities, when differences in the strength of labour demand are controlled for. The effect of living in a Core City is less than half the size of the effect of living in London for both Model 3 and Model 4 and subject to a slightly greater degree of statistical uncertainty, yet the estimated effects for Models 3 and 5 are both significant at the 5% level. When local labour markets are defined as Local Authority Districts, workers in Core Cities have, on average, a 6 percentage-point higher likelihood of escaping low pay on a year-to-year basis than workers in non-urban labour markets. For workers in London, in comparison, the probability of

moving into higher pay is around 16 percentage points higher than for non-urban workers. The results from Model 5 suggest that when it comes to between-firm progression, the probability of escaping low pay is highest for workers living in the Core Cities, with low-paid workers in London no longer having a significantly higher likelihood of progression.

Table 4-18: Average marginal effects derived from random-effects probit on transitions from low pay at *t-1* to higher pay at *t* under threshold 1, local labour markets defined as LADs

	Model 1 (All transitions)	Model 2 (All transitions)	Model 3 (All transitions)	Model 4 (Within-Firm)	Model 5 (Between-firm)	Model 6 (Within-job)
Labour market size (LAD) reference category: Non-cities						
London	0.103***	0.122***	0.163***	0.160***	0.168	0.157***
	(0.021)	(0.021)	(0.032)	(0.032)	(0.110)	(0.033)
Core Cities	-0.000	0.037*	0.063**	0.055*	0.196**	0.048
	(0.020)	(0.022)	(0.028)	(0.029)	(0.092)	(0.029)
Smaller cities	-0.004	0.008	0.005	0.010	-0.029	0.006
	(0.012)	(0.013)	(0.015)	(0.015)	(0.054)	(0.015)
Labour market weakness (JSA claimant		-0.016***	-0.009*	-0.005	-0.054***	-0.004
proportion)		(0.004)	(0.005)	(0.005)	(0.018)	(0.005)
Controls	NO	NO	YES	YES	YES	YES
Log pseudolikelihood	-6436.34	-6428.10	-4150.75	-3827.19	-229.91	-3661.29
Observations	11,383	11,383	7,516	7,030	392	6,798

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers), except for Model 5 for which robust standard errors could not be computed due to small sample size.

The contrast between table 4-16 and table 4-18 indicates that the estimated effect of local labour market size and progression from low pay is to some extent sensitive to the way local labour markets are defined. The fact that the positive effect for Core Cities is stronger and more significant under the more geographically specific LAD definition suggests that for low-paid worker to benefit from the advantage offered by these large labour markets in terms of progression they need to live in close proximity to the cities in question. This does not appear to be as important for workers in London, on the other hand.

Alternative measure of labour market weakness

As discussed in section 4.3, the proxy used to control for the tightness (or weakness) of the local labour market is the JSA claimant count. But, as discussed in section 4.3, this may not be the best measure of labour market slack. It has been argued that claimant count data hides a substantial amount of hidden unemployment: including individuals who are out of work but not claiming unemployment benefits, as well as those who have diverted from unemployment benefits to incapacity benefits (Beatty, Fothergill and Gore, 2012). If differences in local labour market conditions are not adequately controlled for, this may result in biased results. An alternative measure of local labour market weakness is therefore used in the analysis below, based on estimates of the 'real' level of unemployment in local authority districts as developed by Beatty *et al.* (ibid.)[56].

As shown in table 4-19, using real unemployment levels as a measure of labour market slack, instead of JSA claimant proportions, does not change the results substantially. The positive effect found for living in a Core City on the probability of escaping low pay through the external labour market (Model 5) is no longer statistically significant, but the results for London remain more or less unchanged[57].

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[56] Details of the real level of unemployment and how it was used in the analysis can be found in appendix E.
[57] It is worth noting that although the real unemployment level is highly significantly correlated with transitions to higher pay in Model 2 (without controls), when controls are added in Model 3 it no longer is (p = 0.134). This is in contrast to the JSA claimant proportion which, as can be seen in table 12, remained significant at the 10% level.

Table 4-19: Average marginal effects derived from random-effects probit on probability of escaping low pay from t-1 to t under threshold 1, local labour markets defined as LADs, using real unemployment level as measure of labour market weakness

	Model 2 (All transitions)	Model 3 (All transitions)	Model 4 (Within-Firm)	Model 5 (Between-firm)	Model 6 (Within-job)
Labour market size (LAD) reference category: non-cities					
London	0.127***	0.166***	0.161***	0.191*	0.158***
	(0.022)	(0.032)	(0.033)	(0.110)	(0.034)
Core cities	0.022	0.054**	0.050*	0.141	0.043
	(0.021)	(0.027)	(0.027)	(0.091)	(0.028)
Smaller cities	0.005	0.003	0.009	-0.035	0.005
	(0.012)	(0.015)	(0.015)	(0.054)	(0.015)
Real unemployment rate	-0.007***	-0.003	-0.002	-0.022***	-0.002
	(0.002)	(0.002)	(0.002)	(0.008)	(0.002)
Controls	NO	YES	YES	YES	YES
Log pseudolikelihood	-6428.12	-4151.25	-3827.37	-230.51	-3661.37
Observations	11,383	7,516	7,030	392	6,798

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers), except for Model 5 for which robust standard errors could not be computed due to small sample size.

Labour market history

Existing studies of low pay dynamics point to a potentially important issue to be taken into account: whether a worker was low-paid, higher-paid or unemployed in previous periods affects their likelihood of being low-paid in the present (Stewart and Swaffield, 1999; Stewart, 2007; Cappellari and Jenkins, 2008). This suggests that the probability of moving out of low pay in a given year may be influenced by someone's employment status in the recent past. For instance, it is plausible that low-paid workers who had recently been unemployed before they entered low-paid employment have a lower chance of escaping low pay in the following year than low-paid workers who were in work the year prior to their initial observation in low pay. For this reason, workers' labour market and/or pay status at *t-2* was added as an additional control variable, to test whether the results were robust to potential differences in the recent labour market experiences of low-paid workers between different types of labour markets[58].

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[58] The estimated effect of workers' labour market status at may be affected by the 'initial conditions' problem discussed in chapter 3. When including labour market status at *t-2* as a variable in the model there are two

A second concern is the possibility that the positive effect on wage progression found for London and the Core Cities are in fact driven by differences in the more extended labour market history of low-paid workers in these areas compared to low-paid workers elsewhere. If previous experience of low pay, unemployment or inactivity can harm workers' chances of moving into higher pay (Stewart and Swaffield, 1999; Stewart, 2007; Cappellari and Jenkins, 2008), perhaps it is not just workers' recent labour market status, but also their experience of spells of unemployment or inactivity in the more distant past that have an effect on the probability they will move out of low pay. To account for this, separate models were estimated to control for, respectively, workers' labour market history prior to joining the Understanding Society sample, and their more recent labour market experience.

Labour market history prior to joining Understanding Society was controlled for in the form of two variables indicating the proportion of time that respondents spent a) in unemployment and b) out of the labour force in the period between leaving full-time education and their first Understanding Society interview. This was calculated on the basis of information provided in the employment history module of Understanding Society about all employment and non-employment spells experienced by respondents from the time they left full-time education to when they entered the sample. Due to the low response rates on the questions in this module the sample size was reduced substantially from around 7,500 observations to a little over 4,000. The inclusion of the two labour market history variables does not substantially alter the results in the TTWA specification (see table 4-20), with the marginal effect for London remaining significant at 15 percentage points. In the LAD specification the effect for London also remains virtually unchanged but the effect for Core Cities

reasons why this variable might be correlated with current pay status. First; being low-paid, unemployed or higher-paid at *t-2* may have a causal effect on a worker's likelihood of escaping low pay. Second: labour market status at *t-2* may be significantly related to transitions out of low pay because past labour market and pay status is correlated with unobserved attributes of workers that affect their likelihood to currently be low-paid. Assessing what proportion of the observed correlation between pay and work status at *t-2* and low pay probability at *t* is due to an actual effect of previous experience, and what proportion is due to unobserved heterogeneity, would be crucial if the object of this analysis was to measure the effect of workers' status in a previous period on their likelihood of being low-paid (as the studies concerned with the stepping-stone effect of low-paid work are). However, the purpose of the current research is not to find out the exact extent to which previous spells of low pay or unemployment inhibit low-paid workers' chances of progression, but to examine the relationship between workers' local labour market context and their likelihood of moving from low- to higher-paid employment while controlling for as many relevant variables as possible. Consequently, the aim was not to obtain unbiased coefficients on the variable indicating labour market status at *t-2*, but merely to add this as a control to account for potential differences in workers' recent labour market experience across different types of labour markets. If it turns out that this variable partly acts as a proxy for some of the unobserved heterogeneity of workers, this is therefore not too much of a problem. One could argue that this would in fact be a good thing as controlling for unobserved heterogeneity is generally considered to be desirable.

loses some of its statistical significance compared to the results in table 4-18, possibly due to the smaller sample size.

Table 4-20: Average marginal effects derived from random-effects probit on probability of escaping low pay from t-1 to t under threshold 1, controlling for labour market history

	Local labour markets defined as TTWAs		Local labour markets defined as LADs	
	Model 3 (All transitions)	Model 4 (Within-firm)	Model 3 (All transitions)	Model 4 (Within-firm)
Labour market size (TTWA) reference category: non-cities				
London	0.144***	0.136***	0.185***	0.181***
	(0.041)	(0.042)	(0.046)	(0.047)
Core Cities	0.045*	0.035	0.062*	0.052
	(0.027)	(0.027)	(0.037)	(0.038)
Smaller Cities	0.005	0.006	0.012	0.023
	(0.020)	(0.021)	(0.019)	(0.020)
Labour market weakness (JSA claimant proportion)	-0.010	-0.004	0.002	0.006
	(0.007)	(0.008)	(0.006)	(0.007)
Inactivity as proportion of labour market history	-0.135	-0.130	-0.147*	-0.151
	(0.082)	(0.090)	(0.084)	(0.092)
Unemployment as proportion of labour market history	-0.029	-0.044	-0.040	-0.049
	(0.042)	(0.044)	(0.042)	(0.044)
Controls	YES	YES	YES	YES
Log pseudolikelihood	-2322.47	-2156.89	-2308.41	-2144.31
Observations	4,281	4,019	4,263	4,006

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers). Unable to estimate Model 5 (between-firm transitions) due to insufficient observations.

To account for the fact that workers may also differ in terms of their labour market status immediately before being observed in low-paid employment at *t-1*, a further series of models were estimated including respondents' status at *t-2*. Workers could be in one of six states: higher-paid, low-paid, unemployed, inactive, self-employed or other. Inclusion of workers' labour market status reduces the marginal effects for London in both Models 3 and 4 compared to those in tables 4.16 and 4.18, but all effects remain statistically significant. The effect associated with living in a Core city under the LAD specification is no longer statistically significant when controlling for workers' status at *t-2*. Nonetheless, the inclusion of controls for the recent labour market experience of workers

does not qualitatively alter the results. Workers in London still appear to be significantly more likely to move out of low pay, with perhaps a smaller, marginally significant positive effect associated with a living in a Core City.

Table 4-21: Average marginal effects derived from random-effects probit on probability of escaping low pay from *t-1* to *t* under threshold 1, controlling for labour market status at t-2

	Local labour markets defined as TTWAs		Local labour markets defined as LADs	
	Model 3 (All transitions)	Model 4 (Within-firm)	Model 3 (All transitions)	Model 4 (Within-firm)
Labour market size reference category: Non-cities				
London	0.104***	0.089***	0.109***	0.100***
	(0.027)	(0.028)	(0.029)	(0.030)
Core Cities	0.032*	0.019	0.041	0.029
	(0.019)	(0.019)	(0.025)	(0.026)
Smaller cities	0.005	0.010	0.010	0.015
	(0.014)	(0.015)	(0.014)	(0.014)
Labour market weakness	-0.008	-0.003	-0.004	-0.000
(JSA claimant proportion)	(0.005)	(0.005)	(0.004)	(0.005)
status at *t-2* reference category: higher-paid				
Low-paid	-0.216***	-0.218***	-0.218***	-0.219***
	(0.016)	(0.017)	(0.016)	(0.017)
Unemployed	-0.147***	-0.144***	-0.145***	-0.147***
	(0.033)	(0.036)	(0.034)	(0.036)
Economically inactive	-0.133***	-0.132***	-0.132***	-0.129***
	(0.028)	(0.030)	(0.028)	(0.030)
Self-employed	-0.106*	-0.137**	-0.115**	-0.139**
	(0.055)	(0.058)	(0.054)	(0.058)
Other (incl. missing earnings)	-0.172***	-0.156***	-0.186***	-0.174***
	(0.051)	(0.052)	(0.041)	(0.042)
Controls	YES	YES	YES	YES
Log pseudolikelihood	-2787.14	-2476.61	-2800.12	-2487.33
Observations	5,202	4,725	5,226	4,752

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers).

Attrition bias

As discussed in the previous chapter, when dealing with panel data it is important to test whether results are affected by bias resulting from non-random attrition. Wooldridge (2010) suggests it is

possible to test for possible selection bias by including in the equation a lead selection indicator - a variable which indicates whether the respondent is present in the next wave – and test for the significance of this selection indicator. If this indicator is significantly correlated with the dependent variable, this suggests that attrition is endogenous. As a further test, one can include in the equation dummy variables indicating the number of waves an individual is observed in, and test the significance of these dummies.

However, when the dependent variable is a change in status between *t-1* and *t*, as it is here, neither of these two tests are able to determine the endogeneity or not of panel dropout that occurs between the initial observation of low pay at *t-1*, and *t*. A different approach is therefore needed. The most commonly used method in the literature to a) reliably identify whether attrition between *t-1* and *t* is endogenous and b) correct for this, is by estimating a model with endogenous sample selection, often called a Heckman selection model (Heckman, 1979). This approach is frequently employed by researchers to deal with a variety of endogenous selection mechanisms, but is used by Cappellari and Jenkins (2004) and Uhlendorff (2006) specifically to account for endogenous selection due to non-random attrition in a study of low pay transitions.

The method developed by Heckman involves two steps: in the first step, selection into the sample is modelled using a probit, and in the second step, the (transformed) predicted probabilities of selection are included as an additional explanatory variable in the primary, linear, model. Subsequent researchers, however, have tended to estimate both equations jointly using maximum likelihood or partial likelihood estimators (Stewart and Swaffield, 1999; Cappellari and Jenkins, 2004; Knabe and Plum, 2013), and this option was chosen here. As the main equation has a binary dependent variable the probit version of a heckman-style maximum likelihood estimator (the 'heckprobit' in Stata) was used.

The selection equation usually contains most of the variables present in the main equation, but should in addition include at least one variable that is exogenous with respect to the dependent variable in the main equation but predictive of selection. In this case, therefore, this variable needed to be correlated with the likelihood of panel retention (and response on earnings-related questions at *t*), but be uncorrelated with the likelihood of escaping low pay. Cappellari and Jenkins (ibid.) use a variable which indicates whether there was a change of interviewer between *t-1* and *t*, and the same instrument is used here. This variable was specified to take on a value of 0 if the interviewer that contacted the household in which the respondent lived at *t-1* was the same person that contacted

the respondent's household at t, and 1 if there was a change in interviewer between t-*1* and *t*. It is hypothesised that a change in interviewer would make it more likely that a household refused to participate in the study, or that the household could not be contacted due to the new interviewer being less familiar with the exact location of the address or the times at which the household members are likely to be in. Similarly, it was felt that interviewers not familiar with the household may find it more difficult to get respondents to provide information about their earnings. There are no plausible theoretical reasons why changes in interviewer would have an effect on the likelihood of progression out of low pay.

Through estimating the heckprobit models it is possible to test whether attrition and nonresponse were ignorable by examining the estimated correlation between the residuals in the primary equation and the residuals in the panel retention equation. The absence of such a correlation indicates that attrition is not significantly related to low pay escape probability, and means that a model of the latter can be consistently estimated without accounting for attrition, whereas a significant correlation between selection and the primary model indicates that non-random attrition needs to be corrected.

Probit models with sample selection were estimated for both the TTWA specification and the LAD specification, using changes in interviewers between *t-1* and *t* as an instrument in the selection equation, following Cappellari and Jenkins (2004, 2008). This approach is based on the recognition that when modelling transitions from low to higher pay, the dependent variable is only observed when a respondent who was low-paid at *t-1* also responded to the survey *and* provided earnings information at *t*. If Model 3 can be represented by the following equation:

$$P[y_{it} = 0 | y_{it-1} = 1] = \beta x_{it} + \theta z_{it} + u_{it}$$

Where the right-hand term represents the probability of individual i being higher-paid at time t given being low-paid at time *t-1*, the vector x_{it} contains the control variables specified in section 4.3.3, the vector z_{it} includes the four local labour market size dummies, and θ the corresponding coefficients, and u_{it}, represents the composite error term. Then out of the entire potential sample of workers in low pay at *t-1*, y_{it} is only observed when an hourly wage is recorded at *t*. This is assumed to be affected by the same variables that are included in model 3, as well as on whether there was a change in the interviewer who was allocated to the respondent's household between *t-1* and *t*. The equation governing selection into the sample can be represented as follows:

$$y_{it}^{select} = \beta x_{it} + \theta z_{it} + \sigma s_{it} + \mu_{it}$$

Where s_{it} is a dummy variable which takes on a value of 1 when there was a change in interviewer, and μ_{it} is a random error term. The correlation between the first equation and the second (selection) equation is represented by the term ρ.

$$corr(u_{it}, \mu_{it}) = \rho$$

If $\rho \neq 0$, estimation of the main model using a standard random-effects probit model will lead to biased results. By estimating, simultaneously, the selection equation and the main equation using maximum likelihood estimation, the correlation between the probability of selection and the probability of escaping low pay is accounted for and unbiased results are produced.

The results from the probit estimators with sample selection are presented in table 4-23 But first, to show that the instrument is indeed strongly related to the probability of being selected into the sample, table 4-22 shows the coefficients and p-values of the interviewer change variable in the selection equations from both heckprobit models (TTWA and LAD) on the full sample of low-paid workers at *t-1* (the equivalent of Model 3) [59]. It is clear that the instrument is highly statistically significant in both specifications. The coefficient is negative, meaning that in cases where there was a change in interviewer between *t-1* and *t*, respondents were less likely to be retained in the sample at *t*, as expected.

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[59] Estimating a probit model with selection for workers who remained with the same employer between *t-1* and *t* (the equivalent to Model 4), and for workers who changed employers between *t-1* and *t* (the equivalent to Model 5) was unfeasible as in this case selection into the main sample would depend not just on remaining in the sample from *t-1* to *t* but also on whether or not respondents remained with the same employer or changed employer. The selection equation would therefore have a very different interpretation, and would require the use of additional instruments to predict employer change.

Table 4-22: Coefficients from selection equation in heckprobit model with endogenous selection on full sample of workers in low pay at *t-1* (under threshold 1)

	Local labour markets defined as TTWAs Model 3 (All transitions)	Local labour markets defined as LADs Model 3 (All transitions)
Change in interviewer between *t-1* and *t*	-0.484***	-0.229***
	(0.037)	(0.062)
Labour market size		
reference category: Non-cities		
London	-0.026	-0.050
	(0.071)	(0.122)
Core Cities	-0.041	-0.019
	(0.053)	(0.115)
Smaller cities	-0.004	-0.145**
	(0.042)	(0.062)
Labour market weakness	-0.001	0.031
(JSA claimant proportion)	(0.015)	(0.019)
Controls	YES	YES
Log pseudolikelihood	-7727.20	-5520.01
Observations	8,987	7,936

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers).

Moving on to the main results, table 4-23 presents the average marginal effects for both the TTWA and LAD specifications for all workers in low pay at *t-1*. The uncorrected marginal effects shown earlier in tables 4-16 and 4-18 are included for comparison. The first thing to note is that the Wald tests for the estimated correlation between the selection equations and the main equations suggests that this correlation is highly statistically significant, with p-values below the 5% level in both cases. This confirms that selection into the sample, determined by attrition and non-response on earnings, is endogenous, and that the results from the uncorrected models discussed above are therefore subject to bias. The correlation between the selection and main equations (indicated by the coefficient ρ) is positive, meaning that panel retention is positively related to the probability of escaping low pay. As a result, the estimated probability of higher pay at *t* conditional on selection is higher (P = 0.30) than the unconditional probability (P = 0.27). Correcting for endogenous attrition reduces the estimated marginal effects of labour market size slightly in both specifications. However, the difference between the corrected and uncorrected effects is not very large, and all effects remain highly statistically significant, especially those for London. In summary, non-random attrition

in the sample increases the overall estimated likelihood of making a transition to higher pay, but does not have a substantial impact on the estimated likelihood of moving to higher pay in London versus the other local labour market size categories.

Table 4-23: Average marginal effects derived from Heckman selection probit estimator on probability of escaping low pay from t-1 to t (conditional on selection) for all workers in low pay at t-1 (under threshold 1)

	Local labour markets defined as TTWAs		Local labour markets defined as LADs	
	Model 3	Model 3 with attrition correction	Model 3	Model 3 with attrition correction
Labour market size				
reference category: Non-cities				
London	0.152***	0.128***	0.163***	0.143***
	(0.030)	(0.023)	(0.032)	(0.025)
Core cities	0.037*	0.036**	0.063**	0.057**
	(0.020)	-0.016	(0.028)	(0.022)
Smaller cities	-0.007	-0.004	0.005	0.008
	(0.016)	-0.012	(0.015)	-0.012
Labour market weakness	-0.012**	-0.010**	-0.009*	-0.008**
(JSA claimant proportion)	(0.006)	-0.005	(0.005)	(0.004)
ρ (coefficient of correlation between selection and main equations)		0.441		0.363
P-value of Wald test of independent equations (ρ = 0)		0.012		0.097
Controls	YES	YES	YES	YES
Log-pseudolikelihood	-3018.81	-7727.20	-4150.75	-5520.01
Observations (uncensored)	7,561	7561	7,516	7516

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers).

4.6 Results under occupational definition of low pay

As explained in the previous chapter, it is possible that the higher observed progression rates in London are the result of using a nationally-defined low pay threshold to categorise workers as low-paid and measure rates of progression. This is because this threshold is located at a lower point relative to the wage distribution for London-based workers than relative to the wage distributions of other local labour market areas, and because wages tend to grow faster the further one moves down the wage distribution, as shown in the previous chapter. To test whether the above results are

affected by this issue, we can check whether similar results are produced when measuring progression against local, rather than national, low pay thresholds. Defining low pay with reference to the same point in the wage distribution of each Travel-To-Work-Area means that workers in all TTWAs will be held against a similar standard when assessing whether they have progressed or not. In the analysis presented below (table 4-24) low pay is defined for each Travel-To-Work-Area as the 25th percentile of the local wage distribution[60], and year-to-year transitions of initially low-paid workers are calculated in a similar way as in table 4-6. The difference in results is striking. In contrast to the results presented in tables 4-6 and 4-7, the proportion of transitions to higher pay is very similar in London, the Core Cities and Smaller Cities, whereas it is low-paid workers in non-urban TTWAs workers who appear to be most likely to progress to higher-paid employment. London no longer seems to be associated with higher rates of progression out of low pay when low pay is defined in relation to the wage distribution of the local labour market.

Table 4-24: Year-to-year transitions for those in low pay at time *t-1* under low pay threshold 3 (%), pooled transitions, 2009-2014

	Higher-paid	Low-paid	Unemployed	Economically inactive	Self-employed	Total
TTWA size						
London	26.6	57.0	5.4	8.0	2.9	100
Core cities	25.7	60.0	6.0	7.1	1.3	100
Other cities	27.1	58.8	4.6	7.7	1.8	100
Non-cities	33.0	53.1	4.2	7.3	2.4	100

Source: Understanding Society, waves 1-5. N = 11,719. Weighted estimates. Difference between TTWA size categories statistically significant at 1% level (Pearson χ^2 = 70.6192, p < 0.001). Difference between Non-cities and other size categories significant at 1% level (p < 0.001).

As the 25th percentile of the local wage distribution is a somewhat arbitrary threshold, table 4-25 presents transition rates from low to higher pay under two alternative local thresholds: the 20th and 30th percentile of the local distribution of hourly pay.

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[60] As explained in section 3.3.1, the proportion of respondents defined as low-paid under threshold 3 tends to be slightly lower in smaller local labour markets due to the way the definition excludes workers whose hourly pay is exactly equal to the threshold. As a result, the incidence of low pay as defined under threshold 3 is slightly lower than 25 per cent in the Non-cities and Smaller cities categories. However, when low pay is defined as hourly pay *less than or equal to* the 25th percentile of the local wage distribution, resulting in the proportion of low-paid workers in smaller local labour markets being slightly higher than 25 per cent, the transition rates are very similar and workers in Non-cities are still most likely to escape low pay.

Table 4-25: Transition rate to higher pay at t, among workers in low pay at t-1 (%), low pay defined as less than 20th, 25th and 30th percentile of local distribution of hourly pay

	20th percentile	25th percentile	30th percentile
London	29.9	26.6	21.6
Core Cities	29.7	25.7	22.8
Smaller cities	33.3	27.1	23.5
Non-cities	38.6	33.0	28.6
N	9,236	11,719	14,192

Source: Understanding Society, waves 1-5. Weighted estimates.

The results shown in table 4-25 confirm once again that the position of the low pay threshold in relation to the local wage distribution is of crucial importance to the transition rate to higher pay that is observed. The lower the position of the low pay threshold in the local distribution of wages, the higher the resulting transition rate to higher pay. The second key finding is that, no matter which one of the three local low pay definitions is used, the highest progression rate to higher pay is never found in London, but instead in Non-cities. When low pay is defined in relation to the local, rather than the national, wage distribution, London no longer appears to be associated with a higher likelihood of escaping low pay.

This has clear implications for the results presented in sections 4.4 and 4.5. The nationally defined thresholds used in these sections in effect defined low pay according to a lower benchmark – relative to local wages – in London than in other Travel-To-Work-Areas. As a result, the models described in the previous sections increased the likelihood of respondents in London crossing the threshold and moving into higher pay. When low pay is defined with reference to the local distribution of wages, on the other hand, the measured rate of progression to higher pay is no higher in London than for workers living in smaller cities or non-urban labour markets.

But this finding, too, can be questioned theoretically. This is because defining low pay with reference to a fixed percentile of the local wage distribution does not take into account differences in the industrial and occupational composition of jobs between local labour markets. One reason why the wage distribution of non-urban labour markets differs from that of urban labour markets is because the mix of jobs is not the same as in urban areas, with one of the main differences being that the share of jobs in relatively low-paid occupations tends to be higher in non-urban labour markets. So when low pay is defined as the 25th percentile of the local wage distribution, this means that in urban labour markets the majority of workers in low-wage occupations are covered under the definition of low pay, whereas in non-urban labour markets a lower share of employees in low-paid

occupations are defined as low-paid. For instance, under this definition 63 per cent of workers in sales occupations in London are classified as low-paid, but only 54 per cent of workers in the same occupations living in Non-cities are defined as low-paid. It could be argued, therefore, that using a threshold equal to the 25th percentile of the local wage distribution still does not allow us to compare a similar group of workers in each local labour market.

Instead of relying on a wage threshold to define low paid workers, an alternative approach is therefore taken in the following section. This is to analyse wage progression for a sample of workers who are employed in the same set of low-paid occupations in each area. By defining low-paid workers in terms of their occupation allows for a comparison of wage progression among workers employed in similar jobs. To enable such a comparison, low-paid occupations were defined as three-digit SOC2000 occupational groups with a median hourly pay rate below two-thirds of the median hourly wage for all UK employees (calculated over the period 2009-2014, with wages adjusted to 2014 prices). This results in seven low-paid occupational groups: Elementary sales occupations; Elementary cleaning occupations; Elementary personal services occupations; Sales assistants and retail cashiers; Hairdressers and related occupations; Animal care services; and Food preparation trades (see table 4-26).

Table 4-26: Low-paid occupations used in section 4.6

Occupation	Median hourly pay over period 2009-2014 (2014 prices)
Elementary sales occupations	7.39
Elementary cleaning occupations	7.04
Elementary personal services occupations	6.42
Sales assistants and retail cashiers	7.08
Hairdressers and related occupations	6.5
Animal care services	6.77
Food preparation trades	7.59

Source: Understanding Society, waves 1-5

It is worth noting that, although the sample of workers in low-paid occupations is broadly similar to the sample of low-paid workers defined under threshold 1 with respect to gender balance, age, household composition and educational attainment, workers in low-paid occupations are somewhat more likely to work part-time than workers defined as low-paid based on a threshold of two-thirds of median hourly pay. Whereas 56 per cent of low-paid workers under threshold 1 work less than 35

hours per week, 66 per cent of workers in low-paid occupations do so. Since part-time working is negatively related to wage growth, the overall degree of wage progression among workers in low-paid occupations may be lower than among low-paid workers as defined under threshold 1.

The distribution of workers across these occupations is similar in each local labour market size category, with sales assistants and retail cashiers making up the largest group (39-45 per cent of workers), followed by workers in elementary personal service occupations (21-22 per cent of workers). Median hourly pay (in 2014 prices) for all workers in low-paid occupations was £7.00 over the period 2009-2014, but the median pay rate varies between local labour market size categories, from £7.75 in London to £6.77 in Core Cities.

Table 4-27 presents median rates of annual wage growth among employees who at *t-1* are working in low-paid occupations and who are still in paid employment at *t* (regardless of whether they are still in a low-paid occupation at *t*). Like in table 4-17, wages were adjusted for inflation using the Consumer Price Index. The estimates indicate that, while the median wage growth experienced by workers in low-paying occupations was negative in all local labour market size categories[61], those who live in London experienced the smallest average reduction in hourly pay, followed by workers in Non-cities and workers in Core Cities, with workers in Smaller Cities having the lowest rates of wage growth. None of the differences between the estimated values are, however, statistically significant. These results, in contrast to those in table 4-17, do not suggest that there is a significant wage growth premium associated with living in London (at least for those in low-paid occupations). This is an important difference from the results presented in sections 4.4. and 4.5, and shows how the use of two different measures of low pay progression result in very contrasting sets of findings.

Table 4-27: Average real wage growth among workers in low-paid occupations at *t-1* and still in paid employment at *t*, by labour market size category

TTWA size	Median annual growth in log hourly wage† (%)	S.E.	95% conf. interval		N
London	-0.33	1.06	-2.41	1.75	800
Core Cities	-0.70	0.48	-1.65	0.25	1117
Smaller Cities	-0.86	0.37	-1.59	-0.14	2251
Non-cities	-0.60	0.37	-1.33	0.13	1446

Source: Understanding Society, waves 1-5. N = 5,614. Weighted estimates. †Wages adjusted to 2014 prices. Wage growth winsorised at 1%.

[61] This was a period of falling real wages across the wage distribution, which may explain this finding (Costa and Machin, 2017).

Similarly, when estimating the effect of local labour market size on growth in log hourly wages from *t-1* to *t* experienced by workers in low-paid occupations in a random-effects regression, the results indicate that living in London has no significant effect on wage growth either for workers who remain with the same employer or workers who switch firms (see table 4-28). In fact, once worker and job characteristics are controlled for[62], the wage growth experienced by low-paid workers in urban areas does not appear to differ from non-urban areas, whether workers live in smaller cities, Core Cities or in London. One thing to note is that the sample size used to estimate Model 5 is very small, which might be a reason why no significant effects are found for the local labour market variables, given that the effect sizes are likely to be small and the wage data is relatively imprecise. This is likely to be less of a problem for Models 3 and 4 but nonetheless even here the coefficients for the local labour market size dummies do not show up as statistically different from zero. Defining local labour markets as Local Authority Districts does not change this finding, nor does controlling for labour market status at *t-2* or labour market history prior to joining the sample.

Table 4-28: Regression coefficients random-effects estimator on growth in real hourly pay from *t-1* to *t* for workers in low-paid occupations at *t*

	Model 1 (All transitions)	Model 2 (All transitions)	Model 3 (All transitions)	Model 4 (Within-Firm)	Model 5† (Between-firm)	Model 6 (Within-job)
Labour market size (TTWA)$_{t-1}$ reference category: Non-cities						
London	6.485***	7.349***	-0.613	-0.688	3.073	-0.743
	(2.089)	(2.085)	(2.513)	(2.249)	(16.170)	(2.273)
Core Cities	1.977	3.750**	0.517	1.503	2.023	1.192
	(1.626)	(1.654)	(1.839)	(1.762)	(14.387)	(1.732)
Smaller cities	0.364	0.756	-0.680	0.171	3.994	-0.204
	(1.367)	(1.359)	(1.492)	(1.379)	(10.439)	(1.390)
Labour market weakness (JSA claimant proportion)		-1.602***	-0.548	-0.169	-4.957	-0.278
		(0.454)	(0.508)	(0.482)	(4.229)	(0.491)
Controls	NO	NO	YES	YES	YES	YES
R² (overall)	0.002	0.004	0.029	0.025	0.071	0.026
Observations	5,614	5,614	4,293	4,012	407	3,897

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. †Union and occupation dummy variables omitted from controls due to insufficient observations. Cluster robust standard errors in parentheses (clustered on workers), except for Model 5 for which robust standard errors could not be computed due to small

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[62] The same set of control variables as used in tables 4-16 to 4-21 are included in the estimation of the results presented in tables 4-28, 4-29 and appendix F, but the 1-digit occupational group dummy variables are replaced with 3-digit occupational groups.

sample size. Wage growth winsorized at 1st and 99th percentiles. The reason for the significant positive effects for London in models 1 and 2, in contrast to the results in table 4-27, is the omission of weights from the estimation.

A further consideration is the impact of increases in the minimum wage on wage growth. Respondents with hourly pay below, at, or just above the minimum wage rate may receive a boost to wage growth when the minimum wage is uprated each year, and, crucially, the proportion of workers with wages close to the minimum wage varies between local labour market size categories. Therefore, the local proportion of low-paid occupation workers with earnings below the applicable minimum wage rate at *t* (based on the age of the worker and the year) was added as a control. This should control for the fact that areas with a larger share of workers on an hourly rate close to the minimum wage will to experience a greater impact of minimum wage hikes. Following Phimister *et al.* (2006), year dummies are also adjusted to coincide with minimum wage changes, covering the period from the 1st of October of each year until the 30th of September of the following year instead of the calendar year.

Table 4-29: Regression coefficients random-effects estimator on growth in (log) real hourly pay from *t-1* to *t* for workers in low-paid occupations at *t*, controlling for effect of minimum wage increases

	Model 3 (All transitions)	Model 4 (Within-Firm)	Model 5 (Between-firm)	Model 6 (Within-job)
Labour market size (TTWA)				
reference category: Non-cities				
London	-0.082	-0.091	0.341	-0.146
	(2.541)	(2.259)	(13.603)	(2.292)
Core Cities	0.098	1.123	-5.000	0.805
	(1.849)	(1.768)	(11.839)	(1.737)
Smaller cities	-0.730	0.149	-2.252	-0.217
	(1.489)	(1.371)	(8.787)	(1.384)
Labour market weakness	-0.530	-0.199	-4.658	-0.305
(JSA claimant proportion)	(0.522)	(0.497)	(3.581)	(0.505)
% local workers earning < min. wage$_{t-1}$	0.135*	0.136**	-0.065	0.136*
	(0.076)	(0.069)	(0.516)	(0.070)
Controls	YES	YES	YES	YES
R² (overall)	0.029	0.026	0.096	0.027
Observations	4,293	4,021	467	3,897

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Robust standard errors in parentheses. Robust standard errors could not be computed for Model 6 due to small sample size, so reported standard errors are non-robust. Wage growth winsorized at 1st and 99th percentile. †Union variable and optimism variable left out of controls as low response rates on these variables would result in insufficient observations for model to be estimated.

As can be seen in table 4-29, the share of workers in the TTWA earning less than the NMW rate at *t* is predictive of higher wage growth, as predicted. Including this additional control also has some impact on the estimated labour market size effects: the effects for London are somewhat less negative in this specification relative to those reported in table 4-28. The Core City coefficient is positive; however, all effects remain statistically insignificant. This means that even when controlling for the effect of minimum wage rises on wage growth, we cannot conclude that workers in low-paid occupations see higher wage growth in cities of any size compared to in Non-city labour markets.

The last aspect to account for is the potential long-term effect of previous city experience on wage growth. There is evidence that previous experience of working in a city could increase wage growth

even when a worker has relocated to a non-city area (D'Costa and Overman, 2014). If the *Non-cities* category contains workers who have previous city experience this may therefore inflate the estimated average wage growth of workers in this category. To isolate the effect of current labour market size on wage growth from the effect of previous city experience, ideally workers who currently live in cities should be compared to those who have never lived in a city. Due to the limited time span covered by the data it is it is not possible to determine the entire adult residential history for all but the very youngest workers. But the data do include the month and year when respondents moved to their current address, meaning it is possible to identify workers who have lived at their current address for at least a certain number of years. Although this is an arbitrary cut-off, it was decided that workers who live in a non-city and have lived there for ten years or more can be classed as 'permanent non-city dwellers'[63]. When these permanent non-city dwellers are taken as the reference category instead of all workers who currently live in non-urban labour markets[64], the results are very similar to those in table 4-29 with no significant difference in wage growth between workers in Non-cities and any of the other size categories (see appendix F). This suggests that either previous city experience has only a limited effect on the wage growth of workers in low-paid occupations, or that the number of non-urban workers who have previously lived in a city is low enough not to exert a large influence on the estimated effects (see section 4.5.1) Either way, the results in appendix F confirm the robustness of the findings presented in tables 4-28 and 4-29.

The results in the above section contrast with the results presented in sections 4.4 and 4.5. Although tables 4-16 through to 4-23 indicated that low-paid workers in London were more likely to make a transition into higher pay – which appears to be consistent with the idea that workers in cities learn faster and/or find it easier to achieve a more productive job match in cities – from the results presented in tables 4-27 and 4-28 it appears that this positive effect associated with living in London might not in fact be attributable to knowledge spillovers or more optimal worker-firm matching after all. Instead the higher rates of progression and wage growth found for workers in London in the earlier sections of this chapter are probably more accurately seen as the result of using a lower yardstick – relative to the local wage distribution – to measure progression among workers in London than workers living in smaller local labour markets. This issue is addressed by defining the

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[63] Because of course it is certain that workers who currently live in a non-city and have not moved for at least ten years have lived in a non-city throughout this ten year period. Unfortunately though the data do now allow me to identify *all* workers who have lived in a non-city for ten years or more, as it is possible that some workers moved to a different address while staying in a non-city.

[64] If workers have left full-time education less than ten years before the interview date and have lived in a non-city since they left full-time education, they are also included in the category of permanent non-city dwellers.

sample as all employees working in low-paid occupations, an approach which, unlike the use of a national low pay threshold, is not sensitive to geographic wage variations. Under this definition, the evidence suggests that low-paid workers are no more likely to experience faster wage progression in London, or indeed in cities of any size, than in non-urban labour markets. The implications of this are returned to subsequently.

4.6.1 Analysis by gender and age

The above models were all estimated on the entire sample of workers who were low-paid at *t-1*. However, previous studies have indicated that the benefits of living in a city may be more pronounced for younger workers (Wheeler, 2006; D'Costa and Overman, 2014). As the effect of living in a large urban labour market versus a rural one may also be different for men and women (Phimister, Theodossiou and Upward, 2006), a version of the last model estimated in the previous section (Model 3 with NMW controls) was estimated in which the effect of local labour market size was allowed to vary by age and gender through using interaction terms.

Marginal effects at representative values (MERs) were calculated based on this model at specific values for age and gender. MERs are a way to compute the marginal effect of an explanatory variable while setting one or more of the other independent variables in the model at a particular value (Williams 2012). They therefore provide an estimate of how the effect of the explanatory variable varies between types of workers (in this case, men and women of different ages). The figures in table 4-30 should therefore be interpreted as the marginal effect associated with living in London, in a Core City, and in a Smaller City if each worker in the sample is treated as being, in the case of the first column, 20 years old and male, or in the case of the last column, 50 years old and female. The MERs are 'average' MERs, meaning that the marginal effects were calculated for each observation in the sample (while artificially setting the values of age and gender to each of the specified combinations but leaving all other variables at the values specified in the dataset) and then averaged to arrive at the figures presented in table 4-30. The first finding is that the wage growth premium associated with living in a city (of any size) is more positive for women than for men. In fact, for male workers living in a city tends to exert a negative effect on wage growth. But none of the marginal effects are statistically significant, apart from the marginal effect associated with living in London for men aged 50 (which is significant at the 10% level only). This result is confirmed when separate models are estimated for men and women: for women all three city size coefficients are

positive, while for men they are negative, but again none of the effects are statistically significant. There is therefore some indication that the urban escalator effect may operate quite differently for male and female workers, but further analysis, potentially using different data, would be required to investigate this further.

Table 4-30: Marginal effects random-effects estimator on growth in (log) real hourly pay from *t-1* to *t* for workers in low-paid occupations at *t* (all transitions), for men and women at ages 20 35 and 50

	Men			Women		
	aged 20	aged 35	aged 50	aged 20	aged 35	aged 50
Labour market size (TTWA)						
reference category: Non-cities						
London	1.574	-3.839	-9.251*	9.248	3.835	-1.577
	(6.045)	(4.353)	(4.974)	(6.255)	(3.697)	(3.403)
Core Cities	-4.690	-5.277	-5.864	2.974	2.387	1.801
	(4.802)	(3.654)	(3.957)	(4.477)	(2.599)	(2.340)
Smaller cities	-0.092	-1.717	-3.342	2.081	0.456	-1.170
	(4.399)	(3.450)	(3.561)	(3.643)	(2.019)	(1.764)
Controls (incl. minimum wage)	YES	YES	YES	YES	YES	YES

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers). Wage growth winsorized at 1st and 99th percentiles. N = 4293, R^2 (overall) = 0.0305.

4.7   Summary and conclusion

This chapter began by reviewing literature suggesting workers tend to experience faster wage growth in cities, fuelled by knowledge spillovers through frequent interactions with other workers and more efficient job matching due to greater labour market density (Wheeler, 2006; Yankow, 2006; D'Costa and Overman, 2014). Drawing on these findings, it aimed to assess whether local labour market size has a positive effect on the wage progression experienced by low-paid workers.

In the first half of the chapter evidence is presented which suggests that low-paid workers living in London are more likely to progress into higher pay. This is consistent with previous research regarding the wage growth premium experienced by urban workers, although the positive effect on wage progression appears to be mostly confined to London rather than applying to cities of all sizes. Under both threshold 1 (two-thirds of national median hourly pay) and threshold 2 (10 per cent above the minimum wage), those in low pay at *t-1* were found to transition into higher pay at a

higher rate in London than in Core Cities, Smaller cities and Non-cities. Regression results indicate that, even when controlling for the local level of unemployment and individual and workplace characteristics, low-paid workers in London are between 10 and 15 percentage points more likely to move into higher pay from one year to the next year than those not living in cities. This finding is robust to using an alternative definition of local labour markets (Local Authority Districts), using an alternative measure of unemployment (the real level of unemployment as estimated by Beatty *et al.* (2012)), controlling for labour market history and labour market status at *t-2*, and correcting for endogenous attrition.

The findings in sections 4.4 and 4.5 therefore suggest that, when low pay is defined nationally, low-paid workers in London have a markedly higher chance of progressing into higher-paid jobs than those living in small, non-urban labour markets. This appears to be true both for workers who remain with the same employer, consistent with the notion that low-paid workers learn faster in cities, and for workers who change employer, consistent with the efficient worker-job matching hypothesis.

There is also some evidence that living in a Core City is associated with a positive effect on progression, although this effect is smaller than that for London and only present when local labour markets are defined as Local Authority Districts. This hints at the importance of the geographic scale of the local labour market measure that is used, given the more limited commuting distances of low-paid workers.

The results presented in sections 4.4 and 4.5 are largely consistent with Phimister *et al.* (2006), the only previous study of low pay progression in cities, which uncovers evidence that low pay spells tend to be shorter in urban areas and more likely to result in a transition to higher pay. Like the first half of this chapter, this study uses on a common wage threshold for both urban and non-urban workers to measure transitions to higher pay[65]. These findings are also consistent with the idea that London acts as an 'escalator' region for workers, including those in low-paid jobs (Fielding, 1992; Gordon, Champion and Coombes, 2015).

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[65] The authors do mention they performed the same analysis with separate thresholds for urban and rural areas as a robustness check but the relevant results are not reported and the authors do not clearly state whether an urban-rural difference is found using separate thresholds.

However, given variations in wage levels between the local labour market size categories, it can be questioned whether using a national low pay threshold is the best way to measure wage progression across local labour markets of different sizes. Since average wages are substantially higher in London than in Core Cities, Smaller cities and Non-cities, a national low pay threshold captures a smaller proportion of the local wage distribution in London than in the remaining three categories. The evidence indicates that the way the low pay threshold is positioned in relation to the local wage distribution has a significant impact on the measured transition rate from low to higher pay: the lower the threshold, the higher the transition rate.

In light of this, in section 4.6 low-paid workers were defined as workers employed in one of seven low-paid occupations. Defining the sample based on the same set of low-paid occupations in each local labour market area avoids the issues associated with using a low pay threshold that is insensitive to geographic variations in pay, as the wages associated with these occupations should adjust according to differences in local wage levels more generally and thus allow for a more meaningful comparison[66]. When defining the sample as workers in low-wage occupations, no evidence of an urban wage growth premium for low-paid workers is found. This is the case when examining wage growth across all workers, when focusing on within-firm wage growth only, or when examining wage growth among workers who change employers (although in this last case small sample sizes may have prevented the detection of statistically significant effects). Neither the notion that cities may enable low-paid workers to accumulate human capital faster, nor the idea that dense urban labour markets make it easier for such workers to find better job matches, are therefore supported by this part of the analysis.

Given these contrasting sets of results, what can we say about the effect of local labour market size on wage progression among low-paid workers? More specifically, is there any evidence that low-paid workers in British cities benefit from faster human capital accumulation and/or more efficient worker-firm matching? Weighing the findings of sections 4.4 and 4.5 against those of section 4.6, there is limited evidence to support the idea that low-paid workers benefit significantly from either of these two potentially wage growth-boosting mechanisms. The initial finding of a higher likelihood of escaping low pay for workers in London appears to largely be the product of using a wage threshold that is insensitive to spatial differences in wage levels. For this reason, the results

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[66] To the extent that geographic differences in the typical pay associated with low-paid occupations reflect, at least in part, differences in the cost of living, this approach is arguably also a better way to take geographic variations in living costs into account.

presented in section 4.6 based on the occupational definition of low-paid work are likely to be more robust than the national pay threshold-based results in section 4.5.

Of course this occupation-based definition is not without limitations either. Despite defining the occupation groups at the most detailed level possible it is possible that there are subtle differences between local labour marker size categories in the composition of workers *within* occupational groups, meaning that this definition still may not allow for an exact like-for-like comparison of workers. Yet these subtle compositional differences are likely to be a less serious problem than the sizable differences in the relative position of low-paid workers in the local wage distribution that are evident under the two national low pay thresholds. It is therefore argued that the results presented in section 4.6 are a more accurate indicator of the true effect of local labour market size on the wage growth of low-wage workers. This section finds no evidence that either the learning effect or the matching effect said to characterise urban labour markets increase wage growth for those in low-paid occupations.

These findings are in contrast to previous findings supporting the notions that living in a city enhances human capital accumulation and enables more efficient job matching (Wheeler, 2006; Yankow, 2006; De la Roca and Puga, 2012; D'Costa and Overman, 2014). Of course the findings in this chapter relate to a different time period to that analysed in previous studies; a time period in which, notably, average weekly earnings fell in real terms (ONS, 2017). In this respect questions could be raised about the representativeness of the findings to periods with stronger (aggregate) wage growth. But even if typical rates of real wage growth were lower during the years from 2009 to 2014, there is little reason to suspect that anything fundamental changed about the geography of wage growth in the UK during this period.

Therefore, the fact that for low-paid workers working in a large urban labour market does not seem to have a positive effect on wage growth suggests that these two mechanisms are perhaps mainly applicable to those in higher-paid occupations, while being much less relevant for those in low-paid jobs. The strongest evidence for this finding is regarding the 'learning-in-cities' effect, as the results do not indicate any significant evidence of faster within-firm wage growth for workers in low-paid occupations.

There are a number of reasons why this may be the case. Firstly, it seems likely that in most low-paid occupations the opportunities for developing human capital are relatively limited, even in cities.

Moreover, the types of skills that are important in low-paid occupations may not be the skills that are most enhanced by frequent interactions with other workers in dense urban areas. As argued by Bacolod *et al.* (2009), the knowledge that is passed along through such interactions is likely to be of a more cognitive kind, which is why those working in occupations involving cognitive skills (such as engineers, lawyers and scientists) are the ones who tend to benefit most from living in a city. This is consistent with findings by Glaeser and Resseger's (2010) that suggest agglomeration effects are stronger in cities with larger proportions of higher-skilled workers. Since the cognitive skill content of the seven low-paid occupations considered in this chapter is likely to be relatively limited, this explains why there is little evidence that workers in these occupations benefit from faster human capital accumulation in cities.

Secondly, even if it were true that workers in low-paid occupations acquire skills and knowledge more quickly in dense urban labour markets, for this to translate into substantial earnings growth is likely to require workers to at some point move into higher-paid job roles, since the scope for pay rises *within* the same position is probably fairly limited in most low-paid jobs. An obstacle to this may be that the majority of workers in low-paid occupations are employed in the retail and wholesale industry or the accommodation and food service industry (almost 70 per cent of workers in the sample). These sectors are characterised by relatively flat organisational structures dominated by low-paid, low-skilled job roles, resulting in a relative paucity of internal progression opportunities (Dutton *et al.*, 2008; Lloyd *et al.*, 2008; Whysall, Foster and Harris, 2009). Since it is unlikely that these organisational structures are much more conducive to upward job mobility in cities than in non-city areas, this may be another reason why this chapter found little evidence for a city size effect on wage growth.

The evidence regarding the existence or not of an urban job-matching effect for workers in low-paid occupations is less conclusive due to the small sample of workers observed moving between employers. Given this small sample size and relatively imprecise earnings data[67], the positive effect of living in a city on between-firm wage growth would have to be substantial to show up as

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[67] As explained, the hourly pay variable is based on respondents' weekly pay and usual hours worked per week, both provided by respondents and therefore potentially subject to overstatement or understatement. As a result, the wage variable is likely to suffer from some degree of measurement error, reducing the precision of the estimated wage growth experienced by workers, and possibly making it harder to detect any real city size wage growth effects that may exist. Conducting a similar analysis but with more reliable wage data, perhaps based on tax or other National Insurance records (such as in the Annual Survey of Hours and Earnings), would therefore be valuable.

statistically significant in the estimations. That no significant effect could be detected for higher between-firm wage growth in tables 4-28 and 4-29, despite a positive coefficient on the *London* variable, therefore does not necessarily mean that low-paid workers in large cities do not benefit from faster wage growth when switching employer. However, as it stands the analysis presented in section 4.6 does not provide sufficient evidence to conclude that living in a city has an effect on between-firm wage growth for those starting off in low-paid occupations.

Importance of low pay measure

An important methodological contribution of this chapter is the demonstration of the way in which adopting a national low pay threshold impacts on measured rates of mobility out of low pay across local areas. In areas with higher relative wage levels, such an approach results in higher transition rates from low to higher pay, whereas in areas with lower average wage levels the opposite will be the case. However, this doesn't necessarily compare workers on a like-for-like basis, since workers in the same (low-paid) occupations tend to receive higher wages in some areas than others. Moreover, workers living in high-wage areas will be crossing a low pay threshold that is positioned much lower in the local wage distribution compared to other areas. This means that calculating low pay mobility rates in this way doesn't necessarily measure the *same type* of progression across places. Researchers incorporating regional or local analysis of low pay dynamics (e.g. Cappellari and Jenkins 2008; D'Arcy and Hurrell 2014; Kumar *et al.* 2014) would benefit from considering carefully what they intend to measure when using a particular low pay threshold to calculate transition rates.

Implications for policy

The findings presented in figure 4-2 and table 4-25 suggest that there may be tendency for wages to increase faster at the lowest end of the local wage distribution. While part of this is likely to be the result of measurement error, the existence of such an effect is plausible, since for workers earning close to the local minimum wage rate, arguably the only way is up. If this finding is correct, low-paid workers in more economically prosperous areas may be more likely to cross a nationally-defined wage threshold than low-paid workers in less prosperous areas, simply because such workers are positioned further down the local distribution of wages. This may seem like an unremarkable finding but it is something that warrants consideration from a policy perspective as it has consequences for the design of Universal Credit. This new combined UK working-age benefit will place a requirement on claimants earning below the equivalent of full-time hours at the national minimum wage to take

steps to increase their earnings. By using a common earnings threshold to determine which workers are subject to this in-work conditionality, this policy may (seem to) be more effective at increasing earnings in high-wage areas of the country purely because the workers selected into the programme will have lower wages relative to the local pay distribution than workers in lower-wage areas[68].

The main finding of this chapter – that workers in low-paid occupations do not appear to benefit from living in cities when it comes to wage progression – provides an important caveat to the current focus on enhancing agglomeration economies. In the UK and elsewhere, the concentration of economic activity in growing urban centres has been touted as a driver of local and regional development (Pike, Rodríguez-Pose and Tomaney, 2017). While agglomeration may bring benefits in terms of higher productivity and economic growth (Rosenthal and Strange, 2004; Melo, Graham and Noland, 2009), the results presented here indicate that this doesn't necessarily translate into better outcomes for all workers, especially those on the lower end of the wage spectrum. Although it has been pointed out by others that the wage-enhancing qualities of cities may apply to a greater extent to higher-skilled workers (Bacolod, Blum and Strange, 2009; Glaeser and Resseger, 2010; De la Roca and Puga, 2012), based on the analysis in this chapter there is little evidence that for those in low-paid jobs living in a larger labour market brings any discernible advantage when it comes to wage progression.

Far from being an issue only for rural areas and smaller towns, achieving genuine wage progression appears to be difficult for low-paid workers regardless of where they live. The fact that even London – not only the largest but one of the most highly-performing local economies of the UK in terms of output growth[69] – is not associated with noticeably higher wage growth for workers in low-paid occupations speaks to the disconnect between economic growth and outcomes for those at the lower end of the wage distribution (Lee and Sissons, 2016; Inclusive Growth Commission, 2017). This suggests that rather than spatial inequalities in labour market performance or a lack of opportunities in the local job market, other barriers are most important in preventing low-paid workers from improving their earning position. These barriers are likely to include demand-side obstacles to progression, such as employer-practices related to staff development and promotion, but also skills mismatches and a lack of knowledge, confidence and/or motivation on the part of low-paid workers when it comes to pursuing career advancement (D'Arcy and Hurrell, 2014; Kumar, Rotik and Ussher,

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[68] Of course this point applies only to improvements in hourly pay rates, and not to increases in hours worked, which is likely to be an important way for many Universal Credit claimants to boost their earnings.
[69] Between 2009 and 2013, gross value added (GVA) per head increased by 13.2 per cent in London (Inner London and Outer London combined), higher than all but four NUTS2 areas (ONS, 2014b).

2014). Initiatives such as workforce development programmes within low-wage sectors, career advice and skills provision (A. Green *et al.*, 2016) should therefore be beneficial for low-paid workers across all local labour markets.

Chapter 5 Job polarisation and progression from low-paid work

5.1   Introduction

Having analysed the effect of local labour market size on wage progression for low-paid workers in chapter 4 and concluded that living in a large city versus a smaller, non-city has little effect on the wage growth experienced by workers in low wage jobs, this chapter moves on to focus on the impact of the occupational structure of local labour markets on pay progression for low-paid workers. This focus is motivated by the fact that, over the last few decades, employment growth in the UK has predominantly been in occupations at the top as well as at the bottom of the wage distribution, while employment in middle-wage occupations has fallen (Goos and Manning, 2007; Holmes, 2010; Goos, Manning and Salomons, 2014). As a result of this process, employment has become increasingly concentrated in relatively low-paid occupations and relatively high-paid occupations, a trend referred to as job polarisation.

The continuing evidence of the 'hollowing out' of the labour market due to the decline in routine occupations has led some commentators to raise concerns about the implications for the career mobility of low-paid workers. It has been suggested that a fall in the number of intermediate jobs may make upward mobility more difficult for those in low-waged jobs (Crawford *et al.*, 2011; McIntosh, 2013; Clayton, Williams and Howell, 2014; Eurofound, 2017). There are, however, few studies which have analysed the relationship between the polarisation of jobs and occupational or wage mobility, and of those that do (Autor and Dorn, 2009; Cortes, 2012; Holmes and Tholen, 2013; Fedorets *et al.*, 2014; Eurofound, 2017) few explicitly address the progression of low-paid workers (exceptions are Holmes and Tholen, 2013; and Eurofound, 2017, which do address this question, although it is not the main focus of investigation). This chapter addresses this gap by first considering the extent to which workers in England and Wales employed in low-paid occupations tend to progress by moving into routine occupations located around the middle of the wage distribution. It is shown that the majority of upwardly mobile workers starting off in low-paid occupations move into non-routine higher-paid occupations, although routine occupations do provide a pathway towards career progression for a substantial minority of workers. After estimating the amount of mobility from low-paid to intermediate routine occupations, the second half of the chapter assesses whether this progression is negatively affected by job polarisation. It does so by exploiting the fact that local labour markets vary in the extent to which their occupational structure is skewed towards high- and low-paying occupations versus intermediate occupations (Jones and Green, 2009; Lee, Sissons and Jones, 2015). If polarisation has a negative impact on the occupational

progression of workers, it is likely that those living in labour markets where polarisation is more pronounced would have be more strongly affected. By comparing rates of progression across local labour markets subject to varying degrees of polarisation, this chapter assesses whether living and working in an area characterised by a highly polarised (and polarising) labour market affects the ability of low-paid workers to move up the occupational ladder and contributes to wider debates about the nature and implications of labour market polarisation.

5.2   Summary of the literature

As discussed in chapter 2, various authors have suggested that a decline in the employment share of intermediate occupations could have negative consequences for the career progression of low-skilled workers. However, little evidence exists about the effect of the polarisation of the occupational structure on upward mobility from low-skilled occupations. There is some evidence that upward mobility from low-paid occupations declined between the early 1990s and the early 2000s (Bukodi and Dex, 2009), although the reasons for this are not clear. On the other hand, a recent study found that across most European countries, including the UK, declining employment in intermediate occupations was accounted for mostly by workers being displaced from these middle-wage jobs, rather than by a decrease in the rate at which workers move from low-wage workers into middle-wage jobs (Eurofound, 2017). Holmes and Tholen (2013) equally found no clear evidence that declining employment in routine-intense intermediate occupations has led to a reduction in the upward occupational mobility of workers in low-paid service occupations.

The aim of this chapter is to investigate this issue more fully, using a methodology which differs from the approaches used in the studies discussed above, namely, by estimating the effect of local differences in job polarisation on transitions from low-paid to higher-paid occupations. To provide a useful context for this investigation, the first stage of the empirical analysis for this chapter consists of analysis of the occupational mobility of low-paid workers using data from the British Household Panel Survey. The aim of this analysis is to assess the degree of movement from low-paid occupations to the intermediate routine occupations which have been subject to technology-driven decline, relative to mobility into other higher-paid occupations. This also allows for an assessment of whether mobility from low-paid into routine occupations has decreased over the past few decades, and some evidence is presented to suggest that this has been the case. Although these findings are somewhat tentative, they suggest that, as the employment share of routine occupations fell between the early 1990s and the late 2010s, fewer low-paid workers moved into these occupations.

5.3   Local labour markets and the geography of polarisation

Of course, observing a decrease in mobility from low-paid into routine occupations alongside a decline in routine occupations does not provide sufficient evidence to draw firm conclusions about the extent to which this type of mobility has been affected by job polarisation. The second stage of the analysis (section 5.6.2) therefore assesses the extent to which degree of job polarisation varies across local labour markets, in order that these local variations in job polarisation can be exploited in the third stage of the analysis (section 5.6.3) to estimate the effect of the local degree of polarisation on occupational mobility. The focus on local labour markets is not only a practical way to gain more insight into the effect of job polarisation on occupational progression but is also theoretically appropriate given the fact that labour markets are decidedly local in nature. Workers – especially those in low-skilled, low-waged jobs – tend to look for opportunities for progression in their local area, and so will be affected mostly by the occupational structure of their local, rather than the national, labour market. And practically, analysing job polarisation and occupational progression from a local perspective also provides useful insights for local policymakers, given that research has shown that local labour markets are affected by polarisation to different degrees.

Specifically, the literature suggest that the degree of polarisation in a region or local area is related to the initial share of employment in routine-intensive occupations (related to its industrial specialisation), and the degree of urbanisation of the area. Evidence from the US and West Germany suggests that local labour markets with a larger initial share of workers in routine-intensive jobs saw greater falls in the employment share of routine occupations between 1980 and the mid-2000s (D. Autor and Dorn, 2013; Senftleben-König and Wielandt, 2014). In both countries, regions with higher than average concentrations of routine occupations in the late 1970s consisted of industrial strongholds with large manufacturing sectors (such as Detroit and Newark in the US and Wolfsburg and Wuppertal in Germany), as well as knowledge-intensive areas specialising in clerical and administrative support functions (such as New York, Chicago or San Francisco in the US and Düsseldorf and Cologne in Germany) (D. Autor and Dorn, 2013; Senftleben-König and Wielandt, 2014; Autor, Dorn and Hanson, 2015).

The literature furthermore suggests there may be complementarities between urbanisation, (high-level) skills, and job polarisation. Firstly, urban areas have tended to see a stronger growth in high-skilled employment, likely to be driven, at least in part, by agglomeration externalities which disproportionally increase the productivity of skilled workers (Glaeser and Resseger, 2010). Secondly, the adoption of routine-biased technologies is argued to be driven by the initial skill level

in the local labour market. Beaudry (2010) suggests that areas with a greater initial supply of college-educated workers will see a greater increase in comparative advantage from the adoption of new technologies, leading to faster take-up. He presents evidence from US regions to support this contention. Third, there is evidence that a greater share of high-skilled workers in cities leads to increased demand for consumer services, and therefore a higher proportion of workers in low-skilled service jobs, like waitressing, food preparation and cleaning (Mazzolari and Ragusa, 2013).

These three processes suggest that job polarisation should have affected cities, and especially higher-skilled cities, more strongly than other areas. There is some empirical support for this notion. Focusing on West Germany, Dauth (2014) shows that polarisation is a primarily urban phenomenon and that rural labour markets are much less likely to display a U-shaped trend in employment growth. This finding is confirmed for the Netherlands by van Maarseveen *et al.* (2017) who also find that polarisation over the period 1999-2012 was more prevalent in urbanised local labour market areas. The authors of both of these studies speculate that this finding is related to the complementarity between high-skilled non-routine job tasks and agglomeration (Glaeser and Resseger, 2010; Behrens, Duranton and Robert-Nicoud, 2014; Brinkman, 2014), which means that growth in high-skilled employment since the 1980s has concentrated in urban areas, contributing to stronger polarisation in these areas. The theoretical complementarities between skills, agglomeration and polarisation also seem to fit reasonably well with data on the occupational structure in UK cities. Lee *et al.* (2015) find that the cities with the most strongly polarised labour markets tend to be located in the Greater South East and for the most part are relatively affluent and highly skilled, whereas the least polarised cities tend to be less affluent and are more likely to be located in the Midlands and North of England. On the other hand, Kaplanis (2009) fails to find strong evidence for a stronger polarisation effect in British metropolitan areas during the 1990s.

5.4   Conceptualising the effect of job polarisation on progression

Several authors have commented on the potential for a declining number of intermediate jobs to negatively affect the upward mobility of workers in low-paid, low-skilled occupations. But none have explicitly articulated how this effect is likely to operate or the factors which may influence it.

Workers in low-paid occupations can achieve career advancement by moving into intermediate occupations such as administrative occupations or skilled manual occupations, many of which

involve a significant component of routine tasks. Alternatively, they can move into other higher-paid occupations, such as associate professional occupations or managerial occupations. Whether a worker moves into a routine or a non-routine occupation depends at least in part on their skills and their preferences, with certain groups of workers more likely to move to routine intermediate occupations, and others more likely to move into other higher-paid occupations. As the use of computer technologies in the workplace has increased, the relative proportion of jobs involving a lot of routine tasks has fallen, and the relative proportion of jobs involving non-routine tasks, especially higher-level cognitive tasks, has increased. This has affected the balance between low-paid occupations, routine occupations, and non-routine higher-paid occupations, and may therefore have had an impact on the career advancement options available to those in low-paid occupations. A reduction in the employment share of routine occupations may decrease the amount of job opportunities available in these occupations. On the other hand, an expansion of employment in higher-skilled non-routine occupations may increase opportunities for workers to move into these occupations, provided they have the necessary skills. This general model for the predicted impact of job polarisation on upward occupational mobility from low-paid jobs is depicted in figure 5-1.

Figure 5-1: The potential impact of job polarisation on occupational advancement
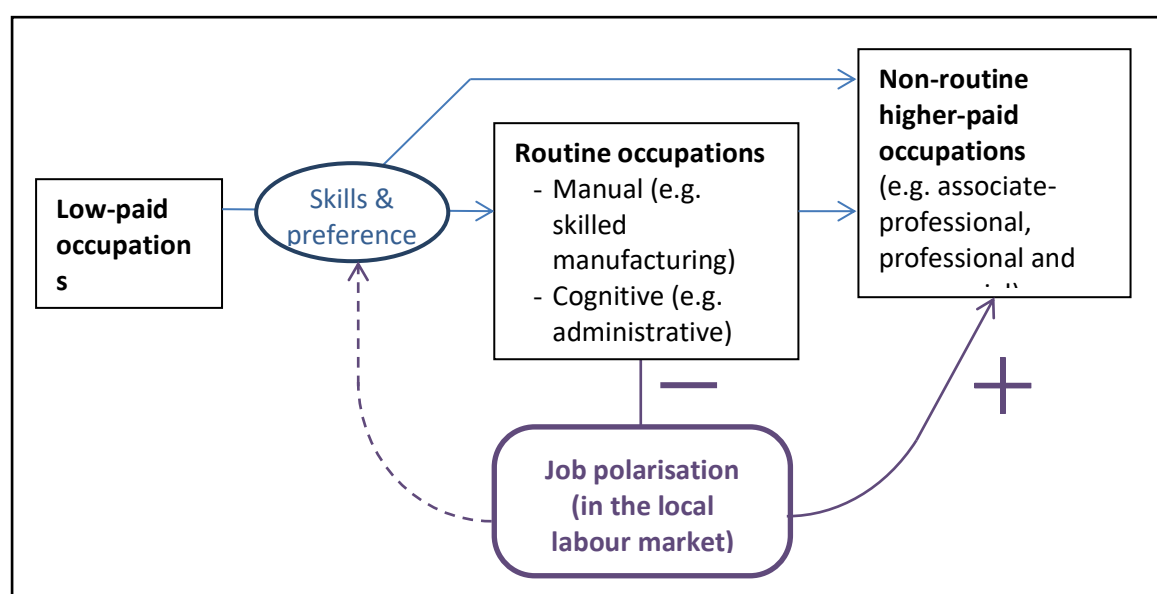
The remainder of this chapter, after describing the methods and data used, firstly focuses on the top half of the diagram figure 5-1, namely documenting the extent of occupational mobility from low-paid occupations into both routine occupations and other higher-paid occupations, for England and Wales as a whole (section 5.6.1). The next section (5.6.2) focuses on the bottom half of the diagram, the degree of job polarisation in local labour markets, and how this varies spatially. Finally, the third

section (section 5.6.3) brings these two together and analyses the relationship between local-level job polarisation and occupational mobility jointly. The variation in the degree of job polarisation across local labour markets offers a useful way to assess the impact of employment polarisation on the extent to which workers to move up the occupational ladder. If a relatively low proportion of employment in jobs around the middle of the earnings distribution does negatively affect the ability of low-paid workers to climb up the career ladder, then we would expect to see lower rates of mobility from low-paid to routine occupations in more highly polarised local labour markets, everything else being equal. Depending on the skills and preferences of workers in these labour markets, we may see an increase in the number of workers who remain in low-paid occupations, or an increase in the number of workers moving into higher-skilled non-routine occupations. To some extent, the skills and preferences of workers may adapt to their perception of the available job opportunities in their local area, as they may decide to develop their skills in order to take advantage of growing labour demand in certain sectors.

In measuring the degree of job polarisation in local labour markets the analysis takes into account both the extent of polarisation evident in the local structure of jobs at a particular moment in time, and the decline in middle-wage occupations over time. The literature suggests that these two are related. Autor and Dorn (2013) find that local labour markets in the US with a higher historical specialisation in routine intensive occupations – and thus a higher initial share of intermediate jobs – experienced greater increases in workplace computer use and greater reductions of employment in routine task-intensive jobs after 1980. They also show greater increases in low-skilled service employment. As a result, areas of the US with higher initial shares of routine occupations have tended to experience increased job (and wage) polarisation over time. Labour Force Survey data analysed in this chapter (section 5.6.2) suggest that the same has been the case for the UK, at least during the 2000s. Areas with a larger share of employment in routine occupations in 1999-03 saw bigger relative decreases in employment in these occupations over the next ten years, on average. It is unclear, however, whether it is the occupational distribution of employment at a point in time, or the change in this distribution over time, that has a bigger effect on occupational mobility from low-paid occupations. The analysis presented in this chapter sheds light on this.

Three main questions are addressed in this chapter:

- What is the importance of routine occupations as destinations or stepping stones for upwardly mobile workers starting off in low-paid occupations (section 5.6.1)?

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- To what extent have local labour market areas in England and Wales been subject to differing degrees of polarisation from the early 2000s to the early 2010s (section 5.6.2)?

- Has the career advancement of initially low-paid workers during the 2000s been affected by the degree of polarisation in the local labour market, and if so how (section 5.6.3)?

Answering these questions contributes to a better understanding of the ways in which the structure of jobs in local labour markets influences the career trajectories of low-paid workers.

5.5   Data and methods

The analysis for this chapter consists of three stages, each focusing on one of the three research questions outlined above, and combines several datasets. Table 5-1 provides an overview.

Table 5-1: Overview of the empirical analysis including research questions explored and datasets used in each section

Stage	Research question	Section	Data
1	What is the importance of routine occupations as destinations or stepping stones for upwardly mobile workers starting off in low-paid occupations?	5.5.1	Longitudinal Study (LS) British Household Panel Survey (BHPS),
2	To what extent have local labour market areas in England and Wales been subject to differing degrees of polarisation from the early 2000s to the early 2010s?	5.5.2	Labour Force Survey (LFS)
3	Has the career advancement of initially low-paid workers during the 2000s been affected by the degree of polarisation in the local labour market, and if so how?	5.5.3	Longitudinal Study (LS) and Labour Force Survey (LFS)

The first stage of the analysis focuses on the occupational mobility of workers initially employed in low-paid occupations. The main dataset used for this analysis is the ONS Longitudinal Study for England and Wales (LS), with some additional analysis of the British Household Panel Survey. The ONS LS is a longitudinal dataset constructed by matching Census records for a 1 per cent sample of

the UK Census (by selecting those born on one of four specific dates). The 2001 and 2011 waves of the ONS LS are used here, enabling analysis of the occupational destinations in 2011 of workers who in 2001 worked in a low-paid occupation. The data allow for a study of comparatively long-term occupational mobility outcomes but does not allow for analysis of the precise nature of occupational trajectories during the intervening period between census dates. Nonetheless, the large sample of the ONS LS and the relatively long duration over which individuals can be observed make it the most suitable dataset for the analysis. A further advantage of the ONS LS is that, in addition to occupational information, it contains data on a relatively wide range of other individual and household characteristics such as gender, age, education level, household composition, industry of employment, etc., which can be used as controls, as well as to examine differences in occupational mobility between different types of workers.

In the second stage, the occupational mobility analysis is followed by area-level analysis of the occupational structure of local labour markets in England and Wales, and the degree of polarisation evident within these. This analysis uses data from the Labour Force Survey (LFS). The LFS is the UK's largest household survey and the source of official labour market statistics such as the employment rate. In addition to occupational information it contains data on hourly earnings, unlike the ONS LS. Three main measures of polarisation are developed:

1) the degree to which the structure of employment is polarised between low- and high-paid occupations at the start of the analysis period (the year 2001);
2) the extent to which the occupational structure becomes *more* (or less) polarised over the next ten years (in other words, the extent to which employment *growth* is polarised); and
3) the degree of job polarisation at the end of the ten-year period.

Measures designed to capture each of these three facets of polarisation were constructed from the LFS data. In addition, three further area-level measures were constructed to assess the effect of another potentially important aspect in influencing occupational advancement from low-paid occupations: the balance between low- versus higher-skilled employment in the local labour market.

In the third and final stage of the analysis, individual-level data from the ONS LS is matched to the area-level data derived from the LFS in order to estimate the effect of job polarisation in the local labour market on occupational progression from low-paid jobs.

In the following sections, more detail is provided about the data samples used in the analysis, the operationalisation of key concepts and measures, and other methodological issues. Section 5.5.1 describes the datasets used and the samples drawn from each for use in the empirical analysis. Sections 5.5.2 and 5.5.3 briefly deal with attrition in the two longitudinal datasets, the Longitudinal Study and British Household Panel Survey. Section 5.5.4 explains how the occupational categories used in the occupational mobility analysis were defined, and section 5.5.5 is a short section which goes into more detail about issues related to occupational classification in the ONS LS. Section 5.5.6 describes how local labour markets were defined, and section 5.5.7 deals with the measurement of job polarisation in local labour markets. Finally, section 5.5.8 details the control variables used in the final stage of the analysis.

5.5.1   Samples

ONS Longitudinal Study

The ONS LS sample used for the analysis was restricted to those of working age at both the 2001 and 2011 Census. Because men and women had different state retirement ages during this period (in 2011 the pension age for men was 65 but for women it was still 60), this meant the sample included men aged 16-54 at the 2001 Census, as well as women aged 16-49 at the 2001 Census. The sample was restricted to workers who reported paid employment as their main economic activity, and so excludes those in self-employment or full-time students who worked alongside their studies. The sample covers workers living in England and Wales (in both periods), excluding the Isle of Wight due to data limitations. For the initial analysis of occupational mobility, the sample was further restricted to those who were also in paid employment (with a known occupation) in 2011. For the multinomial regression analysis transitions to non-employment, as well as to the various occupational categories, were also taken into account, meaning that the sample used for this part of the analysis includes all workers of working age and in a low-paid occupation in 2001. A summary table describing the sample (including the restricted sample of workers in employment in both years) is reported in Appendix G.

Labour Force Survey

The LFS was used to study the degree of polarisation in local labour markets. Ideally the analysis of area polarisation measures would have used LFS data from 2001 and 2011 (in order to match the

years available in the LS). However, to obtain a sufficient number of observations to conduct analysis at the level of local labour markets it was necessary to pool quarterly LFS data for five year periods. The sample for the first period contains data for 1999-2003, and the sample for the second period contains data for 2009-2013. The LFS is collected in waves, with each household being interviewed for five consecutive quarterly waves before dropping out of the survey. Only data from wave 1 was used from each quarter, to avoid double-counting of individuals. Data for all four quarters were included. The 1999-2003 sample comprised 184,094 individuals in paid employment with a known occupation, with the 2009-2013 sample being slightly smaller including 145,858 individuals.

Although the LFS contains occupational information for every year, the classification system used to code occupations is not consistent across all ten years. Until the October-December quarter of 2000, occupational information is coded using the 1990 Standard Occupational Classification (SOC1990). From April-June 2001 until October-December 2010, the 2000 version of the Standard Occupational Classification (SOC2000) is used, and from January-March 2011 occupations are coded using the 2010 version of the Standard Occupational Classification (SOC2010). For quarters from Jan-Mar 2011 until Oct-Dec 2013, SOC2010 the datasets include a 'mapped' occupational variable derived from mapping SOC2010 to SOC2000 codes so that SOC2000 occupational codes are still available for each worker observed in these later quarters (in the variable *sc102km*). For 1999 and 2000, no such mapped variable is available, so to enable consistent analysis of employment change within occupations the SOC1990 codes were recoded to SOC2000 codes using a probabilistic approach based on a correspondence table between SOC1990 and SOC2000 published by the ONS (ONS, no date b). This table is based on a dual-coding exercise using the June-August 2000 quarter of the LFS and indicates, for each SOC1990 code, the composition of workers across SOC2000 codes. The table contains separate figures for male and female workers. For example, it shows that 87 per cent of female workers in SOC1990 unit code 722 (Petrol pump forecourt assistants) were coded to SOC2000 code 7111 (Sales and retail assistants) and 13 per cent were coded to SOC2000 code 7112 (Retail cashiers and check-out operators). Unfortunately, SOC1990/SOC2000 combinations with very low levels of correspondence (less than 5 per cent) were omitted from the ONS table, meaning that for a substantial number of SOC1990 codes, summing worker proportions across all SOC2000 codes does not total to 100 per cent. As there was no way to derive SOC2000 codes for the missing proportions of workers, the proportions given in the table were simply re-based to sum to 100 per cent. This means that the relationship between SOC1990 codes and SOC2000 codes is oversimplified to some extent. The resulting distributions of SOC2000 codes within SOC1990 codes were used to probabilistically impute a SOC2000 code for each worker, based on their gender. So a female worker

with SOC1990 code 722 had an 87 per cent chance of being recoded to SOC2000 code 7111, and a 13 per cent chance of being recoded to SOC2000 code 7112[70].

British Household Panel Survey

The British Household Panel Survey was used to examine occupational mobility for workers initially in low-paid occupations, as well as to assess whether there has been a change over time in mobility from low-paid into routine occupations. As discussed in Chapter 3, the BHPS was collected until 2008 but most members continued to participate in its successor survey, Understanding Society. Using their individual identifiers, the BHPS sample members could be 'followed' even after they entered the wider Understanding Society sample. In this way, it was possible to construct a panel dataset spanning 23 waves, from 1991 to 2014. For the remainder of this chapter, the dataset constructed in this way is referred to as the BHPS dataset or the BHPS sample, even though the data comes from both the BHPS and Understanding Society.

Similarly to the LS, the BHPS sample was similarly restricted to those of working age (defined as 16-64 for men and 16-59 for women). As most of the analysis of this sample is longitudinal, only respondents who are of working age at both the start date and end date of the analysis are included. So if the period of analysis is five years, the sample includes women aged 16-54 at the start of the five year period and aged 21-59 at the end of the five year period. As for the ONS LS sample, only employees (so no students or self-employed workers) were included. The BHPS includes individuals from the whole of Great Britain[71], unlike the ONS LS which is confined to England and Wales. Although this means that the results are not directly comparable, it was decided to leave respondents living in Scotland in the sample to maximize sample size.

5.5.2   Attrition in ONS LS

The ONS LS has relatively low attrition compared to other longitudinal surveys such as Understanding Society. Excluding individuals who are known to have died or moved out of England

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[70] These probabilities are calculated on the basis of the ONS SOC1990-SOC2000 correspondence table, which is publicly accessible from the ONS website (*add reference to table*).
[71] From wave 11 onward, a sample of individuals from Northern Ireland was added to the BHPS, but in the interest of continuity this sample was not included in the analysis.

and Wales ('embarked' in the terminology used in the LS), 87.7 per cent of 2001 ONS LS members were accounted for at the 2011 Census (Lynch *et al.*, no date); an attrition rate of 12.3 per cent. Of all workers aged 16-49 in 2001 (or 16-54 for men) and employed in a low-paid occupation, 88.3 per cent are accounted for in 2011. This includes a small proportion of workers who are known to have died or left the country, so in total 86.5 per cent of workers are observed in the data in 2011. Table 5-2 presents more information regarding the numbers of workers observed and not observed in 2011.

Table 5-2: Attrition in ONS LS and usable sample size

Category	Number of observations		
Members aged 16-49 (or 16-54 for men) in paid employment and in a low-paid occupation in 2001:	38,403		
Of which, observed in 2011:	33,213	Of which, not observed in 2011: Of which:	5,190
Of which, observed with known economic activity in 2011:	33,191	• died before 2011:	540
		• embarked before 2011:	156
Of which, in paid employment in 2011:	25,292	• unknown/other reason for attrition:	4,494

Source: ONS LS, 2001 and 2011. Sample excludes members with multiple enumerations and visitors.

Although attrition is low, there are some notable differences in attrition rates between sub-groups of workers. For instance, male workers in the 2001 sample are more likely to attrit (17.5 per cent) than female workers (11.02), and workers belonging to white ethnic groups are much less likely to attrit (12.8 per cent) than those belonging to Asian (17.4 per cent), Black/Black British (24.3 per cent) and mixed/other ethnic groups (26.2 per cent).

The fact that non-enumeration in 2011 is not evenly distributed across workers of different genders, ages, ethnicities, and tenures could lead to biased estimates of occupational mobility if such mobility is in some way affected by these characteristics. Longitudinal weights were therefore constructed to test the sensitivity of the results to non-random attrition. As longitudinal weights are not provided in the LS, they were constructed for the sample of interest using a similar method to that used in the US Panel Study of Income Dynamics (Gouskova *et al.*, 2008). The weights are based on the inverse of

the probability of being present in 2011, conditional on not having died or embarked[72]. To calculate this probability, a multinomial logit model was estimated using data from the 2001 and 2011 ONS LS and additional data on deaths and embarkations from the Longitudinal Study Vital Events dataset. This model estimated simultaneously the probability of 1) enumeration in 2011, 2) death, 3) embarkation, and 4) non-enumeration for any other reason than death or embarkation, on a range of variables including gender, age, ethnicity, highest qualification, tenure, household composition and migrant status. Based on the estimation of this model, the conditional probability of retention could be determined for each respondent given their characteristics. The lower this probability, the higher the weight. In this way a respondent who, based on their characteristics, has a low estimated probability of retention, is counted more heavily in the longitudinal analysis to compensate for similar respondents who are not present in 2011. At various points in the analysis, non-weighted results were compared to the weighted results to ensure that non-random attrition did not cause biased estimates. As the weighted results were, in all cases, very similar to the unweighted estimates, it was concluded that attrition did not result in any substantial bias in the estimates.

5.5.3   Attrition in the BHPS

The BHPS sample was also affected by attrition between waves, with attrition rates increasing when analysing occupational transitions over a longer period of time (some of the analysis is over 5 years and some of the analysis over 10 years). However, longitudinal waves are supplied as part of the BHPS dataset, which are designed to adjust for the non-random nature of attrition. These weights are used in all of the analysis of BHPS data presented in this chapter.

5.5.4   Defining occupational categories

As the object of the occupational mobility analysis exercise is to assess the degree of movement between low-paid occupations and routine occupations, as well as mobility from low-paid into other higher-paid occupations, the first task was to devise a scheme for categorising occupations as 'low-paid', 'routine', or otherwise. In the literature the most common method of defining routine occupations is by using an index measuring the routine task intensity (RTI) of occupations (e.g. Autor and Dorn, 2013). The higher the RTI index for a particular occupation, the higher is its ratio of

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[72] The small number of sample members who left England and Wales or passed away between 2001 and 2011, would naturally not be expected to have completed the 2011 Census and so their non-enumeration is not problematic. They have simply left the population of interest.

routine tasks to non-routine tasks. This method was adapted from a US to a European context by Goos *et al.* (2014) who mapped the US Census occupation classifications onto two-digit International Standard Occupational Classification (ISCO) codes to produce an RTI index for each ISCO-88 occupation code. These same RTI scores are used here to define routine occupations. For the BHPS analysis, the ISCO-88 classification was used to assign workers to occupational groups, so routine occupations could be straightforwardly defined as those in the top third on RTI score (equating to an RTI of 0.3 or higher) according to table 1 in Goos *et al.* (2014). For the ONS LS analysis, which is based on SOC2000 codes rather than ISCO codes, the 25 sub-major occupational groups in SOC2000 were matched to their closest ISCO-88 sub-major group using the descriptions of each occupation, and allocated the corresponding RTI index. Here again, occupational groups with an RTI of more than 0.3 were classified as routine[73], resulting in six sub-major occupational groups being categorised as such: administrative occupations; secretarial and related occupations; textiles, printing and other skilled trades; customer service occupations; process, plant and machines operatives; and skilled metal, electrical and electronic trades. Between 1999-2003 and 2009-2013 five out of these six routine occupational groups experienced a decline in their employment share, of between 16 to 40 per cent (based on LFS data), consistent with the findings discussed above regarding routine-biased technological change[74].

To categorise the remaining occupational groups an approach similar to that of Holmes and Tholen (2013) was adopted. The median hourly pay of each occupational group was calculated using LFS data for the two time periods (1999-03 and 2009-13). The five occupational groups with the lowest median hourly wage across the two periods were categorised as 'low-paid'. The average median pay for all of these five occupational groups was lower than the median pay for each of the routine occupations. The remaining occupational groups were divided into three categories: intermediate non-routine occupations, associate professional occupations, managerial occupations, and professional occupations. The occupational groups (in both ISCO-88 and SOC2000) in each category, along with their corresponding RTI index and median hourly pay (based on LFS data), can be found in table 5-3. Tables 5-4, 5-5, and 5-6 show the proportion of working age (16-59 for women and 16-64

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[73] The ISCO sub-major group *Labourers in mining, construction, manufacturing and transport*, which is matched to SOC2000 group *Elementary trades and related occupations*, has an RTI score of 0.45. It was decided not to include this group in the 'routine' category but in the 'low-paid' category given its low median hourly wage rate of £5.64 (based on SOC2000-coded LFS data). Given the purposes of the analysis – assessing mobility from low-paid occupations to somewhat higher-paid routine occupations – it was felt to make most sense to categorise this group as a low-paid occupation, despite the fact that many occupations in this group do have a relatively high routine task content.

[74] The only group which did not was customer service occupations, which saw an increase in employment share from 1.22 per cent to 1.55 per cent (an increase of 27 per cent).

for men) individuals employed in each occupational category in the LFS, in the ONS LS and in the BHPS, respectively. The data are presented separately for two periods: 1999-2003 and 2009-2013 in case of the LFS, 2001 and 2011 in case of the LS, and 2000-2002 and 2010-2012 for the BHPS[75]. A comparison of the occupational distribution of workers between these two periods indicates clearly that the share of workers employed in routine intermediate occupations has declined between the period around the year 2001 and the period around the year 2011. The BHPS figures are based on ISCO-88 occupational codes rather than SOC2000 codes, but despite the difference in occupational classification systems used the distribution of workers across categories is fairly similar to that in the LFS and LS, with the main differences being a slightly lower proportion of workers in low-paid occupations and a slightly higher proportion of workers in managerial occupations in the first period. But in all three datasets a decline in employment in routine occupations can be observed.

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[75] Data from multiple years was pooled for both the LFS and BHPS to increase samples size.

Table 5-3: Occupational classification used in occupational mobility analysis throughout chapter 5

Category	ISCO	Description	RTI	SOC2000	description	Median pay	Median pay
Low-paid	51	Personal and protective service workers	-0.60	61	Caring personal service occupations	5.39	7.38
	51	Personal and protective service workers	-0.60	62	Leisure and other personal service occupations	5.58	7.35
	52	Models, salespersons and demonstrators	0.05	71	Sales occupations	4.62	6.41
	91	Sales and service elementary occupations	0.03	92	Elementary administration & service occs	4.63	6.36
	92	Agricultural, fishery and related labourers	N/A	91	Elementary trades and related occupations	5.64	7.38
	93	Labourers in mining, construction, manufacturing & transport	0.45	91	Elementary trades and related occupations	5.64	7.38
Routine†	41	Office clerks	2.24	41	Administrative occupations	6.94	9.40
	41	Office clerks	2.24	42	Secretarial and related occupations	6.75	8.90
	42	Customer service clerks	1.41	72	Customer service occupations	6.51	8.22
	72	Metal, machinery and related trade work	0.46	52	Skilled metal, electrical and electronic trades	8.16	10.90
	73	Precision, handicraft, craft printing and related trade workers	1.59	54	Textiles, printing and other skilled trades	5.69	7.49
	74	Other craft and related trades workers	1.24	54	Textiles, printing and other skilled trades	5.69	7.49
	81	Stationary plant and related operators	0.32	81	Process, plant and machines operatives	6.38	8.65
	82	Machine operators and assemblers	0.49	81	Process, plant and machines operatives	6.38	8.65
Intermediate non-routine	61	Market-oriented skilled agricultural and fishery workers	N/A	51	Skilled agricultural and related trades	5.58	7.72
	71	Extraction and building trades workers	-0.19	53	Skilled construction and building trades	7.35	9.86
	83	Drivers and mobile plant operators	-1.50	82	Transport & mobile machine drivers/operatives	6.17	8.44
Associate-professional	31	Physical, mathematical and engineering assoc. professionals	-0.40	31	Science, engineering and technology associate profs	9.45	12.50
	32	Life science and health associate professionals	-0.33	32	Health & social care assoc. professionals	9.74	13.31
	33	Teaching associate professionals	N/A	N/A			
	34	Other associate professionals	-0.44	34	Culture, media and sports occupations	9.96	12.74
	34	Other associate professionals	-0.44	35	Business & public service assoc. professionals	10.98	13.26
	34	Other associate professionals	-0.44	33	Protective service occupations	10.99	13.95
Managerial	11	Legislators and senior officials	N/A	11	Corporate managers and senior officials	13.08	17.47
	12	Corporate managers	-0.75	11	Corporate managers and senior officials	13.08	17.47
	13	General managers/managers of small enterprises	-1.52	12	Managers and proprietors in agriculture and services	8.13	11.00
Professional	21	Physical, mathematical and engineering professionals	-0.82	21	Science, research, engineering and technology profs	12.91	17.25
	22	Life science and health professionals	-1.00	22	Health professionals	16.03	21.79
	23	Teaching professionals	N/A	23	Teaching and educational professionals	13.08	16.82
	24	Other professionals	-0.73	24	Business, media and public service professionals	12.82	17.58

*Source: LFS. Median hourly pay for 1999-03 expressed in 2001 prices, and for 2009-13 in 2011 prices. †Routine occupations classified based on RTI of ISCO-88 occupations, following Goos et al. (2014).

Table 5-4: Distribution of workers between occupational categories in LFS, 1999-2003 and 2009-2013, workers aged 16-59/16-64

	1999-2003	2009-2013
Low-paid	27.5	27.7
Routine intermediate	28.6	21.9
Non-routine intermediate	6.0	5.3
Associate-professional	13.2	15.1
Managerial	13.1	15.9
Professional	11.7	14.1
N	178,662	138,245

Source: LFS, 1999-2003 and 2009-2013. Data refer to England and Wales.

Table 5-5: Distribution of workers between occupational categories in LS, 2001 and 2011, workers aged 16-59/16-64

Occupational category	2001	2011
Low-paid	25.1	26.6
Routine	29.2	23.7
Intermediate	6.0	5.9
Associate professional	13.9	14.2
Managerial	14.8	15.6
Professional	11.1	14.0
N	191,960	163,530

Source: ONS LS, 2001 and 2011. Data refer to England and Wales.

Table 5-6: Distribution of workers between occupational categories in BHPS, 2001-03 and 2011-13, workers aged 16-59/16-64

Occupational category (based on ISCO-88)	2000-02	2010-12
Low-paid	21.3	27.0
Routine	29.5	23.2
Intermediate	6.9	6.3
Associate professional	13.4	14.6
Managerial	16.1	15.0
Professional	12.8	14.0
N	22,835	13,982

Source: BHPS/Understanding Society, 2001-03 and 2011-13. Weighted estimates. Data refer to Great Britain.

5.5.5 Issues regarding occupational classification in the ONS Longitudinal Study

To assess whether someone has made an occupational transition between 2001 and 2011, it is necessary that occupational data is recorded using the same classification scheme in both years. Unfortunately, in the ONS LS the occupational information provided by respondents was coded to SOC2000 in 2001, but to SOC2010 in 2011. In the 2011 dataset, some dual-coded occupational data (coded to both SOC2000 and SOC2010) does exist, but only for a very small sub-sample of 2011 records. To enable consistent analysis of occupations across 2001 and 2011, SOC2000 codes were therefore retrospectively imputed for remaining 2011 observations by the ONS. This was done by matching ONS LS records to the most appropriate SOC2000 code based on several matching variables: their SOC2010 code, age group, sex, region, industry, tenure, and highest level of qualification (Dyer, 2016). For the most part there is a close correspondence between SOC2010 codes and the SOC2000 codes that ONS LS members were assigned. For instance, almost all workers (89 per cent) in SOC2010 sub-major group 62 (Leisure, Travel and Related Personal Service Occupations) were also coded to SOC2000 sub-major group 62 (Leisure and Other Personal Service Occupations). However, in some cases respondents belonging to particular a SOC2010 sub-major group are more widely dispersed across SOC2000 groups.

To assess the quality of the imputed data, the relationship between SOC2000 codes and SOC2010 codes in the imputed ONS LS sample was compared to this same relationship in a dual-coded sample of 1 per cent sample of economically active respondents in the 2001 Census (whose occupational information was dual-coded to both SOC2000 and SOC2010 during the development of SOC2010). Tables describing the correspondence between the two classifications were published by the ONS based on this dual-coded data (ONS, 2010), allowing for a comparison of the correspondence between SOC2010 and (imputed) SOC2000 codes in the 2011 ONS LS dataset to that in the dual-coded Census data. This comparison indicates that the degree of dispersion of SOC2010 codes across SOC2000 codes is greater in the 2011 ONS LS dataset than in the dual-coded Census sample. This is likely because the imputation procedure used for the retrospective SOC2000 coding of ONS LS respondents was not as precise as the dual-coding procedure used for the Census sample, and so some discrepancies are to be expected. However, the wider dispersion across SOC2000 codes found among 2011 ONS LS observations could mean that analysing changes in workers' occupations between 2001 and 2011 on the basis of their SOC2000 codes overstates the true amount of mobility between occupational categories. This is because, of all ONS LS members who in 2001 belonged to a low-paid SOC2000 sub-major group, there may be a small proportion for whom a different SOC2000 sub-major group was imputed in 2011 than for the majority of their peers, even though they may

not necessarily have changed occupation. Where these initially-low-paid workers have been coded to a non-low-paid SOC2000 occupational group, they would appear to have progressed to a higher-paid occupation while in reality this may not have been the case. But as the difference in the degree of dispersion across SOC2000 codes between the ONS LS and the Census sample is small, the degree of overstatement of occupational mobility is likely to be minimal. And as the main purpose of the ONS LS analysis is to assess whether the degree of local job polarisation has an effect on occupational mobility, rather than provide conclusive estimates of the exact extent of mobility between occupational categories, this issue should not present any serious implications for the interpretation of the results.

5.5.6   Defining local labour markets

The basis for defining local labour market areas is the 2011 definition of Travel-To-Work-Areas. As 2011 TTWAs were not available in the LFS data until the July-September quarter of 2012, for quarters before this date electoral wards were best-fitted to TTWA boundaries to be able to analyse the pre-2012 data at the TTWA level. Due to the small size of electoral wards, it was possible to create a very close fit to actual TTWA boundaries[76].

As some TTWAs are much less sparsely populated than others, there were a substantial number of TTWAs for which there were too few observations in the LFS to construct an accurate measure of polarisation. Not only was the sample in the LFS relatively small for these TTWAs, as a consequence a significant number of occupations were not observed at all in these areas. Because having a sufficient number of observations, ideally across all or most occupations, for each local labour market is important to assess its occupational structure and calculate measures of polarisation, it was decided to combine the smaller TTWAs into larger areas. When combining areas, two factors were taken into consideration: 1) geographic proximity (in all cases amalgamated TTWAs are conjoined), and 2) evidence of commuting between the individual TTWAs (visually examined using the DataShine Commuting Flow map). The criteria was to achieve at least 600 observations of individuals in paid employment with a known occupation in each local labour market area (for both the 1999-2003 period and the 2009-2013 period). To achieve this it was necessary to combine the

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[76] The vast majority of wards fit entirely within a single TTWA. For a small proportion of wards, the surface area of the ward does not sit entirely in a single TTWA, but is spread between more than one TTWA. Yet even where this is the case, the majority of the ward usually sits within one TTWA, with only a small area falling outside of this main TTWA. Out of 9,313 wards, there are only 378 which fit less than 95% in a single TTWA (4.1% of all wards).

majority of TTWAs into larger Super-TTWAs, as only 25 out of 173 TTWAs in England and Wales had a sufficient number of observations in and of themselves[77]. Often several small TTWAs were joined together to form one large Super-TTWA: for example the TTWAs of Exeter, Bideford, Barnstaple, Sidmouth and Torquay & Paignton were combined into one Super-TTWA covering most of Devon, and the TTWAs of Whitby, Scarborough, Malton and Bridlington were combined into one Super-TTWA covering north-east Yorkshire. But in several cases, a small TTWA was joined to a larger nearby TTWA, for instance the relatively small TTWA surrounding Buxton was joined to the Manchester TTWA, as most Buxton workers who do not work locally commute to towns and cities within the Manchester TTWA (such as Tameside, Stockport, and Manchester itself).

As a result of this exercise the final base is 81 local labour market areas, of which the majority (56) are combined Super-TTWAs and 25 are single TTWAs. The Isle of Wight was not included in the analysis as it has only 409 and 328 observations in the LFS (for 1999-03 and 2009-13 respectively), but due to being an island could not easily be amalgamated with another TTWA. Table 5-7 lists the Super-TTWAs, including which TTWAs each is composed of. As not all Travel-to-Work-Areas were combined into Super-TTWAs, the local labour market areas used in the analysis are a combination of Super-TTWAs, and single TTWAs which are analysed in their own right. However, all areas are referred to in the rest of this chapter as Super-TTWAs (or STTWAs) for ease.

Although steps were taken to combine TTWAs for which there was some evidence of cross-commuting[78], and thus a justification for treating the resulting Super-TTWA as one local labour market area, the Super-TTWAs inevitably to require some degree of relaxation to the criteria of being a 'functional labour market'. As the aggregating of Travel-To-Work-Areas results in the creation of rather large areas, which do not necessarily correspond very well to the actual labour markets of low-paid workers, sections of the analysis were also repeated with a sub-sample of large single TTWAs that had at least 600 observations in both 1999-03 and 2009-13, and where at least 70 occupations were observed in both periods. This allows for a triangulation of findings across the two samples to provide a sensitively check on the results. A list of the TTWAs large enough to meet the criteria of at least 600 observations across 70 observations is provided in appendix I.

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[77] The only Super-TTWA with fewer than 600 observations is the Whitby, Scarborough, Malton & Bridlington Super-TTWA, which has 586 observations for 1999-2003 and 515 for 2009-2013.
[78] Or, in the cases where smaller TTWAs were attached to larger TTWAs, for which there was some evidence of commuting from the smaller to the larger TTWA.

Table 5-7: List of Super-TTWAs

Super-TTWA	Composed of TTWAs
Aberystwyth, Tywyn, Cardigan, Haverfordwest & Pembroke	Aberystwyth Tywyn and Dolgellau Cardigan Haverfordwest and Milford Haven Pembroke and Tenby
Bangor, Pwllheli, Colwyn Bay	Bangor and Holyhead Pwllheli and Porthmadog Colwyn Bay
Bath & Trowbridge	Bath Trowbridge
Birkenhead	Birkenhead
Birmingham	Birmingham
Blackburn & Burnley	Blackburn Burnley
Blyth and Ashington & Berwick	Berwick Blyth and Ashington
Bournemouth & Poole	Bournemouth Poole
Bradford & Halifax	Halifax Bradford
Brighton & Worthing	Worthing Brighton
Bristol & Weston-super-Mare	Weston-super-Mare Bristol
Bury St Edmunds & Thetford	Thetford and Mildenhall Bury St Edmunds
Cambridge & Huntingdon	Huntingdon Cambridge
Canterbury & Margate	Margate and Ramsgate Canterbury
Cardiff, Bridgend, Merthyr & Newport	Merthyr Tydfil Cardiff Bridgend Newport
Carlisle, Penrith, Workington, Whitehaven & Barrow-in-Furness	Penrith Workington Whitehaven Barrow-in-Furness Carlisle
Chelmsford	Chelmsford
Colchester & Clacton	Clacton

	Colchester
Cornwall	Wadebridge
	Launceston
	Bude
	Liskeard
	Penzance
	Falmouth
	Redruth and Truro
	St Austell and Newquay
Coventry & Leamington Spa	Leamington Spa
	Coventry
Crawley	Crawley
Crewe	Crewe
Derby & Burton upon Trent	Burton upon Trent
	Derby
Doncaster & Worksop	Worksop and Retford
	Doncaster
Dudley	Dudley
Durham & Darlington	Darlington
	Durham and Bishop Auckland
Eastbourne & Hastings	Hastings
	Eastbourne
Exeter, Barnstaple, Bideford, Sidmouth & Torquay	Sidmouth
	Bideford
	Barnstaple
	Torquay and Paignton
	Exeter
Folkestone & Ashford	Ashford
	Folkestone and Dover
Gloucester, Cheltenham & Cinderford	Cinderford and Ross-on-Wye
	Cheltenham
	Gloucester
Grimsby & Scunthorpe	Scunthorpe
	Grimsby
Guildford and Aldershot	Guildford and Aldershot
Harrogate & Northallerton	Northallerton
	Harrogate
Hereford, Ludlow, Llandrindod & Brecon	Llandrindod Wells and Builth Wells
	Ludlow
	Brecon
	Hereford
High Wycombe and Aylesbury	High Wycombe and Aylesbury
Huddersfield	Huddersfield
Hull	Hull
Ipswich	Ipswich

King's Lynn & Wisbech	Wisbech
	King's Lynn
Lancaster, Morecambe & Kendall	Kendal
	Lancaster and Morecambe
Leeds & Skipton	Skipton
	Leeds
Leicester	Leicester
Lincoln, Boston & Skegness	Boston
	Skegness and Louth
	Lincoln
Liverpool	Liverpool
London	London
Lowestoft & Great Yarmouth	Great Yarmouth
	Lowestoft
Luton	Luton
Manchester & Buxton	Buxton
	Manchester
Medway & Tunbridge Wells	Tunbridge Wells
	Medway
Middlesbrough, Stockton & Hartlepool	Hartlepool
	Middlesbrough and Stockton
Milton Keynes & Bedford	Bedford
	Milton Keynes
Minehead, Bridgwater & Taunton	Minehead
	Bridgwater
	Taunton
Newcastle & Hexham	Hexham
	Newcastle
Northampton, Kettering & Corby	Corby
	Kettering and Wellingborough
	Northampton
Norwich & Cromer	Cromer and Sheringham
	Norwich
Nottingham, Grantham & Mansfield	Grantham
	Mansfield
	Nottingham
Oxford & Banbury	Banbury
	Oxford
Peterborough & Spalding	Spalding
	Peterborough
Plymouth, Kingsbridge and Darthmouth	Kingsbridge and Dartmouth
	Plymouth
Portsmouth & Chichester	Chichester and Bognor Regis
	Portsmouth
Preston & Blackpool	Blackpool
	Preston

Reading, Basingstoke & Newbury	Newbury
	Basingstoke
	Reading
Rhyl, Wrexham & Chester	Wrexham
	Rhyl
	Chester
Salisbury, Gillingham & Andover	Blandford Forum and Gillingham
	Andover
	Salisbury
Sheffield, Barnsley & Chesterfield	Chesterfield
	Barnsley
	Sheffield
Shrewsbury, Telford, Welshpool & Oswestry	Newtown and Welshpool
	Oswestry
	Shrewsbury
	Telford
Slough and Heathrow	Slough and Heathrow
Southampton	Southampton
Southend	Southend
Stevenage and Welwyn Garden City	Stevenage and Welwyn Garden City
Stoke-on-Trent	Stoke-on-Trent
Sunderland	Sunderland
Swansea & Llanelli	Swansea
	Llanelli
Swindon	Swindon
Wakefield and Castleford	Wakefield and Castleford
Warrington and Wigan	Warrington and Wigan
Whitby, Scarborough, Malton & Bridlington	Whitby
	Bridlington
	Malton
	Scarborough
Wolverhampton, Walsall & Stafford	Stafford
	Wolverhampton and Walsall
Worcester, Kidderminster & Evesham	Evesham
	Worcester and Kidderminster
Yeovil, Street, Bridport & Weymouth	Bridport
	Street and Wells
	Dorchester and Weymouth
	Yeovil
York	York

5.5.7   Measuring polarisation

To assess whether living in a more strongly polarised local labour market is associated with a lower chance of progression, an appropriate measure of job polarisation must first be established. There are two potential approaches to investigating the impact of polarisation on progression. Firstly, the degree of polarisation in the local labour market can be measured as the *level* of polarisation at a particular point in time. Secondly, polarisation can be conceptualised as a process (i.e. a *change* in the occupational distribution of employment over time). The literature has tended to focus on measuring the relative growth or decline in employment in occupations ranked by average wage or education level (e.g. Autor, Katz and Kearney, 2006; Goos and Manning, 2007; Michaels, Natraj and Van Reenen, 2014). These two different forms of polarisation are likely to have a similar effect on progression, but it is not clear which will be more important in influencing upward mobility from low-paid to higher-paid occupations. On the one hand, the degree of expansion (or contraction) in particular occupations might be expected to be most important in creating job vacancies for low-skilled workers to move into. If this is true, changes in the employment share of intermediate versus other occupations are likely to have the biggest impact on occupational mobility. On the other hand, within all occupations there is likely to be substantial replacement demand even in the absence of net employment growth (Holmes and Tholen, 2013). If this replacement demand is a more important determinant in creating opportunities for occupational advancement, then a static measure of job polarisation in the local labour market may have a stronger effect. Therefore, the analysis includes both two static measures of job polarisation – one relating to the degree of polarisation in the occupational distribution of employment in the initial period (1999-2003), and one relating to the degree of polarisation in the final period (2009-2013) – as well as a dynamic measure of polarisation quantifying the degree to which employment growth over time is concentrated in low- and high-paid occupations versus intermediate occupations.

For both types of measure (static and dynamic), job polarisation is measured using a polarisation index, first developed by Green and Jones (2009). The index was calculated for local labour markets using Labour Force Survey (LFS) data. As the sample size of the LFS is not sufficient to allow the degree of polarisation in each local labour market to be accurately calculated based on data for a single year, data for the years 1999 to 2003 were pooled to create a polarisation index for the period 1999-2003, and data for the years 2009 to 2013 were pooled to create a polarisation index for the period 2009-2013.

The aim of the polarisation index is to measure the extent to which employment (or employment growth) is concentrated in low-paid and high-paid occupations, as opposed to in middle-wage

occupations. It is created by ranking occupations on the basis of median hourly pay, and creating a measure that weights employment in occupations further from the middle of the ranking more strongly than employment in occupations near the middle of the ranking. In Green and Jones (2009) the polarisation index is calculated on the basis of SOC1990/SOC2000 unit groups (the finest level of disaggregation available in the LFS), but in this chapter minor groups are used, of which there are 81 in SOC2000. This is because the analysis is conducted at a smaller spatial scale than that presented in Green and Jones where statistical regions are used. Secondly, partly as a result of the relatively smaller local samples used here, not all 4-digit SOC2000 unit groups are represented in each local labour market area[79]. Using 81 aggregated minor occupational groups rather than 353 unit groups means that most occupational groups are represented in each local labour market area, enabling a polarisation index to be calculated for each area on the basis of a more or less equal number of occupational ranks[80].

The first step in calculating the polarisation indices (both static and dynamic) was to calculate the median hourly pay for each 3-digit minor occupational group over the period 1999 to 2003, with hourly pay figures adjusted to 2001 prices using the Consumer Price Index. Occupational groups were then ranked according to their median hourly pay. Using the same data, the share of employment represented by each of these ranked occupational groups in each local labour market was computed, and a quadratic regression of the form $e_{rl} = \beta_0 + \beta_1 r + \beta_2 r^2$ was calculated for each area (where e_{rl} represents the employment share of the occupation at rank r in local labour market area l; and r and represents the rank of that occupation). The fitted values of e_{rl} follow a U-shaped plot if employment in the area is relatively concentrated in low- and high-paid occupations rather than in intermediate occupations (which is the case for most areas). The sum of the fitted employment shares of each occupational rank should theoretically equal 100 per cent, but for many STTWAs the sum of the fitted employment shares is off by a few percentage points, so the constant of the fitted equation is adjusted after the fact to ensure the sum of all fitted employment shares is exactly 100 per cent[81]. To calculate the polarisation index P_l for each local labour market, the fitted

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[79] This will be partly because the number of workers observed in each area is relatively small, particularly in more sparsely-populated local labour market areas, decreasing the probability of observing workers in smaller occupational groups. But in part it may also simply reflect the fact that not all occupations are present in each local labour market. For instance, it is to be expected that workers in an occupation such as 'Senior officials in national government' will be concentrated in London and other large cities and few, if any, such workers might live in rural Wales.

[80] In 72 per cent of areas, at least 75 out of 81 occupations are observed in both periods. In only eight local labour markets fewer than 70 occupations are observed in both periods.

[81] This is to ensure that polarisation index scores aren't skewed by slight differences in the sum of the estimated employment shares.

employment share ($e(r)$) of each occupational rank is multiplied by the squared distance of each rank from the median occupational rank, and the resulting products are summed. Finally, this sum is multiplied by a scalar factor of 4 to ensure that $0 \leq P_l \leq 100$, where a value of 0 would indicate the hypothetical case in which all employment is concentrated in the mid-ranked occupation, and a value of 100 would indicate that all employment is concentrated in the lowest-ranked and highest-ranked occupation. In practice, polarisation values range between 35.7 and 46.0 in 1999-03 and between 38.8 and 46.2 in 2009-13.

$$P_l = 4 \sum_{l=1}^{N} e(r) \left(\frac{r}{N} - 0.5\right)^2$$

To calculate the dynamic polarisation index, instead of the employment share of each ranked occupation, the percentage change in employment share between the two periods was used[82]. The regression was estimated using the initial (1999-2003) employment share as a weight, to ensure that the estimated employment change equation was not unduly skewed by strong percentage changes in very small occupations. The resulting dynamic polarisation index is therefore strongly correlated with the difference between the static polarisation indexes for the two periods, but is not entirely equivalent (Pearson's correlation = 0.85). Both the polarisation index for 2009-13 and the dynamic polarisation index are based on the occupation ranking in 1999-03. Holmes and Tholen (2013) point out that this does not take into account possible changes in the median wage associated with occupations. For instance, some low-paid occupations could become more highly paid over time and move closer towards the middle of the wage distribution, and some high-paid occupations could see a reduction in median pay and therefore also move closer to being a 'middle-wage' occupation. A polarisation measure based on a wage ranking of occupations at the start of a period may therefore not provide a good indication of the share of middle-wage occupations at the end of a period. Examining the data, however, indicates that while between 1999-03 and 2009-13 most occupations see some minor changes in median pay, the ranking of occupations is very similar in both periods (correlation between ranks is 0.99), suggesting that the 1999-03 wage ranking can reliably be used to assess the degree of polarisation in 2009-13, as well as polarisation over time. Appendix H

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[82] Because percentage change in employment share can take negative as well as positive values, this creates a problem when calculating the polarisation index. To overcome this, a constant is simply added to the fitted employment change estimates such that all fitted values are greater than zero. This does not change the shape of the fitted regression line, and so does not affect the value of the polarisation index, but merely ensures that the presence of negative values of $e(r)$ do not distort the calculation of the index.

provides the three polarisation index scores (1999-03, 2009-13 and the dynamic polarisation index) for each STTWA.

While the polarisation index is a useful descriptor of the distribution of employment across occupations, perhaps a more direct measure of the impact of technological change on the occupational structure of local labour markets is to simply look at (changes in) the share of employment in routine occupations. This share was calculated for each local labour market area for the period 1999-03 and for the period 2009-13, and additionally the change in the routine employment share between these periods was also measured. As expected, the correlation between the routine employment share and the polarisation index is negative, indicating that areas with a lower share of employment in routine occupations tend to have a higher polarisation index. The correlation between the two measures is -0.80 for 1999-03 and -0.81 for 2009-13, indicating a reasonably close relationship between the two. The correlation between the dynamic polarisation index and the change in routine share is somewhat less strong at -0.66.

The key feature of the polarisation index is that it weighs employment growth in occupations located further from the median rank more heavily than employment in occupations located closer to the median rank. But it is indiscriminate when it comes to the relative balance of employment growth between low- versus highly-ranked occupations. This means that areas with quite different patterns of employment change can have very similar polarisation scores. It also means that local labour market areas where employment growth is heavily skewed towards one side of the occupational wage ranking (i.e. towards either the lowest-paid occupations or the highest-paid occupations) can have very similar polarisation index scores to areas where the distribution of employment more closely follows the U-shaped plot associated with the notion of job polarisation.

For instance, the local labour market area of Plymouth, Kingsbridge and Dartmouth saw relatively strong employment growth in high-wage occupations over the period 1999-03 to 2009-13, with the share of employment in middle-wage occupations remaining more or less flat, and the share of employment in low-paid occupations falling slightly (figure 5-2). This can perhaps best be described as a process of occupational upgrading, rather than job polarisation. On the other hand, in Birkenhead a moderate degree of polarisation can be observed, while at the same time employment in low-wage occupations grew more strongly than in high-paid occupations. But these two areas have almost identical scores on the dynamic polarisation index.

Figure 5-2: Employment change across ranked occupations in Birkenhead and in Plymouth, Kingsbridge and Dartmouth, 1999-03 to 2009-13
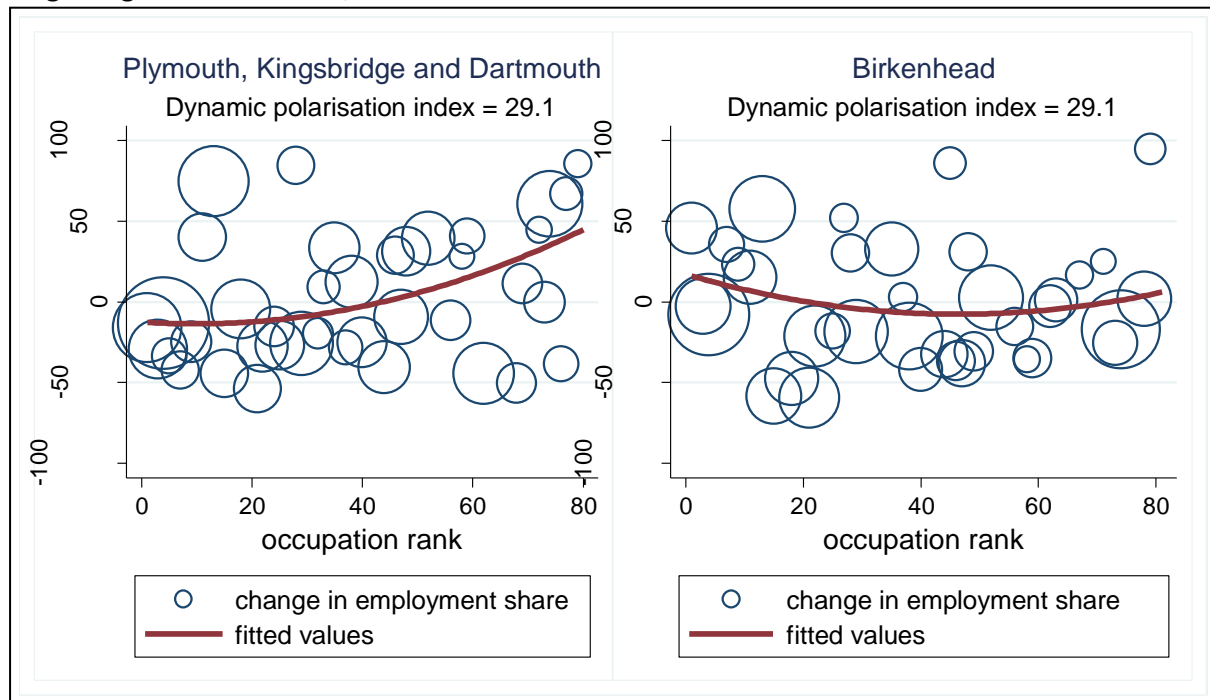
Source: LFS 1999-03 and 2009-13. Markers showing percentage change in employment share are weighted by the initial share of employment in that occupation. Occupation ranks with change in employment share of more than 100% not shown. Employment share changes based on small cell counts suppressed.

To address this issue, a further index is constructed to measure the degree to which employment growth is skewed towards low-paid versus high-paid occupations. This index is used as a control variable in the regression analysis, so that the effect of polarisation – understood as the relative fall of employment in middle-wage occupations compared to low-paid and high-paid occupations – can be isolated from the degree of bias in employment growth towards either low-paid or high-paid occupations. The skill bias index is also calculated as a static measure for the two periods.

The skill bias index is calculated in a similar way to the polarisation index, but instead of weighing (changes in) the employment share of each ranked occupation by the squared distance to the middle occupation rank, it is simply weighed by the distance to the middle occupation rank (ranging from -0.5 for rank 1 to 0.5 for rank 81). The weighed occupational employment shares are summed across all ranks, and this sum is multiplied by two to ensure that the resulting skill bias index S_l falls in the range $-100 \leq S_l \leq 100$. A skill bias index score of -100 would indicate that all employment is concentrated in the lowest-ranked occupation, and a score of 100 would indicate that all employment is concentrated in the highest-ranked occupation. A score of 0 indicates that employment is equally balanced between low-ranking and high-ranking occupations. In the period 1999-03, all but three local labour markets had a negative skill bias, indicating that employment was

skewed towards lower-ranked occupations. Between 1999-03 and 2009-13, however, employment growth across virtually all areas was biased towards higher-paid occupations, so the dynamic skill bias index has positive values for almost all areas[83].

5.5.8   Control variables

As well as the degree of skill bias in the local labour market, two further area-level variables controlled for in the regression analysis are the regional unemployment rate in 2001 and the increase in regional unemployment between 2001 and 2011 (all regions saw an increase in the unemployment rate over this period as a result of the 2008-9 recession). Unemployment is measured at the level of government office regions and calculated by simply dividing the number of unemployed individuals by the number of economically active individuals (unemployed plus employed) for each government region. The unemployment rate for England and Wales as a whole was 5.2 in 2001 and 7.1 in 2011, according to the ONS LS data. The 2011 figure is markedly lower than the unemployment rate in the LFS for the same year (8.1 per cent). The fact that there is a discrepancy in the unemployment rate calculated from the LFS when compared with the census has been documented by the Office for National Statistics, with differences between the reference periods for both surveys, an underrepresentation of working women in the LFS sample, and differences in questioning being mentioned as possible reasons for the discrepancy (ONS, 2012a).

There are a small number of individuals (254 in the total sample) who, although they live in the same STTWA in 2011 as in 2001, move from one region to another. This is because the boundaries of regions and Travel-To-Work-Areas are not contiguous and so it is possible to relocate *within* the same (S)TTWA and still cross the boundary between one region and the next. This affects mostly workers in the London STTWA (123 out of 2,856 sample members who live in the London STTWA in both 2001 and 2011 move between regions). For these workers, the change in unemployment is calculated as the difference between the unemployment rate in the region where they lived in 2001 and the unemployment rate in the region where they lived in 2011.

A number of individual-level control variables are also included. These include several individual characteristics observed in 2001: gender, age, ethnic group, migrant status[84], English language

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[83] Skill bias scores for each STTWA are provided in appendix H.

[84] Here a distinction is made between those born in the UK, those born in Europe, North America, Oceania, and Japan, and those born in the rest of the world. A list of countries included in each of these categories can

proficiency, limiting health conditions, and highest qualification. Several job-related variables, also observed in 2001, are included: occupation (SOC2000 sub-major groups), full- or part-time working hours, and firm size. Industry of employment in both 2001 (SIC2003 major groups) and in 2011 (SIC2007 major groups)[85] are also included as controls. Controls furthermore include a number of household-level variables: household composition, housing tenure, and the number of dependent children in the household. These are all observed in 2001. Lastly, to reflect the fact that the characteristics and circumstances of individuals might change between 2001 and 2011, a number of dynamic control variables are added: whether the individual obtained any additional qualifications, whether they developed a limiting health condition, and whether they had any (additional) children. This last variable is interacted with gender as it is likely that the (negative) effect of having children on occupational advancement will be greater for women. A full list of all control variables can be found in appendix L.

5.6   Results

This section is divided into three sub-sections. The first section (5.6.1) presents data from the British Household Panel Survey and Longitudinal Study on mobility from low-paid occupations to other occupational categories, including changes in mobility patterns over time. Section 5.6.2 considers geographic differences in job polarisation across England and Wales, using Labour Force Survey data. Finally, section 5.6.3 discusses the impact that job polarisation has had on occupational mobility from low-paid occupations.

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be found in appendix L. The reason it may be important to control for whether individuals are UK born, or have migrated to the UK from different parts of the world is that migrants, especially those from relatively poorer countries outside of Europe, North America and Australia/New Zealand, are often employed in lower-skilled occupations than would appear to be commensurate with their qualifications and skill level before emigrating, perhaps owing to labour market discrimination or other factors. Some research suggest that such workers may therefore have greater potential for occupational progression as their actual skill level becomes apparent over time (Gordon and Kaplanis, 2014), but in the analysis presented here there is little evidence of such a finding as the effect of being a migrant from the rest of the world on occupational advancement is negative (see appendix M).

[85] When estimating the multinomial logit models, which include transitions to non-employment as well as to the various occupational categories, a potential problem is that respondents who are not in work in 2011 do not technically have an industry. However, in the 2011 Census industrial codes are also recorded for individuals who are not in employment, in which case industry codes refer to the industry in which they were last employed. Although not all out-of-work respondents provide the industry of their last job, in the total usable sample available for the multinomial analysis (that is, members of the core sample for whom information is recorded on all other variables in the model), there are only 182 workers who are no longer in employment in 2011 and who do not have a recorded industry code (2.7 per cent of the sample). The exclusion of these workers is therefore unlikely to present a major problem.

5.6.1   Occupational mobility analysis

This section presents data from the BHPS and ONS LS to provide a sense of the amount of mobility from low-paid occupations to other occupational categories, and how this has changed over time. To see if there is any evidence that rates of progression from low-paid occupations have fallen in recent decades, as might be expected given the decline in the number of intermediate jobs, figure 5-3 shows mobility rates from low-paid occupations (as defined in table 5-3) to all other occupational categories over the period 1991 to 2008. Mobility rates are calculated over a period of five years on a forward-looking basis: for all workers starting off in a low-paid occupation in a particular year, it is calculated what proportion has moved into an occupation belonging to a higher-paid category five years later. Only workers in paid employment at both start and end dates are included in the sample, so transitions out of paid employment are not taken into account. Unfortunately the number of workers in the BHPS who are in paid employment and working in a low-paid occupation is not very large, and the number of these workers who are observed again five years later (and still of working age and employed with a known occupation) is reduced further, so the sample size for each year is just over 700 on average. This means that the estimates for specific years are subject to a rather large margin of uncertainty, but the general trend does provide some indication of the change in mobility from low-paid occupations over time. The data presented in figure 5-3 indicate that between 1991 and 1999/2000, the proportion of low-paid workers moving into a higher-paid occupation within five years was more or less stable, and perhaps even increased slightly. But since the year 2000, mobility from low-paid to higher-paid occupations appears to have declined[86].

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[86] Data for 2004 is not available, as BHPS interviews skipped a year in 2009 due to the BHPS being incorporated into Understanding Society from its second wave onwards. BHPS wave 18 interviews took place in 2008, and the interviews for Understanding Society wave 2 (which in effect equates to the 19th wave of the BHSP), did not take place until 2010. For this reason, five-year mobility rates for workers observed in a low-paid occupation in 2004 could not be calculated.

Figure 5-3: Mobility rates from low-paid occupations to all higher-paid occupations between _t_ and _t+5_, by initial year worker is observed (_t_)
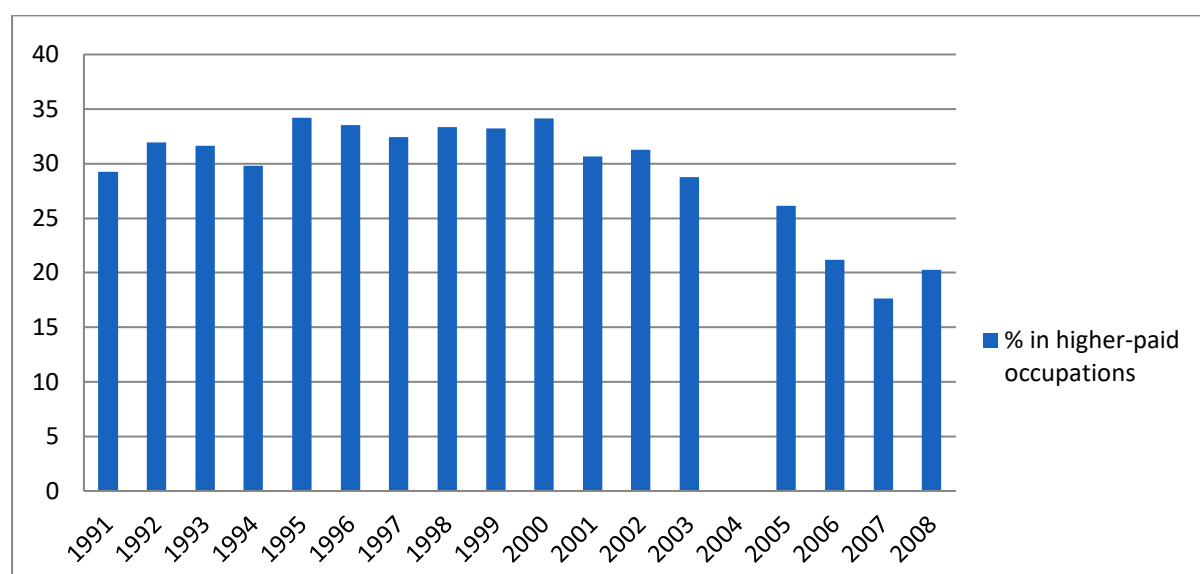
Source: BHPS/Understanding Society. Weighted estimates. N = 12,104.

It is worth noting that in wave 16 of the BHPS the wording of the question relating to respondent's occupation was changed. Instead of being asked to provide their job title and describe the sort of work they do as in earlier waves, from wave 16 onwards respondents are first asked if they are still in the same occupation as the previous year. Only if they answer negatively are they asked to provide the job title and a description of the occupation they are now employed in. This change in questioning may have led fewer recorded changes in occupations from about 2006 onwards, and therefore may partly explain the decline in mobility rates observed in figure 5-3 (note that in figure 5-3 the x-axis represents the start year of each five-year period).

Even if the downward mobility trend shown in figure 5-3 may therefore be caveated to some degree, the BHPS data do present a striking contrast between the change in mobility from low-paid to routine occupations and the change in mobility from low-paid into other higher-paid occupations (figure 5-4). This divergence seems unlikely to be explained by the change in questioning, and therefore seems more strongly indicative of the notion that, as the share of employment in routine, intermediate occupations has declined, so has mobility into these occupations from lower-skilled occupations. While again, the year-to-year changes in mobility rates presented in figure 5-4 should be interpreted with caution due to the relatively small yearly samples, it suggests that mobility into routine occupations fell strongly from the year 2000 onwards, while mobility into other higher-paid occupations appears to have increased during 2000-2003. However, in the second half of the 2000s,

mobility into non-routine higher-paid occupations also appears to be in decline, something which may have been related to the recession which affected the UK from 2008 onwards[87].

Figure 5-4: Mobility rates from low-paid occupations to routine occupations and other higher-paid occupations between *t* and *t+5*, by start year (*t*)
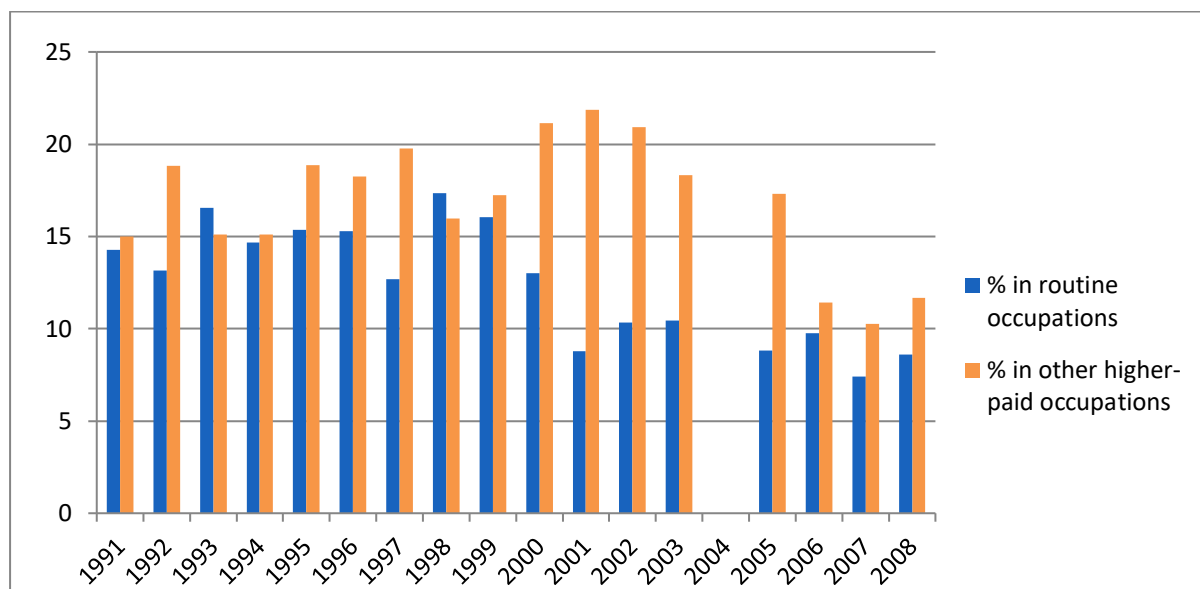
Source: BHPS/Understanding Society. Weighted estimates. N = 12,104.

Table 5-8 confirms the picture presented by figures 5-3 and 5-4 of falling movement from low-paid to routine occupations and relatively stable mobility rates to other higher-paid occupations. Here occupational transitions are analysed over a ten year period and observations are pooled over multiple years to increase sample size. The two columns compare ten year mobility rates for workers who started off in a low-paid occupation in 1991-1993 and workers who started off in a low-paid occupation in 2001- 2003. The amount of movement into routine occupations is clearly lower in the period 2001-03 to 2011-13 than in the period 1991-93 to 2001-03, while the amount of mobility into other higher-paid occupational categories increased slightly in the later period, although the difference is not significant. The breakdown of mobility rates into the separate higher-paid occupational categories in rows 4-7 indicates mobility to associate professional and professional occupations increased in particular (although for professional occupations the difference is not statistically significant).

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[87] As these mobility rates are forward-looking, the figure for the year 2005 relates to mobility between 2005 and 2010, the figure for 2006 relate to mobility between 2006 and 2011, and so on. It is thus plausible that the decline in mobility from low-paid to non-routine higher-paid occupations from around 2006 onwards was in part caused by the recession, as workers initially observed in 2006 may have been negatively affected by the recession in terms of their chances of having progressed to a higher-paid occupation by 2010.

Table 5-8: Destinations after 10 years for workers starting off in low-paid occupations, by period (%)

Occupational category	1991-93 to 2001-03	2001-03 to 2011-13
Low-paid	56.9	61.0
Routine	18.5	11.7
All other higher-paid	24.6	27.4
Intermediate	5.1	2.1
Associate professional	7.8	9.6
Managerial	8.5	8.5
Professional	3.2	7.2
N	1,373	1,502

Source: BHPS/Understanding Society. Weighted estimates. N = 2,875.

Another observation that can be made from figure 5-4 and table 5-8 is that, although mobility into routine occupations may have fallen since the 1990s, even in the earlier period (1991-93 to 2001-03), progression from low-paid to non-routine higher-paid occupations (intermediate, (associate) professional and managerial occupations) was higher than from low-paid to routine occupations. This is an important point to bear in mind, especially since arguments about the potential effect of job polarisation on occupational mobility often appear to be based on an implicit assumption that progression from low-paid jobs mostly involves mobility into occupations located around the middle of the wage distribution. This assumption can be detected in assertions that declining numbers of middle wage jobs may create a "bottleneck" for upwardly mobile workers (Holmes and Tholen, 2013, p. 2), or that the comparatively low and declining number of intermediate jobs in the UK means that "there are fewer jobs for low-paid workers to aspire to and get promoted into" (Social Mobility and Child Poverty Commission, 2016, p. 127). Table 5-8 suggests that over the past few decades there has always been a substantial group of low-skilled workers who moved from low-paid occupations into professional and managerial occupations located further up the wage distribution.

There is a question, however, about the extent to which these workers moved directly from a low-paid into one of these higher-paid occupations, rather than making a more gradual transition using a routine or other intermediate occupation as a stepping stone. In table 5-9, therefore, additional data is presented to shed light on this. The table presents 10-year transitions from low-paid to higher-paid occupations (other than routine occupations or intermediate occupations), broken down by whether, in the intervening nine years, workers were observed in a routine or other intermediate occupation. Of course, just because a worker is observed in a routine occupation at some point between being observed in a low-paid occupation and being observed in a managerial or (associate)

professional occupation does not mean that the routine occupation served as a stepping stone towards the higher-skilled occupation. Some workers may have moved from a low-paid occupation in the beginning of the period, to a managerial or professional occupation, then temporarily to a routine occupation, and then back to a managerial or professional occupation – in which case the routine occupation did not strictly function as a stepping stone. But it provides an upper limit of the extent to which routine/intermediate occupations play a stepping-stone function in the occupational progression of low-paid workers. As can be seen in table 5-9, in only about a third of cases do ten-year transitions from low-paid occupations to higher-paid (associate professional, managerial or professional) occupations involve a routine or intermediate occupation as a stop-gap. This suggests that for the majority of workers moving into higher-paid occupations during the period 1991-2013, the availability of jobs in intermediate occupations was of little importance. What is interesting to note, however, is that the stepping-stone role of intermediate occupations appears to have been more important in the 1990s and early 2000s than in the late 2000s and 2010s. When separating ten-year transitions into those which started before 1997 (and ended before 2007) and those which started in or after 1997, it can be seen that during the earlier period a greater share of mobility from low-paid to higher-paid occupations involved one or more years of being employed in a routine or other intermediate occupation than was the case in the later period. This suggests that perhaps in the past, upward mobility did more commonly take the form of a gradual ascent from relatively low-skilled and low-paid occupations, to middle-skilled occupations, and then on to higher-skilled, higher-paid occupations. But in more recent decades the importance of routine and other intermediate occupations as a stepping stone to higher-paid occupations seems to have diminished. Since 1997, the majority of workers appear to have been able to move from low-paid occupations to relatively high-paid associate professional, managerial and professional occupations without working in a routine or other intermediate occupation in between.

Table 5-9: Occupational advancement from low-paid to non-routine higher-paid occupations involving routine and other intermediate occupations as a stepping stone (%)

	10-year periods starting before 1997	10-year periods starting in/after 1997	Total
Transitions involving a routine/intermediate occupation	39.9	32.0	36.4
Transitions not involving a routine/intermediate occupation	60.2	68.0	63.6
N	598	635	1,233

Source: BHPS/Understanding Society. Weighted estimates. Sample includes workers who moved from a low-paid to a higher-paid occupation only. N= 7,961

The considerable amount of mobility from low-paid occupations to professional and managerial occupations is something also picked up by Holmes and Tholen (2013), where it is suggested that mobility from low-paid service occupations to managerial and (associate) professional jobs probably reflects workers moving along internal career paths within specific industries, for example in healthcare or retail. It is plausible that as the share of jobs in routine occupations has declined, this type of mobility from low-paid to better non-routine occupations is becoming more commonplace as workers are forging new career paths in a changing occupational landscape. Indeed the fact that occupational mobility seems to have increased in tandem with the changing structure of the labour market (Kambourov and Manovskii, 2008; Rhein and Trübswetter, 2012) suggests that occupational trajectories may be adapting to shifting occupational structures. But given that for a considerable proportion of low-paid workers routine occupations still appear to be a route towards upward mobility (whether as final destination or stepping-stone), it remains an important question whether the career progression of low-paid workers is affected by the local availability of routine jobs.

Occupational mobility in the ONS LS is now examined. The ONS LS has a larger sample size than the BHPS, which means it is possible to study occupational mobility of different groups of low-paid workers to provide a sense of the importance of routine occupations as a destination for different types of upwardly mobile workers.

Table 5-10 shows the destinations of workers who begin in a low-paid occupation in 2001 and are still in paid employment in 2011. Here the occupational categories are defined according to the SOC2000 code of ONS LS respondents, as detailed in table 5-3, and so mobility rates cannot be directly compared to those based on the BHPS and defined according to ISCO-88 codes presented in the previous section. The difference in occupational classifications may explain why progression rates to the different occupational categories differ somewhat between the two surveys[88]. Looking at all workers first, in total about 43 per cent of workers who were working in a low-paid occupation in 2001 had moved into a higher-paid occupation by 2011. However, there are notable differences between men and women both in terms of the overall proportion of upwardly-mobile workers and in terms of the occupational categories they are most likely to move into. Occupational progression out of the low-paid category to all other occupational categories is higher for male workers (53 per cent) than for female workers (37 per cent). Although the overall proportion of male workers who move into a routine intermediate occupation is greater than that of female workers, when

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[88] Another factor may be the fact that, as discussed on p. 11, the ONS LS data possibly slightly overestimates occupational mobility due to the imputation of SOC2000 codes for 2011 observations.

considering only those workers who make an 'upward' occupational transition (i.e. only those who move out of the low-paid occupational category into one of the higher-paid occupational categories), women appear more likely than men to achieve this upward mobility by moving into routine intermediate occupations. Men, on the other hand, are much more likely to move into non-routine intermediate occupations.

Table 5-10: Occupational destinations in 2011 for workers starting off in low-paid occupations in 2001 and in paid employment at 2011

	All workers			Upwardly mobile workers only		
Occupational category	% male	% female	% total	% male	% female	% total
Low-paid	46.9	62.8	57.1			
Routine	17.7	15.5	16.3	33.4	41.7	38.0
Intermediate	12.8	0.6	5.0	24.1	1.6	11.6
Associate professional	8.2	9.0	8.7	15.4	24.1	20.2
Managerial	10.6	7.5	8.6	19.9	20.2	20.0
Professional	3.9	4.6	4.4	7.3	12.4	10.1
Total	100	100	100	100	100	100
N	9,108	16,174	25,282	4,834	6,011	10,845

Source: ONS LS, 2001 and 2011.

To test whether non-random attrition affects the results presented in table 5-10, the same analysis was performed using the longitudinal weights discussed on p. 162-163. The results in this case are comparable to those in table 5-10 (and are reported in appendix J) indicating attrition is not a concern.

Table 5-11 shows rates of occupational transition for workers with different qualification levels in 2001. The qualifications are split into the five levels reported in the census. Level 1 is equivalent to 1-4 GCSEs, O Levels, or CSEs (at any grades), or an equivalent such as an Entry Level qualification. Level 2 is equivalent to having 5 or more GCSEs (at grades A*-C), 5 or more O-Levels or 5 or more CSEs at grade 1, or an equivalent vocational qualification such as a level 2 NVQ or BTEC. Level 3 is equivalent to 2 or more A Levels or 4 or more AS Levels, or a level 3 vocational qualification such as a level 3 NVQ, an advanced GNVQ, or RSA Advanced Diploma. Level 4 and above is achieved with a degree (BA, BSc), a postgraduate degree, a level 4 vocational qualification such as an HNC, HND, or Higher Level BTEC, or a professional qualification such as teaching, nursing, or accountancy.

Occupational advancement is clearly higher the more education workers possess, with 30 per cent of those without qualifications having moved to a non-low-paid occupation by 2011, compared with 65 per cent of those with a level 4 qualification. As might be expected, the importance of routine intermediate occupations as a destination for upwardly mobile workers appears to be greater for those with relatively low qualifications, with more highly qualified workers comparatively more likely to move into associate-professional, professional and managerial occupations. The impact of declining employment in routine occupations may therefore have a greater effect on those with low and moderate levels of education.

Table 5-11: Occupational destination in 2011 for workers starting off in low-paid occupations in 2001 and in paid employment at 2011, by highest qualification (2001)

A) All workers

Occupational category	No qualifications	Level 1: 1-4 GCSEs/ O-Level	Level 2: 5+ GCSEs/O-levels	Level 3: 2+ A-Levels/ HSC/NVQ3	Level 4: Degree level and above	Unknown/ other qualification
Low-paid	70.3	59.7	52.1	42.6	34.8	59.9
Routine	14.1	17.6	18.0	15.9	11.3	17.9
Intermediate	7.4	5.4	3.6	2.1	1.7	7.7
Associate professional	3.1	6.9	11.5	16.7	18.0	5.0
Managerial	4.0	8.2	10.5	14.2	14.0	6.3
Professional	1.0	2.4	4.3	8.4	20.2	3.2
N	6,041	7,596	6,560	2,008	1,816	1,261

B) Upwardly mobile workers only

Occupational category	No qualifications	Level 1: 1-4 GCSEs/ O-Level	Level 2: 5+ GCSEs/O-levels	Level 3: 2+ A-Levels/ HSC/NVQ3	Level 4: Degree level and above	Unknown/ other qualification
Routine	47.5	43.5	37.6	27.6	17.4	44.6
Intermediate	25.0	13.4	7.4	3.7	2.6	19.3
Associate professional	10.6	17.0	24.0	29.1	27.6	12.4
Managerial	13.6	20.3	21.9	24.9	21.5	15.8
Professional	3.4	5.8	9.1	14.7	30.9	7.9
N	1,795	3,063	3,145	1,152	1,184	506

Source: ONS LS, 2001 and 2011.

5.6.2 Job polarisation in local labour markets in England and Wales

Having assessed the extent of occupational mobility from low-paid occupations to intermediate occupations over time and for different groups of workers, this section describes spatial differences in the share of employment in intermediate occupations, and differences in the degree to which employment in these occupations has declined between the early 2000s and early 2010s. This provides a context for section 5.6.3 in which the effect of the local degree of job polarisation is examined through regression modelling. By having a better understanding of the sorts of areas which were affected by polarisation to a greater or lesser degree during the 2000s, it will be easier to interpret the results of the regression analysis and draw conclusions about whether there are areas of England and Wales where workers may have been better able (or less able) to progress to higher-paid occupations.

First, to demonstrate that this was a period of increasing job polarisation, figure 5-5 shows how the employment shares of 3-digit occupations changed between 1999-03 and 2009-13 across the whole of England and Wales. Occupations are ranked on the basis of median hourly pay (from lowest-paid at rank 1 to highest-paid at rank 81), and the percentage change in the employment share of each ranked occupation is shown along the y-axis, with the size of the markers proportional to the initial share of employment in each occupation.

Figure 5-5: Changes in employment share of ranked occupations, England and Wales, 1999-03 to 2009-13
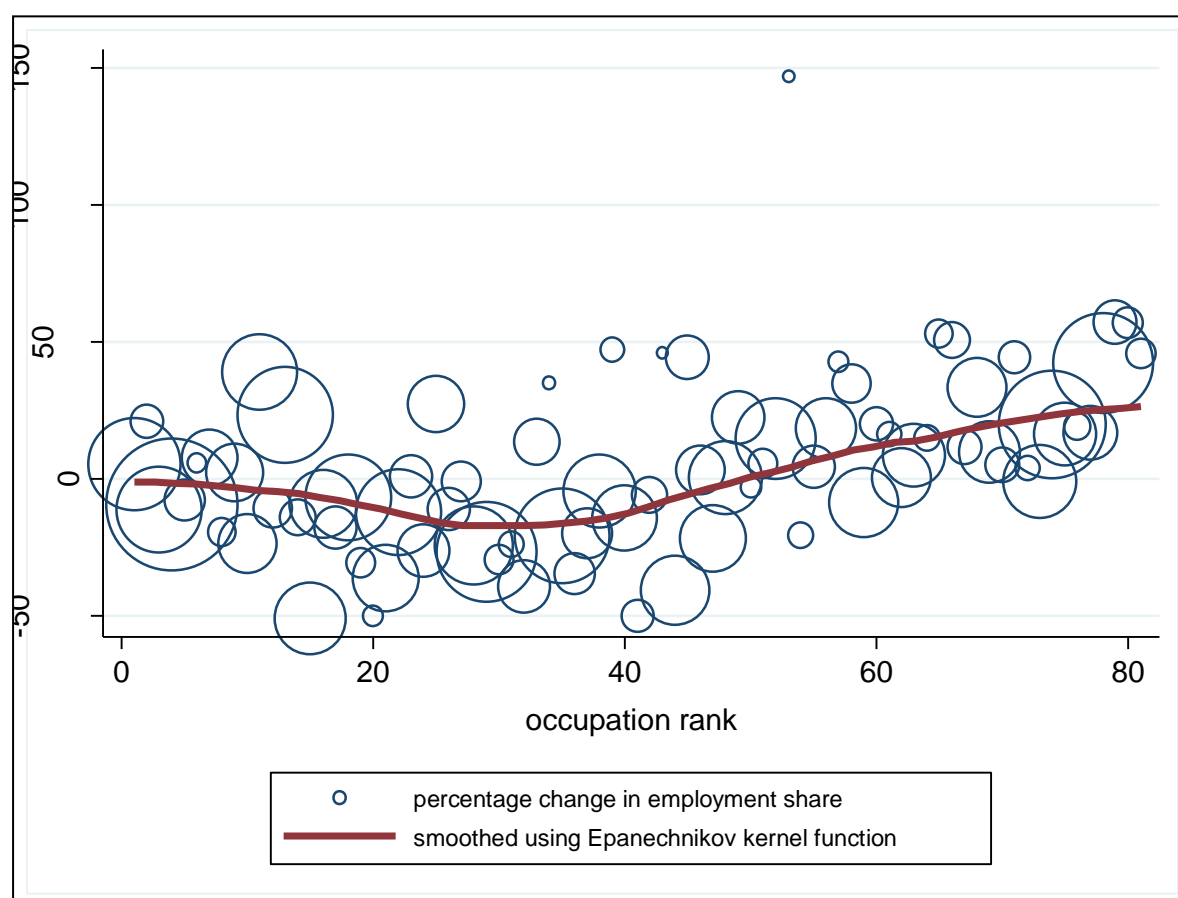
Source: Labour Force Survey, 1999-03 and 2009-13. N = 329,952.

Figure 5-5 clearly suggests a pattern of job polarisation over time. Employment in low-paid occupations remained more or less stable between 1999-03 and 2009-13, while employment in occupations around the middle of the wage ranking fell in relative terms, and the employment share of higher-paid occupations increased.

Job polarisation in 1999-03

Due to differences in industrial and functional specialisation (Duranton and Puga, 2005), as well as differential exposure to routine-biased technological change and trade, the occupational structure of local labour markets in the early 2000s varies substantially. Across local labour markets, there are therefore variations in the degree to which employment is polarised in low-paid and high-paid occupations in the period 1999-03. In figure 5-6, a map is shown of all STTWAs in England and Wales,

with areas with a higher polarisation index score shaded in dark grey, and areas with lower scores in lighter grey.

There appears to be no clear geographic pattern when it comes to the degree of job polarisation. Among the local labour markets with the highest degree of polarisation several are located in the South East of England, but the most polarised STTWAs also include two areas of Wales (the STTWAs of Aberystwyth, Tywyn, Cardigan, Haverfordwest & Pembroke, and Bangor, Pwlleli and Colwyn Bay) and three in the North of England (Harrogate & Northallerton, Lancaster, Morecambe & Kendall, and Crewe). These areas are mostly rural and, for the most part, relatively affluent. The lowest degrees of polarisation are found in the Midlands, parts of Wales and the North of England.

Figure 5-6: Map of job polarisation in England and Wales, by Super-Travel-To-Work-Area, 1999-03
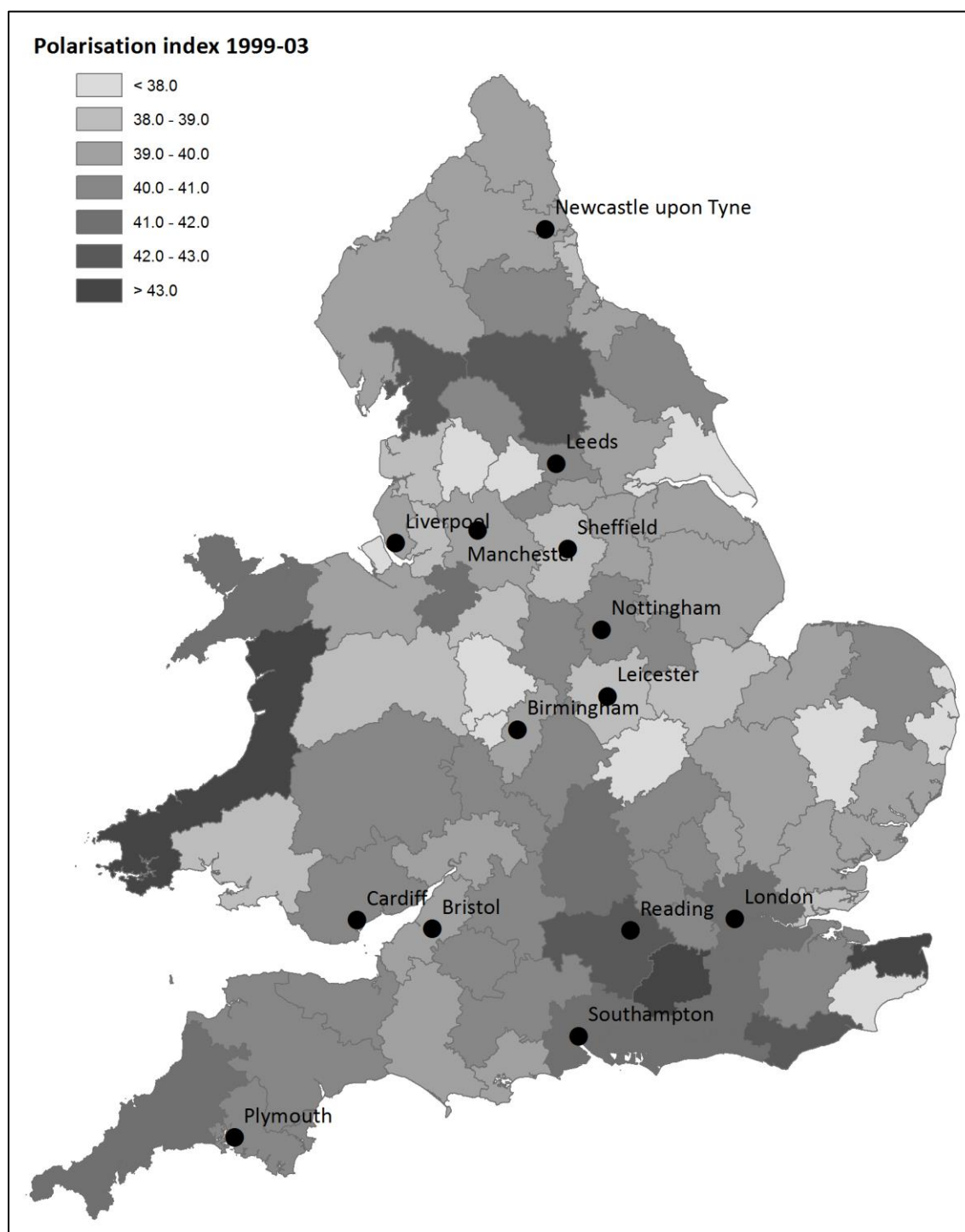
Source: LFS, 1999-2003.

Table 5-12 lists the STTWAs with the highest and lowest polarisation index scores for 1999-03. The ten STTWAs with the lowest polarisation scores are mostly former industrial areas in the North of England and the midlands (Blackburn & Burnley, Bradford & Halifax, Wolverhampton & Walsall, Dudley, Northampton, Kettering & Corby) or coastal cities with a history of shipbuilding and fishing

(Birkenhead, Hull, Lowestoft & Great Yarmouth, Folkestone & Ashford). The skill bias in all of these areas is decidedly negative, with large concentrations of employment in low-paid occupations such as elementary cleaning occupations, sales assistance occupations, transport occupations and process operative occupations. An illustration of the typical occupational structure of these weakly-polarised areas is provided in figure 5-7, which shows the actual and fitted employment shares of ranked occupations for the STTWA of Wolverhampton, Walsall and Stafford showing a relatively high share of employment in several lower-paid occupations, a reasonably high share in a number of middle-wage occupations and a relatively low concentration of employment in most high-wage occupations.

Table 5-12: Most and least polarised STTWAs, as measured by polarisation index, 1999-03

Most polarised STTWAs	Polarisation index
Aberystwyth, Tywyn, Cardigan, Haverfordwest & Pembroke	46.0
Guildford and Aldershot	43.7
Canterbury & Margate	43.5
Harrogate & Northallerton	42.6
Lancaster, Morecambe & Kendall	42.4
Reading, Basingstoke & Newbury	42.3
Eastbourne & Hastings	42.1
Crewe	41.7
Southampton	41.7
Bangor, Pwlleli & Colwyn Bay	41.6
Least polarised STTWAs	Polarisation index
Northampton, Kettering & Corby	37.8
Bradford & Halifax	37.5
Hull	37.5
Folkestone & Ashford	37.4
Bury St Edmunds & Thetford	37.4
Wolverhampton, Walsall & Stafford	37.3
Birkenhead	37.2
Lowestoft & Great Yarmouth	36.9
Blackburn & Burnley	35.8
Dudley	35.7

Figure 5-7: Actual and fitted employment share by ranked occupation, Wolverhampton, Walsall & Stafford, 1999-03
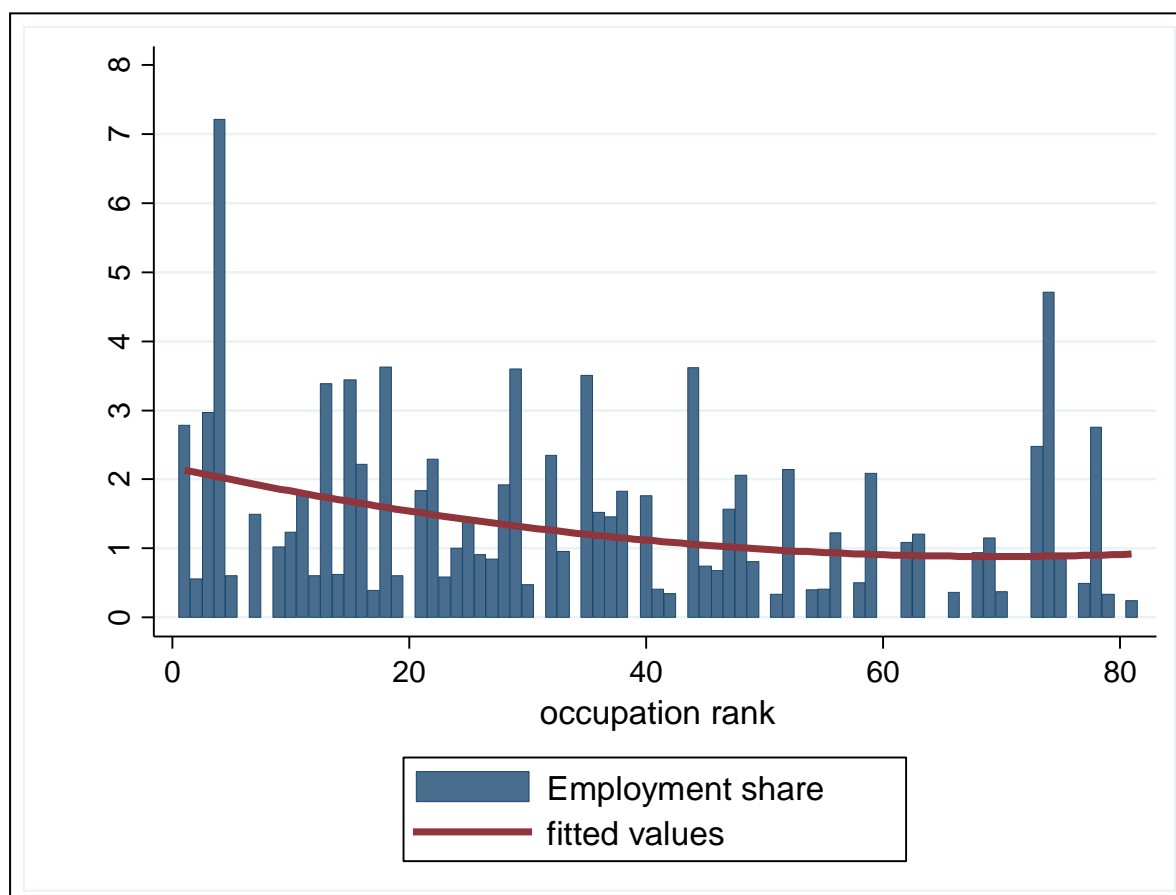
Source: LFS 1999-03. Occupation ranks with smallest employment shares have been suppressed to prevent data disclosure.

Compared to the least polarised local labour markets, the ten most highly polarised areas have fewer similarities. Two main groups can be discerned. The largest group are STTWAs are non-metropolitan, with relatively high concentrations of employment in low-skilled occupations (and thus a negative skill bias), but with a smaller concentration in one or several highly-paid occupations. STTWAs in this category are Eastbourne & Hastings, Canterbury & Margate, Lancaster, Morecambe & Kendall, Bangor, Pwlleli & Colwyn Bay, and Aberystwyth, Cardigan, Haverfordwest & Pembroke. Several of these STTWAs include towns or cities with universities (Aberystwyth, Bangor, Canterbury, Lancaster), which explains the relatively large number of workers employed in teaching professions in these areas. Additionally, Canterbury & Margate and Eastbourne & Hastings also have higher than average shares of workers employed as production managers and office managers. The second group are urban STTWAs where the balance between low-skilled and high-skilled employment is much more equal, being on the whole even slightly skewed towards high-skilled occupations. STTWAs in this category are Guildford and Aldershot, Reading, Basingstoke & Newbury, and

Southampton, local labour markets which are all relatively close to London. These areas have a higher than average proportion of workers in information and communication professions, engineering professions, and functional managerial occupations, as well as relatively high employment shares in several low-paid occupations, such as sales assistance occupations, and security occupations. The difference between the occupational structures of highly polarised yet negatively skill-biased and highly polarised but positively skill-biased local labour markets is illustrated in figure 5-8, which shows the actual and fitted employment shares across ranked occupations for Canterbury & Margate, and Reading, Basingstoke & Newbury. This shows the contrast between the comparatively high concentration in low-wage occupations in Canterbury and Margate, and the more highly skilled occupational bias of Reading, Basingstoke and Newbury. The local labour markets of Harrogate & Northallerton and Crewe fall somewhere in the middle of these two types.

Figure 5-8: Actual and fitted employment share by ranked occupation for Canterbury & Margate, and Reading, Basingstoke & Newbury, 1999-03
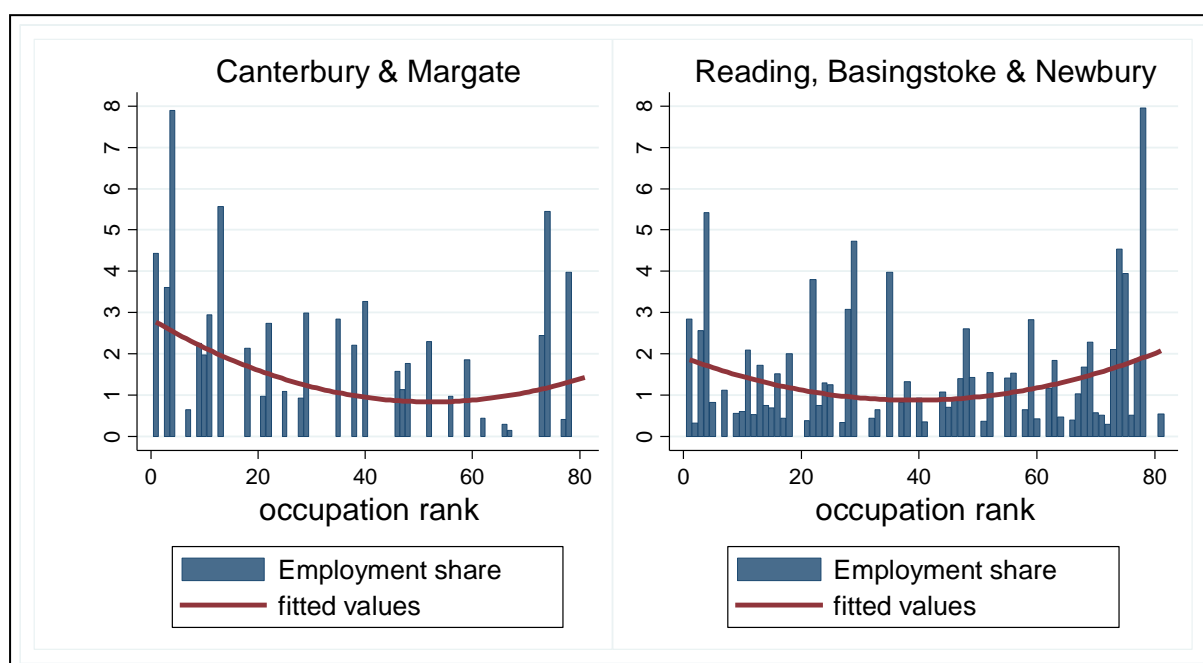
Source: LFS 1999-03. Occupation ranks with smallest employment shares have been suppressed to prevent data disclosure.

Job polarisation from 1999-03 to 2009-13

Now the extent to which local labour markets experienced polarised employment growth over the period between 1999-03 and 2009-13 is considered. When examining changes in occupational employment shares, it becomes clear that the trend towards increased concentration of employment in low- and high-paid occupations shown in figure 5-6 is common to most local labour market areas in England and Wales – in all but a handful of STTWAs employment growth was in a polarised form. A map of the geography of job polarisation over time is presented in figure 5-9. It suggests that the major cities (Leeds, Manchester, Sheffield, Nottingham, Leicester, Birmingham, Bristol and London) tended to see relatively strong increases in polarisation over the ten year period. Additionally, employment seems to have polarised relatively strongly in parts of the South East (especially the northern home counties, Oxfordshire and Northamptonshire), the East of England, parts of the South West (especially Wiltshire and East Somerset), and parts of Wales.

Figure 5-9: Map of dynamic job polarisation in England and Wales over the period 1999-03 to 2009-13, by Super-Travel-To-Work-Area
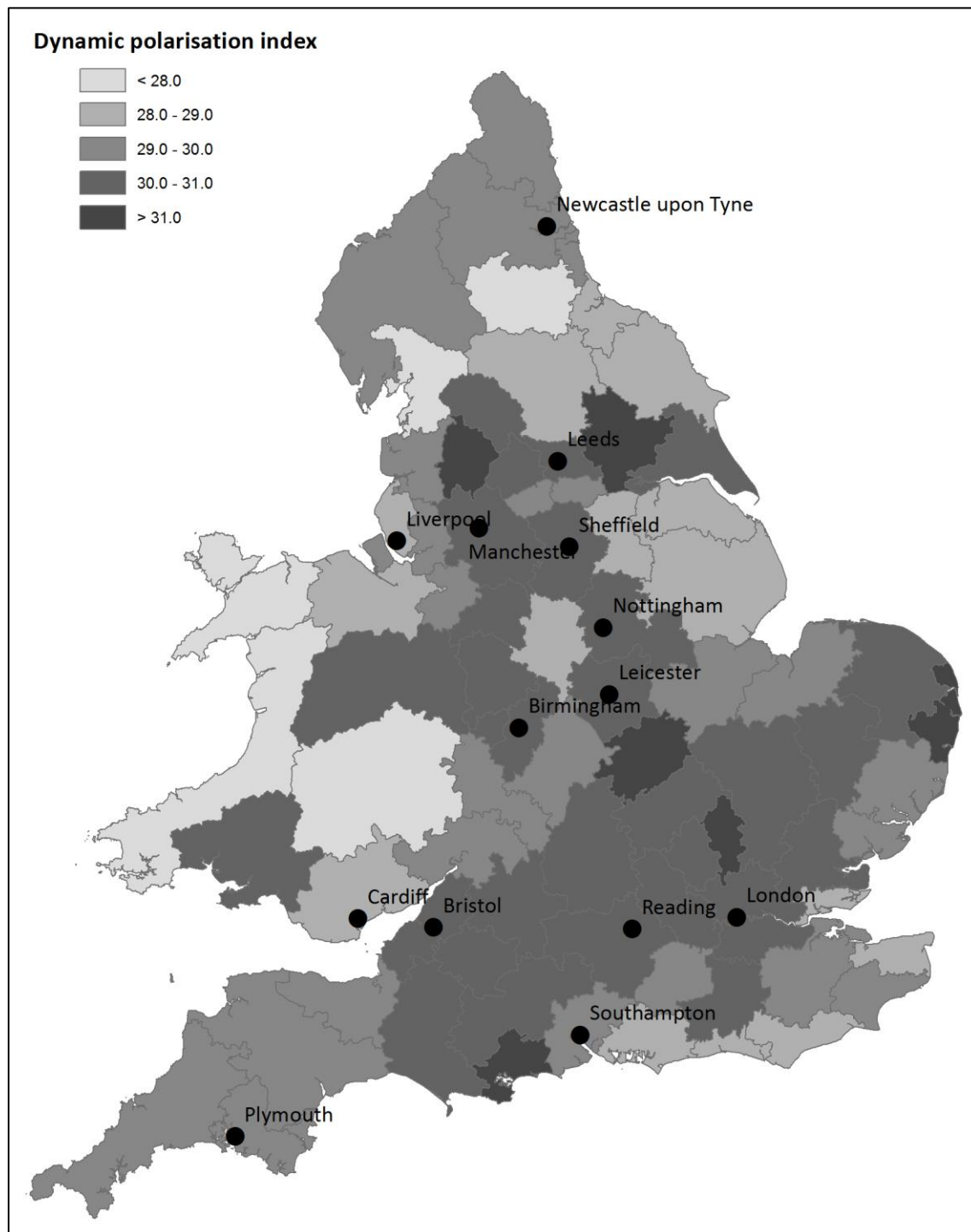
Source: LFS, 1999-03 and 2009-13.

To assess whether job polarisation occurred more strongly in urban areas during the 2000s, in line with findings from the Netherlands and West Germany (Dauth, 2014; Terzidis, Van Maarseveen and Ortega-Argilés, 2017), dynamic polarisation scores are compared between urban and non-urban

areas. For this purpose urban areas are defined as the STTWAs which correspond most closely to Primary Urban Areas (PUAs) with a population of more than 250,000[89]. Contrasting average polarisation in urban STTWAs with non-STTWAs provides some indication of a higher degree of polarisation in urban areas, with average dynamic polarisation index of urban STTWAs of 30.1 against an average index of 29.7 for non-urban areas (standard deviation in polarisation index is 1.2). Moreover, out of 21 urban STTWAs, 15 have a higher-than-average dynamic polarisation index. These findings suggest there may be a relationship between the degree of agglomeration of an area and the strength of employment polarisation, although there is not a clear-cut difference between urban and non-urban areas when it comes to the extent to which employment polarised during the 2000s. This conclusion is consistent with Kaplanis (2009), who found a small, yet statistically insignificant difference in job polarisation between metropolitan areas and non-metropolitan areas in Great Britain (although this finding relates to an earlier time period).

Moreover, agglomeration is clearly not the only factor related to job polarisation, as there are a number of STTWAs that saw relatively polarised employment growth without containing major population centres (for example, Stevenage and Welwyn Garden City, York, and Northampton, Kettering and Corby). The other two factors correlated with increased job polarisation over time are the degree of polarisation evident in 1999-03, and the degree of positive skill bias in the local labour market.

The first of these, the level of job polarisation in 1999-03, is negatively related to the degree of dynamic polarisation, with areas that have lower initial polarisation index scores – reflecting higher-than average employment in routine occupations – seeing, on average, more strongly polarised employment growth (correlation = -0.52), as is illustrated in figure 5-10. The negative correlation between these measures fits the observation made by Autor and Dorn (2013) in the US that areas with a higher initial proportion of employment in routine occupations saw greater polarisation between 1980 and the mid-2000s. As discussed previously, many of the areas with relatively high concentrations of employment in routine intermediate occupations (and, therefore, low polarisation) in 1999-03 were areas which in the 1970s and 1980s had strong manufacturing, mining

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[89] Population counts at time of the 2001 Census. Primary Urban Areas were defined by the Department for Communities and Local Government in 2006 as a tool for analysing the major cities in England. In total 56 PUAs were defined, based on a population cut-off of 125,000, but here only the largest PUAs are included. STTWAs were best-fit to PUAs as their boundaries differ, with PUAs being slightly larger, on the whole, than STTWAs centred on major urban settlements. PUAs are only defined for England, and consequently so are urban STTWAs, but when the Cardiff and Swansea TTWAs are included in the urban definition, the difference in average polarisation between urban and non-urban areas is very similar.

and/or shipping industries, but which have since seen a gradual decline in the number of workers employed in these industries. Despite this gradual decline in manufacturing employment, many of these areas still had higher-than-average employment shares in occupations such as printing trades, electrical trades, and metal machining trades, as well as relatively high proportions of employment in administrative occupations, in the late 1990s and early 2000s. Over the next decade, however, employment in these types of occupations fell sharply, affecting these areas more strongly than the rest of England and Wales.

Nonetheless, not all industrial areas experienced strong job polarisation, and there are several other areas which saw relatively polarised employment growth despite already having a reasonably highly polarised employment structure in 1999-03. Examples are High Wycombe and Aylesbury, Bath & Trowbridge, and Reading, Basingstoke & Newbury.

Figure 5-10: Correlation between job polarisation in 1999-03 and dynamic polarisation from 1999-03 to 2009-13
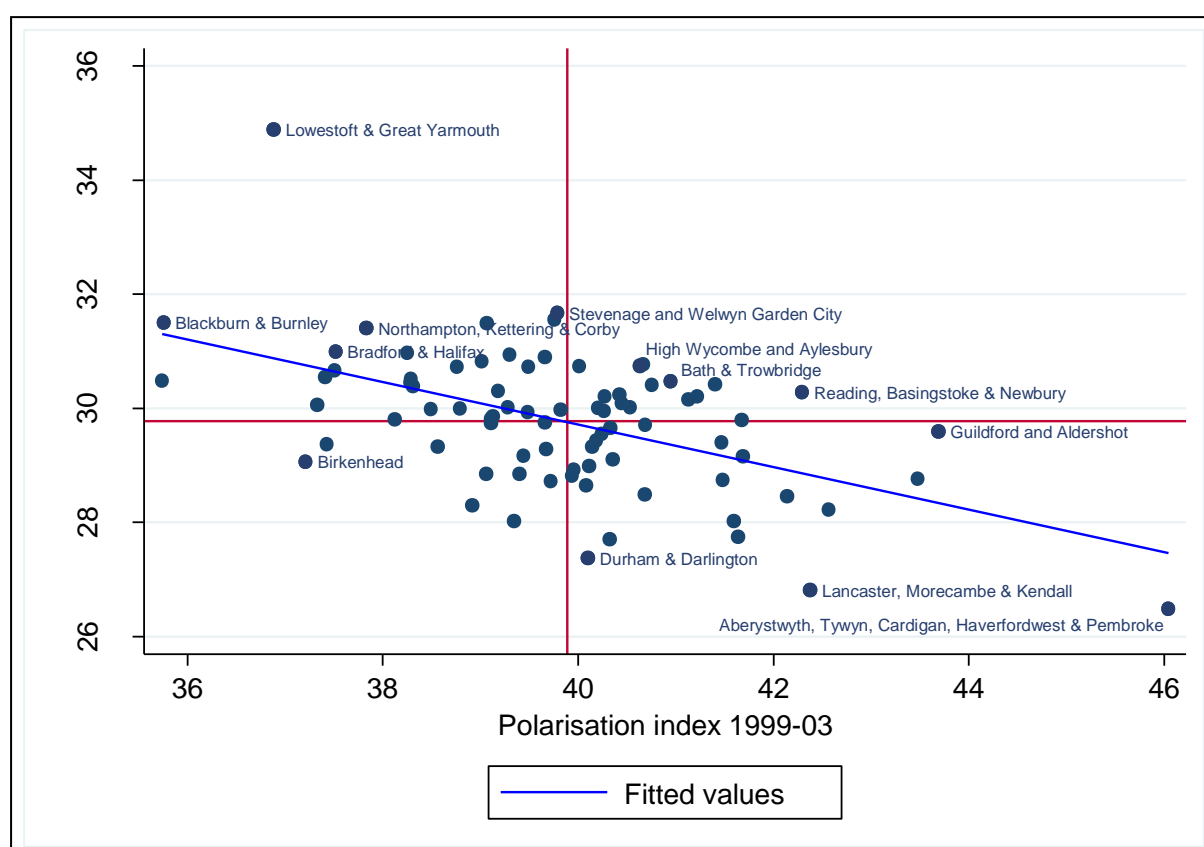
Source: LFS, 1999-03 and 2009-13. Vertical and horizontal reference lines indicate average polarisation index in 1999-03 and average dynamic polarisation index, respectively.

The second factor that could explain why certain areas polarised more strongly than others is the initial supply of highly skilled workers. As argued by Beaudry (2010) employers in areas with a more skilled labour force may be more incentivised to adopt computers given the complementarity between higher-level skills and computer technology, and the negative impact on routine employment may therefore be greater in these areas. There is, however, little evidence that the initial supply of skilled workers (as measured by the skill bias index for 1999-03) had a large effect on the subsequent decline in intermediate employment in England and Wales during the 2000s, with only a modest positive correlation of 0.17 between the skill bias index for 1999-03 and the dynamic polarisation index. On the other hand, the degree to which new job growth was biased towards high-paid occupations is more strongly correlated with degree of job polarisation from 1999-03 to 2009-13 (correlation = 0.35). In areas where employment growth was more strongly biased towards higher-paid occupations, employment growth tended to also be more polarised (see figure 5-11).

Figure 5-11: Correlation between degree of skill bias in employment growth and dynamic polarisation from 1999-03 to 2009-13
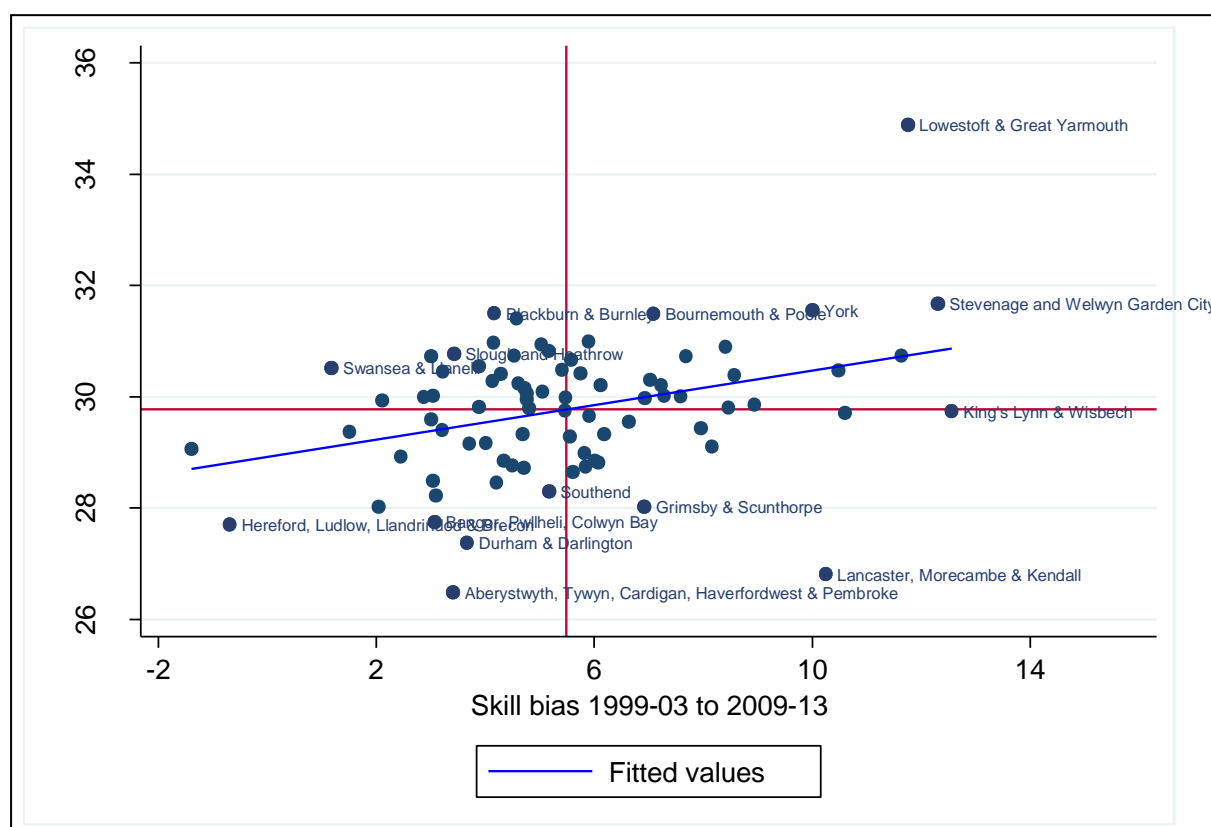
Source: LFS, 1999-03 and 2009-13. Vertical and horizontal reference lines indicate average dynamic skill bias index and average dynamic polarisation index, respectively.

These two factors – the initial level of job polarisation, and the degree of skill bias over the ten year period – appear to be more strongly related to dynamic polarisation than whether or not a local labour market area is centred on a major city. In fact, when all three factors are analysed together in a regression, the urban-rural distinction no longer seems to have any bearing on dynamic polarisation.

Job polarisation in 2009-13

Given the relatively strong increases in job polarisation seen in the South East of England – and reflecting the moderate to high levels of polarisation already evident in many of these areas in 1999-03 – this region includes many of the most polarised local labour markets in 2009-13 (see figure 5-12). Other STTWAs with relatively high levels of polarised in this period include several northern cities (York, Manchester, Nottingham, Sheffield), Bristol, Cornwall, and Norwich and Cromer.

Figure 5-12: Map of job polarisation in England and Wales, by Super-Travel-To-Work-Area, 2009-13
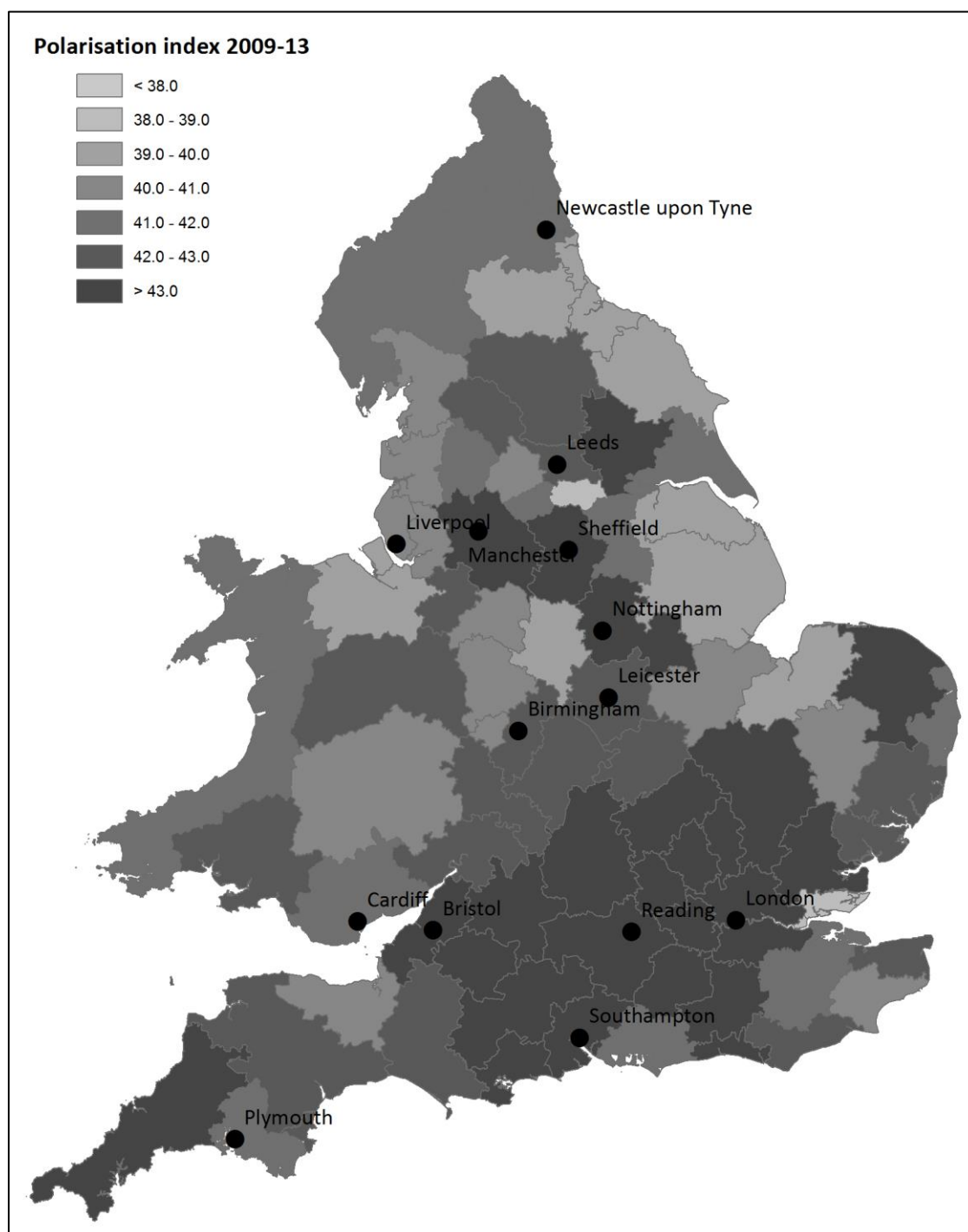
Source: LFS, 2009-13.

The least polarised local labour markets in 2009-13 tend to be located along the north-east coast of England, including Middlesbrough & Hartlepool, the STTWA surrounding Whitby & Scarborough, Grimsby & Scunthorpe, and the STTWA of Lincoln, Boston & Skegness. Despite the tendency for industrial areas to experience more polarised employment growth, there are some areas for which

this was not the case, such as Durham & Darlington, Wakefield & Castleford, and Derby & Burton upon Trent. Consequently, in these areas employment in routine intermediate occupations remained relatively high in 2009-13, and the level of polarisation remained relatively low.

Table 5-13: Most and least polarised STTWAs, as measured by polarisation index, 2009-13

Most polarised STTWAs	Polarisation index
Reading, Basingstoke & Newbury	46.2
Guildford and Aldershot	46.2
High Wycombe and Aylesbury	45.6
London	45.4
Slough and Heathrow	45.2
Oxford & Banbury	44.9
Luton	44.8
Bath & Trowbridge	44.5
Southampton	44.4
Cambridge & Huntingdon	44.1
Least polarised STTWAs	Polarisation index
Rhyl, Wrexham & Chester	39.8
Birkenhead	39.7
Sunderland	39.6
Derby & Burton upon Trent	39.6
King's Lynn & Wisbech	39.5
Durham & Darlington	39.4
Grimsby & Scunthorpe	39.3
Whitby, Scarborough, Malton & Bridlington	39.2
Wakefield and Castleford	38.9
Southend	38.8

Summary

The geography of job polarisation during the 2000s is a complex story. Many of the local labour markets which saw the strongest job polarisation over the decade are areas in the South East which tended to start the decade with higher-than-average levels of job polarisation. Examples include London, Luton, High Wycombe and Aylesbury, Slough and Heathrow, and Stevenage and Welwyn Garden City. On the other hand, several areas which in the early 2000s still had relatively high shares of employment in intermediate occupations – owing to a historical specialisation in skilled manual and administrative occupations – also appear to see strong shifts in employment from middling

occupations to low- and high-skilled occupations. Examples are Blackburn & Burnley, Bradford & Halifax, Sheffield, Barnsley and Chesterfield, and Northampton, Kettering & Corby. Nevertheless, because these areas started off with relatively unpolarised occupational structures, by 2009-13 they still tend to have lower-than-average levels of polarisation. A third group of local labour markets start off with relatively low levels of polarisation in 1999-03, and do not see strongly polarised employment growth over the subsequent decade, meaning they are among the STTWAs with the lowest degrees of polarisation in 2009-13. These areas include Southend, Rhyl, Wrexham & Chester, Grimsby & Scunthorpe, and Middlesbrough, Stockton & Hartlepool. One of the reasons for the low rates of polarisation in these places is the fact that relatively few higher-skilled jobs were created in these STTWAs over the period considered.

5.6.3   The relationship between local job polarisation and occupational progression

Having investigated the patterns of occupational mobility for workers in low-paid occupations in section 5.6.1, and examined how both static levels of job polarisation and dynamic changes in job polarisation vary between local labour markets in section 5.6.2, this section combines the two insights and assesses to what extent job polarisation at the local labour market level had an effect on occupational mobility. It does this by estimating, through a series of regression models, the effect of job polarisation on the occupational destinations in 2011 of workers employed in low-paid occupations in 2001. In this the same three measures of polarisation discussed in the previous section are examined: the degree of polarisation around the start of the ten-year period (during the years 1999-03), the extent to which employment growth between 1999-03 and 2009-03 was polarised, and the degree of polarisation around the end of the ten-year period (during the years 2009-13).

To provide an initial indication of the possible effect of living in a more versus a less polarised area, data is presented for how occupational mobility varies between workers in areas subject to varying degrees of polarisation, starting with the level of polarisation in 1999-03. To do this, local labour markets were divided into four quartiles based on their polarisation index score in 1999-03. The first quartile contains the least polarised STTWAs, and the 4th quartile the most polarised STTWAs. The sample is restricted to those who are living in the same STTWA in both 2001 and 2011 and excludes

workers who are mobile between STTWAs, to ensure that results aren't affected by workers who move from a relatively weakly polarised area to a more strongly polarised area, or vice versa[90].

Table 5-14 describes how occupational transitions differ across polarisation quartiles. It shows that the overall amount of mobility out of low-paid occupations is very similar in each quartile (the difference between polarisation quartiles in proportion of workers still employed in low-paid occupations in 2011 is statistically insignificant). There does appear to be less mobility into routine occupations in more strongly polarised areas, consistent with the idea that a relatively fewer number of jobs in routine-intensive occupations around the middle of the wage distribution means low-paid workers are less likely to move into these occupations. However, the differences in mobility into routine occupations across polarisation quartiles are also statistically insignificant (p = 0.191). Similarly, although mobility into associate-professional, managerial and professional occupations appears to be a little higher in more polarised local labour markets, transition rates into these occupations are not significantly different across polarisation quartiles.

Table 5-14: Occupational destinations in 2011 for workers in low-paid occupations in 2001, by polarisation quartile in 1999-03

Occupational category	Polarisation quartile			
	1st	2nd	3rd	4th
Low-paid	57.8	59.6	58.9	58.2
Routine	16.9	16.2	16.1	15.4
Intermediate	5.0	5.1	5.0	4.7
Associate professional	8.6	8.1	7.7	8.0
Managerial	8.1	7.8	8.4	8.5
Professional	3.6	3.3	4.0	5.3
N	6,484	6,024	5,497	4,786

Source: ONS LS, 2001 and 2011. Pearson's Chi-squared = 41.44 (p = 0.000)

Table 5-15 shows how occupational mobility varies across local labour markets subject to different degrees of dynamic job polarisation between 1999-03 and 2009-13. There is some indication that workers are less likely to move out of low-paid occupations in areas which experienced stronger job polarisation, but the difference between polarisation quartiles is again not statistically significant (p

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[90] This reduces the sample by around 13 per cent.

= 0.159). When it comes to transitions into the different higher-paid occupational categories, there does not appear to be a clear pattern.

Table 5-15: Occupational transitions for workers in low-paid occupations in 2001, by dynamic polarisation quartile

Occupational category	Polarisation quartile			
	1st	2nd	3rd	4th
Low-paid	59.7	58.6	58.1	57.9
Routine	15.6	16.8	15.9	16.4
Intermediate	4.7	5.3	4.9	5.0
Associate professional	8.4	7.9	7.6	8.3
Managerial	8.0	7.8	8.5	8.6
Professional	3.6	3.6	5.0	3.9
N	6,505	6,172	4,465	5,649

Source: ONS LS, 2001 and 2011. Pearson's Chi-squared = 29.81 (p = 0.013)

Finally, table 5-16 shows occupational transitions by job polarisation quartile in 2009-13. Here again differences between polarisation quartiles in the likelihood of being in a low-paid occupation in 2011 are not statistically significant, nor are differences in transitions to routine occupations.

Table 5-16: Occupational transitions for workers in low-paid occupations in 2001, by polarisation quartile in 2009-13

Occupational category	Polarisation quartile			
	1st	2nd	3rd	4th
Low-paid	59.0	59.1	58.0	58.1
Routine	16.3	16.5	16.2	15.4
Intermediate	5.2	4.6	5.0	5.2
Associate professional	8.4	8.3	8.0	7.5
Managerial	7.8	8.1	8.5	8.4
Professional	3.3	3.5	4.3	5.4
N	6,689	6,288	5,911	3,903

Source: ONS LS, 2001 and 2011. Pearson's Chi-squared = 42.92 (p = 0.000)

The fact that no significant associations between local job polarisation and occupational progression are found when comparing mobility rates across more and less polarised areas does not mean that no effect exists of polarisation on transitions from low-paid to higher-paid occupations. Differences in worker characteristics have not been controlled for, nor variables related to respondents' employment in 2001. These factors may all have an impact on whether workers are still (or again) in a low-paid occupation in 2001, and on what types of higher-paid occupations they are most likely to move into. Moreover, as discussed in section 5.6.2, employment in local labour markets with a more strongly polarised occupational structure in 1999-03 tends to be biased towards higher-paid occupations, and similarly, local labour markets that see stronger dynamic polarisation between 1999-03 and 2009-13 also tend to experience more positively skill-biased employment growth. It is important to control for these differences in both static and dynamic skill bias to isolate the effect of job polarisation. In the next steps multivariate regression analysis is used to allow these factors to be controlled for.

First, transitions from low-paid occupations to any other occupation were modelled, using a simple logistic regression. The aim is to find out whether workers in more polarised areas are less likely to move out of low-paid occupations, regardless of what type of occupation they move into. As before, workers who move to a different local labour market between 2001 and 2011 are excluded from the sample. Separate models were estimated to assess the effect of polarisation in 1999-03, the effect of dynamic job polarisation, and the effect of polarisation in 2009-13. In each case the model was estimated initially without a control for skill bias, and then with a control for skill bias added to be able to evaluate the difference.

The results are summarized in table 5-17 (with full results in appendix M). Average marginal effects (AMEs) are shown, which represent the percentage point change in the probability of having moved out of a low-paid occupation by 2011 associated with a unit-increase in each independent variable. In model 1, local job polarisation in 1999-03 does not appear to have an effect on occupational progression out of low-paid occupations. When skill bias in 1999-03 is added as an additional control variable, the estimated effect of polarisation increases in magnitude (becoming more negative) and becoming marginally significant (at the 10 per cent level). These results are consistent with the bivariate results presented in table 5-14.

A different picture emerges when it comes to dynamic polarisation (models 3 and 4). Whether or not dynamic skill bias is controlled for, a higher degree of dynamic job polarisation is associated with an increased likelihood of moving out of a low-paid occupation. Each unit increase in the dynamic polarisation index score of the local labour market is associated with a 0.7 percentage-point increase

in the probability of being observed in a higher-paid occupation in 2011. To put this into perspective, moving from a local labour market with a dynamic polarisation score at the 5th percentile to a local labour market with a score at the 95th percentile corresponds to an average increase in the likelihood of progressing to a higher-paid occupation of 2 percentage points (from 40.1 per cent to 42.1 per cent). So the effect is not very large, but it does suggest that workers living in areas that saw stronger job polarisation over the period 1999-03 to 2009-13 may have found it easier to move into a higher-paid occupation[91]. This is a somewhat surprising finding given suggestions in the literature that job polarisation may result in a 'bottleneck' effect when it comes to occupational progression. According to these results, the opposite is the case, as areas that experienced stronger polarisation during the 2000s are associated with a higher likelihood of upward occupational mobility. This is a finding that warrants further examination. It could be that, while the relatively larger decreases in intermediate occupations in these areas had a depressing effect on occupational progression, this effect was outweighed by the fact that more strongly polarising areas saw the creation of greater quantities of other, higher-skilled jobs which offered alternative opportunities for career advancement. This is something that will be explored further below through the use of multinomial regression.

Model 5 indicates that a higher degree of job polarisation in 2009-13 also appears to be associated with a positive effect on occupational mobility away from low-paid occupations. Yet in contrast to the results relating to dynamic polarisation, this effect disappears when skill bias in 2009-13 is controlled for. One reason for this may be that the correlation between polarisation and skill bias in 2009-13 is quite strong (correlation coefficient = 0.75), so the polarisation variable may be picking up a combined effect of job polarisation *and* skill bias, which together have a slight positive effect on occupational progression. When it comes to the three different measures of polarisation, ultimately only the dynamic polarisation index appears to have any effect on mobility out of low-paid occupations, once skill bias is controlled for.

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[91] A similar result is obtained if instead of the dynamic polarisation index, the change in (static) polarisation index between 1999-03 and 2009-13 is used as the measure of job polarisation over time. Here the marginal effect is 0.004 (significant at 5% level). Moving from the bottom 5 per cent of STTWAs on this measure to the top 5 per cent of STTWAs corresponds to an average increase in the probability of moving out of the low-paid occupational category of 2.4 percentage points (from 40 per cent to 42.4 per cent).

Table 5-17: Average marginal effects, logit estimator on transitions from low-paid occupations in 2001 to all higher-paid occupations in 2011

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Polarisation index 1999-03	0.000	-0.004*				
	(0.002)	(0.002)				
Skill bias index 1999-03		0.002***				
		(0.001)				
Dynamic polarisation index			0.007**	0.007**		
			(0.003)	(0.003)		
Dynamic skill bias index				-0.001		
				(0.001)		
Polarisation index 2009-03					0.004**	0.001
					(0.002)	(0.003)
Skill bias index 2009-13						0.001
						(0.001)
Regional unemployment rate$_{2001}$	0.001	0.003	0.002	0.002	0.003	0.004
	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Increase in unemployment$_{2001-2011}$	-0.006	-0.011	-0.006	-0.007	-0.005	-0.006
	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Controls	X	X	X	X	X	X
N	22,758	22,758	22,758	22,758	22,758	22,758
Pseudo R2	0.1377	0.1381	0.1379	0.1379	0.1379	0.1380
Log likelihood	-13306.8	-13301.3	-13304.4	-13304.2	-13304.5	-13303.2

Source: ONS LS 2001 and 2011. Standard errors reported in brackets below average marginal effects. * = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level.

The Super-TTWAs used here are of course rather large areas, and so measuring polarisation at this level may not provide a very accurate estimate of the level of job polarisation that workers are exposed to in their actual local labour market area. Therefore, the analysis was also conducted using the 74 largest TTWAs (those with more than 600 observations in the pooled LFS samples), with results reported in appendix N. The marginal effects are very similar to those in table 5-17, with the main difference being that the positive effect of dynamic skill bias in models 3 and 4 is less

statistically significant (p = 0.081 and p = 0.109) than in the STTWA specification shown in table 5-17. This may simply be a consequence of the smaller sample size used in this model.

Furthermore, as an alternative to the regional unemployment measures derived from the LS, official regional unemployment estimates based on the LFS were used to control for regional variations in labour market tightness. The results, reported in appendix O, are broadly consistent with those in table 5-17, with the dynamic polarisation effects in models 3 and 4 being slightly less strong in magnitude and less statistically significant (p = 0.061 in model 3, and p = 0.052 in model 4), yet comparable to those reported above. Similar to before, the degree of polarisation in 1999-03 and in 2009-13 (once skill bias is controlled for) do not have a significant effect on occupational advancement in this specification. Interestingly, however, when using the LFS unemployment figures the results suggests that workers in regions that saw a higher increase in unemployment between 2001 and 2011 were more likely to progress into higher-paid occupations. This is a counterintuitive finding which is explored more fully in appendix P.

Multinomial modelling

So far, the likelihood of moving out of the low-paid occupational category has been assessed without considering whether the effect of job polarisation (and skill bias) may be different depending on which of the five higher-paid occupational categories workers move into. It is plausible that job polarisation affects transitions from low-paid to routine occupations more negatively than transitions to, say, professional and managerial occupations. It may even be the case that stronger dynamic job polarisation is related to higher rates of mobility into non-routine higher-paid occupations. To explore this question, multinomial logit regressions were performed to model transitions from low-paid occupations to each of the five other occupational categories, as well as to non-employment. A multinomial logit model is similar to a binary logit model, but instead of estimating the probability of a positive versus a negative outcome, it allows for more than two possible outcomes. In this case, there are seven possible outcomes for each worker's occupational status in 2011: they can be 1) in a low-paid occupation, 2) in a routine occupation, 3) in an intermediate non-routine occupation, 4) in an associate-professional occupation, 5) in a managerial occupation, 6) in a professional occupation, or 7) no longer in paid employment. The model estimates the effect of the independent variables on the probability of a worker ending up in each occupational category (and non-employment), ensuring that the sum of these probabilities equals 1.

Similar to regular logit models, a logistic link function is used to transform the predicted probabilities so that 0 <= Pr <= 1.

First the effect of polarisation in 1999-03 is assessed. Table5- 18 summarises the output of this regression, with results presented in the form of average marginal effects. The figures presented in columns one to seven of table 5-18 represent the average marginal effects of each covariate on the probability of observing the relevant outcome[92]. It should be noted that column 1 shows the effect of job polarisation on the probability of (still) being in a low-paid occupation in 2011, meaning a positive AME here signifies that living in a more polarised area increases the likelihood of remaining in a low-paid occupation (or, conversely, *decreases* the probability of moving into a higher-paid occupation).

Similar to what is suggested by table 5-17, the results in table 5-18 indicate that a higher degree of job polarisation in 1999-03 has a negative association with mobility out of low-paid occupations: the average marginal effect of an increase in the local polarisation index on the likelihood of still (or again) being employed in a low-paid occupation in 2011 is positive and significant at the 5 per cent level. A higher degree of skill bias, on the other hand, increases the likelihood of making a transition out of the low-paid occupation category. However, the results do not provide any clues about whether workers living in highly positively skill-biased areas are more likely to move into particular types of higher-paid occupations. Surprisingly, a stronger degree of job polarisation does not appear to decrease transitions to routine occupations. Contrary to what may be expected given that the share of routine employment tends to be lower in areas with higher job polarisation, it appears that having fewer routine jobs in the local labour market did not translate into a lower rate of mobility from low-paid to routine occupations, at least not over the period considered.

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[92] This is in contrast to the way that the results of multinomial logits are sometimes reported, which is in the form of relative risk ratios. For dummy variables, the relative risk ratio denotes the ratio of the probability (risk) of a given outcome *relative to* the base outcome specified in the model when the variable equals one to the probability of a given outcome relative to the base outcome when the variable equals zero. Having to evaluate the effect of each variable in terms of the relative probability of an outcome versus the base outcome makes relative risk ratios less straightforward to interpret than marginal effects, which is why the latter are reported here.

Table 5-18: Average marginal effects of polarisation in 1999-03, based on multinomial logit on transitions to all occupational categories and non-employment, controlling for individual, household and job characteristics

	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 1999-03	0.005**	0.002	-0.001	-0.001	-0.002	0.000	-0.003
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Skill bias index 1999-03	-0.002***	0.000	0.000	0.000	0.000	0.0004**	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regional unemployment	0.002	0.004**	-0.001	0.001	0.000	0.000	-0.006***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	0.011	0.010**	-0.007***	-0.003	-0.007**	-0.001	-0.003
	(0.007)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.006)
Pseudo R2	0.1562						
Log likelihood	-38062.343						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents (13,348 were still/again in a low-paid occupation in 2011). Controls the same as in models 1-6 in table 5-17.

As discussed, it may be that it is not so much the overall stock of employment in particular occupations, but employment growth and/or decline in occupations that has the biggest influence on occupational mobility. The effect of dynamic polarisation and dynamic skill bias is now considered using a similar multinomial logit model as above (the results are shown in table 5-19). Similarly to what was found in table 5-17, an increase in dynamic polarisation is associated with a lower likelihood of being employed in a low-paid occupation in 2011, suggesting again that job polarisation over time has a positive effect on occupational progression. The magnitude of the effect is very similar to that found using the binomial logit estimator, with moving from a local labour market in the 5th percentile of the dynamic polarisation distribution to one in the 95th percentile being associated with a decrease in the probability of being employed in a low-paid occupation of 2.1 percentage points (from 46.7 per cent to 44.6 per cent[93]). This finding again challenges the notion

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[93] The overall estimated probability of being low-paid in 2011 in the multinomial logit model differs from that in the 'regular' binomial logit model because the multinomial model includes transitions to non-employment whereas the binomial logit does not.

that a decline in the share of intermediate jobs has made it more difficult for lower-skilled workers to progress. In fact, it suggests that perhaps the process of job polarisation has created new opportunities for workers in low-paid occupations to achieve occupational advancement, although this effect is relatively small in magnitude. The results in table 5-19 provide some suggestion that areas which saw stronger job polarisation during the 2000s enabled workers to move into managerial occupations at a slightly faster rate than elsewhere, although the marginal effect is only significant at the 10% level. However, the results provide no indication that stronger dynamic job polarisation increased transitions to associate-professional or professional occupations. It is therefore difficult to draw any firm conclusions about what explains the higher likelihood of mobility out of low-paid occupations in more polarising areas.

Table 5-19: Average marginal effects of dynamic polarisation, based on multinomial logit on transitions to all occupational categories and non-employment, controlling for individual, household and job characteristics

	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Dynamic polarisation index	-0.008***	0.001	0.000	0.000	0.003*	0.000	0.004
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Dynamic skill bias index	0.000	0.000	0.000	0.000	0.000	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Regional unemployment	0.002	0.003*	-0.001	0.002*	0.000	-0.001	-0.005***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	0.006	0.009**	-0.006**	-0.003	-0.005	-0.001	-0.001
	(0.007)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.006)
Pseudo R2	0.1560						
Log likelihood	-38069.2						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents (13,348 were still/again in a low-paid occupation in 2011). Controls the same as in models 1-6 in table 5-17.

Lastly the degree of job polarisation in 2009-13 is considered (table 5-20). Unlike the effect of polarisation in 1999-03 shown in table 5-18, the marginal effect of the 2009-13 polarisation index in

the equation predicting the likelihood of being low-paid is negative, yet not statistically significant. This suggests that workers in local labour markets which by the early 2010s were more strongly polarised were no less likely to have moved out of a low-paid occupation by 2011.

Table 5-20: Average marginal effects of polarisation in 2009-13, based on multinomial logit on transitions to all occupational categories and non-employment, controlling for individual, household and job characteristics

	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 2009-13	-0.001	0.002	-0.002**	0.000	0.000	0.000	0.000
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Skill bias index 2009-13	-0.001	0.000	0.0005**	0.000	0.000	0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regional unemployment	0.001	0.004**	-0.001	0.001	0.000	0.000	-0.005**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	0.006	0.010**	-0.006**	-0.002	-0.005*	-0.001	-0.001
	(0.007)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.006)
Pseudo R2	0.1561						
Log likelihood	-38064.131						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents (13,348 were still/again in a low-paid occupation in 2011). Controls the same as in models 1-6 in table 5-17.

A further finding from tables 5.18-5.20 is that a higher regional unemployment rate, and a greater increase in regional unemployment, both seem to have a positive effect on mobility from low-paid to routine occupations (while having a negative effect on mobility into non-routine intermediate occupations). This is a similar finding as that reported in table 5-17. Appendix P explores this issue more fully, showing that this result can be explained by unusually low mobility from low-paid to routine occupations and low increases in unemployment in the South West of England.

Returning to the effect of job polarisation on occupational mobility, tables 20-22 are more or less in line with the results displayed in tables 16-19 when it comes to the marginal effects of the various polarisation measures. The effect of job polarisation in 1999-03 on the likelihood of working in a

low-paid occupation in 2011 is not significant when using the LFS-based unemployment controls, but still positive and of a similar magnitude as that in the earlier model. The dynamic polarisation effect, however, is very similar and significant across both specifications. This attests to the robustness of the finding that stronger dynamic job polarisation between 2001 and 2011 is associated with greater mobility out of low-paid occupations. However, the multinomial results do not provide any reasoning for whether this increased occupational advancement is the result of a higher rate of mobility into particular types of occupations, as the dynamic polarisation measure does not have a significant effect on any of the occupational outcomes other than the likelihood of remaining in a low-paid occupation. The marginal effects are largest for transitions into managerial occupations and for transitions out of paid employment, in both tables 18 and 21 (although they remain statistically insignificant), providing some very tentative indication that stronger dynamic polarisation may lead to increased mobility from low-paid into managerial occupations, as well as make it more likely that workers will exit paid employment. This would be a plausible finding, as in many low-paid occupations and industries the most easily available progression opportunities may be to move into a managerial role through internal career advancement[94].

As a final robustness check, the share of employment in routine occupations was used as a measure of job polarisation. Again, three different models were estimated; the first includes the routine employment share in 1999-03, the second the change in the routine employment share between 19990-03 and 2009-013, and the third the routine share in 2009-13. The results are summarized in appendix Q. The effect of the routine employment share is not statistically significant in any of these models, which caveats the results presented above regarding the negative effect of static job polarisation in 1999-03 on progression from low-paid occupations and the positive effects of dynamic polarisation on such progression. On the other hand, the results in appendix Q equally fail to find any evidence that a stronger degree of job polarisation over time reduces upward mobility from low-paid occupations.

Results for different groups of workers

A further way to explore the impact of job polarisation on occupational progression is to consider the effects on different types of workers. It is possible that some groups of workers are more strongly affected than others. The first dimension looked at was gender, by estimating separate multinomial models for male and female workers. Starting, as before, by looking at the effect of job

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[94] Although it has to be borne in mind that in some industries, like hospitality or retail, even managerial roles can still be relatively low-paid.

polarisation in 1999-03, we can see that this effect differs quite strongly between women and men (see table 5-21). While the degree of local job polarisation in the early 2000s had no noticeable effect on the occupational advancement of female workers starting off in low-paid occupations, for male workers there is a definite negative association between polarisation in 1999-03 and the likelihood of having moved out of the low-paid occupational category by 2011. It appears that the static polarisation effect found in table 5-18 is driven mostly by male workers. For female workers, on the other hand, the degree of initial skill bias in the local occupational structure appears to be more important than for men, with women living in more positively skill-biased areas being more likely to have moved out of low-paid occupations and into a routine occupation (although they are also somewhat more likely to have left paid employment).

Table 5-21: Average marginal effects of polarisation in 1999-03, based on multinomial logit on transitions to all occupational categories and non-employment, models estimated for female and male workers separately

Female (N = 18,757)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 1999-03	0.001	0.003	-0.001***	0.000	-0.002	0.001	-0.002
	(0.003)	(0.002)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)
Skill bias index 1999-03	-0.002***	0.001**	0.000	0.000	0.000	0.000	0.001**
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Pseudo R2	0.1490						
Log likelihood	-22550.5						
Male (N = 10,632)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 1999-03	0.012***	0.000	-0.001	-0.002	-0.002	-0.001	-0.005
	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)
Skill bias index 1999-03	-0.001	-0.001*	0.001	0.000	0.001**	0.001***	0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Pseudo R2	0.1455						
Log likelihood	-15063.3						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents. Controls the same as in models 1-6 in table 5-17, minus gender control and interaction between gender and whether worker had (additional) children.

The fact that there is such a stark contrast between male and female workers in the effect of job polarisation on occupational advancement is perhaps not surprising given that, as discussed in section 5.6.1, men and women tend to move into different occupational categories, with men having higher overall rates of mobility into routine intermediate and non-routine intermediate occupations, and women being more likely to move into associate-professional and professional occupations. Moreover, when considering occupational mobility patterns in more detail, men and women tend to move into different types of occupations within the broad occupational categories (see table 5-22). Men are more likely than women to move into routine manual occupations, such as skilled metal, electrical and electronic trades, and process and machine operation occupations. Women, on the other hand, are much more likely to move into routine service occupations such as administrative and secretarial occupations, as well as non-routine occupations such as health and social care associate-professional roles and teaching roles. It stands to reason that low-paid male workers whose skills and preferences lend themselves more readily to manual occupations but who live in areas where employment opportunities in such occupations are few may struggle to progress beyond the low-paid jobs they are in at the start of the decade. Female workers, on the other hand, may be have more transferable skills due to their tendency to work in more service-oriented roles.

Table 5-22: Occupational destinations in 2011 of male and female workers initially working in low-paid occupations but no longer in a low-paid occupation in 2011

Category	Occupation	Men	Women
Routine intermediate	Administrative occupations	8.17	19.88
	Secretarial and related occupations	0.43	8.83
	Skilled metal, electrical and electronic trades	6.97	0.4
	Textiles, printing and other skilled trades	3.91	5.21
	Customer service occupations	1.53	3.93
	Process, plant and machine operatives	12.35	3.46
Non-routine intermediate	Skilled agricultural and building trades	1.94	0.48
	Skilled construction trades	4.3	0.14
	Transport & mobile machine drivers/operators	17.81	1.01
Associate-professional	Science, engineering and technology associate-professionals	2.21	1.68
	Health & social care associate-professionals	3.08	13.72
	Protective service occupations	2.65	1.05
	Culture, media and sport associate-professionals	1.26	1.18
	Business & public service associate-professionals	6.23	6.44
Managerial	Corporate managers and directors	15.54	14.46
	Other managers and proprietors	4.34	5.69
Professional	Science, engineering and technology professionals	3.64	1.28
	Health professionals	0.23	0.52
	Teaching and education professionals	1.72	8.38
	Business, media and public service professionals	1.68	2.26

Source: ONS LS, 2001 and 2011. N = 10,845. Some proportion have been very slightly altered as a few cells are based on small counts.

There does not appear to be as large a gender contrast when it comes to the effect of dynamic polarisation (table 5-23). For both men and women, stronger polarisation over time appears to be associated with a higher rate of mobility out of low-paid occupations, as before. However, there is some evidence that the effect is somewhat stronger for male than for female workers, suggesting that on the whole men may be slightly more likely to benefit from increases in job polarisation when it comes to generating opportunities for occupational advancement.

Table 5-23: Average marginal effects of dynamic polarisation, based on multinomial logit on transitions to all occupational categories and non-employment, models estimated for female and male workers separately

Female (N = 18,757)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Dynamic polarisation index	-0.006*	0.001	0.001	-0.002	0.002	-0.001	0.005*
	(0.004)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)
Dynamic skill bias index	0.001	-0.001	0.000	-0.001	-0.001	0.000	0.002
	(0.002)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Pseudo R2	0.1485						
Log likelihood	-22563.4						

Male (N = 10,632)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Dynamic polarisation index	-0.010**	0.000	0.000	0.004*	0.004	0.002	0.000
	(0.005)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)
Dynamic skill bias index	-0.002	0.001	0.000	0.000	0.002*	0.000	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Pseudo R2	0.1452						
Log likelihood	-15068.8						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents. Controls the same as in models 1-6 in table 16, minus gender control and interaction between gender and whether worker had (additional) children.

Table 5-24 shows the marginal effects of job polarisation in 2009-13, which much like in previous models are not significant.

Table 5-24: Average marginal effects of polarisation in 2009-13, based on multinomial logit on transitions to all occupational categories and non-employment, models estimated for female and male workers separately

Female (N = 18,757)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 2009-13	-0.004	0.002	0.000	0.001	0.000	0.000	0.002
	(0.003)	(0.002)	(0.000)	(0.002)	(0.001)	(0.001)	(0.002)
Skill bias index 2009-13	-0.001	0.001	0.000	-0.001*	0.000	0.000	0.001
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)

Pseudo R2	0.1488
Log likelihood	-22554.7

Male (N = 10,632)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 2009-13	0.006	0.001	-0.004*	0.000	0.000	0.001	-0.003
	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)
Skill bias index 2009-13	-0.001	-0.001*	0.001**	0.000	0.001*	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)

Pseudo R2	0.1454
Log likelihood	-15065.8

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents. Controls the same as in models 1-6 in table 5-17, minus gender control and interaction between gender and whether worker had (additional) children.

As well as a contrast between male and female workers, there may be differences in the effects of polarisation between younger and older workers. Tables 5-23 and 5-24 show, respectively, the effects of polarisation in 1999-03 and dynamic polarisation on younger workers (aged 35 or below) and older workers (aged 36 or above)[95]. There is evidence that both the negative effect of the initial degree of polarisation in 1999-03 on occupational mobility out of low-paid occupations and the positive effect of polarisation over the ten-year period to 2009-13 are somewhat stronger for older workers, while not being as important for younger workers. While the first result would fit with the interpretation that older workers may be less able to adapt to a more polarised labour market while

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[95] Marginal effects derived from models including polarisation in 2009-13 for younger and older workers not shown here as results for both are very similar to those for all workers shown in table 5-23. These results can be found in appendix R.

younger workers are not as strongly affected, the second set of results contradicts this interpretation to some degree as it indicates that older workers are less likely to still be in a low-paid occupation in areas which underwent stronger dynamic polarisation. A possible explanation is that the reason for older workers being more likely to move out of low-paid occupations in more strongly polarising local labour markets is that they have a higher rate of moving into non-employment. There is some tentative evidence for this as the size of the marginal effect of dynamic polarisation on transitions to non-employment is much larger for older workers than for younger workers. But as this effect is statistically insignificant it is difficult to say with certainty whether this explanation holds any truth.

Table 5-25: Average marginal effects of polarisation in 1999-03, based on multinomial logit on transitions to all occupational categories and non-employment, models estimated for younger and older workers separately

Aged 35 or under in 2001 (N = 14,153)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 1999-03	0.003	0.002	-0.002	-0.003	-0.001	0.001	0.000
	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)
Skill bias index 1999-03	-0.001*	0.000	0.001**	0.000	0.000	0.000	0.001
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Pseudo R2	0.1640						
Log likelihood	-19306.4						
Aged 36 and over in 2001 (N = 15,236)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 1999-03	0.007**	0.000	0.000	0.001	-0.002	-0.001	-0.004
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Skill bias index 1999-03	-0.002***	0.001	0.000	0.000	0.000	0.001***	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Pseudo R2	0.1492						
Log likelihood	-18502.7						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents. Controls the same as in models 1-6 in table 5-17.

Table 5-26: Average marginal effects of dynamic polarisation, based on multinomial logit on transitions to all occupational categories and non-employment, models estimated for younger and older workers separately

Aged 35 or under in 2001 (N = 14,153)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Dynamic polarisation index	-0.007	0.001	0.001	0.002	0.002	0.000	0.001
	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Dynamic skill bias index	-0.001	0.001	0.000	0.000	0.001	0.000	-0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Pseudo R2	0.1638						
Log likelihood	-19311.5						
Aged 36 and over in 2001 (N = 15,236)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Dynamic polarisation index	-0.009**	0.002	0.000	-0.002	0.003	0.001	0.005
	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)
Dynamic skill bias index	0.001	-0.001	0.000	-0.001	0.000	-0.001	0.002
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	0.002
Pseudo R2	0.1491						
Log likelihood	-18505.7						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents. Controls the same as in models 1-6 in table 5-17.

Finally, the same exercise was repeated for workers with relatively low qualifications – level 1 qualifications or below – and workers with moderate to high qualifications – level 2 qualifications or above (see p. 189). Here the results, which can be found in appendix S, are very similar across both groups, suggesting that, when it comes to progression out of low-paid occupations, there is not much difference in the impact of job polarisation between relatively low-qualified and better-qualified workers. This suggests that even for those with relatively low levels of education, occupational mobility is not affected in a substantial way by job polarisation, contrary to what might have been expected given that routine occupations are a relatively important destination for upwardly mobile workers with low qualifications (see p. 190). Both higher-qualified and low-qualified workers are, in fact, slightly more likely to have moved out of the low-paid occupational

category if they lived in areas with stronger evidence of dynamic polarisation, although this positive effect is relatively small.

5.7   Summary and conclusions

This chapter responded to a large literature documenting the gradual decline in employment in routine-intensive middle-wage occupations at the expense of relatively low-paid and high-paid occupations. Several authors have expressed concern that this process of job polarisation may have adverse consequences for social mobility through occupational advancement. The findings presented in this chapter looked at the extent to which routine intermediate occupations act as a progression pathway for workers in low-paid occupations, and found that while the majority of workers did not move into routine occupations when they made a transition out of the low-paid occupational category, about a third of initially low-paid but upwardly mobile workers made a transition to a routine occupation between 2001 and 2011. This suggests that routine occupations are a destination for a sizable minority of upwardly mobile low-paid workers. Nonetheless, during this period, a stronger local degree of job polarisation over time appeared to be associated with increased, rather than decreased, mobility out of low-paid occupations. This finding runs counter to suggestions that the hollowing out of the occupational structure is making it more difficult for those in low-skilled jobs to progress their careers (Holmes and Tholen, 2013; Clayton, Williams and Howell, 2014; Social Mobility and Child Poverty Commission, 2016), instead suggesting that occupational restructuring away from intermediate occupations may be resulting in increased opportunities for some to move up the occupational ladder.

On the other hand, there is some evidence that in areas which were already more polarised in the early 2000s, low-paid workers experienced lower rates of occupational advancement, although this finding appears to apply to men only. This may be explained by the fact that male workers in low-paid occupations tend to have different patterns of occupational mobility than female workers. Upwardly mobile men are much more likely than women to move into manual occupations such as skilled metal, electrical and electronic trades, process and plant machine operating occupations, and transport and mobile machine operating occupations. Many of the areas which started the 2000s with already high levels of polarisation are service-oriented cities such as Guildford, Reading, Oxford, Harrogate and London. These local labour markets on the whole did not have large shares of these manual occupations and therefore perhaps offered low-paid male workers fewer opportunities for progression than areas such as Dudley, Birkenhead, Blackburn and Folkestone, in which the degree of polarisation was lower at the start of the decade (and tended to remain lower).

The fact that a higher level of polarisation in 1999-03 appears to *decrease* mobility from low-paid occupations (at least for men) but stronger dynamic polarisation over the next ten years *increased* mobility from low-paid occupations may appear somewhat counterintuitive. But it has to be remembered that the two measures describe two very different phenomena. The static polarisation measure is related to the stock of employment in different occupations at a particular point in time. It makes intuitive sense that having a lower overall proportion of employment in routine intermediate occupations, which tend to attract a substantial share of upwardly mobile male workers, decreases the likelihood of occupational progression for men. The dynamic polarisation measure, on the other hand, describes changes in the occupational structure over time, and as such is more closely related to employment growth in certain sectors and occupations. Areas which saw stronger job polarisation over time will have, on average, seen greater expansions in certain types of higher-skilled, higher-paid occupations. This may have opened up opportunities for occupational advancement for certain workers. A further finding that helps to make sense of the contrasting effects of static and dynamic polarisation is the fact that the level of local polarisation in 1999-03 and the degree of dynamic polarisation over the next ten years are inversely related, as described in section 5.6.2. In areas with higher-than-average initial polarisation, the occupational structure tended to polarise less strongly over the course of the 2000s. This helps explain why workers (especially male workers) living in areas with lower levels of polarisation in the early 2000s tended to be more likely to experience upward occupational mobility. These areas had, on average, more employment in intermediate occupations at the start of the period and despite relatively large increases in job polarisation over time, still tended to be less polarised even in 2009-13. At the same time, many of these areas experienced higher-than-average dynamic job polarisation, which appears to be associated with increased occupational mobility out of low-paid occupations.

While these findings provide some indication that the best areas for occupational progression are those that start off with a reasonable stock of routine intermediate jobs, but which nonetheless see relatively pronounced job polarisation over time, the magnitude of both the static effect and the dynamic polarisation effect are relatively small. Moving from one of the least strongly polarising areas to one of the most strongly polarising areas only increasing the likelihood of moving out of a low-paid occupation by around 2 percentage points on average (against a baseline of about 40 per cent). This is a small effect compared to the effect of, for instance, gaining a qualification during the ten-year period, which increases the likelihood of moving out of a low-paid occupation by almost 7 percentage points. For women, having (additional) children decreased the probability of progressing to a higher-paid occupation by almost 6 percentage points. This suggests that the degree of job polarisation in the local labour market is of relatively minor importance in shaping the occupational

trajectories of workers in low-paid occupations. Moreover, these effects are not found when using an alternative measure of job polarisation: the (change in) the share of routine employment in the local labour market. Taken together the evidence suggests that job polarisation appears to have had, at most, a minor effect on the occupational progression of low-paid workers during the 2000s with, as in chapter 4, other factors playing a much bigger role. This is not to say that job polarisation does not potentially have some undesirable consequences, such as job displacement in middle-skilled routine occupations, relative growth in the number of low-paid jobs, or even increasing labour market inequality. But it means that a widespread inability of workers to move on from low-paid work to better-paid employment does not appear to be one of these consequences, at least not in the UK.

The lack of a strong effect of job polarisation on the upward mobility of low-paid workers is consistent with the finding that increased mobility *out of* intermediate occupations, rather than reduced mobility *into* these occupations, accounts for most of the decline in the employment share of occupations located around the middle of the wage distribution (Eurofound, 2017). In other words, instead of the shrinking of intermediate occupations being caused primarily by fewer workers moving into these occupations, the evidence suggests that the main explanation is that more workers have been leaving these occupations in recent years (ibid.). On the other hand, it contrasts to some extent with evidence provided by Autor and Dorn (2009) that, in the US, routine-intensive occupations saw declining shares of younger workers between 1980 and 2005, suggesting that these occupations perhaps attracted fewer recent labour market entrants.

While the relationships between declining employment shares in intermediate occupations and employment flows between occupations (as well as flows into- and out of the labour market), still requires some unpicking, this chapter has shown that concerns by policymakers that job polarisation is making it difficult for low-skilled workers to move up the occupational ladder appear to be unwarranted. The answer to the question why a decline in the relative number of middle-skilled jobs has not resulted in lower rates of occupational progression for low-paid workers are likely to do with the fact that job polarisation increases demand in many higher-skilled occupations at the same time as it decreases demand in routine-intensive intermediate occupations. However, despite attempting to model the effect of job polarisation on transitions to separate categories of occupations, this analysis has not been able to clearly demonstrate whether areas experiencing stronger job polarisation do indeed see greater mobility into non-routine, higher-skilled occupations.

Something which may help to further elucidate the link between occupational restructuring in the labour market and progression from low pay is a better grasp of the occupational mobility patterns

of workers starting off in low-paid jobs, which, despite some evidence provided in this chapter are currently still not very well understood. Additionally, exploring the relationship between job polarisation and occupational mobility over a longer period of time may provide further insights, as this chapter only covers a ten-year period which commences at least a decade after the onset of job polarisation in the UK, thus missing out on evidence from the 1990s during which technological change was already having an important impact on the structure of jobs (Goos and Manning, 2007). Lastly, a consideration of different spatial scales may be necessary given that the relatively large labour market geographies used in this chapter are likely to exceed the functional labour market areas of low-paid workers. Perhaps the use of rather large geographic areas obscures more nuanced patterns of occupational mobility operating at a smaller spatial scale.

Chapter 6 Discussion and conclusions

6.1   Summary of research findings

This thesis has explored whether, and how, progression from low pay is influenced by a set of particular characteristics of the local labour market that workers reside in. In doing this, it has addressed an important gap in the literature on low pay and progression, which thus far has predominantly focused on the effect of individual characteristics and firm-level factors on progression. In exploring the links between progression from low pay and local labour markets, the thesis engages with a range of different literatures and concepts, most important of which are the literature on the link between agglomeration, productivity and wages (Glaeser, 1999; Rosenthal and Strange, 2004; Yankow, 2006; D'Costa and Overman, 2014; Melo and Graham, 2014), studies of escalator regions (Fielding, 1992; Champion, Coombes and Gordon, 2014; Gordon, Champion and Coombes, 2015), and the literature on job polarisation and its local dimensions (Goos and Manning, 2007; Van Reenen, 2011; D. H. Autor and Dorn, 2013; Holmes and Tholen, 2013; Dauth, 2014; Senftleben-König and Wielandt, 2014). Although each chapter in this thesis has a different focus, they contribute to the wider aim of developing a better understanding of the role that the local labour market plays in shaping the wage- and occupational advancement of low-paid workers.

The review of existing literature in chapter 1 emphasised that low pay is a considerable issue in the UK, and that a significant proportion of low-paid workers struggle to progress from low-paid work to more (financially) rewarding employment. It summarised the individual characteristics that tend to be associated with remaining trapped in low wage jobs for considerable amounts of time – being a woman, being an older worker, working part-time, having few qualifications – and discussed the relationship between occupations and industries of employment and the likelihood of progression. It noted however that to date little research has explored whether the type of local labour market a worker lives in has an impact on their likelihood of advancing to better-paid employment.

After setting out the methodological approach taken in this thesis in chapter 3, chapter 4 addresses one of the local labour market characteristics that existing theories of (general) wage growth suggest might influence the progression of those in low wage jobs: the size of the local labour market. A considerable literature suggests that cities – with their large, dense labour markets – increase the wage growth experienced by workers over time through exposing them to learning spillovers and/or increasing their probability of finding a better, more productive job match. But the extent to which these two effects apply to workers at the lower end of the wage distribution is a question which,

until now, has received little attention. For this reason, chapter 4 set out to answer the question, do workers in larger cities experience faster progression from low pay?

Through estimating the effect of living in cities of different sizes – London, a core city such as Manchester or Birmingham, or a smaller city such as Derby or York – on the wage growth experienced by workers in low-paid occupations, chapter 4 provides new evidence on the links between city size and wage progression for those towards the bottom of the wage distribution. The initial results appeared to suggest that low-paid workers in London were substantially more likely to move into higher-paid employment – based on the commonly-used low pay threshold of two-thirds of median hourly pay for all UK workers. However further analysis demonstrated that this finding was driven by the way the low pay threshold intersects the local wage distribution in different areas, sitting at a lower point in the wage distribution in London and at a higher point in the wage distribution of lower-wage areas. When developing an alternative measure through identifying low-paid workers on the basis of their occupation, rather than with reference to a national wage threshold, the results indicated that workers in London experienced no higher wage growth than workers in other British cities or workers in non-urban areas during the period 2009-14.

In recent decades the benefits of agglomeration, for growth, innovation, productivity, and wages, have been widely touted (Martin and Ottaviano, 2001; Fujita and Thisse, 2003; Glaeser and Gottlieb, 2009; Combes *et al.*, 2012). Findings regarding faster 'learning in cities' suggest agglomeration might in addition be associated with a further advantage: higher wage growth for those living in large urban areas (Glaeser, 1999; De la Roca and Puga, 2017). However, the results presented in chapter 4 suggest that for low-paid workers in Great Britain, living in a city brings little gain in terms of earnings improvements over time. Taking into account that large cities such as London additionally tend to be associated with a higher cost of living, this suggests that, in general, low-paid workers are unlikely to benefit from being located in large urban centres.

In Chapter 5, the importance of the local occupational mix was explored, focusing particularly on the influence of labour market polarisation. Several authors have argued that the decline of middle-skill, middle-wage occupations may be an obstacle to progression for those in low-paid work (Crawford *et al.*, 2011; Holmes and Tholen, 2013; McIntosh, 2013; Social Mobility and Child Poverty Commission, 2016). In this regard, the gradual polarisation of employment into highly paid professional and managerial roles, and lower-paid service occupations and the simultaneous decline in intermediate occupations that has occurred over the past few decades (Autor, Katz and Kearney, 2006; Goos and

Manning, 2007) could have a negative effect on the ability of low-paid workers to progress to higher-paid occupations. Since research suggests this process of job polarisation has been geographically uneven (Jones and Green, 2009; D. Autor and Dorn, 2013; Dauth, 2014; Senftleben-König and Wielandt, 2014; Terzidis, Van Maarseveen and Ortega-Argilés, 2017), it might be expected that workers in areas more strongly affected by job polarisation may find it more difficult to progress into higher-paid work.

At the start of chapter 5, findings are presented that are suggestive of declining rates of mobility from low-paid to routine intermediate occupations over the period 1991-2008, although this decline did not appear to affect mobility into higher-paid occupations more generally. To test more thoroughly if job polarisation has had an adverse effect on the upward mobility of low wage workers, the degree of job polarisation in local labour markets in England and Wales was measured and it was investigated whether the strength of polarisation in the local labour market over the period from 2001 to 2011 had an effect on the occupational progression of workers starting off in low-paid jobs. The analysis demonstrates that, despite some local labour markets displaying stronger signs of a polarising occupational structure than others, this did not seem to result in lower rates of occupational mobility from low-paid to higher-paid occupations. On the contrary, workers living in areas with more evidence of polarisation over time, tended to experience slightly higher rates of mobility out of low-paid occupations. This could be because areas which polarised more strongly saw faster employment growth in occupations in the upper half of the wage distribution, opening up progression opportunities for some low-paid workers. The degree to which employment in the local labour market already had a U-shaped distribution at the start of the period, however, had a negative effect on upward mobility, but for low-paid men only. It is hypothesised that this may be a consequence of the fact that these areas tended to have relatively little employment in male-dominated manual occupations, thus restricting progression opportunities for men in industries such as manufacturing, transport and construction.

Both effects, however, were small, suggesting that neither the share of intermediate jobs in the local labour market, nor the magnitude of the fall in this share, had a major impact on occupational advancement among those in low-paid work. The predicted rate of upward occupational mobility from 2001 to 2011 – conditional on being in paid employment at both the start and end of the period – was found to sit just above the 40 per cent mark across England and Wales, and this rate only differed by about 2 percentage points between the areas most and least strongly affected by polarisation. This may be a reassuring finding for those who have been concerned that a decline in

intermediate jobs as a result of automation, trade and offshoring, have eroded the progression opportunities for lower-skilled workers. While the polarisation of employment into relatively low-paid and relatively high-paid occupations may have undesirable implications in its own right – such as an increase in the share of low-paid workers or an increase in labour market inequality – the results presented in chapter 5 provide little evidence that the changing occupational structure has negatively affected the ability of low-paid workers to advance into higher-paid, higher-skilled occupations. More broadly, these findings conform to the contention that in Britain flows of workers between occupations are not strongly correlated with changes in the stock of occupations (Rhein and Trübswetter, 2012).

The fact that the relative decline of intermediate routine occupations did not exert a large influence on occupational advancement from low-paid jobs can be partly explained by the fact that, concurrent with this decline, all local labour markets in England and Wales saw an increase in employment in higher-skilled occupations. This growth is likely to have partially, or perhaps even entirely, offset the decline in intermediate jobs, and therefore provided alternative employment opportunities for those looking to move out of low-paid occupations. However, when the relative growth in high-paid employment is considered in its own right, there is little evidence that larger shifts towards higher-paid occupations in the local labour market had a substantial positive effect on the occupational progression of low-paid workers. Although most of the models estimated in chapter 5 indicate that living in a local labour market with a higher level and/or increase in positive skill bias – a measure of the relative importance of higher-paid versus lower-paid employment in the area - is associated with a higher likelihood of mobility out of low-paid jobs, again the effect is small at best. This suggests that not only did changes in the relative share of intermediate employment not have a major effect on upward mobility from low-paid work during the 2000s, neither did increases in the employment share of highly skilled occupations. One of the implications of this is that the occupational trajectories of low-paid workers appear relatively insensitive to changes in the local occupational structure[96]. This finding suggests that improving access to higher-skilled jobs – either through increasing the concentration of such jobs in the local labour market or through improved transport to places where high-skilled jobs are located – might not in and of itself do much to increase rates of progression from low pay, although this is something that needs to be explored through further research.

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[96] Although it is possible that bigger and more radical shifts in the local jobs structure could have a greater impact.

Taken together the findings from chapters 4 and 5, demonstrate that neither the size, nor the occupational structure of the local labour market had large effect on progression from low pay during the period of study. It appears that, regardless of the type of local labour market that low-paid workers reside in, they have a relatively limited probability of moving out of low-paid work. Even in places where all the right conditions for progression are seemingly present – a large labour market offering many potential job opportunities and a large share of middle- and higher-skilled occupations – the likelihood of moving out of low pay is scarcely higher than in areas without these advantageous characteristics. The central implication of this is that relatively low rates of progression are a problem across the UK and that the tendency for low-paid workers to remain stuck in poorly-paid employment is a national, rather than a local issue.

6.2   Empirical, methodological and theoretical contributions of the thesis

A major contribution of this thesis is in extending existing evidence about the factors influencing progression from low pay by examining the impact of certain aspects of the local labour market. Two specific areas have been assessed which, according to the literature, have the potential to shape the prospects of progression from low-pay: the effect of living in larger urban labour market versus a smaller, less urbanised labour market, and the impact of the local degree of job polarisation. These are two issues which thus far have not been explicitly linked to the question of low pay progression but which the wider literature of labour market effects suggests could be important factors. Through addressing these two issues, chapters 4 and 5 provide a substantial amount of new empirical evidence on wage progression and occupational mobility for low-paid workers, and the factors associated with these.

In chapter 4, new evidence is presented on wage transitions from low to higher pay and on wage growth among workers in low-paid occupations. In this, the importance of variables such as education, occupation, industry and full- or part-time working hours was underscored, confirming existing findings (Cappellari and Jenkins, 2008; Phimister and Theodossiou, 2008; Pavlopoulos and Fouarge, 2010; Knabe and Plum, 2013; D'Arcy and Finch, 2017). In addition, a number of other factors which have received less attention in the literature – workplace size, unionisation in the workplace, housing tenure and the presence of dependent children – are also shown to be significantly associated with moving out of low pay.

To complement a relatively large literature focused on wage mobility among low wage workers, chapter 5 provides evidence on the occupational transitions made by those starting off in low-paid jobs. Although research has pointed out that workers who move out of particular occupational groups such as sales occupations have a higher chance of escaping low pay (D'Arcy and Hurrell, 2014), so far little research has examined the extent to which workers in low wage jobs are able advance to higher-paid, higher-skilled occupations. The analysis shown here indicates that, although the majority of workers employed in low-paid occupations in 2001 were still in a low-paid occupation ten years later, just over two-fifths had moved into a higher-paid occupational group. It also shows that workers initially employed in low wage jobs move into a variety of different occupations, including intermediate occupations, managerial occupations, associate-professional and professional occupations. The fact that, even for workers who started the 2000s without a degree, it was possible to move into an associate-professional or professional occupation (16 per cent of those with a highest qualification of five GCSEs at C or above had moved into an associate-professional or professional occupation over ten years, and 25 per cent of those with at least two A-levels but without a degree) suggests that there are ways for some low-paid workers to move into relatively high-paid and high-skilled occupations, given sufficient time.

Chapter 5 also adds to existing analysis of sub-national spatial patterns of job polarisation (Autor, Dorn and Hanson, 2013; Dauth, 2014; Senftleben-König and Wielandt, 2014; Lee, Sissons and Jones, 2015) by identifying an inverse relationship between the level of job polarisation evident in local labour markets in the early 2000s, and the degree to which employment became more polarised between low-paid and high-paid occupations during the subsequent decade. This finding is suggestive of a tendency for areas which until the early 2000s still had relatively large shares of employment in middling occupations, to 'catch up' in terms of moving towards a more polarised occupational structure. While the degree of job polarisation during the 2000s turns out to only have been of relatively minor importance for the low-paid workers considered in this study, this is nonetheless an interesting finding in itself.

As well as adding to the existing body of empirical evidence related to low pay and progression, this thesis makes an important methodological contribution. Chapter 4 highlights how the specific measure which is used to assess spatial variations in progression from low pay can have significant implications. It is shown that using a national wage threshold to define workers as low-paid or higher-paid in the context of geographic variations in wage levels not only prevents a like-for-like comparison of similar workers, but also has a direct effect in the measured transition rate to higher-

paid employment due to the fact that annual wage growth tends to be higher for workers further down the (local) wage distribution. This finding serves to underscore the importance of using a definition of pay progression which is sensitive to spatial differences in initial wage levels, especially when comparing wage mobility across local areas or regions within a country. By analysing annual growth in hourly pay for those in low-paid occupations, chapter 4 develops a novel approach to studying wage progression for low-paid workers which does not suffer from the same problem of sensitivity to local wage variations.

The thesis makes a number of theoretical contributions. Chapter 4 adds to understandings of 'urban escalators' and the notion that cities facilitate faster human capital development through learning spillovers. This is an influential theory in the economic geography literature which has informed understandings of agglomeration economies, as well as policy. Through showing that low-paid workers in Britain do not appear to benefit from higher wage growth in cities, this thesis attests to the limited applicability of this 'learning effect' for those in lower-paid, lower-skilled jobs. The idea that geographic proximity is of greater relevance for those with higher skill levels has been evidenced in the literature (Bacolod, Blum and Strange, 2009; Glaeser and Resseger, 2010; De la Roca and Puga, 2012). Yet the findings in this thesis are the first to suggest that not only are those lower down the wage distribution less likely to benefit from living in a larger city, when it comes to wage progression for workers in the lowest-paid occupations, there is little sign that agglomeration brings any discernible advantage at all (Velthuis, Sissons and Berkeley, 2018). This adds important nuance to the notion of cities as 'escalators'.

The results in chapter 5 make an important conceptual contribution to the ways in which occupational advancement is understood for those initially employed in low-skilled, low-paid occupations. In the literature, upward mobility from low paid work has a tendency to be described as a rather linear process involving moving from low-paid to middle-paid to higher-paid forms of employment (through moving between occupations at different levels). This is evident in the implicit assumption that the progression opportunities for most low-paid workers are to be found in intermediate occupations (Social Mobility Commission, 2016), and the notion that a fall in the employment share of these intermediate jobs will lead to a 'bottleneck' hampering career advancement (Holmes and Tholen, 2013). The evidence presented in chapter 5 suggests that, while the occupational trajectories of some workers may correspond to this type of linear pattern, other workers are able to move from relatively low-paid occupations directly to associate-professional or professional roles, typically associated with higher wages and higher skill levels, without progressing

via a middle-skilled occupation. This suggests that it is perhaps not helpful to think of progression in terms of a 'career ladder' with relatively predictable rungs, but as a more complex and varied process which can involve a gradual ascent into higher-paid, higher-skilled employment, as well as larger jumps between occupational categories.

The nature of 'local' in local labour markets

It is important to recognise that this thesis takes a particular approach to conceptualising local labour markets. Firstly, local labour markets are proxied through the use of the Travel-To-Work-Area (and in parts of chapter 4, the local authority district), despite the fact that, as various authors have pointed out (e.g. Ball, 1980; Peck, 1989), local labour markets operate at different spatial scales for different types of workers. Because local labour markets are likely to be significantly smaller for low-paid workers than for the average worker, what may matter most for the progression outcomes of those in low-paid work are the number and quality of jobs available at a relatively short distance from their area of residence. By using a TTWA definition of local labour markets, the analysis may therefore have missed certain effects operating at a smaller spatial scale.

At a more fundamental level, the choice of adopting the same spatial unit of measurement for all workers in a sample (even if this spatial unit of measurement had been smaller) assumes a uniformity of travel-to-work patterns that is unlikely to exist in practice. Yet, as in any research project, decisions had to be made about which methods and measures of analysis to adopt. Since a local labour market geography more closely aligned to that of the 'typical' low-paid worker would have been hard to implement in practice – given the fact that such geographies do not exist in any of the datasets used – a judgement was made that Travel-To-Work-Areas, despite their flaws, would be the best available measure with which to analyse the impact of the local labour market characteristics in question. While they might not correspond very closely to the actual local labour market areas accessed by low-paid workers, they can still be used to derive important insights about the effect of living in a large urban labour market like London, versus a much smaller local labour market such as the one surrounding Oban or Pwhelli.

As well as taking a particular approach to defining local labour markets, this thesis deliberately limits its consideration of local labour market characteristics to a few particular aspects that, existing literature suggests, may have an impact on progression. Following the substantial literature around the existence of a wage growth premium in urban labour markets, one of the key labour market

aspects examined is the size of the local labour market – as measured by the number of employees in the Travel-To-Work-Area. Additionally, in chapter 5, the impact of job polarisation is explored, as well as the effect of a bias towards lower- versus higher-skilled employment in the local labour market. In choosing to focus on these particular attributes, the thesis necessarily leaves un-examined a range of other potential mechanisms operating at the local labour market level that may influence low-paid workers' likelihood of moving into better-paid work. One important aspect not examined in this thesis is the degree to which the (lack of) progression experienced by low-paid workers is a result of labour market segmentation, whether by gender, education and skill level, ethnicity, or other factors. Although some of these worker characteristics are included as controls in the regression modelling, there is no in-depth analysis of the progression of different groups of workers in local labour markets characterised by varying degrees – or various kinds – of labour market segmentation. Yet we know that within the same local labour market workers do not compete equally for all types of jobs (Hanson and Pratt, 1991).

A further aspect not examined in this thesis is the impact of living in an area characterised by growth versus stagnation (or even decline), as discussed in section 4.2. Similarly, the thesis does not consider the impact of overall employment growth/reductions on the ability of workers to find better jobs. While the analysis in chapter 5 controlled for changes in regional unemployment –which is likely to be correlated with expansions and contractions in employment to some degree, it is possible that workers in local labour markets where there was a substantial growth in the number of jobs over the course of the 2000s had a higher probability of progressing than workers in less buoyant labour markets. Areas with robust employment growth may, moreover, be those with higher-than-average increases in job polarisation, which may explain partly why stronger dynamic polarisation was found to be associated with higher occupational advancement.

In order to investigate the importance of these aspects – labour market segmentation, spatially uneven economic growth and employment growth – in influencing progression from low pay, a different research design would have been required, potentially incorporating different data. In addition, in order to arrive at a fuller understanding of the role that these local labour market facets play in shaping progression, a different theoretical framework would have been needed. This was beyond the constraints of the thesis but would make for an extremely valuable future research project. One important implication of not having been able to include these additional local labour market characteristics in the analysis means that this thesis cannot claim that the nature of the local labour market has no influence whatsoever on progression. It is possible that a focus on different aspects of the local labour market, or indeed, a different definition of what constitutes a local labour

market, would have identified ways in which the local labour market does have an important impact on progression.

6.3   Implications for policy

The first implication of the analysis presented in this thesis for policy is that, since the probability of progression does not appear to vary much depending on the type of local labour market in which workers live (at least, where labour market size, tightness or occupational structure are concerned), progression from low pay, or the lack of it, is perhaps best seen a national problem rather than a particular issue facing certain areas of the UK. As described in chapter 2, the UK labour market has undergone numerous shifts over the past three to four decades in terms of industrial change, labour market regulation, and adaptation in the competitive strategies employed by firms. Internal labour markets, once an important aspect of career progression, have declined in importance across industries since the 1990s (Grimshaw *et al.*, 2001; Marsden, 2007). At the same time, the liberalisation of employment regulation and a search for more flexibility by firms has changed the relationship between workers and employers (Grimshaw *et al.*, 2001). The decline in the volume of on-the-job training witnessed since the late 1990s (Green *et al.*, 2016) may be one of the consequences of this shift in attitudes of employers towards their workforce. While the relationship between employment relations, labour market regulation, and the potential for workers to move up in the world of work are underexplored, it seems likely that these wider institutional labour market aspects at least in part explain why UK workers are finding it difficult to move out of low pay.

As well as these institutional aspects, the individual-, household-, sector- and occupational-level factors explored in the literature on low pay dynamics also play an important role. At the individual level, factors such as a lack of appropriate skills to compete for well-paid local jobs, conflicts between work and household or family commitments (especially for women), or limited knowledge about how to seek progression are likely to be part of the problem. Sectoral issues are also important, especially the lack of clear progression routes in sectors where low pay is prevalent. This is last point is of particular importance in the UK given that low pay is more highly concentrated in a small set of industries – retail and hospitality being the two most important ones – characterised by flat organisational structures, limited training and high staff turnover.

There are a number of things that could be done, by both government and employers, to begin to address these issues. Projects in the UK and elsewhere have already begun to investigate the potential of developing better progression routes in sectors with large shares of low-paid workers (UKCES, 2014b; Walmart News, 2016; Schaberg, 2017; Learning and Work Institute, 2018; Timewise, no date). These initiatives address some of the barriers to progression faced by workers, such as a lack of experience of completing job applications (Learning and Work Institute, 2018), gaps in specific occupation-related skills (Schaberg, 2017) or a lack of senior roles available on a part-time or flexible basis (Timewise, no date), often by working directly with employers. These should be extended and more efforts should be made to work with employers to realise the benefits of clearer career advancement routes for both workers and businesses (Ussher, 2016).

Improving opportunities for workers to engage in training or re-enter education are also likely to be important ways to improve the chances of progression for low-paid workers. One of the findings in chapter 5 is that workers who gain an additional qualification are substantially more likely to move out of a low-paid occupation. But currently participation in adult education is low in the UK compared to countries like Sweden, Finland, the Netherlands and France, and it has fallen since 2010 (Eurostat, 2018). Moreover, evidence suggests that those from lower socio-economic groups and those in lower-skilled occupations are less likely to access employer-provided training (Social Mobility Commission, 2019). The partial devolution of the adult education budget to English combined authorities provides an opportunity to increase participation in adult education as well as ensuring skills provision is better geared towards improving employment outcomes. But given recent falls in adult education spending (Foster, 2018), there is a case to be made for increasing overall investment in life-long learning as a way to improve the prospects for social mobility for workers who currently have few qualifications. Ensuring that working parents – especially mothers – have sufficient access to affordable childcare may also help to address one of the barriers faced by women when it comes to progressing out of low pay, as would ensuring that more senior roles within organisations are available on a part-time or flexible basis (Tomlinson, 2006b; Ussher, 2016).

Lastly, although this is an under-researched area, it is likely that at least part of the low pay progression problem is the result of some workers feeling that it is not worth trying to seek career advancement. If this is because they are satisfied in their current role and have no desire to acquire a better-paid position, this is perhaps not a cause for concern. But for some these feelings appear to stem from not knowing what options might be open to them, or a lack of confidence about how to improve their job prospects (TUC, 2017; Learning and Work Institute, 2018; Tait and Harrop, 2018).

These issues could be addressed through more transparency by employers about internal career progression opportunities, or through providing low-paid employees with external career advice and guidance. There have been recent calls to develop better career advice services for those in low-paid work in the UK (NIACE, 2015), and even some trials of career advancement advice initiatives, for example the Oldham Career Advancement Service.

The introduction of in-work conditionality under Universal Credit will potentially bring millions of low-income workers into contact with employment support staff at JobCentres, with a large proportion of these likely to be in low-paid employment. This offers a potential opportunity to provide guidance and support to low-paid workers in receipt of benefits about how to increase their earnings, (SSAC, 2017). So far there is little evidence on how the (relatively small) proportion of workers who have had experience of the in-work conditionality regime and associated support have fared under this new system. The Department for Work and Pension did, however, publish the results of a pilot of the new service in which they trialled the effect of three different levels of support and conditionality. The study found that among all workers taking part in the trial, weekly earnings had increased by 23 per cent over a 12 month period, of which a large proportion appears to be due to workers having increased their working hours (DWP, 2018). Those subject to a greater degree of conditionality, and offered more intensive support from a work coach, had a slightly higher increase in earnings. While this seems a positive finding, these workers were not compared to similar workers who had not been subject to the in-work conditionality trial, making it hard to evaluate the effectiveness of the pilot programme overall.

One concern about the way the in-work progression support offered under Universal Credit is currently structured is that it places an emphasis on claimants increasing their working hours, with less focus on ways in which they might be able to increase their earnings potential over the longer run by moving into higher-skilled work. Additionally, the Social Security Advisory Committee argues that for Universal Credit to lead to genuine progression it will be important for the in-work progression service to avoid a focus on narrowly-set administrative objectives and to instead build in the flexibility and discretion to support workers in their individual journey towards greater economic self-sufficiency and, hopefully, an increased standard of living (SSAC, 2017). The analysis in chapter 5 suggests that a sizable minority of low-paid workers are successful in advancing to managerial and professional roles over a ten year period. To achieve this kind of progression is likely to require a longer-term outlook, investment in skill development, and, for those working in sectors with limited progression opportunities, the flexibility to move between industries. It is important that support

services aimed at in-work progression avoid unintentionally discouraging low-paid workers from seeking to progress into these types of higher-skilled occupations by focusing too narrowly on increasing earnings in the short term through working more hours at their current employer.

While a rethink of Universal Credit's in-work progression service, increased access to adult education and training, and the development of local and national in-work progression initiatives aimed at specific groups of workers have the potential to address some of the barrier currently facing low-paid workers, they are unlikely to bring about a fundamental transformation in the scale of progression from low pay. Although they would represent a step in the right direction, these discrete policy interventions have to be set against the wider structure of the UK labour market, and the ways in which this is shaped by employment regulation, welfare and skills policy.

One important aspect is the typically flat employment structure that characterises industries such as retail, care and hospitality. This is not something that supply-side policies such as enhanced career advice or increased access to skills for low-paid workers can easily address. The UK's relatively large share of low-paid work and relatively low progression rates are likely to be influenced by its comparatively flexible regime of labour market regulation, which facilitates the relatively easy hiring and firing of workers, and, therefore, low average rate of job tenure (Eurofound, 2015). This is likely to contribute to a lack of employer investment in workforce training and development. In addition, the stringent conditions that are placed on benefit claimants to seek work mean that employers have a relatively large pool of available workers to fill (often relatively low-paid) vacancies, which could be argued to contribute to a lack of incentive for employers to invest in their existing workforce. Add to this the "long tail" of relatively unproductive firms that has been found to characterise the UK economy (Haldane, 2017), comparatively high levels of skills underutilisation (Holmes, 2017), and a polarised skills base[97] compared to other countries (UKCES, 2014a), and it becomes clear that the UK's progression problem should be understood as the result of a complex interplay of structural factors that are unlikely to be resolved in the short term. To achieve a more fundamental improvement in progression from low pay, a more systematic approach to labour market reform is therefore likely to be necessary.

6.4   Suggestions for further research

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[97] This term refers to a relatively low supply of intermediate skills relative to low- and high skills.

As discussed towards the end of section 6.2, this thesis – while making a valuable contribution to existing literature – also leaves a number of issues unexplored that could usefully be examined in future research. A point already mentioned in chapter 5 is that the analysis of the effect of job polarisation on occupational mobility only uses data from 2001 and 2011. As well as not showing what happened to workers in between these two dates, this misses out any potential impact of job polarisation that occurred before 2001, and after 2011. Building a better picture of the extent to which employment polarised in different parts of the UK during the 1980s and 1990s may help to unpick why areas that had a less polarised employment structure in the early 2000s tended to have slightly higher rates of occupational progression. Was this because these areas historically had greater amounts of routine intermediate employment, even before the diffusion of computer technology which is said to have had the largest impact on the relative decline of middle-wage jobs (Van Reenen, 2011; Goos, Manning and Salomons, 2014; Autor, Dorn and Hanson, 2015)? Or did the processes that drove polarisation happen at a slower pace in these areas?

A more fundamental concern is related to defining what constitutes a local labour market for low-paid workers. In this thesis, the term 'local labour markets' has been used to refer to relatively large areas, either Travel-To-Work-Areas, or local authorities. However, since low-paid workers are likely to travel much less far for work than more highly skilled workers, there is a question about the scale at which labour market characteristics should be measured when considering the progression prospects of low-paid workers. Given that data from Understanding Society suggests that low-paid workers travel on average only 5.7 miles to their place of work (compared to 12 miles for non-low-paid workers), perhaps the number and types of job opportunities at relatively small distances are more influential in determining how likely workers are to escape low-paid employment. Literature related to the notion of spatial mismatch suggests that the number of jobs that individuals can access within a relatively small geographic area from where they live has important implications for their labour market outcomes (Dawkins, Shen and Sanchez, 2005; McQuaid, 2006). These findings mirror results from a large-scale study into the wage trajectories of low-waged workers in the US by Andersson *et al.* (2005), in which it was found that employees who lived within a 5 mile radius to 'good' jobs were significantly more likely to find better-paid employment than workers who lived 6-10 miles from such opportunities. The fact that there are limits to how far it is feasible, or worthwhile, for workers to commute to a particular job due to the financial cost, time and effort involved, is something that the present research was not able to take into account, mostly due to practical constraints related to the geographies available for analysis in the datasets used and the need to ensure a sufficient number of observations across local labour market areas. The

importance of the density and structure of employment at a very local level when it comes to progression from low pay is something that could be explored in further research.

Aside from addressing some of the limitations of the current research, there are a number of potential areas of investigation that would enhance understanding of low pay and progression more broadly, and may inform policymakers about the sorts of interventions that could increase progression rates. One of these is a better understanding of the extent to which greater engagement in adult education or training could low-paid workers to advance their careers. It is known that participation in lifelong learning can bring benefits to workers in terms of increased earnings (Dorsett, Lui and Weale, 2011; Blanden *et al.*, 2012), and occupational status (Gloster *et al.*, 2015). But less is known about what types of adult education are most useful to different types of workers, or about how more low-paid workers could be encouraged to participate in life-long learning. Another avenue for future research would be to trial and evaluate an advice and guidance service targeted at progression for those in low wage employment, to investigate whether equipping workers with the knowledge and motivation needed to seek out more highly paid or more senior job roles is an effective way to increase progression from low pay. Lastly, building on research which explores the effect of motherhood on the employment trajectories of female workers (Stewart, 2009; Bastagli and Stewart, 2011), more could be done to identify what would enable and incentivise low-skilled mothers of young children to remain in work and seek ways to increase their earnings. Given that, as shown in this thesis, living in a local labour market which seemingly offers workers most of the conditions necessary for progression does in itself not substantially increase workers' likelihood of moving into higher-paid work, it is important to enhance our understanding of the most important barriers to progression and how these can be overcome.

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Appendix A City size categories

Table A-1: List of Travel-To-Work-Areas in Core Cities category

Travel-To-Work-Area	number of employees (average 2009-2014)
Manchester	852,617
Birmingham	680,767
Glasgow	511,583
Newcastle & Durham	492,717
Bristol	460,867
Leeds	416,267
Liverpool	409,883
Leicester	395,183
Sheffield & Rotherham	366,833
Nottingham	352,150
Cardiff	329,567
Edinburgh	315,617

Table A-2: List of Travel-To-Work-Areas in Smaller Cities category

Travel-To-Work-Area	number of employees (average 2009-2014)
Guildford & Aldershot	368,917
Warrington & Wigan	358,717
Luton & Watford	334,383
Southampton	321,233
Portsmouth	292,017
Maidstone & North Kent	282,167
Southend & Brentwood	272,000
Reading & Bracknell	271,783
Crawley	271,733
Wycombe & Slough	268,983
Oxford	250,250
Swindon	245,600
Coventry	244,283
Stoke-on-Trent	237,067
Lanarkshire	226,117
Northampton & Wellingborough	224,867
Milton Keynes & Aylesbury	222,683
Hull	217,317
Cambridge	215,333
Bradford	212,200
Aberdeen	210,033
Dudley & Sandwell	205,633

Brighton	204,400
Norwich	204,217
Preston	200,067
Middlesbrough & Stockton	196,467
Swansea Bay	194,367
Derby	191,683
Ipswich	190,367
Stevenage	182,550
Rochdale & Oldham	181,017
Chelmsford & Braintree	179,800
Wirral & Ellesmere Port	169,650
Plymouth	169,583
Wolverhampton	165,050
Harlow & Bishop's Stortford	164,850
Walsall & Cannock	158,733
York	157,717
Exeter & Newton Abbot	156,633
Lincoln	155,100
Peterborough	153,800
Sunderland	150,850
Wakefield & Castleford	150,000
Bournemouth	149,133
Newport & Cwmbran	149,017
Blackburn	135,050
Tunbridge Wells	134,433
Crewe & Northwich	128,333
Mansfield	127,950
Doncaster	126,000
Worcester & Malvern	125,450
Bolton	123,900
Cheltenham & Evesham	122,400
Chester & Flint	120,850
Warwick & Stratford-upon-Avon	116,017
Blackpool	113,583
Huddersfield	112,600
Colchester	108,633
Barnsley	107,950
Telford & Bridgnorth	105,200

Table A-3: List of Travel-To-Work-Areas in Non-Cities category

Travel-To-Work-Area	number of employees (average 2009-2014)
Ayr & Kilmarnock	99,950
Poole	95,700
Chichester & Bognor Regis	95,633
Dundee	94,917
Bath	93,883
Bedford	93,833
Calderdale	92,750
Worthing	90,350
Gloucester	88,433
Grimsby	86,633
Canterbury	85,950
Burton upon Trent	85,800
Huntingdon	84,333
Falkirk	83,467
Eastbourne	82,067
Chesterfield	80,600
Kettering & Corby	80,117
Yeovil & Chard	79,167
Basingstoke	79,067
Trowbridge & Warminster	78,700
Livingston & Bathgate	77,983
Bishop Auckland & Barnard Castle	77,550
Burnley, Nelson & Colne	76,517
Wrexham & Whitchurch	72,517
Morpeth, Ashington & Alnwick	71,933
Kirkcaldy & Glenrothes	70,733
King's Lynn & Fakenham	70,483
Hereford & Leominster	70,283
Hastings	70,200
Bridgend	69,450
Salisbury	69,150
Harrogate & Ripon	69,000
St Austell	68,217
Scunthorpe	67,517
Dunfermline	66,750
Newbury	64,300
Shrewsbury	63,750
Lancaster & Morecambe	62,300
Stirling & Alloa	61,733
Banbury	61,550
Carlisle	61,217
Inverness & Dingwall	60,717
Stafford	60,633

Perth & Blairgowrie	60,117
Taunton	58,317
Lowestoft & Beccles	56,183
Dorchester & Weymouth	55,150
Irvine & Arran	54,867
Margate, Ramsgate & Sandwich	54,450
Truro, Redruth & Camborne	54,400
Ashford	54,050
Isle of Wight	53,000
Worksop & Retford	52,383
Thetford & Mildenhall	51,917
Kidderminster	49,283
Bangor, Caernarfon & Llangefni	48,650
Darlington	48,483
Folkestone	47,500
Bury St Edmunds	47,300
Rhyl & Denbigh	46,317
Moray	44,700
Great Yarmouth	44,400
Ebbw Vale & Abergavenny	43,083
Bridgwater	42,283
Hartlepool	41,133
Monmouth & Cinderford	40,500
Rugby	40,217
Barnstaple	39,733
Kendal	38,917
South Holland	38,783
Dover	38,383
Merthyr Tydfil & Aberdare	38,083
Dumfries & Annan	37,483
Andover	37,467
Barrow-in-Furness	37,400
Paignton & Totnes	36,133
Llandudno & Colwyn Bay	36,067
Greenock	36,000
Workington & Keswick	35,633
Carmarthen & Llandovery	35,433
Shaftesbury & Blandford Forum	35,000
Dumbarton	34,467
Wells & Shepton Mallet	34,183
Grantham	33,000
Wisbech	32,900
Haverfordwest & Fishguard	32,700
Scarborough	32,700
Boston	31,350
Northallerton & Thirsk	31,233

Torquay	30,833
Whitehaven	30,333
Oswestry	29,833
Falmouth & Helston	27,900
Matlock	27,833
Forfar & Montrose	27,500
Penzance & Isles of Scilly	27,400
Louth & Horncastle	27,067
Craven	25,083
Galashiels & Peebles	24,933
Bridlington & Driffield	24,800
Aberystwyth & Lampeter	24,417
Clacton	24,333
Penrith & Appleby	23,167
Buxton	23,133
Newtown & Welshpool	22,783
Malton & Pickering	22,717
Tiverton	21,917
Honiton & Axminster	21,883
Skegness	21,600
Bideford	21,233
Cromer & Sheringham	21,150
St Andrews & Cupar	20,883
Hexham & Haltwhistle	19,483
Ludlow	18,733
Peterhead	17,250
Richmond & Catterick	16,050
Pembroke & Tenby	14,100
Cardigan	13,683
Berwick	13,567
Bude & Holsworthy	12,817
Kingsbridge & Dartmouth	12,667
Llandrindod Wells & Builth Wells	12,600
Banff	12,567
Shetland Islands	12,067
Eilean Siar	11,667
Whitby	11,517
Okehampton	11,450
Brecon	11,433
Bridport & Lyme Regis	11,100
Launceston	10,983
Orkney Islands	10,950
Minehead	10,900
Wadebridge	9,767
Invergordon	9,150
Kirkcudbright	8,983

Hawick	8,967
Fraserburgh	8,933
Stranraer	8,800
Lochaber	8,633
Porthmadog & Ffestiniog	8,517
Pwllheli	8,433
Holyhead	8,167
Thurso	7,483
Dunoon & Bute	7,217
Kelso & Jedburgh	6,833
Oban	6,733
Dolgellau & Barmouth	6,550
Badenoch	6,383
Wick	6,267
Pitlochry	5,667
Machynlleth & Tywyn	5,350
Skye & Lochalsh	5,217
Lochgilphead	5,117
Newton Stewart & Wigtown	5,000
Dornoch & Lairg	4,717
Hawes & Leyburn	3,500
Ullapool & Gairloch	3,117
Campbeltown	2,983
Mull & Islay	2,733

Source: Annual Population Survey, 2009-2014, number of employees by Travel-To-Work-Area.

Appendix B – Transition rates from low to higher pay in tight, average, and slack labour markets

Table B-1 presents transition rates from low to higher pay for workers living in tight, average and slack labour markets. As can be seen, transitions to higher pay are more likely in tight labour markets than in 'average' labour markets, and least likely in slack labour markets. Transitions to unemployment are also more frequent in slacker labour market areas.

Table B-1: Year-to-year transitions for workers in low pay at *t-1*
(under threshold 1) by labour market tightness, pooled transitions, 2009-2014

	Higher-paid	Low-paid	Unemployed	Economically inactive	Self-employed	Total
Tight	28.0	58.9	3.9	7.2	2.0	100
average	27.4	56.7	5.2	8.3	2.4	100
Slack	24.5	61.9	5.4	6.8	1.4	100

Source: Understanding Society, waves 1-5. N = 11,371. Differences in transition rates between tight, average and slack labour markets significant at 0.01% level (Pearson χ^2 = 45.5283, p < 0.001). Difference in transition rates to higher pay significant at 5% level (Pearson χ^2 = 12.9634, p = 0.023).

The measure of labour market tightness is based on the proportion of residents aged 16-64 who were registered as JSA claimants[98], with areas with a high proportion of claimants being classified as 'slack', those with a low proportion of claimants as 'tight' and all other areas as 'average'. On average across all Travel-To-Work-Areas and all years, the JSA claimant proportion was 3.2 per cent, however claimant proportions were subject to substantial variation over time. Rather than basing the classification of labour markets as 'tight', 'average' or 'slack' on a single set of cut-off points for the entire period – which would have risked conflating differences between local labour markets with aggregate changes in the JSA claimant count – the classification was therefore conducted for each year separately. A further complication was presented by the fact that Travel-To-Work-Areas with a low proportion of JSA claimants tend to be smaller than those with higher claimant proportions. This means that if I had simply taken the claimant proportion for each Travel-To-Work-Area and averaged it, the number of workers living in relatively tight labour markets would have been substantially lower than the number of workers in slacker labour markets. Therefore, the mean value of the JSA claimant proportion was calculated across all working-age respondents within Understanding Society for each year. Labour markets were classified as 'tight' if the proportion of

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[98] Ideally, the ratio of claimants to economically active residents would be a more appropriate measure but unfortunately this is not available through Nomis.

JSA claimants to working-age residents was more than half a standard deviation below the mean value for each particular year, and as 'slack' if the claimant proportion was more than half a standard deviation above the mean value for each year. As workers were more or less normally distributed across the range of claimant proportions within TTWAs, this method meant that the numbers of workers in each category are roughly equally balanced in each period.

Appendix C – Full regression results (AMEs) for Model 3 in table 4.16

Table C-1: Average marginal effects derived from random-effects probit estimator on probability of escaping low pay from *t-1* to *t* based on threshold 1, local labour markets defined as TTWAs, Model 3 full results

	AME	Standard Error	95% confidence interval
Local labour market size (TTWA)$_{t-1}$			
reference category: Non-cities			
London	0.152***	(0.030)	0.093 - 0.211
Core Cities	0.037*	(0.020)	-0.003 - 0.076
Other cities	-0.007	(0.016)	-0.037 - 0.024
Labour market weakness $_{t-1}$	-0.012**	(0.006)	-0.023 - -0.001
Age $_{t-1}$	-0.001	(0.001)	-0.002 - 0.000
Female $_{t-1}$	-0.093***	(0.018)	-0.128 - -0.058
Ethnic group $_{t-1}$			
reference category: White			
Asian	-0.028	(0.027)	-0.081 - 0.025
Black & Caribbean	0.070*	(0.042)	-0.013 - 0.153
Other and mixed	-0.003	(0.051)	-0.104 - 0.097
Long-term health condition $_{t-1}$	-0.004	(0.014)	-0.032 - 0.024
Highest qualification $_{t-1}$			
reference category: Higher-level qualification			
Medium (A-level or equivalent)	-0.040**	(0.020)	-0.079 - -0.002
Low (GCSE or no qualification)	-0.070***	(0.018)	-0.105 - -0.034
Not born in UK $_{t-1}$	-0.028	(0.025)	-0.078 - 0.021
Children $_{t-1}$	-0.028*	(0.015)	-0.058 - 0.001
Second earner $_{t-1}$	0.038***	(0.014)	0.010 - 0.067
Housing tenure $_{t-1}$			
reference category: owner-occupied			
Private rented	-0.015	(0.018)	-0.050 - 0.020
Social rented	-0.063***	(0.017)	-0.095 - -0.030
Optimistic about the future $_{t-1}$	0.027**	(0.013)	0.001 - 0.054
Job satisfaction $_{t-1}$			

reference category: neither satisfied nor dissatisfied

Dissatisfied	0.029	(0.025)	-0.020 - 0.078
Satisfied	-0.000	(0.013)	-0.026 - 0.025
Break in employment $_{t-1\ to\ t}$	-0.023	(0.053)	-0.127 - 0.082
Part-time hours $_{t-1}$	-0.091***	(0.015)	-0.120 - -0.063
Temporary job $_{t-1}$	0.026	(0.026)	-0.025 - 0.077

Occupation $_{t-1}$
reference category: managerial & professional

Administrative & secretarial	0.004	(0.030)	-0.055 - 0.064
Skilled trades	-0.141***	(0.035)	-0.209 - -0.073
Caring & leisure	-0.121***	(0.028)	-0.176 - -0.065
Sales & customer service	-0.161***	(0.030)	-0.220 - -0.102
Process & machine operatives	-0.149***	(0.035)	-0.218 - -0.080
Elementary	-0.202***	(0.026)	-0.253 - -0.150

Industry $_{t-1}$
reference category: manufacturing

Banking, finance and insurance	0.053	(0.043)	-0.031 - 0.138
Transport & communication	0.027	(0.042)	-0.054 - 0.109
Energy & water	0.199**	(0.080)	0.041 - 0.356
Education & public administration	-0.063*	(0.037)	-0.136 - 0.010
Construction	0.085	(0.057)	-0.027 - 0.197
Administrative & support	-0.075**	(0.037)	-0.148 - -0.002
Health & social care	0.028	(0.037)	-0.044 - 0.100
Other services	-0.064	(0.041)	-0.145 - 0.017
Agriculture & fisheries	-0.008	(0.089)	-0.183 - 0.167
Retail & wholesale	-0.042	(0.032)	-0.104 - 0.020
Accommodation & food services	-0.096***	(0.034)	-0.162 - -0.029
Public sector $_{t-1}$	0.064***	(0.021)	0.023 - 0.105

Workplace size $_{t-1}$
reference category: medium (25-499)

Small (<25)	-0.006	(0.014)	-0.034 - 0.022
Large (500+)	0.133***	(0.025)	0.084 - 0.182
Unionised workplace $_{t-1}$	0.072***	(0.016)	0.041 - 0.102

Year dummies
reference category: 2009

2010	0.039**	(0.018)	0.004 - 0.075
2011	0.042**	(0.020)	0.004 - 0.081
2012	0.021	(0.020)	-0.018 - 0.059
2013	0.037*	(0.022)	-0.006 - 0.080
2014	-0.152***	(0.058)	-0.265 - -0.038

Robust standard errors clustered on workers. N = 7,651. Log pseudolikelihood = -3018.81

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%

Appendix D – Effect of local labour market size on moving to higher pay using low pay threshold 2

Table D-1: Average marginal effects derived from random-effects probit estimator on probability of escaping low pay from *t-1* to *t* under threshold 2, local labour markets defined as TTWAs

	Model 1 (All transitions)	Model 2 (All transitions)	Model 3 (All transitions)	Model 4 (Within-Firm)	Model 5 (Between-firm)	Model 6 (Within-job)
Labour market size (TTWA) reference category: Non-cities						
London	0.086***	0.096***	0.094**	0.085**	0.094	0.061
	(0.024)	(0.024)	(0.036)	(0.038)	(0.140)	(0.039)
Core Cities	-0.004	0.017	0.020	0.015	0.096	0.002
	(0.019)	(0.020)	(0.025)	(0.027)	(0.091)	(0.027)
Smaller cities	0.022	0.026	0.013	0.009	0.034	0.005
	(0.016)	(0.016)	(0.019)	(0.021)	(0.072)	(0.021)
Labour market weakness (JSA claimant proportion)		-0.021***	-0.014**	-0.010	-0.035	-0.009
		(0.006)	(0.007)	(0.008)	(0.027)	(0.008)
Controls	NO	NO	YES	YES	YES	YES
Log pseudolikelihood	-4805.84	-4799.91	-3018.81	-2767.08	-160.94	-2664.24
Observations	7,643	7,643	4,908	4,562	274	4,417

Source: Understanding Society, 2009-14. *** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Cluster robust standard errors in parentheses (clustered on workers), except for Model 5 for which robust standard errors could not be computed due to small sample size.

Appendix E – Brief note on the 'real' rate of unemployment as estimated by Beatty *et al.* (2012)

Beatty *et al.* (2012) provide an alternative set of 'real unemployment' figures, drawn from several official sources in an effort to include hidden unemployment not reflected in claimant count data or the unemployment estimates derived from the Labour Force Survey. The real level of unemployment is only calculated by the above authors once every five years, with the most recent years for which it is calculated being 2012 and 2017[99]. As the 2012 estimates are the only ones which fall in the period analysed in this chapter (2009-2014), these were used as a proxy for the real unemployment level throughout the entire period. The real level of unemployment is on the whole reasonably highly correlated with the proportion of the working-age population claiming JSA (the correlation between JSA claimant proportions and real unemployment levels within LADs is between 0.89 and 0.93 depending on the year), with the LADs with the highest levels of hidden unemployment tending to be the ones with higher proportions of JSA claimants. The effect of using real unemployment levels rather than JSA claimant proportions as a measure of labour market tightness is to amplify the contrast between tight and slack labour markets.

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[99] A real unemployment level is additionally not available for the City of London and the Isles of Scilly.

Appendix F – Effect of city size on wage growth for low-paid workers while controlling for long-run effects of previous city experience

Table F-1: Regression coefficients random-effects estimator on growth in (log) real hourly pay from *t-1* to *t* for workers in low-paid occupations at *t*, accounting for potential long-run effects of previous city experience

	Model 3 (All transitions)	Model 4 (Within-Firm)	Model 6 (Within-job)
Labour market size (TTWA)			
reference category: Non-city for at least 10 years			
London	-0.020	-0.793	-0.526
	2.812	2.565	2.624
Core Cities	0.450	0.920	0.810
	2.204	2.116	2.127
Smaller cities	-0.284	-0.231	-0.441
	1.901	1.799	1.836
Labour market weakness	-0.231	-0.090	-0.256
(JSA claimant proportion)	0.582	0.559	0.571
% local workers earning < min. wage$_{t-1}$	0.116	0.112	0.129
	0.082	0.078	0.081
Controls	YES	YES	YES
R² (overall)	0.033	0.030	0.030
Observations	3,768	3,531	3,426

*** = significant at 1% level; ** = significant at 5% level; * = significant at 10%. Robust standard errors in parentheses. Wage growth winsorized at 1st and 99th percentiles. Unable to estimate Model 5 due to insufficient observations.

Appendix G – Description of sample used in chapter 5

Table G-1: Descriptive statistics of sample of workers in low-paid occupations in ONS LS

Category	% of longitudinal sample	% of longitudinal sample in paid employment in both 2001 and 2011
Male	36.63	36.02
Female	63.37	63.98
16-24	20.24	19.54
25-34	26.89	27.25
35-44	34.06	35.88
45-49(54)	18.81	17.33
Ethnic group		
White	92.05	92.71
Asian	4.58	4.01
Black	1.91	1.92
Mixed and other	1.47	1.36
Highest qualification		
No qualifications	25.58	23.89
Level 1: 1-4 GCSEs/O Levels	29.24	30.03
Level 2: 5+ GCSEs grade A*-C/O levels	25.36	25.95
Level 3: 2+ A Levels/HSC/NVQ3	7.67	7.95
Degree level and above	6.97	7.19
Other: Unknown/C&G/Prof	5.18	4.99
Did not gain additional qualifications	44.73	42.16
Gained additional qualification(s)	55.27	57.84
No limiting illness, health condition or disability	93.61	94.73
Limiting illness, health condition or disability	6.39	5.27
Didn't develop limiting illness or health condition	89.75	93.64
Developed limiting illness or health condition	10.25	6.36
Married/cohabiting couple, no children	30.05	29.42
Married/cohabiting couple with children	42.02	43.70
Single, no children	10.92	10.38
Single parent	7.34	7.43
Other	9.66	9.07
No additional children	82.07	83.42
Additional child(ren)	17.93	16.58

Housing tenure

Owner-occupier	71.27	73.01
Social renter	19.53	18.26
Private rent	6.74	6.35
Other	2.47	2.38

Migrant status

UK born	91.67	92.25
Born in Europe, North-America, Oceania or Japan	2.19	2.11
Born in rest of world	6.14	5.63

English proficiency

English/Welsh is main language	96.14	96.73
English/Welsh not main language but speaks well/very well	3.21	2.82
English/Welsh not main language and doesn't speak well or at all	0.65	0.46

Occupation (2001)

Caring personal service occupations	22.61	23.94
Leisure, travel and related personal service occupations	6.72	6.35
Sales occupations	23.92	24.16
Elementary trades and related occupations	19.08	18.37
Elementary administration & service occupations	27.67	27.18

Working hours

Full-time	57.10	57.73
Part-time	42.90	42.27

Firm size (2001)

1-9 employees	23.59	21.75
10-24 employees	19.74	19.69
25-499 employees	42.81	44.21
500 or more employees	13.86	14.35

Industry (2001)

Farming, forestry & fishing	1.50	1.42
Mining & extraction	0.06	0.06
Manufacturing	8.37	8.05
Waste, sewage & recycling	0.54	0.57
Electricity, gas & water	0.28	0.27
Construction	2.34	2.12
Wholesale, retail & renting	28.23	28.55
Hotels & restaurants	8.47	7.97
Transport & communication	8.51	8.73

Financial, insurance & real-estate	1.85	1.81
Computer and related activities	0.20	0.17
Research & development	0.07	0.06
Business services	5.41	5.12
Public administration	2.05	2.03
Education	9.90	10.87
Healthcare & social work	16.63	17.25
Media, entertainment & sport	2.20	2.21
Other activities	3.39	2.72

Source: ONS LS, 2001 and 2011.

Appendix H – Polarisation and skill bias measures for Super-Travel-To-Work-Areas

Table H-1: Polarisation indices, skill bias indices and routine employment shares for all STTWAs

STTWA	Polarisation index 1999-03	Skill bias index 1999-03	Dynamic polarisation index	Dynamic skill bias index	Polarisation index 2009-13	Skill bias index 2009-13	Routine employment share 1999-03 (%)	Routine employment share 2009-13 (%)
Aberystwyth, Tywyn, Cardigan, Haverfordwest & Pembroke	46.04	-27.27	26.48	3.41	41.31	-18.60	25.26	23.15
Bangor, Pwllheli, Colwyn Bay	41.64	-18.89	27.75	3.07	41.62	-14.43	25.30	20.40
Bath & Trowbridge	40.95	-13.66	30.47	10.48	44.48	-0.68	27.63	20.06
Birkenhead	37.21	-8.66	29.06	-1.39	39.68	-13.56	32.08	24.99
Birmingham	39.28	-11.92	30.02	3.04	42.95	-8.90	32.21	22.90
Blackburn & Burnley	35.76	-17.53	31.51	4.17	41.06	-16.13	34.47	26.19
Blyth and Ashington & Berwick	39.13	-20.36	29.86	8.94	41.26	-14.91	27.00	21.54
Bournemouth & Poole	39.06	-12.89	31.50	7.09	43.98	-5.31	27.71	20.87
Bradford & Halifax	37.52	-17.91	31.00	5.90	40.97	-12.74	33.21	25.60
Brighton & Worthing	41.48	-5.31	28.75	5.84	43.13	3.46	25.67	19.20
Bristol & Weston-super-Mare	39.18	-8.15	30.30	7.03	43.02	0.55	28.58	20.33
Bury St Edmunds & Thetford	37.41	-14.40	30.55	3.88	40.23	-11.44	30.04	22.38
Cambridge & Huntingdon	39.30	-1.08	30.94	5.04	44.15	6.40	27.05	18.66
Canterbury & Margate	43.48	-13.71	28.77	4.51	42.27	-11.07	24.01	20.29
Cardiff, Bridgend, Merthyr & Newport	40.11	-16.64	28.99	5.82	41.09	-9.51	30.29	24.50
Carlisle, Penrith, Workington, Whitehaven & Barrow-in-Furness	39.67	-20.88	29.29	5.56	41.16	-15.92	31.62	25.16
Chelmsford	39.49	-3.94	30.73	3.01	43.67	-2.61	25.40	20.01
Colchester & Clacton	39.82	-12.54	29.97	6.93	42.03	-3.55	27.62	19.26
Cornwall	41.47	-20.86	29.40	3.21	43.19	-17.81	27.21	23.29
Coventry & Leamington Spa	40.25	-11.33	29.55	6.64	42.19	-3.41	29.90	22.25
Crawley	41.13	-2.12	30.15	4.72	44.14	4.85	24.39	19.86
Crewe	41.69	-10.13	29.16	3.71	42.45	-5.36	27.95	20.63
Derby & Burton upon Trent	40.08	-14.32	28.65	5.61	39.62	-7.93	29.58	26.86
Doncaster & Worksop	39.06	-21.12	28.85	4.34	41.17	-19.69	30.23	24.22
Dudley	35.74	-16.23	30.49	5.41	40.36	-12.05	37.62	26.95
Durham & Darlington	40.10	-18.28	27.38	3.67	39.43	-13.71	31.91	26.76
Eastbourne & Hastings	42.14	-12.64	28.46	4.21	42.44	-9.03	22.20	23.08
Exeter, Barnstaple,	40.27	-18.00	29.96	4.76	42.38	-12.93	26.48	22.84

Bideford, Sidmouth & Torquay								
Folkestone & Ashford	37.43	-15.53	29.37	1.51	40.18	-15.73	29.70	21.77
Gloucester, Cheltenham & Cinderford	39.66	-10.12	29.76	5.46	42.09	-4.08	30.12	24.45
Grimsby & Scunthorpe	39.35	-23.17	28.02	6.92	39.32	-16.01	31.11	27.32
Guildford and Aldershot	43.69	3.27	29.60	3.00	46.19	7.88	21.55	16.73
Harrogate & Northallerton	42.57	-4.57	28.22	3.09	42.89	-4.36	26.05	20.65
Hereford, Ludlow, Llandrindod & Brecon	40.32	-17.18	27.70	-0.68	40.10	-16.39	27.26	26.00
High Wycombe and Aylesbury	40.63	2.25	30.75	4.54	45.59	9.25	26.44	18.40
Huddersfield	40.19	-14.53	29.44	7.95	41.14	-2.58	30.75	24.64
Hull	37.51	-20.02	30.67	5.58	41.23	-15.61	30.84	23.07
Ipswich	39.49	-11.01	29.94	2.11	42.28	-9.81	27.48	21.68
King's Lynn & Wisbech	39.11	-23.25	29.74	12.56	39.48	-12.57	27.53	26.00
Lancaster, Morecambe & Kendall	42.37	-17.10	26.81	10.25	40.17	-4.59	23.52	20.01
Leeds & Skipton	40.20	-13.61	30.01	7.59	42.68	-4.27	28.30	22.97
Leicester	38.76	-14.98	30.73	7.68	42.68	-7.24	32.36	24.93
Lincoln, Boston & Skegness	39.94	-21.42	28.82	6.07	39.98	-14.35	27.40	25.67
Liverpool	39.95	-16.67	28.93	2.45	40.87	-12.96	27.73	24.73
London	41.40	-0.78	30.42	5.75	45.44	7.88	25.35	18.85
Lowestoft & Great Yarmouth	36.88	-23.54	34.89	11.76	41.04	-17.51	33.34	22.68
Luton	40.76	-3.44	30.41	4.28	44.84	1.48	26.38	19.89
Manchester & Buxton	39.01	-13.74	30.82	5.17	43.27	-8.03	29.95	23.29
Medway & Tunbridge Wells	40.14	-9.78	29.33	6.18	41.96	-1.57	26.46	21.16
Middlesbrough, Stockton & Hartlepool	39.72	-20.79	28.72	4.70	39.78	-14.68	31.49	25.07
Milton Keynes & Bedford	40.45	-4.71	30.09	5.06	43.03	2.35	27.37	19.26
Minehead, Bridgwater & Taunton	40.33	-21.52	29.66	5.91	40.93	-15.78	29.31	23.80
Newcastle & Hexham	39.11	-15.37	29.81	3.89	41.28	-11.71	30.57	25.63
Northampton, Kettering & Corby	37.83	-16.92	31.40	4.58	42.01	-11.26	34.24	22.16
Norwich & Cromer	40.27	-16.61	30.21	7.23	43.13	-8.20	28.26	20.04
Nottingham, Grantham & Mansfield	40.42	-15.76	30.24	4.61	43.41	-10.52	29.02	23.10
Oxford & Banbury	41.22	-0.52	30.21	6.12	44.87	9.21	25.39	16.75
Peterborough & Spalding	38.79	-11.21	30.00	2.88	40.64	-8.92	29.19	23.58
Plymouth, Kingsbridge and Darthmouth	40.36	-15.65	29.11	8.17	41.78	-9.84	28.36	24.11
Portsmouth & Chichester	41.59	-11.47	28.03	2.04	41.76	-7.97	25.50	23.60
Preston & Blackpool	38.56	-15.12	29.33	4.68	40.99	-10.08	30.95	24.19
Reading, Basingstoke & Newbury	42.29	2.84	30.29	4.14	46.22	9.64	24.51	18.48
Rhyl, Wrexham &	39.40	-17.20	28.85	6.01	39.77	-9.37	31.06	26.84

Chester							
Salisbury, Gillingham & Andover	40.01	-9.59	30.74	11.64	43.30	6.25	25.45	19.17
Sheffield, Barnsley & Chesterfield	38.26	-16.37	30.97	4.16	43.27	-13.99	32.50	23.80
Shrewsbury, Telford, Welshpool & Oswestry	38.28	-14.72	30.46	3.22	42.06	-11.23	30.88	24.67
Slough and Heathrow	40.66	-1.15	30.78	3.43	45.17	4.14	25.36	18.06
Southampton	41.68	-4.13	29.80	4.80	44.38	2.64	23.61	20.55
Southend	38.91	-12.39	28.30	5.17	38.80	-5.12	31.52	25.75
Stevenage and Welwyn Garden City	39.79	-10.33	31.68	12.31	44.00	8.69	26.16	17.76
Stoke-on-Trent	38.31	-21.86	30.39	8.58	40.50	-13.28	32.66	23.92
Sunderland	38.12	-24.65	29.81	8.46	39.64	-16.42	34.44	28.95
Swansea & Llanelli	38.29	-17.07	30.51	1.18	42.56	-18.53	30.16	22.95
Swindon	40.54	-9.25	30.02	7.29	43.06	1.02	27.49	21.29
Wakefield and Castleford	39.44	-21.29	29.17	4.02	38.90	-16.14	29.88	24.76
Warrington and Wigan	38.50	-17.27	29.99	5.48	40.37	-9.51	28.61	23.58
Whitby, Scarborough, Malton & Bridlington	40.68	-21.81	28.49	3.05	39.18	-20.86	27.29	24.16
Wolverhampton, Walsall & Stafford	37.33	-16.72	30.06	4.76	40.00	-11.96	33.11	25.86
Worcester, Kidderminster & Evesham	40.69	-14.54	29.71	10.61	42.60	-0.81	28.61	21.15
Yeovil, Street, Bridgport & Weymouth	39.66	-19.95	30.90	8.41	42.43	-8.76	28.34	21.81
York	39.76	-14.30	31.56	10.00	43.98	-3.28	26.58	20.73

Source: LFS, 1999-2003 and 2009-2013

Appendix I – TTWAs with more than 600 observations used in table N.1 (appendix N)

Table I-1: List of TTWAs with more than 600 observations in both periods, with polarisation indices, skill bias indices and routine employment share

TTWA	Polarisation index 1999-03	Skill bias index 1999-03	Polarisation index 2009-13	Skill bias index 2009-13	Dynamic polarisation index	Dynamic skill bias index	Routine employment share 1999-03 (%)	Routine employment share 2009-13 (%)
Barnsley	39.02	-19.23	40.35	-17.01	29.14	2.87	32.43	26.79
Basingstoke	42.04	4.75	43.27	6.76	28.77	3.64	24.51	20.11
Bedford	39.86	-5.56	43.14	1.22	30.72	5.19	26.56	19.05
Birkenhead	37.21	-8.66	39.68	-13.56	29.06	-1.39	31.26	24.99
Birmingham	39.28	-11.92	42.95	-8.90	30.02	3.04	31.42	22.90
Blackburn	36.61	-14.03	41.94	-18.37	31.15	1.41	31.85	26.72
Blackpool	37.85	-18.34	41.15	-9.20	30.16	8.00	32.64	22.65
Bournemouth	39.18	-10.84	44.31	-7.82	31.69	4.48	26.06	20.41
Bradford	37.84	-20.49	40.62	-16.89	30.02	5.42	33.07	26.87
Brighton	42.79	-3.31	44.20	7.80	28.85	7.51	21.70	16.27
Bristol	39.03	-7.28	43.03	1.46	30.33	6.97	28.12	20.04
Cambridge	39.66	0.35	44.99	6.30	31.23	3.93	26.03	17.77
Cardiff	39.95	-13.57	41.24	-6.07	29.49	6.13	28.07	23.20
Chelmsford	39.49	-3.94	43.67	-2.61	30.73	3.01	25.47	20.01
Chester	39.07	-13.01	42.03	-8.36	30.19	4.61	29.88	25.00
Chesterfield	36.49	-10.57	40.80	-5.42	31.39	7.19	32.19	24.75
Colchester	40.77	-8.79	41.38	3.67	28.95	7.94	26.20	18.56
Coventry	39.26	-14.14	41.15	-9.04	29.07	5.57	32.03	24.18
Crawley	41.13	-2.12	44.14	4.85	30.15	4.72	24.15	19.86
Crewe	41.69	-10.13	42.45	-5.36	29.16	3.71	28.02	20.63
Derby	40.20	-13.79	38.83	-6.48	28.17	6.02	29.28	26.22
Doncaster	38.55	-24.41	39.08	-18.15	28.71	7.20	30.25	25.08
Dudley	35.74	-16.23	40.36	-12.05	30.49	5.41	37.31	26.95
Durham and Bishop Auckland	39.10	-15.55	39.40	-9.99	27.91	5.18	32.50	24.35
Exeter	41.67	-13.14	42.40	-8.27	28.81	3.34	25.69	21.07
Gloucester	38.93	-9.17	42.62	-2.16	31.08	5.02	29.19	22.22
Guildford and Aldershot	43.69	3.27	46.19	7.88	29.60	3.00	21.71	16.73
Halifax	37.40	-11.37	42.59	-3.35	33.25	8.05	31.33	22.51
High Wycombe and Aylesbury	40.63	2.25	45.59	9.25	30.75	4.54	25.06	18.40
Huddersfield	40.19	-14.53	41.14	-2.58	29.44	7.95	30.04	24.64
Hull	37.51	-20.02	41.23	-15.61	30.67	5.58	30.84	23.07
Ipswich	39.49	-11.01	42.28	-9.81	29.94	2.11	27.02	21.68
Kettering and Wellingborough	38.01	-14.96	39.69	-11.66	30.90	6.46	32.96	22.60
Leamington Spa	42.25	-6.06	44.68	7.44	30.23	9.28	25.87	17.67

Leeds	39.79	-14.25	42.99	-4.13	30.63	8.53	28.26	23.04
Leicester	38.76	-14.98	42.68	-7.24	30.73	7.68	31.64	24.93
Lincoln	39.80	-17.10	40.15	-11.77	28.68	5.51	25.99	25.19
Liverpool	39.95	-16.67	40.87	-12.96	28.93	2.45	28.44	24.73
London	41.40	-0.78	45.44	7.88	30.42	5.75	24.90	18.85
Luton	40.76	-3.44	44.84	1.48	30.41	4.28	27.34	19.89
Manchester	39.05	-13.62	43.34	-7.96	30.84	5.11	30.22	23.34
Mansfield	38.91	-19.29	39.96	-18.62	28.49	2.59	30.68	26.17
Medway	39.48	-14.20	39.91	-5.78	29.04	5.99	28.20	22.75
Middlesbrough and Stockton	39.86	-20.35	39.50	-14.72	28.32	4.08	30.62	25.04
Milton Keynes	40.56	-2.03	44.51	1.68	29.82	4.56	28.30	19.42
Newcastle	38.85	-15.75	40.98	-11.37	30.04	4.35	30.80	25.97
Newport	39.33	-17.34	39.06	-10.95	28.54	5.23	33.34	27.16
Northampton	37.46	-9.92	42.28	-7.63	31.10	2.50	30.01	22.82
Norwich	40.14	-16.33	42.94	-7.53	30.16	7.47	28.17	19.85
Nottingham	40.56	-13.06	43.98	-6.52	30.83	5.39	28.71	21.86
Oxford	42.25	0.79	45.56	10.91	29.98	6.23	23.44	15.68
Peterborough	39.97	-8.04	41.17	-5.77	29.52	2.77	27.52	23.32
Plymouth	40.00	-17.37	42.98	-9.16	29.58	8.98	29.38	24.40
Poole	39.26	-12.94	42.58	-3.25	30.75	9.36	28.79	21.56
Portsmouth	41.04	-10.60	41.02	-8.01	27.91	1.53	26.30	24.97
Preston	38.17	-12.69	39.46	-9.74	28.96	3.10	29.17	25.14
Reading	42.75	0.13	46.79	9.89	30.86	4.21	23.57	17.42
Sheffield	38.46	-14.85	43.89	-13.51	31.26	3.57	30.67	22.62
Slough and Heathrow	40.66	-1.15	45.17	4.14	30.78	3.43	25.13	18.06
Southampton	41.68	-4.13	44.38	2.64	29.80	4.80	25.18	20.55
Southend	38.91	-12.39	38.80	-5.12	28.30	5.17	33.01	25.75
Stevenage and Welwyn Garden City	39.79	-10.33	44.00	8.69	31.68	12.31	26.71	17.76
Stoke-on-Trent	38.31	-21.86	40.50	-13.28	30.39	8.58	32.99	23.92
Sunderland	38.12	-24.65	39.64	-16.42	29.81	8.46	33.52	28.95
Swansea	36.83	-16.60	42.61	-18.83	31.44	1.09	30.72	23.50
Swindon	40.54	-9.25	43.06	1.02	30.02	7.29	28.79	21.29
Telford	36.82	-11.41	41.18	-7.08	30.89	5.73	32.07	25.00
Trowbridge	39.28	-14.85	42.77	-4.58	30.94	9.73	30.69	21.00
Tunbridge Wells	42.05	-1.96	44.23	7.07	29.94	6.55	22.67	17.73
Wakefield and Castleford	39.44	-21.29	38.90	-16.14	29.17	4.02	27.97	24.76
Warrington and Wigan	38.50	-17.27	40.37	-9.51	29.99	5.48	29.16	23.58
Wolverhampton and Walsall	36.84	-17.77	39.47	-13.19	30.29	5.60	34.69	26.77
Worcester and Kidderminster	40.00	-14.00	42.01	1.57	29.76	12.24	28.93	21.58
York	39.76	-14.30	43.98	-3.28	31.56	10.00	26.81	20.73

Source: LFS, 1999-2003 and 2009-2013

Appendix J - Occupational mobility in the LS, using longitudinal weights to adjust for non-random attrition

Table J-1: Occupational destinations in 2011 for workers starting off in low-paid occupations in 2001 and in paid employment at 2011, weighted using longitudinal weights

Occupational category	All workers			Upwardly mobile workers only		
	% male	% female	% total	% male	% female	% total
Low-paid	46.7	62.7	56.7			
Routine	17.8	15.5	16.4	33.3	41.6	37.8
Intermediate	12.7	0.6	5.2	23.9	1.6	11.9
Associate professional	8.3	9.0	8.7	15.5	24.1	20.2
Managerial	10.7	7.5	8.7	20.0	20.2	20.1
Professional	3.9	4.6	4.4	7.3	12.4	10.0
Total	100	100	100	100	100	100
N	9,491	15,751	25,242	5,007	5,815	10,822

Source: ONS LS, 2001 and 2011.

Table J-2: Occupational destination in 2011 for workers starting off in low-paid occupations in 2001 and in paid employment at 2011, by highest qualification (2001), weighted using longitudinal weights

A) All workers

Occupational category	No qualifications	Level 1: 1-4 GCSEs/ O-Level	Level 2: 5+ GCSEs/O-levels	Level 3: 2+ A-Levels/ HSC/NVQ3	Level 4: Degree level and above	Unknown/ other qualification
Low-paid	69.6	59.4	51.6	42.3	34.6	59.4
Routine	14.4	17.5	18.0	16.0	11.5	18.2
Intermediate	7.6	5.6	3.7	2.2	1.9	7.8
Associate professional	3.2	6.9	11.7	16.8	17.8	5.1
Managerial	4.1	8.3	10.7	14.5	14.2	6.4
Professional	1.0	2.4	4.3	8.3	20.0	3.1
N	6,111	7,475	6,511	2,033	1,837	1,275

B) Upwardly mobile workers only

Occupational category	No qualifications	Level 1: 1-4 GCSEs/ O-Level	Level 2: 5+ GCSEs/O-levels	Level 3: 2+ A-Levels/ HSC/NVQ3	Level 4: Degree level and above	Unknown/ other qualification
Routine	47.4	43.2	37.2	27.7	17.6	44.8
Intermediate	25.2	13.7	7.7	3.8	2.9	19.2
Associate professional	10.4	17.0	24.2	29.1	27.3	12.6
Managerial	13.6	20.3	22.0	25.1	21.7	15.7
Professional	3.4	5.9	8.9	14.3	30.6	7.7
N	1,836	3,005	3,119	1,162	1,189	512

Source: ONS LS, 2001 and 2011.

Table J-3: Occupational transitions for workers in low-paid occupations in 2001, by polarisation quartile in 1999-03, weighted using longitudinal weights

	Polarisation quartile			
Occupational category	1st	2nd	3rd	4th
Low-paid	57.4	59.2	58.5	57.8
Routine	17.1	16.2	16.1	15.4
Intermediate	5.2	5.3	5.2	4.9
Associate professional	8.6	8.1	7.7	8.1
Managerial	8.1	7.9	8.5	8.6
Professional	3.6	3.3	4.0	5.2
N	6,428	5,970	5,484	4,883

Source: ONS LS, 2001 and 2011.

Appendix K – Control variables used throughout chapter 5

Table K-1: Control variables included in all models in tables 5.16 through to 5.19

Variable	Year	Continuous/dummy
Skill bias	2001, 2011 and dynamic measure (depending on model)	Continuous
Regional unemployment rate	2001	Continuous
Change in regional unemployment rate	From 2001 to 2011	Continuous
Age	2001	Continuous
Sex	2001	Dummy • Male (reference category) • Female
Ethnic group	2001	Dummy • White (reference category) • Black/Black British • Asian/Asian British • Mixed ethnicity/other
Limiting health conditions	2001	Dummy • No limiting illness or health condition (reference category) • Illness or health condition which limits activities a little to a lot
Whether developed a limiting health condition	From 2001 to 2011	Dummy • Did not develop limiting illness or health condition (reference category) • Developed a limiting illness or health condition
Migrant status	2001	Dummy • UK born (reference category) • Born in Europe, North-America, Oceania or Japan • Born in rest of world

English proficiency	2001	Dummy • English/Welsh is first language (reference category) • English not first language and speaks English/Welsh well • English not first language and does not speak English/Welsh well
Highest qualification	2001	Dummy • Level 1: 1-4 GSCEs/O-levels (reference category) • No qualifications • Level 2: five or more GCSEs at A*-C/O-levels • Level 3: A-levels or equivalent • Degree-level qualification or above
Whether obtained additional qualification(s)	From 2001 to 2011	Dummy • Did not obtain additional qualifications (reference category) • Obtained additional qualification(s)
Household composition	2001	Dummy • Married/cohabiting without children (reference category) • Married/cohabiting with children • Singe without children • Single parent • Other
Whether had any (additional) children	From 2001 to 2011	Dummy • Did not have (additional) children (reference category) • Had (additional) children
Housing tenure	2001	Dummy • Owner-occupied (reference category) • Social rented • Private rented

Occupation (SOC2000)	2001	Dummy
		• Caring personal service occupations (reference category)
		• Leisure, travel and related personal service occupations
		• Sales occupations
		• Elementary trades and related occupations
		• Elementary administration and service occupations
Industry (SIC2003)	2001	Dummy
		• Retail & wholesale (reference category)
		• Farming, forestry & fishing
		• Mining & extraction
		• Manufacturing
		• Waste, sewage & recycling
		• Electricity, gas & water
		• Construction
		• Hotels & restaurants
		• Transport & communication
		• Financial, insurance & real-estate
		• Computer and related activities
		• Research & development
		• Business services
		• Public administration
		• Education
		• Healthcare & social work
		• Media, entertainment & sport
		• Other activities

Industry (SIC2007)	2011	Dummy	
			• Agriculture, forestry, fishing & mining
			• Manufacturing
			• Electricity, gas & steam
			• Water supply, sewerage, waste management & remediation
			• Construction
			• Wholesale & retail trade
			• Transportation & storage
			• Accommodation & food service activities
			• Information & communication
			• Financial & insurance activities
			• Real estate activities
			• Professional, scientific & technical
			• activities
			• Administrative & support service activities
			• Public administration & defence
			• Education
			• Human health & social work activities
			• Arts, entertainment & recreation
			• Other activities
Working hours	2001	Dummy	
			• Full-time (reference category)
			• Part-time
Firm size	2001	Dummy	
			• Fewer than 10 employees (reference category)
			• 10-24 employees
			• 25-499 employees
			• 500 or more employees

Appendix L – Countries included in each of the three categories that make up the Migrant Status variable used in chapter 5

Table L-1: Countries included in each of the three categories that make up the Migrant Status variable

UK	Europe, North America, Oceania & Japan	Rest of world
United Kingdom	Albania	Afghanistan
Great Britain	Andorra	Alderney
England	Australia	Algeria
Wales	Austria	Angola
Scotland	Belarus	Anguilla
Northern Ireland	Belgium	Argentina
Channel Islands	Bosnia and Herzegovina	Azerbaijan
Jersey	Bulgaria	Bahamas
Guernsey	Canada	Bahrain
Isle of Man	Croatia	Bangladesh
Gibraltar	Cyprus	Barbados
	Czech Republic	Belize
	Denmark	Bermuda
	Estonia	Bhutan
	Finland	Bolivia
	France	Botswana
	Germany	Brazil
	Greece	British Virgin Islands
	Hungary	Brunei
	Iceland	Burkina Faso
	Republic of Ireland	Myanmar
	Ibiza	Burundi
	Italy	Cambodia
	Japan	Cameroon
	Latvia	Cape Verde
	Lithuania	Cayman Islands
	Luxembourg	Central African Republic
	Malta	Chad
	Montenegro	Chile
	The Netherlands	China
	New Zealand	Colombia
	Norway	Russian Commonwealth
	Poland	Comoros
	Portugal	Congo
	Romania	Cook Islands
	Serbia	Costa Rica
	Slovakia	Cuba
	Slovenia	Djibouti
	Spain	Dominica

Sweden

Switzerland

U.S.A

Yugoslavia

Czechoslovakia

Ukraine

Europe

Ireland (not otherwise stated)

Kosovo

Dominican Republic

Ecuador

Egypt

El Salvador

Ethiopia

Falkland Islands

Fiji

Gabon

Gambia

Georgia Republic

Ghana

Grenada

Guatemala

Guinea

Guinea-Bissau

Guyana

Haiti

Honduras

India

Indonesia

Iran

Iraq

Israel

Ivory Coast

Jamaica

Jordan

Kazakhstan

Kenya

Kiribati

South Korea

Kuwait

Kyrgyzstan

Laos

Lebanon

Lesotho

Liberia

Libya

Macedonia

Madagascar

Malawi

Malaysia

Maldives

Mali

Mauritania

Mauritius

Mexico

Moldova
Mongolia
Montserrat
Morocco
Mozambique
Namibia
Nepal
Netherland Antilles
Niger
Nigeria
Oman
Pakistan
Palestine
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Puerto Rico
Qatar
Reunion
Russia
Rwanda
St Kitts - Nevis
St Helena
St Lucia
St Vincent and the
Saudi Arabia
Senegal
Seychelles
Sierra Leone
Singapore
Somalia
South Africa
Sri Lanka
Sudan
Suriname
Swaziland
Syria
Taiwan
Tanzania
Thailand
Togo
Tonga
Trinidad and Tobago
Tunisia

Turkey
Uganda
Uruguay
Uzbekistan
Vanuatu
Venezuela
Vietnam
Yemen
Democratic Republic of
Zambia
Zimbabwe
Eritrea
Armenia
Elsewhere not stated
Africa - East
Africa - North
Africa - West
Asia
Middle East
South America
West Indies
Africa (not otherwise
stated)
Cabinda
Antigua
Tibet
East Falkland
French Guiana
Kashmir
Azores
Ascension Island
Canary Islands
Abu Dhabi
Aden
Barbuda
Hong Kong
Java
Macao
Guam
Curacao
Dubai
Gaudeloupe
Melilla
Martinique
Norfolk Island
New Caledonia

Appendix M – Full estimation results of model summarised in table 5-17

Table M-1: Average marginal effects, logit estimator on transitions from low-paid occupations in 2001 to all higher-paid occupations in 2011 (all variables)

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	AME	SE	AME	SE	AME	SE	AME	SE	AME	SE	AME	SE
Polarisation index 1999-03	0.000	(0.002)	-0.004*	(0.002)								
Skill bias index 1999-03			0.002***	(0.001)								
Dynamic polarisation index					0.007**	(0.003)	0.007**	(0.003)				
Dynamic skill bias index							-0.001	(0.001)				
Polarisation index 2009-03									0.004**	(0.002)	0.001	(0.003)
Skill bias index 2009-13											0.001	(0.001)
Regional unemployment rate 2001	0.001	(0.003)	0.003	(0.003)	0.002	(0.002)	0.002	(0.002)	0.003	(0.003)	0.004	(0.003)
Increase in unemployment	-0.006	(0.007)	-0.011	(0.008)	-0.006	(0.007)	-0.007	(0.007)	-0.005	(0.007)	-0.006	(0.007)
Age	-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)	-0.004***	(0.000)
Female	-0.071***	(0.009)	-0.071***	(0.009)	-0.071***	(0.008)	-0.071***	(0.008)	-0.070***	(0.008)	-0.070***	(0.009)
Highest qualification No qualifications	-0.080***	(0.008)	-0.080***	(0.008)	-0.080***	(0.008)	-0.080***	(0.008)	-0.080***	(0.008)	-0.080***	(0.008)

Level 2	0.058***	(0.008)	0.058***	(0.008)	0.058***	(0.013)	0.058***	(0.008)	0.058***	(0.013)	0.058***	(0.008)
Level 3	0.129***	(0.013)	0.129***	(0.013)	0.129***	(0.013)	0.129***	(0.013)	0.129***	(0.013)	0.129***	(0.013)
Degree or above	0.228***	(0.013)	0.227***	(0.013)	0.228***	(0.014)	0.228***	(0.013)	0.227***	(0.014)	0.227***	(0.013)
Other/unknown	0.004	(0.014)	0.004	(0.014)	0.004	(0.014)	0.004	(0.014)	0.004	(0.014)	0.004	(0.014)
Gained qualification	0.065***	(0.006)	0.066***	(0.006)	0.066***	(0.006)	0.066***	(0.006)	0.066***	(0.006)	0.066***	(0.006)
Limiting health condition	0.014	(0.013)	0.014	(0.013)	0.014	(0.013)	0.014	(0.013)	0.014	(0.013)	0.014	(0.013)
Developed health condition	-0.009	(0.012)	-0.010	(0.012)	-0.009	(0.012)	-0.009	(0.012)	-0.009	(0.012)	-0.009	(0.012)
Ethnic group												
Asian	0.005	(0.022)	-0.001	(0.022)	0.002	(0.022)	0.002	(0.022)	0.002	(0.022)	0.001	(0.022)
Black	0.028	(0.025)	0.017	(0.025)	0.025	(0.025)	0.025	(0.025)	0.02	(0.025)	0.017	(0.025)
Mixed & other	0.020	(0.028)	0.014	(0.028)	0.018	(0.028)	0.018	(0.028)	0.015	(0.028)	0.014	(0.028)
Housing tenure												
Social rent	-0.027***	(0.008)	-0.029***	(0.008)	-0.028***	(0.008)	-0.028***	(0.008)	-0.029***	(0.008)	-0.029***	(0.008)
Private rent	0.007	(0.013)	0.007	(0.013)	0.007	(0.013)	0.007	(0.013)	0.006	(0.013)	0.006	(0.013)
Other	-0.002	(0.021)	-0.002	(0.021)	-0.002	(0.021)	-0.002	(0.021)	-0.002	(0.021)	-0.002	(0.021)
Household composition												
Married/cohabiting with children	0.024***	(0.008)	0.024***	(0.008)	0.024***	(0.008)	0.024***	(0.008)	0.024***	(0.008)	0.024***	(0.008)
Single, no children	-0.013	(0.011)	-0.014	(0.011)	-0.013	(0.011)	-0.013	(0.011)	-0.013	(0.011)	-0.014	(0.011)
Single parent	0.054***	(0.013)	0.054***	(0.013)	0.053***	(0.013)	0.053***	(0.013)	0.054***	(0.013)	0.054***	(0.013)
Other	0.048***	(0.012)	0.048***	(0.012)	0.049***	(0.012)	0.048***	(0.012)	0.048***	(0.012)	0.048***	(0.012)
Firm size												
10-24 employees	0.002	(0.009)	0.002	(0.009)	0.002	(0.008)	0.002	(0.009)	0.002	(0.008)	0.002	(0.009)

25-499 employees	-0.004	(0.008)	-0.005	(0.008)	-0.005	(0.011)	-0.005	(0.008)	-0.005	(0.011)	-0.005	(0.008)
500 or more employees	0.011	(0.011)	0.010	(0.011)	0.011	(0.030)	0.011	(0.011)	0.011	(0.030)	0.01	(0.011)
Industry 2001												
Farming, forestry & fishing	0.012	(0.030)	0.013	(0.030)	0.013	(0.030)	0.013	(0.030)	0.012	(0.030)	0.013	(0.030)
Mining & extraction	-0.011	(0.119)	-0.007	(0.119)	-0.009	(0.119)	-0.009	(0.119)	-0.012	(0.119)	-0.01	(0.119)
Manufacturing	-0.007	(0.014)	-0.005	(0.014)	-0.006	(0.014)	-0.006	(0.014)	-0.006	(0.014)	-0.005	(0.014)
Waste, sewage & recycling	-0.006	(0.040)	-0.006	(0.040)	-0.005	(0.040)	-0.005	(0.040)	-0.006	(0.040)	-0.006	(0.040)
Electricity, gas & water	0.006	(0.058)	0.008	(0.058)	0.006	(0.058)	0.007	(0.058)	0.006	(0.058)	0.007	(0.058)
Construction	0.048**	(0.024)	0.049**	(0.024)	0.049**	(0.024)	0.049**	(0.024)	0.048**	(0.024)	0.048**	(0.024)
Hotels & restaurants	0.049***	(0.015)	0.049***	(0.015)	0.049***	(0.015)	0.049***	(0.015)	0.049***	(0.015)	0.049***	(0.015)
Transport & communication	-0.036**	(0.014)	-0.036**	(0.014)	-0.036**	(0.014)	-0.036**	(0.014)	-0.036**	(0.014)	-0.036**	(0.014)
Financial, insurance & real-estate	0.056**	(0.027)	0.056**	(0.027)	0.056**	(0.027)	0.056**	(0.027)	0.056**	(0.027)	0.056**	(0.027)
Computer and related activities	0.094	(0.084)	0.089	(0.084)	0.093	(0.084)	0.093	(0.084)	0.092	(0.084)	0.091	(0.084)
Research & development	0.096	(0.117)	0.092	(0.117)	0.095	(0.117)	0.095	(0.117)	0.093	(0.117)	0.092	(0.117)
Business services	-0.012	(0.016)	-0.012	(0.016)	-0.012	(0.016)	-0.012	(0.016)	-0.012	(0.016)	-0.012	(0.016)
Public administration	0.002	(0.024)	0.003	(0.024)	0.002	(0.024)	0.002	(0.024)	0.001	(0.024)	0.002	(0.024)
Education	0.039**	(0.017)	0.038**	(0.017)	0.039**	(0.017)	0.039**	(0.017)	0.038**	(0.017)	0.038**	(0.017)
Healthcare & social work	-0.011	(0.016)	-0.010	(0.016)	-0.011	(0.016)	-0.011	(0.016)	-0.011	(0.016)	-0.01	(0.016)
Media, entertainment & sport	0.066***	(0.024)	0.066***	(0.024)	0.067***	(0.024)	0.067***	(0.024)	0.066***	(0.024)	0.066***	(0.024)
Other activities	-0.021	(0.024)	-0.022	(0.024)	-0.021	(0.024)	-0.021	(0.024)	-0.021	(0.024)	-0.022	(0.024)
Industry 2011												
Agriculture, forestry, fishing & mining	0.059	(0.038)	0.060	(0.038)	0.059	(0.038)	0.059	(0.038)	0.06	(0.038)	0.06	(0.038)
Manufacturing	0.315***	(0.014)	0.316***	(0.014)	0.315***	(0.014)	0.315***	(0.014)	0.316***	(0.014)	0.316***	(0.014)
Electricity, gas, steam and air conditioning	0.300***	(0.053)	0.302***	(0.053)	0.301***	(0.053)	0.301***	(0.053)	0.302***	(0.053)	0.302***	(0.053)
Water supply; sewerage; waste	0.206***	(0.038)	0.206***	(0.038)	0.207***	(0.038)	0.207***	(0.038)	0.206***	(0.038)	0.205***	(0.038)

management.

	(1)		(2)		(3)		(4)		(5)		(6)	
Construction	0.316***	(0.020)	0.316***	(0.020)	0.316***	(0.020)	0.316***	(0.020)	0.316***	(0.020)	0.316***	(0.020)
Transportation & storage	0.072***	(0.015)	0.072***	(0.015)	0.072***	(0.015)	0.072***	(0.015)	0.072***	(0.015)	0.072***	(0.015)
Accommodation & food service activities	0.029*	(0.016)	0.029*	(0.016)	0.030*	(0.016)	0.030*	(0.016)	0.029*	(0.016)	0.029*	(0.016)
Information & communication	0.403***	(0.032)	0.400***	(0.032)	0.403***	(0.032)	0.403***	(0.032)	0.401***	(0.032)	0.400***	(0.032)
Financial & insurance activities	0.445***	(0.025)	0.444***	(0.025)	0.445***	(0.025)	0.445***	(0.025)	0.445***	(0.025)	0.444***	(0.025)
Real estate activities	0.328***	(0.030)	0.327***	(0.030)	0.328***	(0.030)	0.328***	(0.030)	0.327***	(0.030)	0.327***	(0.030)
Professional scientific & technical activ..	0.326***	(0.023)	0.323***	(0.023)	0.326***	(0.023)	0.326***	(0.023)	0.324***	(0.023)	0.323***	(0.023)
Administrative & support service activ..	0.002	(0.015)	0.002	(0.015)	0.002	(0.015)	0.002	(0.015)	0.002	(0.015)	0.002	(0.015)
Public administration & defence; compu..	0.341***	(0.017)	0.340***	(0.017)	0.341***	(0.017)	0.341***	(0.017)	0.341***	(0.017)	0.341***	(0.017)
Education	-0.026**	(0.012)	-0.026**	(0.012)	-0.026**	(0.012)	-0.026**	(0.012)	-0.026**	(0.012)	-0.027**	(0.012)
Human health & social work activities	0.050***	(0.011)	0.050***	(0.011)	0.050***	(0.011)	0.050***	(0.011)	0.050***	(0.011)	0.050***	(0.011)
Arts, entertainment & recreation	0.204***	(0.027)	0.203***	(0.027)	0.204***	(0.027)	0.204***	(0.027)	0.204***	(0.027)	0.204***	(0.027)
Other activities	-0.059***	(0.022)	-0.059***	(0.022)	-0.059***	(0.022)	-0.059***	(0.022)	-0.059***	(0.022)	-0.059***	(0.022)
Occupation (SOC2000 sub-major groups)												
leisure, travel and related personal services	0.022	(0.017)	0.022	(0.017)	0.022	(0.017)	0.022	(0.017)	0.022	(0.017)	0.022	(0.017)
sales occupations	0.124***	(0.016)	0.125***	(0.016)	0.124***	(0.016)	0.124***	(0.016)	0.124***	(0.016)	0.125***	(0.016)
elementary trades and related occupations	0.065***	(0.016)	0.067***	(0.016)	0.065***	(0.016)	0.065***	(0.016)	0.066***	(0.016)	0.067***	(0.016)
elementary administration & service occupationss	0.013	(0.012)	0.013	(0.012)	0.013	(0.012)	0.013	(0.012)	0.013	(0.012)	0.013	(0.012)

Part-time	-0.067***	(0.008)	-0.066***	(0.008)	-0.067***	(0.008)	-0.067***	(0.008)	-0.066***	(0.008)	-0.066***	(0.008)
Had (additional) children - male	0.039***	(0.014)	0.040***	(0.014)	0.039***	(0.014)	0.039***	(0.014)	0.040***	(0.014)	0.040***	(0.014)
Had (additional) children - female	-0.056***	(0.011)	-0.056***	(0.011)	-0.056***	(0.011)	-0.056***	(0.011)	-0.056***	(0.011)	-0.056***	(0.011)
Migrant status												
Europe, N-America, Oceania, Japan	-0.025	(0.022)	-0.030	(0.022)	-0.026	(0.022)	-0.026	(0.022)	-0.029	(0.022)	-0.03	(0.022)
Rest of world	-0.066***	(0.020)	-0.069***	(0.020)	-0.066***	(0.020)	-0.066***	(0.020)	-0.068***	(0.020)	-0.069***	(0.020)
English proficiency (ref. English is first language)												
Speaks English well/very well	-0.046**	(0.022)	-0.049**	(0.022)	-0.047**	(0.022)	-0.047**	(0.022)	-0.049**	(0.022)	-0.049**	(0.022)
Does not speak English well/at all	0.065	(0.049)	0.062	(0.049)	0.064	(0.049)	0.064	(0.049)	0.063	(0.049)	0.062	(0.049)
N	22,758		22,758		22,758		22,758		22,758		22,758	
Pseudo R2	0.1377		0.1381		0.1379		0.1379		0.1379		0.1380	
Log likelihood	-13306.76		-13301.3		-13304.4		-13304.2		-13304.5		-13303.2	

Source: ONS LS 2001 and 2011. * = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level. Marginal effects of the 'Had (additional) children' variable are reported separately for male and female workers as this variable was interacted with gender.

Appendix N – Effect of job polarisation on upward mobility from low-paid occupations, for TTWAs with more than 600 observations

Table N-1: Average marginal effects, logit estimator on transitions from low-paid occupations in 2001 to all higher-paid occupations in 2011, polarisation and skill bias measured for TTWAs with more than 600 observations

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Polarisation index 1999-03	0.003	-0.001				
	(0.002)	(0.003)				
Skill bias index 1999-03		0.001*				
		(0.001)				
Dynamic polarisation index			0.007*	0.006		
			(0.004)	(0.004)		
Dynamic skill bias index				0.001		
				(0.002)		
Polarisation index 2009-03					0.003**	0.000
					(0.002)	(0.003)
Skill bias index 2009-13						0.001
						(0.001)
Regional unemployment rate$_{2001}$	0.003	0.004	0.001	0.001	0.003	0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Increase in unemployment$_{2001-2011}$	-0.006	-0.007	-0.007	-0.006	-0.005	-0.005
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Controls	X	X	X	X	X	X
N	17,986	17,986	17,986	17,986	17,986	17,986
Pseudo R2	0.1420	0.1422	0.1421	0.1421	0.1421	0.1422
Log likelihood	-10467.0	-10465.2	-10466.2	-10466.1	-10465.8	-10464.5

Source: ONS LS 2001 and 2011. Standard errors reported in brackets below average marginal effects. * = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level.

Appendix O – Effect of polarisation on upward mobility from low-paid occupations, including unemployment controls based on LFS

Table O-1: Average marginal effects, logit estimator on transitions from low-paid occupations in 2001 to all higher-paid occupations in 2011, LFS-based unemployment controls

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Polarisation index 1999-03	0.001	-0.002				
	(0.002)	(0.002)				
Skill bias index 1999-03		0.002***				
		(0.001)				
Dynamic polarisation index			0.006*	0.006*		
			(0.003)	(0.003)		
Dynamic skill bias index				-0.001		
				(0.001)		
Polarisation index 2009-03					0.005**	0.001
					(0.002)	(0.003)
Skill bias index 2009-13						0.001*
						(0.001)
Regional unemployment rate$_{2001}$	-0.003	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Increase in unemployment$_{2001-2011}$	0.021**	0.025***	0.016*	0.016*	0.024***	0.028***
	0.010	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)
Controls	X	X	X	X	X	X
N	22,758	22,758	22,758	22,758	22,758	22,758
Pseudo R2	0.1381	0.1384	0.1382	0.1382	0.1383	0.1384
Log likelihood	-13301.6	-13296.1	-13300.0	-13299.8	-13298.4	-13296.6

Source: ONS LS 2001 and 2011. Standard errors reported in brackets below average marginal effects. * = significant at 10% level, ** = significant at 5% level, *** = significant at 1% level.

Appendix P – Investigating positive effect of unemployment increases on mobility from low-paid occupations

In tables 5-17 to 5-20 a positive effect is found of increases in unemployment on transitions from low-paid occupations to routine and other higher-paid occupations. These models include regional unemployment rates calculated from the ONS LS. A first possibility is that these results are an indication that the ONS LS-based unemployment estimates are not very accurate and perhaps overestimate unemployment in some regions and underestimate it in others. The models presented in tables 5-18 to 5-20 were therefore re-estimated using official regional unemployment rates based on LFS data instead (obtained from regional unemployment time series published by the ONS (ONS, 2018c). Table P-1 shows the marginal effects based on this alternative specification, with polarisation measured in 1999-3 (equivalent to the model summarised in table 5-18). Again, a higher regional unemployment rate seems to be associated with a decreased likelihood of being out of work in 2011.

Table P-1: Average marginal effects, based on multinomial logit on transitions to all occupational categories and non-employment, with LFS-based regional unemployment control

	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 1999-03	0.003	0.002	-0.001	0.000	-0.001	0.000	-0.002
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Skill bias index 1999-03	-0.002***	0.000	0.000	0.000	0.000	0.0003**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regional unemployment 2001	0.006**	0.002	-0.001	0.000	-0.001	0.000	-0.005**
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	-0.020**	0.013**	0.000	0.007	0.005	-0.001	-0.003
	(0.009)	(0.006)	(0.004)	(0.004)	(0.005)	(0.003)	(0.008)
Pseudo R2	0.1555						
Log likelihood	-38090.6						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents (13,348 were still/again in a low-paid occupation in 2011). Controls the same as in models 1-6 in table 5-17.

The same is found in table P-2, where dynamic polarisation and skill bias are included rather than

polarisation in 1999-03 (equivalent to the results in table 5-19).

Table P-2: Average marginal effects, based on multinomial logit on transitions to all occupational categories and non-employment, with LFS-based regional unemployment control

	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Dynamic polarisation index	-0.007**	0.001	0.000	0.000	0.002	0.000	0.003
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Dynamic skill bias index	0.000	0.000	0.000	0.000	0.000	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Regional unemployment 2001	0.005**	0.002	-0.001	0.000	-0.001	0.000	-0.004*
	0.003	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	-0.013	0.008	0.000	0.009**	0.004	-0.004	-0.003
	0.008	(0.005)	(0.003)	(0.004)	(0.004)	(0.003)	(0.007)
Pseudo R2	0.1554						
Log likelihood	-38096.2						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents (13,348 were still/again in a low-paid occupation in 2011). Controls the same as in models 1-6 in table 16.

And again a similar marginal effect is found in table P-3, which reports the results from the model

including the degree of polarisation and skill bias in 2009-13 (equivalent to table 5-20).

Table P-3: Average marginal effects, based on multinomial logit on transitions to all occupational categories and non-employment, with LFS-based regional unemployment control

	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 2009-13	-0.001	0.001	-0.001	0.000	0.000	0.000	0.000
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Skill bias index 2009-13	-0.001*	0.000	0.0004*	0.000	0.000	0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regional unemployment 2001	0.006**	0.002	-0.001	0.000	-0.001	0.000	-0.005**
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	-0.024***	0.011*	0.001	0.006	0.006	-0.001	0.000
	(0.009)	(0.006)	(0.003)	(0.004)	(0.004)	(0.003)	(0.007)
Pseudo R2	0.1555						
Log likelihood	-38090.4						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents (13,348 were still/again in a low-paid occupation in 2011). Controls the same as in models 1-6 in table 16.

Clearly the issue is not explained by some idiosyncrasy of the ONS LS unemployment data. So perhaps more can be learned from examining which regions have the highest and lowest rates of unemployment. In both the ONS LS and LFS estimates, the regions with the highest unemployment in 2001 were the North East and London, and the regions with the lowest unemployment were the South East, the East of the England, and the South West (see table P-4). When the predicted probability of making a transition to non-employment is calculated for each region, using a similar multinomial model as before and controlling for the individual, household and job-related characteristics included in the previous models, a striking finding is that the probability of no longer being in work in 2011 is highest in the South East, the South West, and particularly, the East of England: precisely those regions with the lowest rates of unemployment (see table P-5). It appears that, despite these regions having relatively low unemployment rates, workers living there are more likely to have exited paid employment by 2011[100]. This may explain the negative relationship

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[100] It has to be remembered that the 'non-employment' category includes not just unemployed workers but also the economically inactive and the self-employed. In the sample used for the multinomial modelling, only 16 per cent of respondents who make a transition to non-employment in 2011 are unemployed. A further 17

between the 2001 unemployment rate and the likelihood of moving from a low-paid occupation to non-employment found in tables 5-18 to 5-20.

Table P-4: Unemployment and unemployment change, by region

| | LS | | | LFS | |
	2001	Change		2001	change
North East	7.0	1.8		7.3	3.5
North West	5.8	2.0		5.3	3.3
Yorkshire & The Humber	6.2	1.7		5.3	4
East Midlands	5.1	1.8		4.7	3.3
West Midlands	6.1	2.2		5.5	3.6
East of England	3.7	2.3		3.7	3
London	6.9	1.7		6.7	3.2
South East	3.4	2.0		3.3	2.8
South West	4.0	1.1		3.6	2.8
Wales	5.5	1.6		5.9	2.7

Source: ONS LS, 2001 and 2011 (N = 512,112), and LFS Regional unemployment time series (annual unemployment rates). Cells highlighted in red are highest unemployment rates for each year, and cells highlighted in green are lowest unemployment rates for each year.

Table P-5: Predicted probabilities of non-employment in 2011, by region

	Pr	S.E	95% conf. interval		
North East	0.222	0.009	0.204	-	0.240
North West	0.217	0.006	0.206	-	0.229
Yorkshire & The Humber	0.222	0.007	0.209	-	0.235
East Midlands	0.222	0.008	0.208	-	0.237
West Midlands	0.226	0.007	0.213	-	0.239
East of England	0.251	0.007	0.237	-	0.266
London	0.220	0.008	0.204	-	0.235
South East	0.235	0.006	0.223	-	0.246
South West	0.242	0.007	0.227	-	0.256
Wales	0.215	0.009	0.197	-	0.233

Source: ONS LS, 2001 and 2011. Based on multinomial logit model on sample of 30,681 respondents. Controls the same as in models 1-6 in table 5-17.

What it does not explain is why regions with bigger increases in unemployment have higher mobility from low-paid to routine occupations (a result found in both tables 5-18 to 5-20 and tables P-1 to P-

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per cent are economically inactive due to being permanently sick or disabled, 38 per cent are economically inactive for other reasons (retirement, looking after family/home or full-time study), and 26 per cent are self-employed.

3). But again looking at regional effects on transition probabilities provides some clues. These show that the South West region stands out in having the lowest mobility from low-paid to routine occupations (controlling for individual, household and job characteristics). And this region also has one of the lowest increases in unemployment between 2001 and 2011 (in both the ONS LS and LFS). Indeed, once the model is estimated on a sample which excludes workers in the South West, the positive marginal effect of unemployment change on transitions into routine occupations decreases and is no longer statistically significant (see table P-6). It seems, therefore, that the unusually low mobility into routine occupations in the South West region explains, for a large part, the apparent association between rising unemployment and increased mobility into routine employment.

Table P-6: Average marginal effects, based on multinomial logit on transitions to all occupational categories and non-employment, excluding workers in the South West

	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 1999-03	0.006***	0.002	-0.001	-0.001	-0.002*	0.000	-0.004*
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Skill bias index 1999-03	-0.002***	0.000	0.000*	0.000	0.000*	0.000**	0.001*
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regional unemployment	0.002	0.003	-0.001	0.001	0.001	0.000	-0.005**
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	0.010	0.005	-0.007**	-0.003	-0.002	-0.002	-0.001
	(0.010)	(0.006)	(0.003)	(0.004)	(0.004)	(0.003)	(0.008)
Pseudo R2	0.1544						
Log likelihood	-34358.54						

Source: ONS LS, 2001 and 2011. Total sample included 26,514 respondents. Controls the same as in models 1-6 in table 5-17.

Appendix Q – Estimating effect of (changes in) routine employment share on mobility from low-paid occupations

Table Q-1: Average marginal effects of routine employment share in 1999-03, based on multinomial logit on transitions to all occupational categories and non-employment, controlling for individual, household and job characteristics

	Low-paid	Routine	Intermediate	Associate-professional	Managerial	Professional	Non-employment
Routine share 1999-03	-0.001	-0.002*	0.001*	0.000	0.001	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Skill bias index 1999-03	-0.001**	0.000	0.000*	0.000	0.000	0.0003*	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regional unemployment	0.002	0.005***	-0.001	0.001	0.000	0.000	-0.006***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	0.008	0.011**	-0.007***	-0.003	-0.006**	-0.001	-0.003
	(0.007)	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.006)
Pseudo R2	0.1556						
Log likelihood	-38087.9						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents (13,348 were still/again in a low-paid occupation in 2011). Controls the same as in models 1-6 in table 5-17.

Table Q-2: Average marginal effects of change in routine employment share, based on multinomial logit on transitions to all occupational categories and non-employment, controlling for individual, household and job characteristics

	Low-paid	Routine	Intermediate	Associate-professional	Managerial	Professional	Non-employment
Change in routine share	0.002	0.000	-0.001	0.000	-0.001	0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Dynamic skill bias index	-0.001	0.000	0.000	-0.001	0.000	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Regional unemployment	0.003	0.003**	-0.001	0.002	0.000	-0.001	-0.005***
	0.002	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	0.007	0.010**	-0.006**	-0.003	-0.005*	-0.001	-0.001
	0.007	(0.005)	(0.003)	(0.003)	(0.003)	(0.002)	(0.006)
Pseudo R2	0.1554						
Log likelihood	-38096.1						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents (13,348 were still/again in a low-paid occupation in 2011). Controls the same as in models 1-6 in table 5-17.

Table Q-3: Average marginal effects of routine employment share on 2009-13, based on multinomial logit on transitions to all occupational categories and non-employment, controlling for individual, household and job characteristics

	Low-paid	Routine	Intermediate	Associate-professional	Managerial	Professional	Non-employment
Routine share 2009-13	0.001	-0.002*	0.001	-0.001	0.001	0.000	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Skill bias index 2009-13	-0.001	0.000	0.000	-0.001*	0.000	0.0004*	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Regional unemployment	0.001	0.004***	-0.001	0.002	0.000	0.000	-0.005**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Unemployment change	0.006	0.010**	-0.006**	-0.002	-0.005*	-0.001	-0.001
	(0.007)	(0.005)	(0.002)	(0.003)	(0.003)	(0.002)	(0.006)
Pseudo R2	0.1556						
Log likelihood	-38089.1						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents (13,348 were still/again in a low-paid occupation in 2011). Controls the same as in models 1-6 in table 5-17.

Appendix R – Effect of job polarisation on occupational mobility among younger and older workers

Table R-1: Average marginal effects of polarisation in 2009-13, based on multinomial logit on transitions to all occupational categories and non-employment, models estimated for younger and older workers separately

Aged 35 or under in 2001 (N = 14,153)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 2009-13	-0.002	0.003	-0.003**	0.000	0.000	0.001	0.000
	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)
Skill bias index 2009-13	-0.001	0.000	0.001**	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)

Pseudo R2	0.1640	
Log likelihood	-19306.4	

Aged 36 and over in 2001 (N = 15,236)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 2009-13	0.000	0.001	-0.001	0.001	0.000	-0.001	0.000
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Skill bias index 2009-13	-0.001	0.000	0.000	0.000	0.000	0.001**	0.000
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)

Pseudo R2	0.1490	
Log likelihood	-18507.6	

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents. Controls the same as in models 1-6 in table 5-17.

Appendix S – Effect of job polarisation on occupational mobility among lower-qualified and higher-qualified workers

Table S-1: Average marginal effects of polarisation in 1999-03, based on multinomial logit on transitions to all occupational categories and non-employment, models estimated for low-qualified and high-qualified workers separately

Level 1 and below (N = 16,527)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 1999-03	0.005*	0.001	-0.002*	0.000	-0.003*	-0.001	-0.001
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Skill bias index 1999-03	-0.002**	0.001*	0.000	0.000	0.000	0.000*	0.000
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Pseudo R2	0.1452						
Log likelihood	-19931.5						
Level 2 and above (N = 12,862)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 1999-03	0.004	0.002	0.000	-0.001	-0.001	0.001	-0.005**
	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)
Skill bias index 1999-03	-0.002**	0.000	0.000	-0.001	0.000	0.001*	0.001**
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Pseudo R2	0.1577						
Log likelihood	-17852.9						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents. Controls the same as in models 1-6 in table 5-17.

Table S-2: Average marginal effects of dynamic polarisation, based on multinomial logit on transitions to all occupational categories and non-employment, models estimated for low-qualified and high-qualified workers separately

Level 1 and below (N = 16,527)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Dynamic polarisation index	-0.008**	0.002	0.001	0.002	0.000	0.001	0.002
	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.003)
Dynamic skill bias index	0.000	0.000	0.000	-0.001	0.001	0.000	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)

Pseudo R2	0.1450
Log likelihood	-19936.5

Level 2 and above (N = 12,862)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Dynamic polarisation index	-0.008*	-0.001	0.000	-0.002	0.006**	0.000	0.005
	(0.004)	(0.003)	(0.001)	(0.003)	(0.003)	(0.002)	(0.004)
Dynamic skill bias index	0.000	0.000	0.000	0.000	-0.001	0.000	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)

Pseudo R2	0.1575
Log likelihood	-17857.502

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents. Controls the same as in models 1-6 in table 5-17.

Table S-3: Average marginal effects of polarisation in 2009-13, based on multinomial logit on transitions to all occupational categories and non-employment, models estimated for low-qualified and high-qualified workers separately

Level 1 and below (N = 16,527)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 2009-13	-0.001	0.001	-0.003*	0.002	-0.002	0.000	0.003
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Skill bias index 2009-13	-0.001	0.001	0.000	0.000	0.000	0.000	-0.001
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Pseudo R2	0.1452						
Log likelihood	-19932.2						

Level 2 and above (N = 12,862)	Low-paid	Routine	Inter-mediate	Associate-professional	Managerial	Professional	Non-employment
Polarisation index 2009-13	0.000	0.002	-0.001	-0.001	0.003	0.000	-0.003
	(0.004)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
Skill bias index 2009-13	-0.001	-0.001	0.000	0.000	0.000	0.001	0.001*
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Pseudo R2	0.1577						
Log likelihood	-17853.0						

Source: ONS LS, 2001 and 2011. Total sample included 29,389 respondents. Controls the same as in models 1-6 in table 5-17.