

# Impact of the national minimum wage on staff turnover, retention and recruitment



Low Pay Commission

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# Executive Summary

1. This report attempts to assess the impact of the national minimum wage on labour retention and turnover and to examine whether the imposition of the minimum wage has affected the ability of firms to recruit into lower paid occupations.
2. Standard economic theory relates job search activity and rates of labour turnover to features of the wage structure. By altering the wage distribution, we would expect the NMW to influence patterns of turnover (and, related to this, of recruitment and retention).
3. Our research has two related strands. First, we use data from the Labour Force Survey (LFS) to analyse changes in job search activity and quit rates among low paid workers. Second, we use data from the LSC National Employers Skills Survey (formerly the Skills Needs in Britain survey) to examine recruitment issues facing individual firms.
4. In analysing both LFS and NESS data, our general approach is to compare behaviour before and after the introduction of the NMW or the subsequent upratings, in an attempt to identify the impact of the NMW on turnover, recruitment and retention among various groups of workers.
5. By combining both household survey data and employer survey data, we aim to provide a more complete analysis of how the NMW has influenced turnover behaviour by workers and its implications for recruitment and retention by firms.
6. The results of our analysis are mixed. There is some evidence that the introduction of the NMW and early upratings may have been associated with reduced search activity among minimum wage workers. There is, however, no evidence of effects from subsequent upratings.
7. Nor is there any evidence to support the proposition that the NMW (either its introduction or upratings) has had any significant effect on job-to-job moves among low paid workers, or recruitment difficulties among their employers.

# 1 Introduction

Since the introduction of the minimum wage in 1999 the Low Pay Commission has overseen a gradual increase in the minimum wage relative to the growth in average earnings with no significant adverse effects on employment. The Low Pay Commission has undertaken a wide variety of research projects in order to monitor the impact of the minimum wage and subsequent upratings. The LPC's research programme has investigated the impact of the minimum wage on different parts of the economy, the labour market, firms and specific groups.

The Low Pay Commission have previously funded research into the dynamics of individual responses to the minimum wage. Jones et al (2004) used the Labour Force Survey to examine flows into and out of the national minimum wage, and found that NMW jobs were typically held for relatively short durations – implying higher rates of turnover – although this varied across different groups of individuals, industries, and regions. Bryan & Taylor (2006) explored the longer term labour market outcomes of NMW workers using the British Household Panel Survey (BHPS).

Neither of these projects specifically considered the impact of the introduction of, or changes to, the NMW on turnover among workers, or on recruitment and retention among firms. This project adds to previous research by investigating the possible impact of the national minimum wage on staff turnover, retention and recruitment. This research differs from previous LPC-funded research in focusing on movements of workers between firms and on firms' attempts to recruit workers, rather than on movements between labour market activity states or movements in and out of minimum wage employment as a whole. It attempts to assess the impact of the national minimum wage on labour retention and turnover and to examine whether the imposition of the minimum wage has affected the ability of firms to recruit into lower paid occupations. Broadly, we explore the impact of the minimum wage on retention and turnover from the employee's perspective using data from the Labour Force Survey. This research is supplemented with information from business employment surveys to explore recruitment issues from the perspective of employers. The results add to our understanding of how the national minimum wage affects labour market dynamics among lower paid workers and particularly within low paid sectors.

Standard economic theory relates job search activity and rates of labour turnover to features of the wage structure. All else being equal, we would expect lower wage firms to have higher turnover rates than higher wage firms, and that the overall rate of turnover would be positively related to the spread in the wage distribution. By altering the wage distribution, we would expect the NMW to influence patterns of turnover (and, related to this, of recruitment and retention). If, as evidence to date suggests, the NMW compresses the wage distribution for low-paid workers, we would expect reductions in turnover among those firms now forced to pay higher wages, although turnover might rise among firms paying just above the new minimum wage. The impact on firms paying above the minimum wage, would, however, both influence and be influenced by the extent of wage spillovers from the minimum wage further up the wage distribution. We would also expect the ability of a firm to recruit new workers to be influenced by its wage offer relative to those made by other employers that are attempting to recruit similar workers to similar jobs. Increases in the NMW might be expected to ease recruitment and retention among firms directly affected (i.e. those that are required to raise their wages as a result).

Our research has two related strands. First, we use data from the Labour Force Survey (LFS) to analyse changes in job search activity and quit rates among low paid workers. Second, we use data from the LSC National Employers Skills Survey (formerly the Skills Needs in Britain survey) to examine recruitment issues facing individual firms.

The LSC National Employer Skills Survey asks detailed questions on recruitment and recruitment difficulties by industry and occupation. The NESS has been running since 1999 and could, therefore, provide a basis for exploring whether any of the upratings to NMW have had an impact on recruitment in low pay sectors. There are, however, practical problems with earlier editions of these surveys which limit their use in exploring the impact of the NMW on recruitment. In particular, industries are defined only on a broad basis up until 2003, from when a 4-digit SIC industry variable was included. Detailed industries are required in order to allocate firms to the LPC low pay sectors, the only basis on which we can identify firms likely to be strongly affected by changes to the NMW. There have also been substantial changes in the size and composition of the sample frame over the life of the survey, as well as changes to the definitions of key recruitment-related variables. For these reasons, our analysis of the NESS data is largely confined to the 2003-5 surveys. In particular, we use NESS data to consider whether the rate of 'hard to fill' vacancies has fallen in low pay sectors relative to other sectors over this time period, and whether these effects have been more pronounced in areas (industries and regions) that have been particularly strongly affected by changes to the NMW, and in occupations dominated by low wage employment.

In analysing both LFS and NESS data, our general approach is to compare behaviour before and after the introduction of the NMW or the subsequent upratings, in an attempt to identify the impact of the NMW on turnover, recruitment and retention among various groups of workers. By combining both household survey data and employer survey data, we aim to provide a more complete analysis of how the NMW has influenced turnover behaviour by workers and its implications for recruitment and retention by firms.

The results of our analysis are mixed. There is some evidence that the introduction of the NMW and early upratings may have been associated with reduced search activity among minimum wage workers. There is, however, no evidence of effects from subsequent upratings. Nor is there little evidence to support the proposition that the NMW (either introduction or upratings) has had any significant effect on job-to-job moves among low paid workers, or recruitment difficulties among their employers.

## 2 Background and Literature Review

### 2.1 The National Minimum Wage

The UK National Minimum Wage (NMW) specifies a minimum hourly rate that must be paid to all UK workers. The NMW was introduced in April 1999 at a rate of £3.60 an hour for workers aged 22 and over, with a lower rate of £3.00 an hour for younger workers aged 18-21 and for adults on accredited training schemes. The adult rate has since increased to £5.52 an hour from October 2007, following particularly substantial upgrades during 2001 and since October 2003. The direct effect of this has been substantially to increase wages for the lowest paid workers since 1999, so that such wages have risen significantly in real terms (i.e. relative to the Retail Prices Index).

Evidence produced by the Low Pay Commission (LPC, 2008) using the Annual Survey of Hours and Earnings (ASHE), also suggests that the NMW has progressively increased relative to other earnings. Thus, the adult minimum wage increased from 47.6 per cent of median earnings in 1999 to 51.1 per cent in 2007, with similar increases in the 'bite' of the NMW measured against other points in the earnings distribution.

As a result, the NMW now directly determines the earnings of a significant proportion of workers. Estimating the coverage of the NMW is complicated, since it requires a counterfactual estimate of what wages would have been without the NMW. The LPC estimate that, following the 2006 upratings, the national minimum wage covered between 1.25 million and 1.65 million workers or 4.7 – 7.7 % of all workers.

### 2.2 Impact of the NMW on the distribution of earnings

There is extensive evidence that the NMW has altered the distribution of earnings, particularly at the bottom end of the distribution. One effect has been to create a spike in the earnings distribution around the national minimum wage rate, and this spike has grown as the NMW has increased (LPC, 2008). Further spikes in the adult earnings distribution at rounded wage rates above the NMW (e.g. at £5.50, £6.00 and £6.50 an hour in 2006) may also suggest that some firms set wages just above the NMW to avoid being seen as 'minimum wage employers' (LPC, 2007: 23).

LPC (2007), supplementing analysis by Butcher (2005), provide evidence that the hourly wages of those at the bottom of the earnings distribution have increased substantially between 1998 and 2006, with the largest increases occurring immediately after the introduction of the NMW. Earnings at the bottom decile of the earnings distribution increased by about 30 per cent between 1998 and 2004 compared with 25 per cent growth of earnings at the median of the earnings distribution. Earnings increases up to the 30<sup>th</sup> percentile of the wage distribution (above the NMW), have been higher, on average, than those at the median, but have been lower than the direct increases in the NMW itself. This suggests a substantial narrowing of wage differentials among low paid workers. These effects appear to have been particularly concentrated in the period following the introduction of the NMW and the early increases (1998-2004).

**Table 1: Changes to the UK National Minimum Wage**

Year <sup>1</sup>	Adult NMW as % of			Coverage
	NMW Adult Rate	Lowest Quartile	Median	% of adult jobs at or below NMW <sup>2</sup>
1999	3.60	65.1	45.7	5.4
2000	3.60	64.2	45.4	3.4
2001	3.70	63.0	44.2	2.7
2002	4.10	67.5	47.2	3.1
2003	4.20	65.8	46.5	2.9
2004	4.50	68.3	48.1	2.8
2005	4.85	69.9	49.4	3.1
2006	5.05	70.0	49.7	3.4
2007	5.35	71.8	51.1	3.9

Source: ONS and LPC as reported by Low Pay Commission (2008)

Notes:

1. Estimates of 'bite' and coverage of NMW based on ONS central estimates using ASHE without supplementary information and LFS for 1999-2004. Estimates for 2004 and 2005 are LPC estimates using ASHE with supplementary information. Estimates for 2006 and 2007 are LPC estimates using the ASHE 2007 methodology.

2. Coverage estimates are from LPC based on 10 pence pay bands using the ONS central estimate methodology

The finding that earnings distributions have been squeezed following the introduction of the NMW is supported by Denvir & Loukas (2006) and IDS (2006). Econometric research by Lam *et al* (2006), which examined the influence of the minimum wage on company pay policies, found that companies generally maintained cash differentials between different pay grades following the introduction of the NMW and subsequent upratings. A consequence of this would be to induce some degree of wage 'spillover' above the NMW rate, but gradually to reduce percentage differentials over time.

## 2.3 Impact of the NMW on Employment & Unemployment

The period since the introduction of the national minimum wage has, until recently, generally been one of strong employment growth and low unemployment within the UK labour market. Under these conditions, we might not expect, therefore, to detect any obvious impact of the NMW on employment or unemployment based on any simple examination of the data. Any negative impact on employment would likely be swamped by the effects of buoyant macroeconomic conditions on the growth of jobs.

More rigorous econometric research based on individual-level data has also failed to find any negative impact from the introduction of the NMW or the early upratings. Stewart (2002, 2004a/b) has investigated the impact of the NMW on individual employment probabilities using data from a variety of sources. He found no significant effects from the introduction of either the NMW or its initial uprates. Similarly, Dickens & Draca (2005) found no significant effect from the 2003 NMW upratings on the probabilities of employment for individual workers.

Some recent studies of employment using more aggregated data have suggested negative employment impacts within areas where the NMW has the largest 'bite'. Galindo-Rueda & Pereira (2004) and Experian (2007) present evidence of slower employment growth in counties or regions where wages need to adjust most to comply with the minimum wage. Thus, while Stewart (2002) found no evidence of any adverse effects of the minimum wage on local area

employment, these findings do not capture any effects from the 2001 and subsequent upratings, which have substantially increased the bite of the NMW in some areas.

It is possible that the introduction of a minimum wage could reduce total employment through a reduction in average hours rather than in the number of jobs. Connolly & Gregory (2002) found no significant effect from the NMW on the average hours of low-paid women after either one year or 3 years. Stewart and Swaffield (2004) have, however presented evidence of a negative long run impact on working hours.

## 2.4 Wider Impacts of the National Minimum Wage

The general finding that the NMW has resulted in a rise in wages for low paid earnings, but no overall reduction in employment for such workers, suggests that the NMW must have impacted in some way on prices, on other labour costs (e.g. through improvements in labour productivity), or on profitability.

Research by Draca et al (2005) and Wadsworth (2007) into the impact of the NMW on prices found no evidence of statistically significant effects on the prices of goods or services associated with minimum wage workers. Wadsworth did, however, find that the price of a basket of minimum wage goods and services had risen significantly faster than general RPI inflation.

Studies which have examined the impact of the minimum wage on productivity by Forth & O'Mahoney (2003), Draca et al (2005) and Machin et al (2003) have found no significant effects. Galindo-Rueda & Pereira (2004) did, however, find evidence that labour productivity increased faster in firms most affected by the minimum wage, and that this effect was statistically significant within the services sector (but not in manufacturing). They found no significant effect from the minimum wage on total factor productivity. There has been little specific research into the impact of the minimum wage on non-wage elements of labour costs.

One specific avenue through which it has been suggested the minimum wage may improve productivity is by increasing the amount of training provided by minimum wage employers. Analysis of the BHPS by Aralampulam et al (2004) found a small, but statistically significant, positive impact on training. Dickerson (2007), however, found no such effect using the larger LFS dataset.

Descriptive analysis of trends in overall business profitability by the LPC (LPC, 2007) shows that the non-oil profit share has been lower during the period since 1999 than in the previous 15 year period. Draca et al (2005) present some evidence that the introduction of the NMW has led to reduced profit rates within the Care Homes sector. Experian (2007), however, found no statistically significant effect from the minimum wage on average profits at an industry level.

## 2.5 Labour Market Flows

Sloane et al (2004, 2007) and Bryan & Taylor (2006) have investigated patterns of employment among workers directly affected by the minimum wage, in order to assess the persistence of minimum wage employment. Sloane et al (2007) used the panel dataset from the New Earnings Survey to look at the duration of minimum wage jobs. Both studies showed that minimum wage jobs were typically of short duration, so that 'the time spent in minimum wage employment was quite short'. Using data from the British Household Panel Survey (BHPS), Bryan & Taylor (2006) also found that minimum wage jobs were of short duration for most

workers. The latter survey did, however, find that up to 40 per cent of workers who were in minimum wage jobs at the start of their study period subsequently moved between such jobs or out of the labour market.

## 2.6 Labour Turnover

### 2.6.1 Labour Market Search

Labour turnover is an important feature of the labour market within the UK and in other advanced economies. The majority of labour turnover is voluntary on the part of workers and involves direct movements from one job to another without any intervening period of unemployment or inactivity. The Chartered Institute for Personnel and Development (CIPD) conducts an annual survey of Recruitment, Retention and Turnover among UK firms. The latest survey suggests an overall labour turnover rate of around 18 per cent, with turnover of around 23 per cent among private sector organisations. The survey suggests significant variation in labour turnover rates across industries and occupations, with quit rates being lower among managerial, professional and highly skilled staff.

Search theory provides the most commonly used framework for examining worker retention and turnover within the labour market. Recent surveys of the search theory literature as applied to the labour market include Eckstein & van den Berg (2007), Rogerson et al (2005) and Yashev (2007).

The basic ideas for search theory were laid out by Phelps (1970) and Mortensen (1970), which introduced the flow approach to the labour market and identified search costs as a key element in labour market adjustment. The standard job search model was subsequently developed by, *inter alia*, Diamond (1982a, b), Mortensen (1982a, b), Pissarides (1979, 1985) and Mortensen & Pissarides (1994). In this model, homogeneous workers and firms with vacant jobs need to engage in costly search to find each other. The basic model assumes that workers search for jobs only while unemployed.

An important extension to the standard job-search model is to allow for on-the-job search, so incorporating the direct movement of workers from job to job without intervening periods of unemployment or inactivity. The on-the-job search model was introduced by Burdett (1978), with important subsequent contributions from Mortensen & Neumann (1984), Mortensen & Pissarides (1994), Pissarides (1994) and others. In the standard on-the-job search model, workers receive offers at different rates depending on whether they are currently employed or unemployed, and each offer is a random draw from the wage distribution. Employed workers quit and switch jobs whenever they receive an offer at above their current wage. The likelihood of this occurring depends on the place of the current wage in the overall wage distribution.

This simple framework generates several hypotheses concerning the determinants of job turnover, which have been shown to be consistent with the evidence (Rogerson et al, 2005). Workers with relatively high current wages are, all else remaining equal, less likely to be offered higher wages and are therefore less likely to search or to quit in order to switch jobs. The model therefore predicts a negative relationship between current wages, search activity and turnover rates. In addition, since workers move only to higher paid jobs, workers with longer spells of continuous employment (including job-to-job switches) have higher wages and are less likely to search or to quit their current jobs. Similarly, the fact that a worker has held a job for a long time suggests that there is a low probability of receiving improved offers, so that search activity and quit rates are negatively related to job tenure.

The above discussion presented the basic on-the-job search theory as a partial equilibrium model which takes the wage distribution as given and determines the pattern of job turnover. In fact, most theoretical treatments of on-the-job search embed the turnover model within a general equilibrium framework which endogenizes the wage distribution. Including wage determination within the search model allows for the possibility that firms may set higher wages to increase the inflow of workers and to reduce the outflow of workers (quit rates). Models with these features include Burdett & Mortensen (1998) and Burdett et al (2003). The dynamic search model of Burdett & Mortensen (1998) suggests a link between turnover rates and a firm's position within the wage distribution. In their model, a continuum of firms chooses permanent wage offers and workers sequentially sample from those offers. They show that, in this case, firms paying high wages and making low profits per worker experience lower turnover than those that pay low wages and make high profits per workers. However, in equilibrium both groups have the same overall expected profits, since high wage firms compensate for low profits per worker by having higher levels of employment.

The literature on on-the-job search has typically focused on wages as the sole benefit from employment. Some research has, however, also considered the potential role of working conditions as determinants of job search behaviour and employee turnover (Blau, 1991; Hwang et al, 1998; Lang & Majumdar, 2004). In this case, job search and turnover may arise in response to offers of either better pay or improved working conditions. This introduces a range of other factors that will influence workers' search behaviour and quit rates, and consequently the level of worker turnover experienced by employers. Various empirical studies have investigated these effects (Viscusi, 1979; Bartel, 1982, Herzog & Schottman, 1990; Gronberg & Reed, 1994; Manning, 2003; Bockerman & Ilmakunnas, 2007). Related research has investigated the relationships between job search or turnover and workers' stated job satisfaction (Flanagan et al, 1974; Freeman, 1978; Clark et al, 1998; Ward & Sloane, 2000; Clark, 2001; van Orphem, 1991; Shields & Price, 2002; Garcia-Serrano, 2004; Sousa-Poza & Henneberger, 2004; Levy-Garboua et al, 2007). Psychological studies have shown that stated intentions, and search activities, are good predictors of subsequent quits (see Bockerman & Ilmakunnas, 2007). Empirical work in this area has generally shown that working conditions have a strong influence on worker satisfaction, search intensity and actual quit behaviour.

### 2.6.2 Minimum Wages, Search and Turnover

We would expect the introduction of a minimum wage to affect patterns of job turnover within the on-the-job search model. Workers in jobs paying below the minimum wage immediately prior to its introduction (or uprating) enjoy an increase in their wages when the minimum wage is introduced (assuming they remain in employment). Whether this results in a reduction in the overall level of turnover depends on what happens to the wage distribution above the minimum wage. In the simplest case, if the minimum wage truncates the wage distribution creating a spike at the minimum wage with no change higher up the wage distribution, then the probability that workers previously paid below the minimum wage will find improved wage offers will fall as the minimum wage binds. The strength of this effect would depend on the worker's position in the wage distribution prior to the change, i.e. how far wage was below the new minimum wage. The probability of improved offers for workers who already earn more than the minimum wage will remain unchanged. This would imply no change in search activity and turnover rates among higher paid workers and a reduction in search activity and turnover among minimum wage workers, so that the aggregate turnover rate falls. The extent of the reduction in search

and turnover rates will depend on the 'bite' of the minimum wage. Similar effects would accompany subsequent minimum wage upratings.

Specific analysis of the impact of minimum wages within search theory models is fairly limited, and has generally focused on the use of general equilibrium search models to analyse the impact of a minimum wage on both search behaviour and the shape of the wage distribution.

Eckstein & Wolpin (1990) provide an analysis of the impact of a minimum wage based on generalised version of the equilibrium search model in Albrecht & Axell (1984). In this model, firms differ in their profitability and the minimum wage operates, in equilibrium, as a selection device which forces less profitable (and hence lower wage) firms out of the market. Eckstein & Wolpin estimate this model using data for the US. Van den Berg & Ridder (1998) present a similar analysis based on a modified version of the Burdett & Mortensen (1998) equilibrium search model with on-the-job search. In this case, where firms differ in terms of their profitability and individual workers differ in terms of their productivity, the introduction of a minimum wage can make some individuals unemployable and some firms unprofitable. Van den Berg & Ridder estimate their model using data for the Netherlands.

Flinn (2006) presents theory and evidence concerning the effects of minimum wage changes on labour market outcomes and welfare within a search theory building on Flinn & Heckman (1982) and Meyer & Wise (1983a,b). This model includes an endogenously determined wage distribution. It assumes that the productivity of a worker in a job depends on the quality of the match between them. The productive value of a potential match can be observed by both the potential employee and the firm when they meet. A productive match results in a surplus that is bargained over by the worker and the firm, which determines the wage. The introduction of a minimum wage constrains the bargaining problem, by restricting the set of feasible wages that can result from the bargain. As a result, fewer contacts result in jobs. In addition, the introduction of a minimum wage results in a spike (or mass point) in the wage distribution at the minimum wage.

### 2.6.3 Turnover, Profits & Welfare

Voluntary labour turnover imposes a variety of costs on firms. Firms suffer losses of job-specific skills and disruption to production processes, and well as the substantial costs of hiring and training new workers. The CIPD survey suggests that the majority of employers believe labour turnover adversely affects their business. Over 70 per cent of employers in the survey believe that labour turnover has a negative impact on business performance. A significant minority of respondents, however, reported that turnover had either a neutral or a positive effect on the performance of their organisations. The CIPD attempts to put a monetary estimate on the cost of turnover based on the survey responses. CIPD found that the direct costs of labour turnover averaged £7,750 per job leaver in 2006.

We might, therefore, expect higher rates of turnover to be associated with lower profits. In the context of equilibrium search models, however, the turnover rate and wage distribution are co-dependent, and high turnover firms receive offsetting benefits in terms of lower wage costs, while some variants introduce additional productivity effects that could offset the costs of higher turnover rates. The theoretical relationship between turnover and profits therefore depends on the details of the model.

The Salop (1979) efficiency wage model, for example, is one of labour market search and matching where workers have private uncertainty over the job attributes of firms, which they only learn on becoming employed. Firms choose the wage so as to minimise the marginal cost

of labour, balancing the effects of higher wages against reductions in recruitment and training costs. In this simple model, higher turnover is always associated with lower profits.

The negative relationship between labour turnover and profits is not, however, guaranteed. Garino & Martin (2007) present an extension to the Salop model with productivity differences between newly-hired and incumbent workers. Incumbent workers have higher job-specific skills; but new hires may have higher general human capital. A higher turnover rate raises the share of new hires in the workforce which may lead to a rise in average labour productivity if the productivity benefits from the higher general skills of new hires dominate the job-specific skills of incumbents. This is most likely where job-specific skills are modest. If the impact of higher turnover on productivity is sufficiently positive to outweigh additional recruitment and training costs, then turnover may actually increase profits. In Garino & Martin's model, however, this can only arise if the employer cannot unilaterally choose the wage – otherwise higher turnover is associated with lower profits. The impact of turnover on profits within the model depends, among other things, on the ease with which new hires can be substituted for incumbent workers and on the costs of hiring and training new workers. The authors present evidence that firms with high hiring and training costs are most likely to report that turnover is 'too high' – suggesting that lower turnover would be associated with higher profits. They also find that firms which set wages through a works council (and therefore did not set wages unilaterally) were more likely to report that turnover is 'too low' – suggesting that higher turnover may be profitable for those firms.

Brown et al (2007) provide further empirical evidence on the Garino & Martin (2005) model. They analyse a sample of 1900 workplaces from the 2004 cross-section *Workplace and Employee Relations Survey* (Chaplin et al, 2005). In this survey, the annual quit rate is measured by the proportion of employees on the payroll 12 months ago who stopped working at the workplace as they resigned or left voluntarily. The average quit rate is around 13 per cent. Workplaces where wages are set by negotiation with trade unions have lower turnover rates. The study examines the effect of quit rates on financial performance. Higher quit rates are associated with poorer financial performance in those firms without bargaining over wages. Firms with trade union bargaining over wages, on the other hand, have a positive relationship between quit rates and financial performance.

Labour turnover also imposes some short term costs on workers through the loss of job-specific skills and dislocation of career paths. For voluntary turnover, however, these costs are presumably more than compensated by the net benefits of new jobs. Topel & Ward (1992), for example, provide evidence that job-to-job transitions make an important contribution to wage gains over individual US workers' employment life cycles.

Flinn (2006) considers the welfare implications for the minimum wage for both employers and workers, building on the approach of Hosios (1990). Hosios derived welfare results from the standard search theory model, and found that the efficient labour market equilibrium depends on the properties of the matching function and the bargaining solution between workers and firms. Specifically, an efficient labour market equilibrium requires that the elasticity of the matching function with respect to the size of the set of searchers is equal to the share of the surplus they receive through the bargaining process. In Flinn's model, a minimum wage provides a means (albeit crude) for moving the labour market in the direction of this efficient allocation by altering the bargaining power of workers and firms.

## 2.7 Conclusions

The introduction of the NMW and ongoing increases in NMW rates have altered the distribution of earnings, particularly at the bottom end of the distribution, resulting in a substantial narrowing of wage differentials among low paid workers. The evidence on the employment effects of the NMW is mixed. Studies based on individual data have found no significant impact from either the introduction of the minimum wage or from upratings. Studies based on aggregated data for industries and local areas, on the other hand, have detected some small negative impact on employment growth where the 'bite' of the NMW is greatest. In the absence of significant reductions in employment, the NMW must have some effect on prices, other labour costs or profitability. Evidence to date has not, however, provided strong evidence for such impacts.

Search theory suggests that a minimum wage may, by altering the shape of the bottom tail of the wage distribution, influence levels of on-the-job search and labour turnover. We do not attempt a formal analysis of the impacts of the NMW based on search theory. Rather we focus on estimating econometric models of on-the-job search and turnover behaviour, and of recruitment problems among employers of low wage labour. We take a partial-equilibrium approach. Whether this is fully justified depends on whether the wage distribution can reasonably be regarded as fixed with respect to the impacts under analysis. The weight of evidence is that the NMW and subsequent upratings *have* altered the shape of the wage distribution. But we do not attempt to address these issues here. We do, however, attempt to examine the impacts on both workers directly affected by the NMW and its upratings and on workers earning just above the NMW. The latter allows some (informal) check on the possible impact of changes further up the wage distribution resulting from changes to the NMW.

It is at least possible that reductions in labour turnover or the easing of recruitment difficulties could provide one mechanism by which the minimum wage provides a benefit to firms to offset its direct effect on wage costs – so reconciling the lack of any substantial employment impacts with the lack of evidence on prices and profitability. We do not, however, attempt any analysis of effects of the minimum wage on employer costs and profitability or of levels of economic welfare among workers. What limited theoretical and empirical analysis there exists concerning such effects has produced mixed results: so that the introduction of a minimum wage could either raise or lower both profitability and employee welfare depending on the circumstances of the case.

## 3 Data

### 3.1 On-the-job search

The labour force survey contains the following variables which provide information on search activities by individual workers:

- Whether the person was looking for a different or an additional job or paid business (DIFJOB)
- Whether the search was for a different job or for an additional job (ADDJOB)
- Reasons for looking for a different job (LOOKM(1-3))

DIFJOB and ADDJOB are binary variables indicating that the person is actively searching for work, and that this search is for a replacement or for an additional job, respectively. LOOKM(1-3) gives the following possible reasons for looking for a different job. Respondents may give up to three reasons.

1. Present job may come to an end
2. Present job is to fill time before finding another job
3. Pay unsatisfactory in present job
4. Journey to work unsatisfactory in present job
5. Respondent wants to work longer hours than in present job
6. Respondent wants to work shorter hours than in present job
7. Other aspects of present job unsatisfactory
8. Other reasons

These variables have been collected in each quarter since Spring 1992. DIFJOB applies to all respondents in employment; ADDJOB to all respondents for whom DIFJOB = 'yes'; and LOOKM(1-3) for all respondents for whom ADDJOB = 'yes' and DIFJOB = 'different'.

Since the LFS job search variables record current search activity, they can easily be linked to attributes of the worker and of current employment, including the current hourly wage for those workers who have provided this information.

### 3.2 Turnover

The LFS datasets can also be used to derive measures of employment turnover from the perspective of the employee. Using a combination of variables within individual quarterly surveys related to previous employment, it is possible to construct variables that indicate whether workers have changed jobs over the previous year, and whether those changes involved intervening periods of unemployment or inactivity. It is also possible to combine individual surveys to match responses from individual workers and to identify changes in employment for those workers over a period of up to 5 quarters. We have used a combination of these two approaches to identify workers who have engaged in direct job-to-job moves during a particular year. We used 5 period panel data to identify and characterize movers on the basis of their origin job. This speaks directly to issues of retention and turnover within low paid

jobs. We also use the individual quarterly survey datasets to identify and characterize movers on the basis of their destination job. This speaks (rather less directly) to issues of recruitment into low paid jobs. We have focused the former analysis on the major NMW upratings between 2001 and 2004, while the latter covers the full period from 1998-2007.

## 3.3 Recruitment

### 3.3.1 Employers Skills Surveys

We have also investigated whether the employer skills surveys that have been conducted over the past decade can provide evidence of any effects from the NMW on recruitment by firms in low pay sectors. We have examined the following surveys to establish whether they can provide useful information for this task:

- National Employers Skills Survey, LSC 2003, 2004, 2005
- Employers Skills Survey, Department for Education and Skills 1999, 2001, 2002
- Skill Needs in Britain, Department for Education and Skills 1990-1998

Post 1998 the survey does not cover the entire GB or UK, with the latest surveys undertaken in England and Wales. The survey in Wales is also undertaken separately from England through Future Skills Wales. The 1999-2002 surveys were only undertaken in England. For these reasons we will focus our research on data for firms based in England only.

### 3.3.2 Survey content and coverage

The Employers surveys are primarily undertaken to identify the extent, causes and implications of skill deficiencies reported by employers in England, but also cover questions relating to recruitment difficulties. The series addresses a number of key questions:

- What are the skill needs of employers?
- What is the scale of, and the contribution of a lack of skills to external recruitment difficulties facing employers?
- How do these problems vary by occupation, establishment size, industrial sector, and region?
- What evidence is there about the existence of internal skill gaps within the employed workforce?
- What are the perceptions of employers about the causes and consequences of skill deficiencies?

**Table 2: National Employers Skills Surveys, Sample Size**

Survey Year	Sample of Employers
1999	26,952
2001	27,031
2002*	4,054
2003	72,100
2004	27,172
2005	74,500

Source: *National Employers' Skills Surveys*

The survey sample size has varied considerably over time. The ESS for 2002, in particular, was a much smaller survey than those for other years, with a shorter questionnaire than its predecessors and a significantly more limited sample. It was designed primarily to maintain the continuity of the dataset in terms of broad measures of skills deficiencies in England.

The survey questionnaire collects information on the establishment including the main purpose of business which is coded by 4 digit Standard Industrial Classification. For our analysis we have coded the data to match definitions of low pay sectors identified by the Low Pay Commission in previous research. Other data collected includes size band of employer, part-time/full-time split, and the occupations for which firms are experiencing skills and/or recruitment difficulties.

### 3.4 Recruitment problems

The Employers Survey questionnaire contains a dedicated section on recruitment problems and this is presented in Appendix B to this report. Key to this research are questions surrounding the number of vacancies and the number of hard-to-fill vacancies, which can be analysed by industry and size of employer and occupation over time.

Hard-to-fill vacancies are simply those vacancies described by employers as being hard to fill. Reasons for reporting that vacancies are hard to fill often include skills-related issues, but can simply involve such aspects as poor pay or conditions of employment, or the employer being based in a remote location. This measure is self-reported based on rather vague criteria, and is therefore likely to be subject to considerable measurement errors and possibly even to biases if different types of employers vary in their assessment of what constitutes "hard-to-fill", or if these assessments alter systematically over time. In the absence of alternative sources of recruitment data, we are not in a position to assess these data quality issues.

## 4 Descriptive analysis

Our primary aim in this study is to assess whether changes to the national minimum wage have affected turnover, retention and recruitment among lower paid workers. In the main, we do this by comparing the experiences of the low paid, and particularly of those workers directly affected by the NMW, with those of workers further up the wage distribution. The econometric methodologies adopted are well established within research on the minimum wage, and are discussed in section 4. They involve allocating workers and/or firms to 'treatment' or 'control' groups according to the degree to which they are impacted by changes in the NMW. More specifically, in analysing the LFS data we have allocated adult workers to the treatment group depending on their reported wage relative to the NMW at that time. Workers with reported wages no more than 1% above the NMW are allocated to group Treatment A (NMW workers); those with wages between 1% and 10% above the NMW are allocated to group Treatment B; and those with wages between 10% and 50% above the NMW are allocated to the control group (low paid). 50% above NMW roughly corresponds to the lowest quartile of the wage distribution.

This section reports some simple descriptive analysis of our key variables (on-the-job search activity, voluntary job-to-job moves, and reported recruitment difficulties by firms) prior to presenting more formal econometric analysis in sections 4 and 5. Our aim here is merely to identify any broad patterns in the data related to changes in key variables over time and to differences between groups of workers and firms.

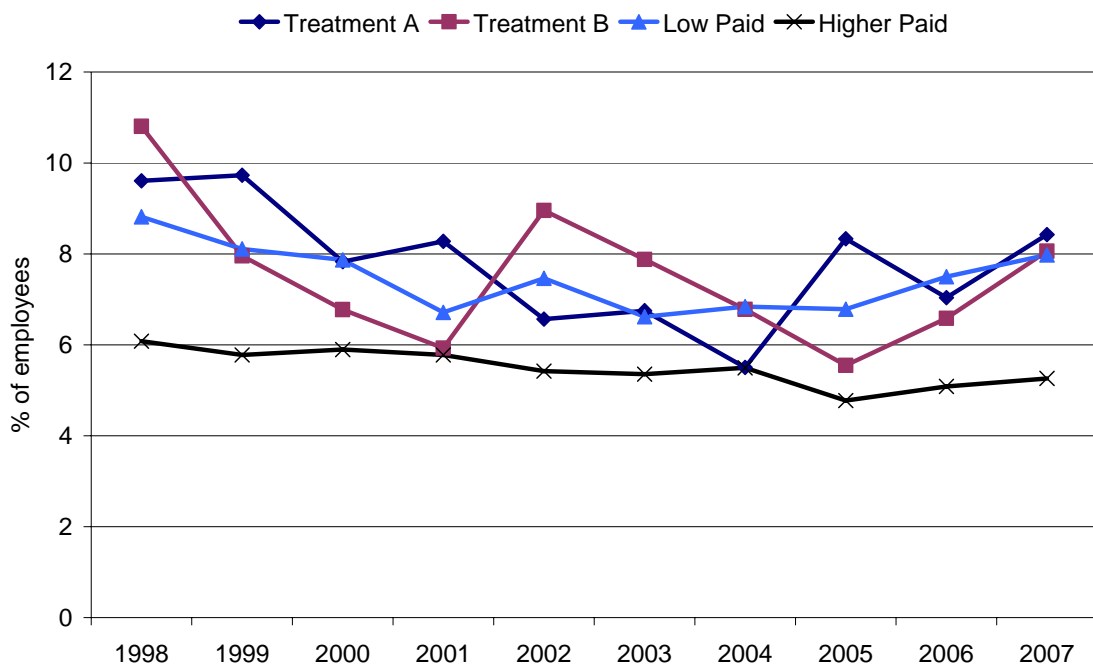
### 4.1 On-the-job search

Figure 1 shows levels of on-the-job search activity (as % of all employees) for NMW workers (Treatment A), workers earning 'just above' NMW (Treatment B), other low paid workers and higher paid workers, for the period 1998-2007. It is difficult to discern changes in search activity between NMW workers and those on higher wages on the basis of this chart. However, there is some indication of a reduction in search activity among NMW workers between 1999 and 2000 with a similar movement for workers just above NMW, but not matched by other lower paid workers or by more highly paid workers. There are further reductions in search activity in the Treatment A group between 2001 and 2002, and between 2003 and 2004, which, again, are not matched by similar movements for lower paid workers as a whole. These movements are timed to correspond (broadly) with the introduction of the NMW and with subsequent major upratings in the adult rate. On the other hand, there is an abrupt increase in search activity among NMW workers between 2004 and 2005, corresponding with another substantial uprating.

Figure 2 also shows somewhat different patterns of search activity among male and female lower paid workers, with the former showing a more marked reduction in search activity during the early years of the NMW, but also substantial up and down movements from 2004 onwards. Figures 3 and 4 distinguish between part-time and full-time workers, and between low-paid and other industries.

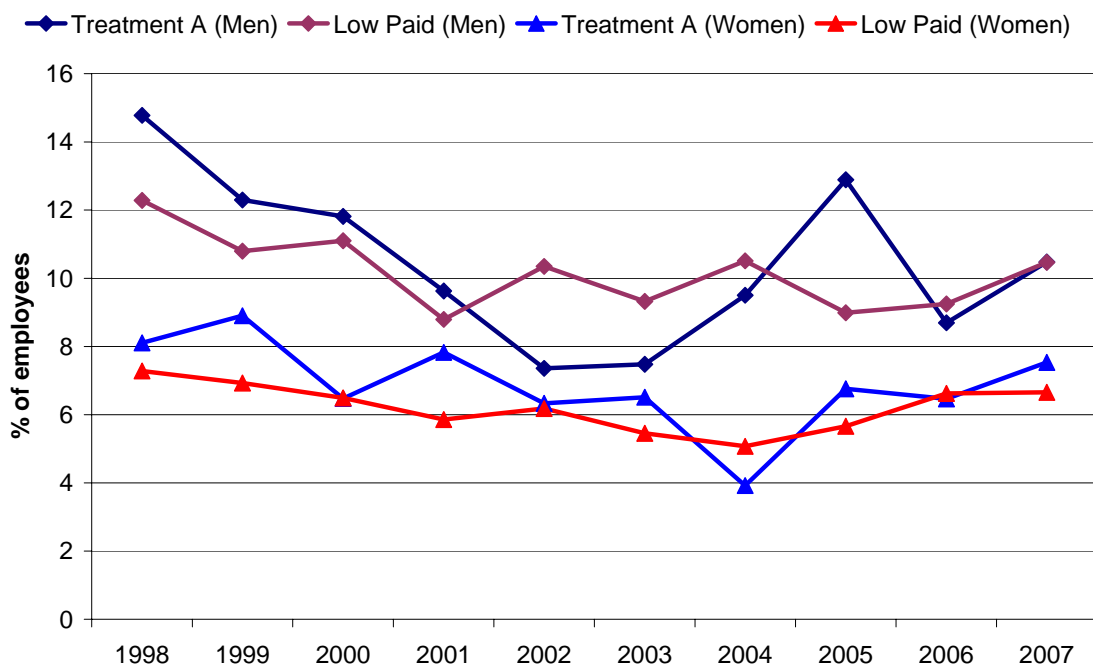
In very broad terms this analysis is suggestive of a reduction in search activity among the lowest paid workers timed around the introduction of the NWM, but gives a mixed picture regarding changes in search behaviour around subsequent upratings.

**Figure 1: On-the-job search activity among lower paid workers**



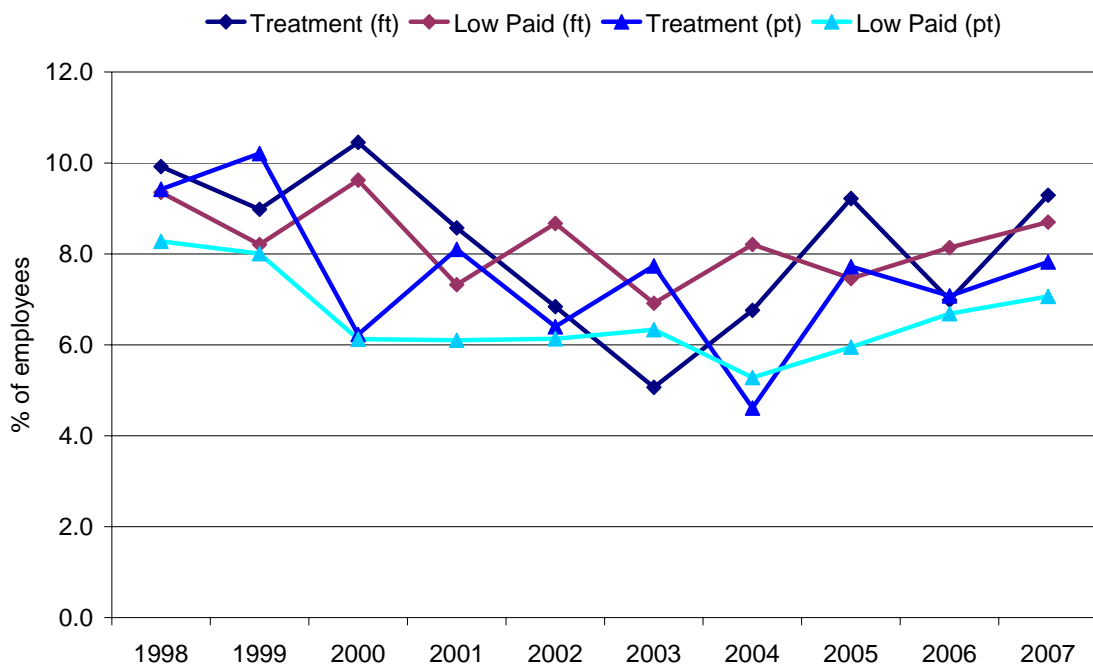
Source: Authors' analysis based on ONS LFS data

**Figure 2: On-the-job search activity among lower paid men & women**



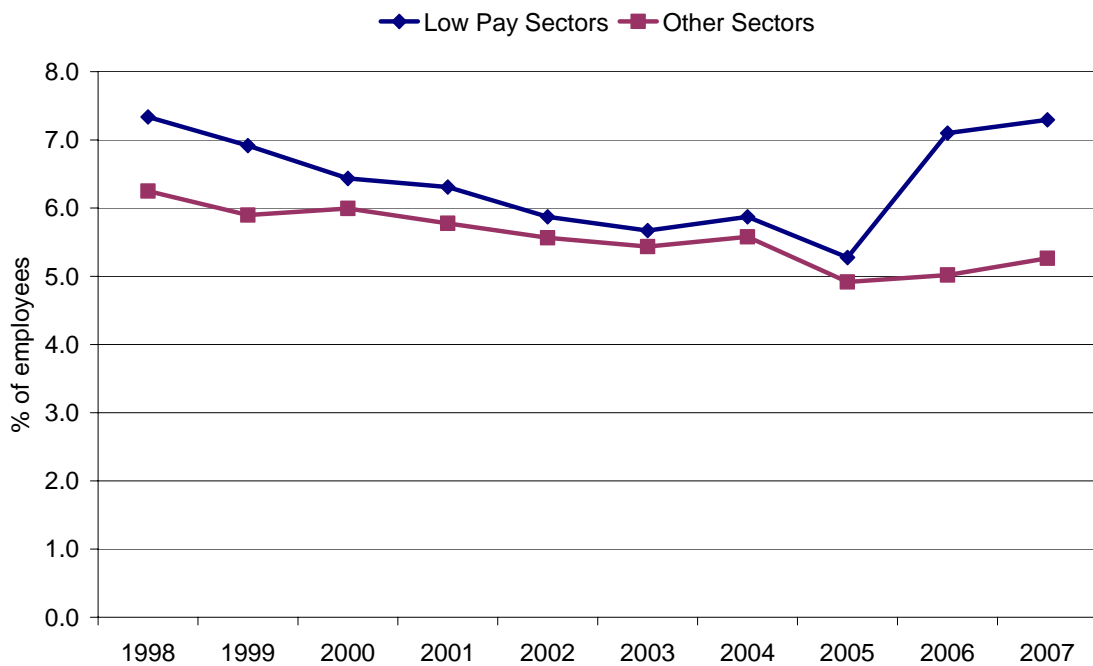
Source: Authors' analysis based on ONS LFS data

**Figure 3: On-the-job search activity among part-time and full-time workers**



Source: Authors' analysis based on ONS LFS data

**Figure 4: On-the-job search activity within LPC low-paid sectors**

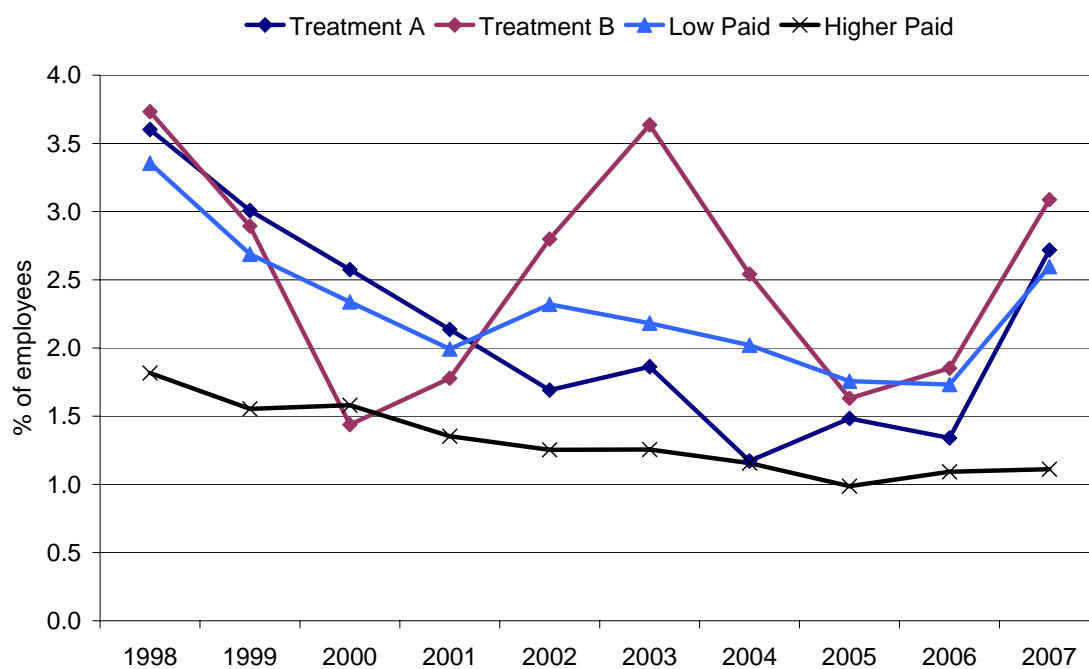


Source: Authors' analysis based on ONS LFS data

## 4.2 Pay-related on-the-job search

As noted in Section 3.1, the LFS also asks those workers who report actively searching for alternative jobs to give reasons for this activity. We might expect changes to the minimum wage primarily to affect pay-related search activity, since its main direct impact is to compress the wage distribution, reducing the potential for moves to higher-paid jobs among workers at the bottom of the wage distribution. Figure 5 shows pay-related search activity for our treatment and control groups as identified above. There is a marked decline in pay-related search activity among NMW workers (Treatment A) throughout most of the period, although this is reversed during 2006-2007. A similar trend is, however, also seen among other low paid workers (our control group: those earning less than 50% above the NMW), providing little evidence of systematically larger changes among the treatment group. There are also large swings in activity among workers earning just above the NMW, although these may reflect sampling variation due to the relatively small sample size for this group.

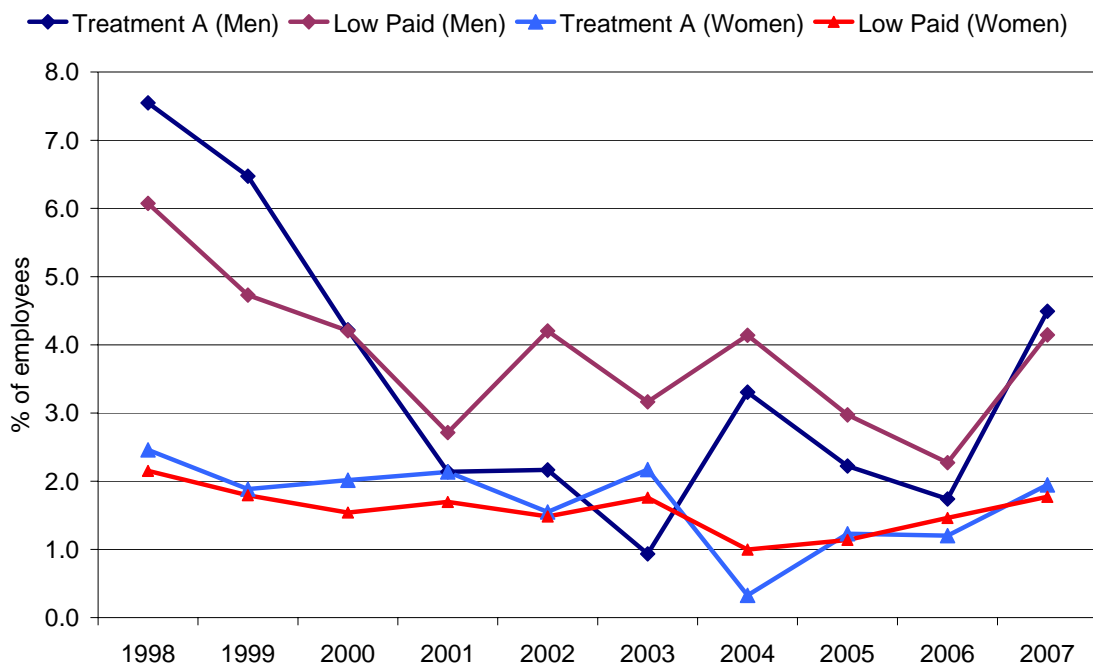
Figure 5: Pay-related search activity for lower paid workers



Source: Authors' analysis based on ONS LFS data

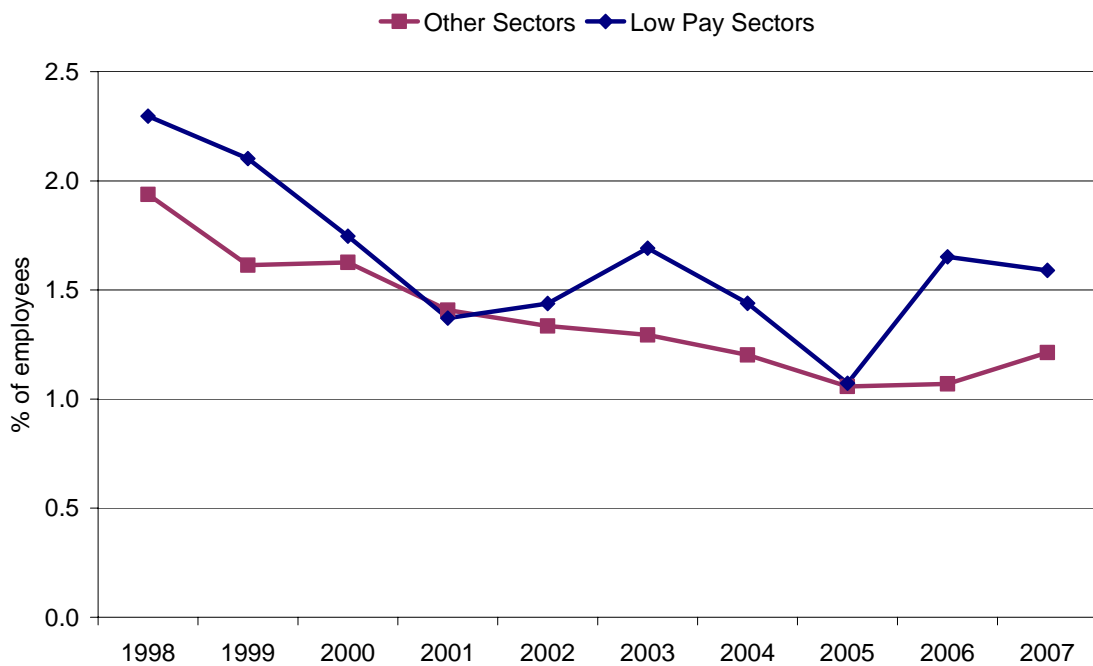
Figures 6 and 7 show movements in pay-related search activity for low paid men/women and for workers in low paid sectors, respectively. Both women and (particularly) men show marked reductions in pay-related search activity during the early years of the NMW although, again, there are no clear patterns from 2002 onwards. Nor is the apparent convergence in pay-related search activity between LPC low paid sectors and other sectors maintained beyond 2001.

**Figure 6: Pay-related search activity for lower paid men & women**



Source: Authors' analysis based on ONS LFS data

**Figure 7: Pay-related search activity in LPC low paid sectors**

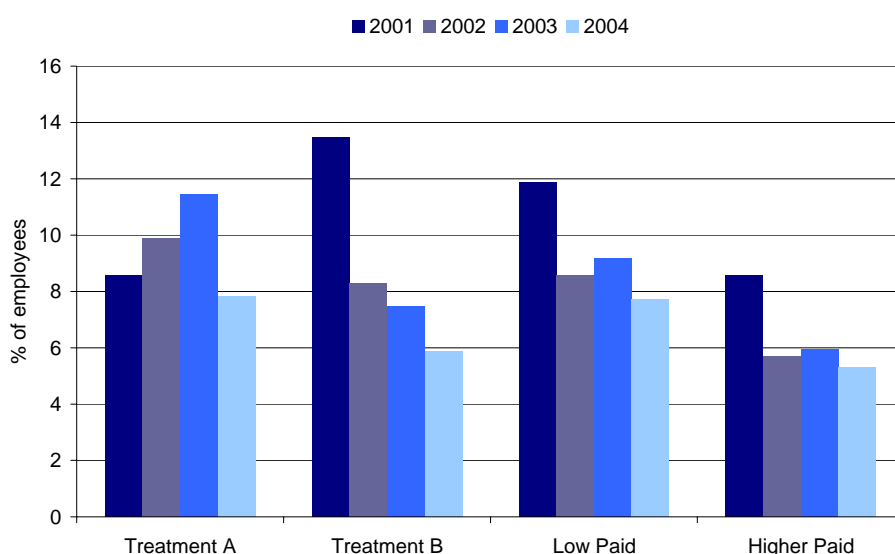


Source: Authors' analysis based on ONS LFS data

### 4.3 Turnover

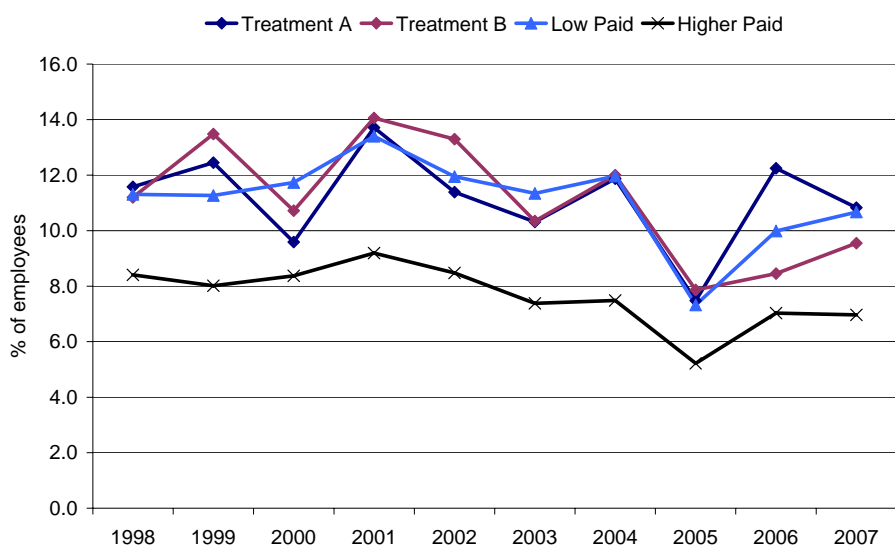
Figure 8 shows changes in patterns of job-to-job moves among workers defined in terms of pay (HRRATE) in their origin jobs (as identified through matched quarterly LFS datasets comparing spring quarters in consecutive years, so that '2001' relates to moves between Spring 2001 and Spring 2002). The pattern of change for workers moving out of Treatment A is rather different from those for other, higher paid workers, with a rising trend of moves during 2001-2003 beginning from a comparatively low level in 2001, before falling back in 2004. The low level of moves out of NMW jobs in 2001-2 coincides with the major uprating at that time, but we have not been able to identify how this compares with moves before that uprating.

**Figure 8: Job-to-job moves based on origin job attributes**



Source: Authors' analysis based on ONS LFS data

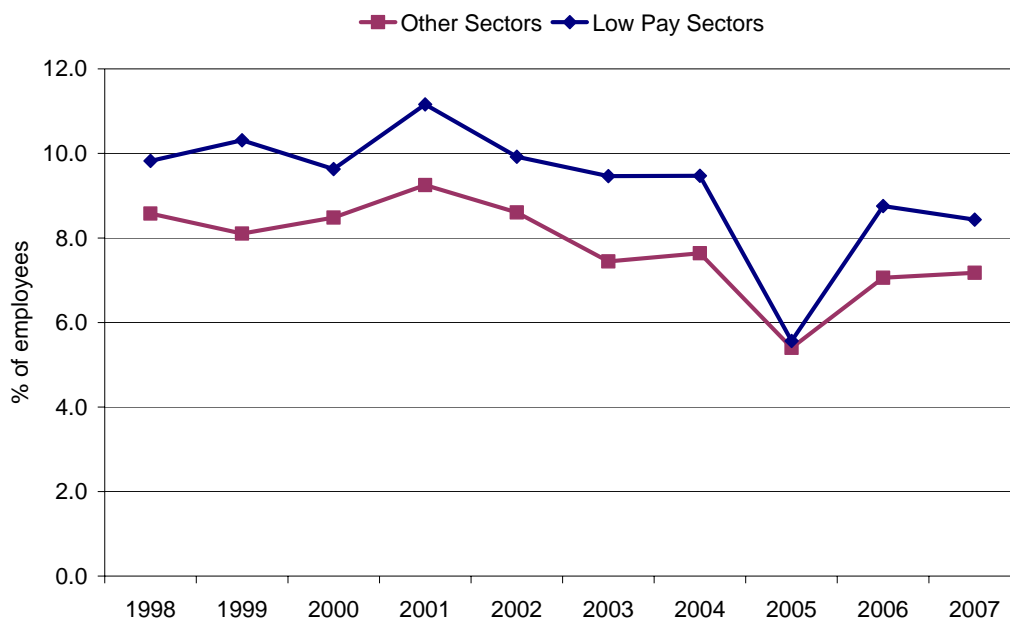
**Figure 9: Job-to-job moves based on destination job attributes**



Source: Authors' analysis based on ONS LFS data

Figure 9 (above) shows trends in job-to-job moves defined in terms of the attributes of (i.e. pay in) destination jobs, where again the values for 1999 (for example) reflects moves occurring between Spring 1998 and Spring 1999. We might expect improvements in relative pay in low paid jobs to be associated with more frequent moves into low paid jobs, so that moves to NMW jobs (Treatment A) increase (relative to those into other low paid jobs) following the introduction of the NMW and major upratings. This is not obviously the case in Figure 9, or in Figure 10 which shows movements into jobs within the LPC low pay sectors compared to those into other sectors of the economy.

**Figure 10: Job-to-job moves based on destination sector**



*Source: Authors' analysis based on ONS LFS data*

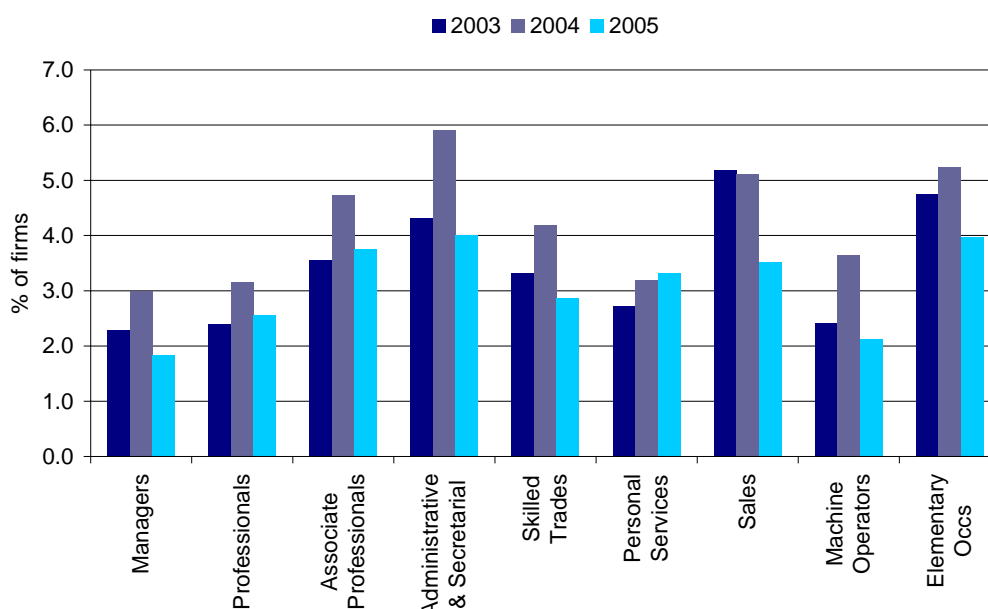
To summarize, some patterns in search activity and job-to-job moves (over time and across workers/jobs) are consistent with the expected impact of the NMW among workers directly affected. In particular, the general reduction in search (and particularly pay-related search) activity during the period 1998-2002 is consistent with the expected impacts from the introduction of NMW and the major uprating of 2001-2. However other patterns, particularly in the period from 2003 onwards, go against what we might expect to be the result of rises in the NMW among low pay workers (reduced search and turnover; easier recruitment).

## 4.4 Recruitment Difficulties

We now examine the data on vacancies and hard-to-fill vacancies from the National Employers Skills Survey, to see whether changes to the NMW have been associated with changes in the prevalence of vacancies and, particularly, of hard-to-fill vacancies within lower paid industries and occupations. Our basic hypothesis is that firms on whom the NMW binds and which are therefore required to increase wages following increases in the NMW might, *ceteris paribus*, see an increase in job applicants and a reduction in hard-to-fill vacancies as a result. Owing to the limitations of the NESS identified in section 2.3 above we are only able to compare vacancy levels over the limited time period from 2003-2005. This period does, however, span 2 substantial NMW upratings.

Our basic variables are binary dummies for firms reporting vacancies and firms reporting hard-to-fill vacancies. The NESS survey also allows us to identify the occupations that firms are seeking to recruit and whether they are having difficulties doing so.

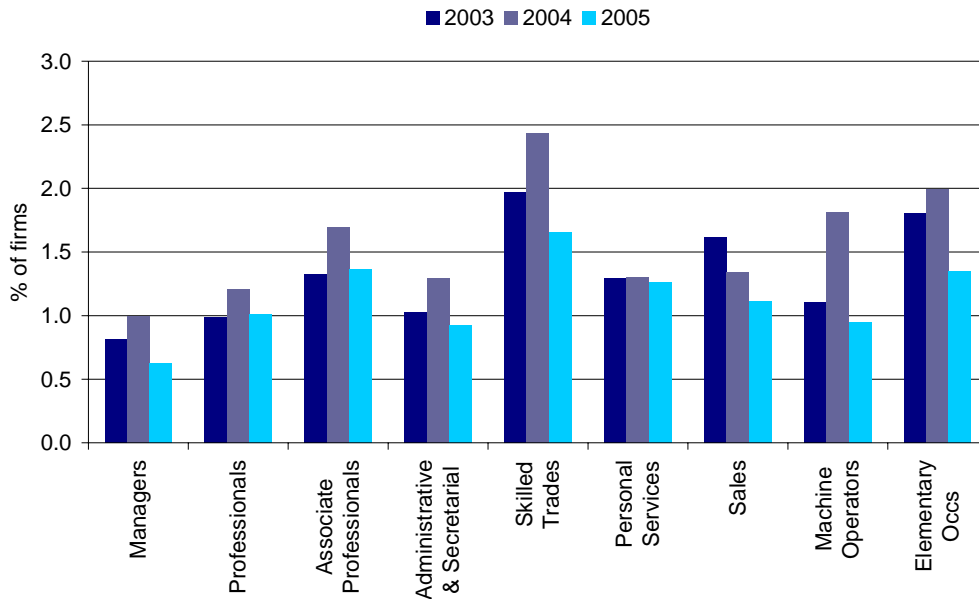
**Figure 11: Firms reporting vacancies as % of all firms**



Source: Authors' analysis based on NESS data

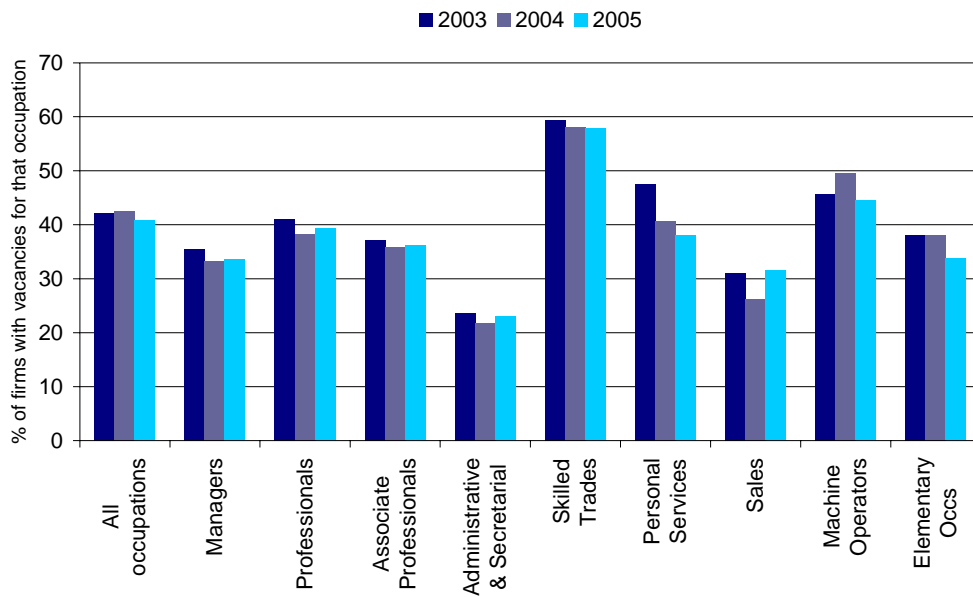
Figure 11 shows the proportion of firms reporting vacancies by broad occupation group between 2003 and 2005, while Figure 12 (over) shows firms reporting hard-to-fill vacancies as a share of all firms. Figure 13 shows the proportion of firms that have reported vacancies for particular occupations that also report that those vacancies are proving hard-to-fill – a simple measure of recruitment problems at the level of individual firms (indicating firms that are trying to recruit particular occupations but are struggling to do so). This measure suggests that recruitment problems are most common in attempts to recruit skilled trades and machine operatives, and least common in attempts to recruit administrative and secretarial occupations. There are no strong patterns in movements in firms reporting recruitment difficulties over time that suggest tightening or easing in recruitment to lower paid jobs.

**Figure 12: Firms reporting 'hard-to-fill' vacancies as % of all firms**



Source: Authors' analysis based on NESS data

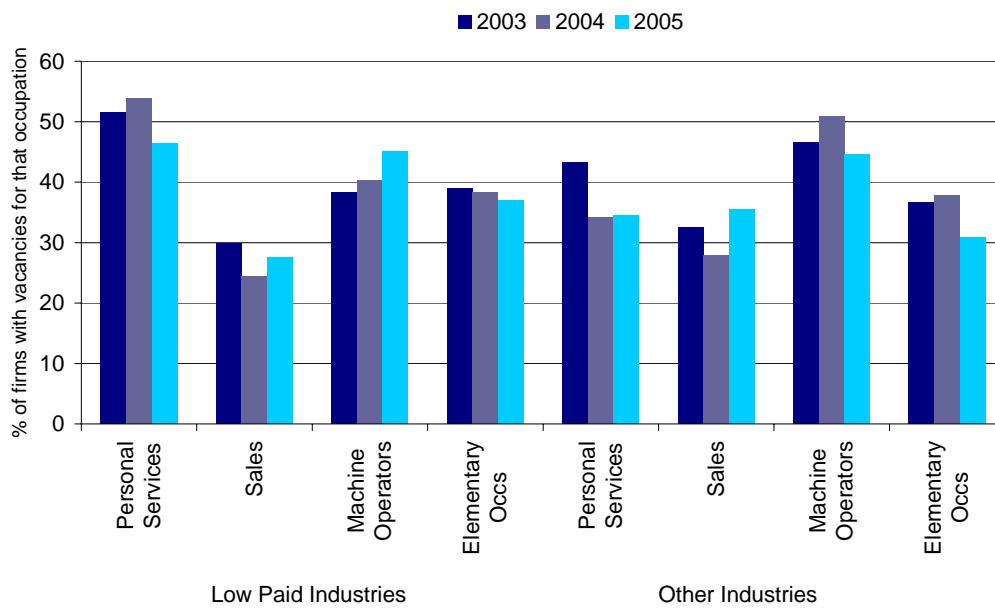
**Figure 13: Firms reporting 'hard-to-fill' vacancies as % of firms reporting vacancies**



Source: Authors' analysis based on NESS data

Figure 14 compares the incidence of recruitment difficulties between firms in the LPC low pay sectors (identified on the basis of 4-digit SIC codes) and those in other sectors. Again, there are no clear patterns suggesting either easing or tightening of recruitment problems within the LPC low pay sectors.

**Figure 14: Firms reporting 'hard-to-fill' vacancies as % of all firms reporting vacancies, low pay sectors**



Source: Authors' analysis based on NESS data

## 5 Econometrics

We now proceed to attempt more rigorous econometric analysis of the impact of national minimum wage on recruitment, retention and turnover. As above, we focus on three sets of measures as indicators of the retention, turnover and recruitment respectively: engagement in on-the-job search activity (and pay-related search activity); job-to-job movements; and the prevalence of hard-to-fill vacancies and recruitment difficulties. We restrict our analysis to adult workers.

The aim is to relate movements in these measures to changes in the national minimum wage. As is usual in research on the NMW there are substantial identification problems related to this task. Each of these variables is the outcome of decisions among individual workers and employers that are influenced by a myriad of other factors in addition to changes in the NMW. It is, therefore, a difficult challenge to identify those changes that are due to changes in the NMW rather than to changes in those many other influences.

We follow the mainstream of NMW research in adopting a ‘quasi-experimental’ (treatment) approach in an attempt to resolve these identification issues. Our basic econometric specification is the difference-in-difference model:

$$y = \beta_0 + \delta_0 d2 + \beta_1 dB + \delta_1 d2 \cdot dB + \chi \mathbf{X} + u \quad (1)$$

where  $y$  is the outcome variable of interest,  $d2$  is a time dummy for the period after a change in the NMW,  $dB$  is a dummy variable for membership of the treatment group (1 = treatment; 0 = control) and  $\beta_0, \delta_0, \beta_1, \delta_1$  are parameters to be estimated. In particular,  $\delta_1$  represents the differential impact of the policy change (change in NMW) within the treatment group. In isolation, the time dummy  $d2$  captures aggregate factors which vary over time with a common effect on both treatment and control groups, while the treatment group dummy  $dB$  captures differences between treatment and control groups before the policy change. We also include a range of conditioning variables (vector  $\mathbf{X}$ ) in most of our specifications, to control for changes in the composition of treatment and control groups. Since all of our target measures are binary variables at the level of individual workers and firms, we imbed the difference-in-difference specification within a probit binary choice model (so that  $y$  is a latent variable).

In the case of the LFS analysis (search and job-to-job moves) the difference-in-difference approach involves comparing the behaviour of workers over the history of NMW upratings, and comparing groups with high exposure to the minimum wage against those with lesser exposure. Groups with higher exposure to the minimum wage can be identified in two ways: first, based on reported hourly wages; and second, based on industry and occupation – i.e. by classifying low paid sectors and occupations based on the LPC sector groups. While we report some results based on low-paid sectors, in the main we focus on low paid workers identified directly by their wage (using either the HOURPAY or HRRATE variables within the LFS, with a preference for the latter).

Changes in the NMW are also identified in two broad ways: by simple before-and-after comparisons around the time of substantial changes to the NMW rate as in equation (1); or by replacing the year dummy,  $d2$ , in (1) with a measure of the ‘bite’ of the NMW defined as the ratio of the NMW adult rate to some fixed point in the wage distribution (e.g. median). The latter approach allows us to test whether changes observed within the treatment group (relative to the control) are most pronounced when and where changes to the NMW have the greatest

direct effect on wages. We therefore allow the 'bite' to vary by industry (broad sector) and location (Government Office Regions, GORs) as well as over time. We use equation (2) in both year-on-year comparisons and in pooled regressions covering the full period 1998-2007 or some sub-sample of that period.

Econometric analysis of the NESS data poses particular identification challenges since we cannot directly allocate employers to low-paid sectors (treatment), but have to rely on their 4-digit SIC industry as an indicator of the likely impact of the NMW. In particular, we allocate firms to the NMW treatment group if they belong to one of the LPC's low pay sectors. Because of the errors in allocation that are bound to arise from this approach, we emphasise difference-in-difference specifications based on the 'bite' variable: which is again allowed to vary across time, industries and locations (GOR). We also examine models for recruitment difficulties in individual (socmajor) occupation groups as a further informal check on whether any significant treatment effects are plausibly related to changes in the NMW. There is, nevertheless, a high residual probability that any results from this analysis might be due to idiosyncratic sector shocks that are unrelated to changes in the NMW. The results are therefore regarded as no more than suggestive of possible NMW effects rather than as strong tests of those effects.

## 6 Results

### 6.1 On-the-job search

The results of our econometric analysis of on-the-job search are summarised in Tables 3 and 4. Fuller results for all time periods and for alternative specifications are reported in Appendix C. Tables 3 and 4 concentrate on the results for major changes in the NMW (because of the timing of the introduction in 1999 during the time covered by the spring LFS, we take the period 1999-2000 as corresponding to the introduction of the NMW).

Table 3 shows estimated marginal effects, robust standard errors and significance levels for NMW effects on engagement in on-the-job search activity among low paid workers. Here the treatment group (NWM) is defined to include workers earning up to 1% above the NMW based on either the HOURPAY or HRRATE pay measures within the LFS. The control group, in all cases, is workers earning between 1% and 50% above the NMW (roughly equivalent to the range from the NMW to the lower quartile point in the wage distribution according to ASHE data). The results therefore correspond to differences in responses between NMW and other low paid workers to changes in the NMW. They suggest significant negative impacts of the NMW on search activity among NMW workers (treatment group) following the introduction of the NMW and the first major uprating in October 2001. These are generally robust to the inclusion of a wide range of conditioning variables (worker and job characteristics), and to whether the treatment group is defined based on the HOURPAY or HRRATE variable. Analysis based on the latter definition shows no significant effects from subsequent upratings in October 2003 and October 2004. There are no significant effects for other years without substantial changes to the NMW rates (see Appendix C).

**Table 3: Econometric Results: On-the-job search**

#### Annual Difference-in-difference Probit Regressions

##### Dependent Variable: On-the-job Search

	1999-2000	2001-2002	2003-2004	2004-2005
<i>Based on HOURPAY</i>				
Without Conditioning Variables	<b>-0.0199</b> <sup>#</sup> <i>0.0113</i>	<b>-0.0247</b> <sup>**</sup> <i>0.0108</i>	<b>-0.0176</b> <sup>#</sup> <i>0.0116</i>	<b>0.0471</b> <sup>***</sup> <i>0.0191</i>
With Conditioning Variables	<b>-0.0182</b> <i>0.0102</i>	<b>-0.0211</b> <sup>*</sup> <i>0.0097</i>	<b>-0.0167</b> <sup>#</sup> <i>0.0096</i>	<b>0.0474</b> <sup>***</sup> <i>0.0204</i>
<i>Based on HRRATE</i>				
Without Conditioning Variables	<b>-0.0192</b> <sup>#</sup> <i>0.0108</i>	<b>-0.0217</b> <sup>***</sup> <i>0.0078</i>	<b>0.0059</b> <i>0.0096</i>	<b>0.0020</b> <i>0.0097</i>
With Conditioning Variables	<b>-0.0211</b> <sup>**</sup> <i>0.0100</i>	<b>-0.0186</b> <sup>**</sup> <i>0.0071</i>	<b>0.0074</b> <i>0.0088</i>	<b>0.0028</b> <i>0.0097</i>

Source: Authors' calculations based on LFS data

#### Notes:

1. For adult workers. The treatment group includes individuals earning 1% above NMW or less based on the HOURPAY and HRRATE pay variables. The control group includes individuals earning between 1% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g. sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

**Table 4: Econometric Results: On-the-job search****Annual Difference-in-difference Probit Regressions**  
**Dependent Variable: On-the-job Search**

	1999-2000	2001-2002	2003-2004	2004-2005
<i>Based on HOURPAY</i>				
Treatment A	<b>-0.0205</b> *	<b>-0.0183</b> #	<b>-0.0196</b> *	<b>0.0481</b> ***
	<i>0.0102</i>	<i>0.0102</i>	<i>0.0093</i>	<i>0.0209</i>
Treatment B	<b>-0.0155</b>	<b>0.0208</b>	<b>-0.0211</b> *	<b>0.0018</b>
	<i>0.0145</i>	<i>0.0190</i>	<i>0.0103</i>	<i>0.0171</i>
<i>Based on HRRATE</i>				
Treatment A	<b>-0.0238</b> **	<b>-0.0177</b> **	<b>0.0054</b>	<b>0.0006</b>
	<i>0.0102</i>	<i>0.0075</i>	<i>0.0091</i>	<i>0.0101</i>
Treatment B	<b>-0.0139</b>	<b>0.0022</b>	<b>-0.0094</b>	<b>-0.0091</b>
	<i>0.0156</i>	<i>0.0134</i>	<i>0.0123</i>	<i>0.0139</i>

Source: Authors' calculations based on LFS data

**Notes:**

1. For adult workers. Treatment group A includes individuals earning 1% above NMW or less based on the HOURPAY and HRRATE pay variables. Treatment group B includes individuals earning between 1% and 10% above NMW. The control group includes individuals earning between 10% and 50% above NMW.

2. Values in bold show marginal effects estimates for probit regressions.

3. Values in italics are estimated robust standard errors.

4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.

5. Conditioning variables include individual characteristics (e.g. sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

Table 4 shows similar results where we have defined two treatment groups corresponding to NMW workers (less than 1% above NMW) and workers earning marginally above the NMW (1-10% above NMW). The control group is now low paid workers earning between 10% and 50% above the NMW. The results for NMW workers are essentially the same as those reported in Table 3, with significant negative effects on on-the-job search activity among NMW workers around introduction of the NMW and the 2001 uprating, but no significant effects from later upratings (based on the HRRATE definition).

## 6.2 Pay-related on-the-job search

As noted in section 3.2 above, we might expect changes to the NMW to have particular large effects on pay-related search activities, whereas other search activity might be relatively less affected by changes to the NMW. Table 5, below, shows results for difference-in-difference probit regressions for pay-related search activity among low paid workers in the UK, around the introduction of the NMW and subsequent major upratings. The results based on our preferred definition of NMW workers (using HRRATE) suggest, as for search activity in general, a significant negative impact on pay-related search activity among NMW workers around the introduction of the NMW and the 2001 upratings, with no significant effects from subsequent upratings.

**Table 5: Econometric Results – Pay-related on-the-job search**

**Annual Difference-in-difference Probit Regressions**  
**Dependent Variable: Pay-related On-the-job Search**

	1999-2000	2001-2002	2003-2004	2004-2005
<i>Based on HOURPAY</i>	<b>-0.0007</b> <i>0.0059</i>	<b>-0.0065</b> <i>0.0042</i>	<b>-0.0070</b> <i>0.0042</i>	<b>0.0066</b> <i>0.0089</i>
<i>Based on HRRATE</i>	<b>-0.0117 ***</b> <i>0.0041</i>	<b>-0.0070 **</b> <i>0.0029</i>	<b>0.0011</b> <i>0.0041</i>	<b>-0.0018</b> <i>0.0036</i>

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers. The treatment groups include individuals earning 1% above NMW or less based on the HOURPAY and HRRATE pay variables. The control group includes individuals earning between 1% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g.sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

**Table 6: Econometric Results – On-the-job Search**

**Pooled Difference-in-difference Probit Regressions (1998-2007)**  
**Dependent Variables: On-the-job Search & Pay-related on-the-job search**

With Conditioning Variables

	Treatment group defined by HRRATE			
	Introduction of NMW		NMW Upratings (Bite)	
	Coeff.	S.E.	Coeff.	S.E.
<b>ALL ON-THE-JOB SEARCH</b>				
ALL	<b>-0.0091</b>	<i>0.0035 ***</i>	<b>0.0497</b>	<i>0.0454</i>
MEN	<b>-0.0070</b>	<i>0.0073</i>	<b>-0.0078</b>	<i>0.0806</i>
WOMEN	<b>-0.0105</b>	<i>0.0059 *</i>	<b>0.0827</b>	<i>0.0649</i>
NORTH	<b>-0.0071</b>	<i>0.0039 *</i>	<b>-0.0318</b>	<i>0.1053</i>
SOUTH	<b>-0.0110</b>	<i>0.0060 *</i>	<b>-0.0684</b>	<i>0.0548</i>
PART-TIME	<b>-0.0216</b>	<i>0.0047 ***</i>	<b>0.0304</b>	<i>0.0747</i>
FULL-TIME	<b>0.0034</b>	<i>0.0037</i>	<b>0.0555</b>	<i>0.0633</i>
LOW PAID SECTORS	<b>-0.0250</b>	<i>0.0080 ***</i>	<b>0.0565</b>	<i>0.0947</i>
<b>PAY-RELATED ON-THE-JOB SEARCH</b>				
ALL	<b>-0.0038</b>	<i>0.0020 **</i>	<b>0.0233</b>	<i>0.0211</i>
MEN	<b>-0.0083</b>	<i>0.0045 **</i>	<b>0.0393</b>	<i>0.0540</i>
WOMEN	<b>-0.0014</b>	<i>0.0016</i>	<b>0.0170</b>	<i>0.0266</i>
NORTH	<b>-0.0027</b>	<i>0.0026</i>	<b>0.0035</b>	<i>0.0655</i>
SOUTH	<b>-0.0056</b>	<i>0.0027 **</i>	<b>-0.0063</b>	<i>0.0275</i>
PART-TIME	<b>-0.0052</b>	<i>0.0023 ***</i>	<b>-0.0127</b>	<i>0.0268</i>
FULL-TIME	<b>-0.0017</b>	<i>0.0038</i>	<b>0.0540</b>	<i>0.0391 #</i>
LOW PAID SECTORS	<b>-0.0051</b>	<i>0.0058</i>	<b>0.0449</b>	<i>0.0514</i>

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers. The treatment groups include individuals earning 1% above NMW or less based on the HRRATE pay variable. The control group includes individuals earning between 1% and 50% above NMW. 'Bite' variable is adult NMW as % of median wage by region and broad sector.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors (cluster adjusted for bite).
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g.sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

Finally, we pooled all years together and estimated difference-in-difference probit regressions where the impact of upratings to the NMW was identified using a measure of 'bite' rather than simple year dummies. The results are reported in Table 6 (above). They suggest a significant impact on search activity and pay-related search activity across all low paid workers from the introduction of the NMW, although the results for particular groups of workers are variable (generally negative but often insignificant). The results show no persistent significant impact from subsequent upratings that increased its bite.

The above analysis suggests that the introduction in the NMW and the early upratings may have resulted in reduced on-the-job search activity among minimum wage workers, and also among workers earning just above the minimum wage, but that later increases had no impact on job search activity or were actually associated with an increase in search among the treatment group.

### 6.3 Job Moves

Table 7 shows the results of difference-in-difference probit regressions for movements out of low paid jobs. The underlying data were constructed by identifying job-to-job movers based on one spring quarter's LFS and then identifying the personal and job characteristics of those workers prior to the move by matching back to the same quarter one year previously. The job characteristics at that time were regarded as those of the origin job and workers allocated to treatment and control groups based on wages in that origin job (using HOURPAY or HRRATE). This dataset was then pooled together with the equivalent for one year later to provide a basis for the difference-in-difference regressions. As above, the treatment group is defined as those with hourly pay in their origin job less than 1% above the NMW rate, and the control as workers earning between 1% and 50% above NMW in their origin job. In general, the results do not allow us to reject the null hypothesis of no NMW impact on moves from NMW jobs for upratings during the period 2001-2004, although there is some suggestion of a reduction in turnover around the October 2003 uprating based on our preferred definition of the treatment group based on the hourly pay rate (HRRATE) variable.

**Table 7: Econometric Results – Job-to-job moves by origin**

**Annual Difference-in-difference Probit Regressions**  
**Dependent Variable: Movements from low paid jobs**

	2001-2002	2002-2003	2003-2004
<i>Based on HOURPAY</i>	<b>0.0426</b> # <i>0.0320</i>	<b>0.0127</b> <i>0.0268</i>	<b>-0.0217</b> <i>0.0224</i>
<i>Based on HRRATE</i>	<b>0.0167</b> <i>0.0843</i>	<b>0.0386</b> <i>0.0462</i>	<b>-0.0584</b> * <i>0.0194</i>

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers based on origin jobs. The treatment groups include individuals earning 1% above NMW or less based on the HOURPAY or HRRATE pay variables. The control group includes individuals earning between 1% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g.sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

We also investigated the impact of the NMW on moves to low paid jobs (particularly NMW jobs) and the main results are reported in Table 8. The results suggest a variety of responses to changes in the NMW. The analysis based on HRRATE definition of the treatment group suggested a significant reduction in moves to NMW jobs associated with the introduction of the NMW and a significant increase following the 2004 uprating. These are consistent with falling and then rising search activity among low pay workers with consequent changes in movements among NMW jobs, although clearly other explanations are possible.

**Table 8: Econometric Results – Job-to-job moves by destination**

**Annual Difference-in-difference Probit Regressions**  
**Dependent Variable: Movements to low paid jobs**

	1999-2000	2001-2002	2003-2004	2004-2005
<i>Based on HOURPAY</i>	<b>-0.0370</b> *** <i>0.0117</i>	<b>-0.0487</b> <i>0.0170</i>	<b>0.0191</b> <i>0.0188</i>	<b>0.0047</b> <i>0.0186</i>
<i>Based on HRRATE</i>	<b>-0.0301</b> *** <i>0.0119</i>	<b>0.0157</b> # <i>0.0117</i>	<b>0.0105</b> <i>0.0114</i>	<b>0.0270</b> ** <i>0.0141</i>

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers based on destination jobs. The treatment groups include individuals earning 1% above NMW or less based on the HRRATE pay variable. The control group includes individuals earning between 1% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g.sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

## 6.4 Analysis of LFS data: Summary

Taken together, our econometric analysis of LFS data on job search activity and job-to-job moves is consistent with a significant negative impact from the introduction in the NMW and the early upratings on search and turnover among the treatment group. Later upratings do not, however, appear to have had any significant impact on either on-the-job search or turnover among the very low paid.

We have not been able to identify a robust explanation for this pattern. It is, however, possible that this is related to the precise pattern of impacts of the NMW on the wage distribution reported by the Low Pay Commission (2008). This suggests that those at the bottom of the wage distribution received higher pay rises than those higher up the wage distribution during the period 1998-2004, but that increases in the minimum wage since then have had a smaller effect on the wage distribution. The LPC also reports that the 1998-2004 increases “appear to have had knock-on effects up to around the 25<sup>th</sup> percentile” but that “the impact declines between the 5<sup>th</sup> and 25<sup>th</sup> percentile and is smaller than the increase in the minimum wage.” These effects would tend to compress the bottom end of the wage distribution in a way that might be expected to result in reduced search and turnover among workers at the very bottom of the distribution. Smaller impacts of later upratings on the shape of the bottom tail of the earnings distribution could account for our findings over the post-2004 period.

## 6.5 Recruitment

We noted above the additional difficulties of identifying NMW impacts on vacancies and recruitment based on the National Employers Skills Survey. We do not have direct information on the concentration of low wage employment within individual firms and therefore have to allocate employers to the treatment group based on 4-digit industry of employment (according to the LPC low pay sectors). We have, nevertheless, attempted to identify minimum wage impacts on vacancies and recruitment difficulties using similar methods to those reported above for the employee-based analysis using LFS. In particular, we have estimated annual and pooled difference-in-difference regressions based on simple annual dummy variables and on a measure of the bite of the NMW varying by region and industry. We also estimated separate equations for different types of vacancy defined by broad (socmajor) occupation groups.

The results are reported in Tables 9 and 10 (below) and show a number of statistically significant effects. However these fail to show any consistent pattern of impacts of the NMW within relevant occupations, and are most likely due to firm and/or industry effects unconnected with changes in the NMW. We could, therefore, find no robust evidence that changes to the NMW have had a significant impact (either positive or negative) on recruitment difficulties among firms employing low paid workers.

**Table 9: Econometric Results – Recruitment problems by occupation**

**Annual difference-in-difference probit regressions**

**Dependent Variables: Hard-to-fill Vacancies**

	2003-2004		2004-2005	
	Coeff.	S.E.	Coeff.	S.E.
<b>Based on Annual Dummies</b>				
ALL	<b>-0.0152</b>	<i>0.0158</i>	<b>0.0111</b>	<i>0.0162</i>
Managers	<b>0.0667</b>	<i>0.0557</i>	<b>-0.0401</b>	<i>0.0519</i>
Professionals	<b>-0.1046</b>	<i>0.1388</i>	<b>0.0209</b>	<i>0.1651</i>
Associate Professionals	<b>0.0172</b>	<i>0.0718</i>	<b>0.0270</b>	<i>0.0699</i>
Administrative & Secretarial	<b>-0.0365</b>	<i>0.0405</i>	<b>-0.0152</b>	<i>0.0472</i>
Skilled Trades	<b>0.0362</b>	<i>0.0445</i>	<b>0.0060</b>	<i>0.0451</i>
Sales	<b>0.0125</b>	<i>0.0305</i>	<b>-0.0442</b>	<i>0.0306</i> #
Personal Services	<b>0.1188</b>	<i>0.0451</i> ***	<b>-0.0802</b>	<i>0.0404</i> **
Machine Operators	<b>-0.0737</b>	<i>0.0672</i>	<b>0.1090</b>	<i>0.0649</i> *
Elementary Occs	<b>-0.0388</b>	<i>0.0315</i>	<b>0.0790</b>	<i>0.0326</i> **
<b>Based on NMW 'Bite'</b>				
ALL	<b>0.1385</b>	<i>0.0709</i> *	<b>0.0250</b>	<i>0.3727</i>
Managers	<b>0.4654</b>	<i>0.2434</i> *	<b>-0.1490</b>	<i>0.3427</i>
Professionals	<b>-0.5536</b>	<i>1.0406</i>	<b>0.4478</b>	<i>1.0322</i>
Associate Professionals	<b>0.2991</b>	<i>0.3267</i>	<b>-0.3628</b>	<i>0.6419</i>
Administrative & Secretarial	<b>0.1294</b>	<i>0.2856</i>	<b>0.8983</b>	<i>0.4465</i> **
Skilled Trades	<b>-0.3683</b>	<i>0.3076</i>	<b>-0.2819</b>	<i>0.3598</i>
Sales	<b>0.0217</b>	<i>0.1332</i>	<b>-0.1176</b>	<i>0.2666</i>
Personal Services	<b>0.3836</b>	<i>0.2635</i> #	<b>-0.6411</b>	<i>0.3883</i> *
Machine Operators	<b>0.0428</b>	<i>0.6771</i>	<b>0.3791</b>	<i>0.8856</i>
Elementary Occs	<b>0.8770</b>	<i>0.1351</i> ***	<b>0.4108</b>	<i>0.4615</i>

Source: Authors' calculations based on NESS data

Notes:

1. The treatment groups include in LPC-defined low pay sectors. The control groups are all other firms. 'Hard-to-fill' vacancies: (1) are relative to firms not reporting vacancies; (2) are relative to firms reporting vacancies. 'Bite' variable is adult NMW as % of median wage by region and broad sector.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors (cluster adjusted for bite).
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include firm characteristics (firm size, industry, location)

**Table 10: Econometric Results – Recruitment problems by occupation**

**Pooled difference-in-difference probit regressions**  
**Dependent Variables: Vacancies & Hard-to-fill Vacancies**

	All Vacancies		Hard-to-fill Vacancies (2)	
	Coeff.	S.E.	Coeff.	S.E.
All Occupations	<b>0.1593</b>	<i>0.0155</i> ***	<b>0.0077</b>	<i>0.0337</i> **
Managers	<b>-0.1076</b>	<i>0.0032</i> ***	<b>0.1369</b>	<i>0.0564</i> **
Professionals	<b>-0.0307</b>	<i>0.0053</i> ***	<b>-0.2910</b>	<i>0.2405</i>
Associate Professionals	<b>-0.0593</b>	<i>0.0055</i> ***	<b>-0.0277</b>	<i>0.0724</i>
Administrative & Secretarial	<b>-0.0538</b>	<i>0.0070</i> ***	<b>0.1143</b>	<i>0.0391</i> ***
Skilled Trades	<b>0.0091</b>	<i>0.0115</i>	<b>-0.0511</b>	<i>0.0537</i>
Personal Services	<b>0.0167</b>	<i>0.0011</i> ***	<b>-0.0560</b>	<i>0.0550</i>
Sales	<b>-0.0063</b>	<i>0.0102</i>	<b>-0.1196</b>	<i>0.1050</i>
Machine Operators	<b>-0.0065</b>	<i>0.0042</i> #	<b>-0.0425</b>	<i>0.1440</i>
Elementary Occs	<b>0.0639</b>	<i>0.0024</i> ***	<b>0.0663</b>	<i>0.0419</i> #

Source: Authors' calculations based on NESS data

Notes:

1. The treatment groups include in LPC-defined low pay sectors. The control groups are all other firms. 'Hard-to-fill' vacancies are relative to firms reporting vacancies. 'Bite' variable is adult NMW as % of median wage by region and broad sector.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors (cluster adjusted for bite).
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include firm characteristics (firm size, industry, location)

## 7 Conclusions

There is abundant evidence that the introduction of the UK national minimum wage (NMW) and subsequent upratings have had a substantial effect on earnings at the bottom end of the wage distribution. We might expect such changes in the wage distribution to influence search activity and job moves by low paid workers, and consequently the ability of firms to recruit and retain employees.

This study has investigated the impact of the NMW on three sets of variables related to recruitment, retention and turnover. First, we used individual-level data from the labour force survey (LFS) to analyse the impact on on-the-job search activity by low paid workers over the period 1998-2007. Second, we used LFS data to examine the impact of changes to the NMW on (direct and voluntary) movements of workers from and to low paid (NMW) jobs. Finally, we used firm-level data from the National Employers Skills Survey (NESS) for the period 2003-2005 to try to investigate the impact of NMW upratings on vacancies and recruitment difficulties (hard-to-fill vacancies) among employers of low paid workers. In all cases, the basic methodological approach was 'quasi-experimental' based on the definition of treatment (NMW) and control (above NMW) groups of workers or firms and estimation of difference-in-difference regressions.

As usual in research related to the NMW, identification problems are to the fore limiting our ability to isolate effects of the NMW from the many other factors influencing recruitment & retention (or search and job moves). We used two basic identification strategies, based on standard (year dummy) difference-in-difference regressions, and based on measures of the strength of the NMW derived from its 'bite' (ratio to the median wage) in individual industries and locations. We also estimated separate regressions for different categories of workers (by gender, employment status, etc.) and of vacancy (by occupation) as more informal checks on the plausibility that any significant effects emerging from the econometric analysis were related to changes in the NMW rather than to other unobserved 'events'.

The results are best described as mixed. There is some evidence that the introduction of the NMW and early upratings may have been associated with reduced search activity (and pay-related search activity) among minimum wage workers (the treatment group). There is, however, no evidence of effects from subsequent upratings. A potential (and tentative) explanation for this pattern is that the development of the NMW over the 1998-2004 period had a more profound impact on the shape of the bottom tail of the earnings distribution than did subsequent upratings.

The data on recruitment difficulties (hard-to-fill vacancies) from the National Employers Skills Surveys (NESS) does not provide a reliable way to identify employers of low paid workers and so to attribute individual employers to treatment and control groups. Results from this analysis are therefore suggestive rather than definitive. Econometric analysis of these data suggested a number of statistically significant changes in reported recruitment problems coinciding with NMW upratings, but there was no clear pattern of these effects in terms of either timing or the occupations involved that could sensibly link them to changes in the national minimum wage.

Labour turnover can have substantial effects on the welfare of both employers and employees, so that further investigation is perhaps warranted. This would, however, require better data, particularly related to turnover and recruitment issues facing individual employers of low paid workers.



Appendix A

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## Appendix B

### National Employer Skills Survey Questionnaire (Section C)

## **SECTION C: Recruitment and Hard to fill vacancies**

ASK ALL

- C1. **Changing the subject slightly, how many vacancies, if any, do you currently have at this establishment? PROBE FOR BEST ESTIMATE**

WRITE IN NUMBER \_\_\_\_\_ [ALLOW DK. IF 0 OR DK GO TO D1]

- IF C1 > 100 ASK:*  
C1chk **I've recorded that as (insert number from C1), is this correct?**

Yes	1	CONTINUE
No	2	RE-ASK C1

- ASK ALL WITH ANY VACANCIES AT C1. OTHERS GO TO D1.*  
C2. **TEXT SUBSTITUTION: IF C1>1: In which specific occupations do you currently have vacancies at this establishment? / IF C1=1: In which specific occupation do you currently have a vacancy at this establishment?**

PROMPT FOR FULL DETAILS (E.G. IF 'MANAGER' PROBE: WHAT TYPE OF MANAGER?) RECORD DETAILS FOR UP TO 6 OCCUPATIONS.

**DUMVAC CATI DUMMY VARIABLE – LIST OF UP TO 6 OCCUPATIONS WITH VACANCIES**

*IF >1 OCCUPATION WITH VACANCIES AT C2, ASK C3. OTHERS GO TO C3a.*

- C3. **How many vacancies do you have for [EACH OCCUPATION AT C2]?**  
*PROBE FOR BEST ESTIMATE*

**CATI – NUMBER OF VACANCIES FROM C1 TO APPEAR ON SCREEN**

**CATI – DO NOT ALLOW DON'T KNOW. ANSWER MUST BE AT LEAST 1**

C2	C3 – number
Occupation 1 -	(1-9999)
Occupation 2 -	(1-9999)
Occupation 3 -	(1-9999)
Occupation 4 -	(1-9999)
Occupation 5 -	(1-9999)
Occupation 6 -	(1-9999)

**CATI CHECK 6: TOTAL OF ALL VACANCIES AT C3 MUST SUM TO C1 (UNLESS GIVE 6 OCCUPATIONS IN WHICH CASE TOTAL CANNOT BE GREATER THAN C1).**

**IF FAIL CATI CHECK 6: PROMPT RESPONDENT WITH ... This sums to [INSERT C3 SUM] but you just told me that you had [INSERT C1] vacancies in total...THEN RE-ASK C3**

*ASK ALL WITH VACANCIES AT C1*

- C4. **TEXT SUBSTITUTION: IF C1>1: Are any of these vacancies proving hard to fill? / IF C1=1: Is this vacancy proving hard to fill?**

Yes	1	ASK C5
No	2	GO TO D1
DK	3	GO TO D1

*ASK C5 IF YES AT C4 AND C1 > 1 (IF C4 YES AND C1=1 THEN ASK C5A)*

*ASK C5 FOR EACH OCCUPATION AT C2*

C5. **How many of your vacancies for [TEXT SUBSTITUTION: OCCUPATION AT C2] are proving hard-to-fill?**

**CATI – SHOW ON SCREEN NUMBER OF VACANCIES FOR EACH OCCUPATION AT C2. ANSWER GIVEN MUST BE BETWEEN 0 AND C3 RESPONSE**

	C5 Number of hard to fill vacancies
Occupation 1 -	(0 – RESPONSE AT C3_1)
Occupation 2 -	(0 – RESPONSE AT C3_2)
Occupation 3 -	(0 – RESPONSE AT C3_3)
Occupation 4 -	(0 – RESPONSE AT C3_4)
Occupation 5 -	(0 – RESPONSE AT C3_5)
Occupation 6 -	(0 – RESPONSE AT C3_6)

	Occupations with hard-to-fill vacancies					
	Occ 1	Occ 2	Occ 3	Occ 4	Occ 5	Occ 6
Too much competition from other employers	1	1	1	1	1	1
Not enough people interested in doing this type of job	2	2	2	2	2	2
Poor terms and conditions (e.g. pay) offered for post	3	3	3	3	3	3
Low number of applicants with the required skills	4	4	4	4	4	4
Low number of applicants with the required attitude, motivation or personality	5	5	5	5	5	5
Low number of applicants generally	6	6	6	6	6	6
Lack of work experience the company demands	7	7	7	7	7	7
Lack of qualifications the company demands	8	8	8	8	8	8
Poor career progression / lack of prospects	9	9	9	9	9	9
Job entails shift work/unsociable hours	10	10	10	10	10	10
Seasonal work	11	11	11	11	11	11
Remote location/poor public transport	12	12	12	12	12	12
Other (WRITE IN)	13	13	13	13	13	13
No particular reason	14	14	14	14	14	14
Don't know	X	X	X	X	X	X

**CATI CHECK 7: NUMBER OF HARD TO FILL VACANCIES MUST SUM TO > 0 AT C5.**

**IF FAIL CATI CHECK 7: PROMPT RESPONDENT WITH: You told me earlier that you had vacancies that were hard-to-fill but I have not recorded any of them here...THEN REASK C4**

**C5DUM – CATI DUMMY VARIABLE – LIST OF UP TO 6 OCCUPATIONS WITH HARD-TO-FILL VACANCIES**

*ASK C5A - C7 IN SEQUENCE FOR UP TO 6 OCCUPATIONS > 0 AT C5 (I.E. OCCUPATIONS WITH HARD-TO-FILL VACANCIES. NB IF C1=1 AND C4=YES, ASK ABOUT OCCUPATION FROM C2)*

C5a **What are the main causes of having a hard to fill vacancy for** [TEXT SUBSTITUTION:  
OCCUPATION WITH HARD TO FILL VACANCY AT C5]?

DO **NOT** READ OUT. CODE ALL MENTIONED

C6. THERE IS NO C6

FOR EACH OCCUPATION WHERE VACANCIES ARE HARD-TO-FILL BUT WHERE ONE OF CODE 4, 7 OR 8 AT C5A NOT MENTIONED (IF ALL HARD-TO-FILL OCCUPATIONS CODED 4, 7 OR 8 AT C5a, GO TO C6c)

C6a. **Can I just check, are you finding [TEXT SUB IF SUM OF C5 = 1 OR ONLY 1 HARD TO FILL VACANCY IN TOTAL [C1=1]: this vacancy] [TEXT SUB IF C5>1: any of these vacancies] for [EACH OCCUPATION MENTIONED] hard to fill because... ? READ OUT**

	Occ 1	Occ 2	Occ 3	Occ 4	Occ 5	Occ 6
<b>Applicants have not been of sufficient quality</b>	1	1	1	1	1	1
<b>Because there have been few or no applicants</b>	2	2	2	2	2	2
<b>Or for both of these reasons</b>	3	3	3	3	3	3
DO NOT READ OUT: Neither of these reasons	4	4	4	4	4	4
<b>Don't know</b>	5	5	5	5	5	5

ASK FOR ALL HARD-TO-FILL VACANCIES CAUSED BY LACK OF QUALITY (C6A/1

OR 3)

C6b. **You said that you have had problems with the quality of the candidates for [OCCUPATION]. Would you say that they have been lacking... ? READ OUT. CODE ALL MENTIONED.**

	Occ 1	Occ 2	Occ 3	Occ 4	Occ 5	Occ 6
<b>The skills you look for</b>	1	1	1	1	1	1
<b>The qualifications you look for</b>	2	2	2	2	2	2
<b>The work experience that you require</b>	3	3	3	3	3	3
<b>Or do applicants tend to have poor attitudes, motivation and/or personality</b>	4	4	4	4	4	4
DO NOT READ OUT: Don't know	X	X	X	X	X	X

ASK FOR EACH OCCUPATION WITH HARD-TO-FILL VACANCIES CAUSED BY LACK OF SKILLS [(C6B/1-3) OR (C5A/4 or 7 or 8)]

C6c. **Have you found any of the following skills difficult to obtain from applicants for [TEXT SUBSTITUTION: OCCUPATION WITH SKILLS SHORTAGE VACANCY] ...? READ OUT**

CODE ALL MENTIONED

CATI - ROTATE ORDER OF SKILLS (APART FROM IT SKILLS WHICH MUST ALWAYS APPEAR TOGETHER WITH IT USER SKILLS FIRST, FOLLOWED BY IT PROFESSIONAL SKILLS). TECHNICAL & PRACTICAL SKILLS, ANY OTHER SKILLS, NONE & DK MUST ALWAYS APPEAR LAST).

	Occupations with hard to fill vacancies					
	Occ 1	Occ 2	Occ 3	Occ 4	Occ 5	Occ 6
<b>General IT user skills</b>	1	1	1	1	1	1
<b>IT professional skills</b>	2	2	2	2	2	2
<b>Oral communication skills</b>	3	3	3	3	3	3
<b>Written communication skills</b>	4	4	4	4	4	4
<b>Customer handling skills</b>	5	5	5	5	5	5
<b>Team working skills</b>	6	6	6	6	6	6
<b>Foreign language skills</b>	7	7	7	7	7	7
<b>Problem solving skills</b>	8	8	8	8	8	8
<b>Management skills</b>	9	9	9	9	9	9
<b>Numeracy skills</b>	10	10	10	10	10	10
<b>Literacy skills</b>	11	11	11	11	11	11
<b>Technical, practical or job-specific skills</b>	12	12	12	12	12	12
<b>Office admin skills</b>	13	13	13	13	13	13
<b>Any other skills (WRITE IN)</b>	14	14	14	14	14	14
No particular skills difficulties	15	15	15	15	15	15
Don't know	X	X	X	X	X	X

7.1.1.1.1.1.1.1.1 ASK IF 'TECHNICAL, PRACTICAL OR JOB SPECIFIC' SKILLS MENTIONED AT C6c

C6d. **What technical, practical or job-specific skills do candidates for [OCCUPATION] particularly tend to lack? RECORD VERBATIM.**

	C6d
Occupation 1 -	WRITE IN
Occupation 2 -	WRITE IN
Occupation 3 -	WRITE IN
Occupation 4 -	WRITE IN
Occupation 5 -	WRITE IN
Occupation 6 -	WRITE IN

*ASK ALL WITH HARD-TO-FILL VACANCIES AT C4, OTHERS GO TO D1*

C7. **Generally speaking, [TEXT SUBSTITUTION: IF MORE THAN ONE OCCUPATION WITH VACS AT C5: *thinking of ALL hard-to-fill vacancies you are currently experiencing*], how much of an impact are hard-to-fill vacancies having on this establishment?**

( )

A major impact	1	
A minor impact	2	
No impact	3	
Don't Know	4	

*ASK ALL WHERE HARD TO FILL VACS HAVING IMPACT (c7/1-2 or 4)*

C8 **Generally speaking, are hard-to-fill vacancies causing this establishment to... READ OUT?**

*CODE ALL MENTIONED*

**CATI - ROTATE ORDER APART FROM "OTHER"/"NONE"/DK.**

**CATI – IF 'NO IMPACT' CODED AT C7 AUTOMATICALLY CODE C8/9**

<b>Lose business or orders to competitors</b>	1
<b>Delay developing new products or services</b>	2
<b>Have difficulties meeting quality standards</b>	3
<b>Increase operating costs</b>	4
<b>Have difficulties introducing new working practices</b>	5
<b>Increase workload for other staff</b>	6
<b>Outsource work</b>	7
(DO NOT READ OUT) None	9
(DO NOT READ OUT) Don't know	X

**C9** *ASK ALL WITH HARD-TO-FILL VACANCIES AT C4*  
**What, if anything, is this establishment doing to overcome the difficulties that you are having finding candidates to fill these hard-to-fill vacancies?**  
*DO NOT READ OUT. PROBE FULLY. CODE ALL MENTIONED*

*INTERVIEWER NOTE:* If the respondent mentions advertising or recruitment please probe to fully understand whether they are using a *new* method of recruitment (code 6), spending *more money* on recruitment (code 4), or both.

<b>Increasing salaries</b>	1
<b>Increasing the training given to your existing workforce in order to fill the vacancies</b>	2
<b>Redefining existing jobs</b>	3
<b>Increasing advertising / recruitment spend</b>	4
<b>Increasing/expanding trainee programmes</b>	5
<b>Using new recruitment methods or channels</b>	6
<b>Other (WRITE IN)</b>	7
<b>Nothing</b>	8
<b>Don't know</b>	X



## Appendix C

### Detailed Econometric Results

## Annual Difference-in-difference Regression

Dependent Variable: On-the-job Search

Without Conditioning Variables

	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
<b>1. Treatment Group defined by low pay sectors</b>									
Number of Observations	96,097	95,538	93,593	92,902	91,344	87,490	85,404	84,414	83,121
Pseudo R-squ	0.0005	0.0002	0.0002	0.0002	0.0001	0.0001	0.0006	0.0013	0.0022
Year Dummy	<b>-0.0036 **</b>	<b>0.0010</b>	<b>-0.0022</b>	<b>-0.0021</b>	<b>-0.0013</b>	<b>0.0014</b>	<b>-0.0067 ***</b>	<b>0.0010</b>	<b>0.0026</b>
	<i>0.0016</i>	<i>0.0017</i>	<i>0.0017</i>	<i>0.0017</i>	<i>0.0016</i>	<i>0.0017</i>	<i>0.0017</i>	<i>0.0016</i>	<i>0.0017</i>
Treatment	<b>0.0107 ***</b>	<b>0.0102 ***</b>	<b>0.0043</b>	<b>0.0052 *</b>	<b>0.0031</b>	<b>0.0024</b>	<b>0.0028</b>	<b>0.0037</b>	<b>0.0212 ***</b>
	<i>0.0038</i>	<i>0.0038</i>	<i>0.0031</i>	<i>0.0032</i>	<i>0.0031</i>	<i>0.0031</i>	<i>0.0031</i>	<i>0.0031</i>	<i>0.0037</i>
Treatment x Year Dummy	<b>-0.0002</b>	<b>-0.0053</b>	<b>0.0010</b>	<b>-0.0020</b>	<b>-0.0007</b>	<b>0.0005</b>	<b>0.0009</b>	<b>0.0163 ***</b>	<b>-0.0010</b>
	<i>0.0049</i>	<i>0.0043</i>	<i>0.0043</i>	<i>0.0042</i>	<i>0.0043</i>	<i>0.0044</i>	<i>0.0044</i>	<i>0.0051</i>	<i>0.0042</i>
<b>2. Treatment Group defined based on HOURPAY</b>									
Number of Observations	9,889	8,628	7,908	8,800	8,398	8,507	8,623	8,137	8,428
Pseudo R-squ	0.0015	0.0013	0.0018	0.0011	0.0008	0.0008	0.002	0.0017	0.0003
Year Dummy	<b>-0.0084</b>	<b>0.0039</b>	<b>-0.0159 **</b>	<b>0.0110 *</b>	<b>-0.0104 *</b>	<b>0.0059</b>	<b>-0.0110 *</b>	<b>0.0139 **</b>	<b>0.0027</b>
	<i>0.0066</i>	<i>0.0069</i>	<i>0.0066</i>	<i>0.0062</i>	<i>0.0063</i>	<i>0.0061</i>	<i>0.0061</i>	<i>0.0066</i>	<i>0.0067</i>
Treatment A	<b>0.0119</b>	<b>0.0222 **</b>	<b>-0.0004</b>	<b>0.0167</b>	<b>-0.0103</b>	<b>0.0013</b>	<b>-0.0193 **</b>	<b>0.0213 **</b>	<b>-0.0053</b>
	<i>0.0087</i>	<i>0.0095</i>	<i>0.0094</i>	<i>0.0110</i>	<i>0.0087</i>	<i>0.0095</i>	<i>0.0088</i>	<i>0.0105</i>	<i>0.0100</i>
Treatment A x Year Dummy	<b>0.0106</b>	<b>-0.0199 #</b>	<b>0.0219</b>	<b>-0.0247 **</b>	<b>0.0130</b>	<b>-0.0176 #</b>	<b>0.0471 ***</b>	<b>-0.0232 *</b>	<b>0.0116</b>
	<i>0.0131</i>	<i>0.0113</i>	<i>0.0166</i>	<i>0.0108</i>	<i>0.0151</i>	<i>0.0116</i>	<i>0.0191</i>	<i>0.0107</i>	<i>0.0149</i>
<b>3. Treatment Group defined based on HHRATE</b>									
Number of Observations	.	8804	11094	11455	11053	10627	10255	9837	7697
Pseudo R-squ	.	0.0023	0.0019	0.0051	0.0065	0.0025	0.0009	0.0032	0.0071
Year Dummy	.	<b>-0.0014</b>	<b>-0.0077</b>	<b>0.0092</b>	<b>-0.0088</b>	<b>0.0022</b>	<b>0.0002</b>	<b>0.0140 **</b>	<b>0.0098</b>
	.	<i>0.0073</i>	<i>0.0064</i>	<i>0.0060</i>	<i>0.0060</i>	<i>0.0062</i>	<i>0.0065</i>	<i>0.0067</i>	<i>0.0076</i>
Treatment A	.	<b>0.0173 ***</b>	<b>-0.0173 ***</b>	<b>-0.0092</b>	<b>-0.0302 ***</b>	<b>-0.0180 ***</b>	<b>-0.0105</b>	<b>-0.0072</b>	<b>-0.0246 ***</b>
	.	<i>0.0093</i>	<i>0.0065</i>	<i>0.0063</i>	<i>0.0063</i>	<i>0.0064</i>	<i>0.0066</i>	<i>0.0069</i>	<i>0.0072</i>
Treatment A x Year Dummy	.	<b>-0.0192 #</b>	<b>0.0078</b>	<b>-0.0217 ***</b>	<b>0.0121</b>	<b>0.0059</b>	<b>0.0020</b>	<b>-0.0167 *</b>	<b>0.0538 ***</b>
	.	<i>0.0108</i>	<i>0.0099</i>	<i>0.0078</i>	<i>0.0098</i>	<i>0.0096</i>	<i>0.0097</i>	<i>0.0089</i>	<i>0.0204</i>

Source: Authors' calculations based on LFS data

### NOTES:

1. For adult workers. Treatment group A includes individuals earning 1% above NMW or less based on the HOURPAY and HHRATE pay variables. The control group includes individuals earning between 1% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.

**Annual Difference-in-difference Regression**  
**Dependent Variable: On-the-job Search**  
 With Conditioning Variables

	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
<b>4. Treatment Group defined by low pay sectors</b>									
Number of Observations	91,550	90,126	87,960	87,433	85,338	80,906	66,485	64,829	74,857
Pseudo R-squ	0.0548	0.0493	0.0443	0.048	0.0512	0.0496	0.047	0.0473	0.0507
Year Dummy	<b>-0.0026 *</b>	<b>0.0016</b>	<b>-0.0010</b>	<b>-0.0025</b>	<b>-0.0002</b>	<b>0.0020</b>	<b>-0.0054 ***</b>	<b>0.0007</b>	<b>0.0012</b>
	<i>0.0016</i>	<i>0.0016</i>	<i>0.0016</i>	<i>0.0016</i>	<i>0.0016</i>	<i>0.0016</i>	<i>0.0018</i>	<i>0.0018</i>	<i>0.0016</i>
Treatment	<b>0.0078 *</b>	<b>0.0056</b>	<b>0.0021</b>	<b>0.0034</b>	<b>0.0035</b>	<b>0.0033</b>	<b>0.0013</b>	<b>0.0013</b>	<b>0.0099 ***</b>
	<i>0.0045</i>	<i>0.0043</i>	<i>0.0037</i>	<i>0.0035</i>	<i>0.0035</i>	<i>0.0037</i>	<i>0.0036</i>	<i>0.0042</i>	<i>0.0039</i>
Treatment x Year Dummy	<b>-0.0021</b>	<b>-0.0068</b>	<b>0.0017</b>	<b>-0.0009</b>	<b>-0.0022</b>	<b>-0.0002</b>	<b>0.0031</b>	<b>0.0110 **</b>	<b>0.0004</b>
	<i>0.0045</i>	<i>0.0041</i>	<i>0.0043</i>	<i>0.0040</i>	<i>0.0039</i>	<i>0.0042</i>	<i>0.0050</i>	<i>0.0053</i>	<i>0.0041</i>
<b>5. Treatment Group defined based on HOURPAY</b>									
Number of Observations	9,846	8,529	7,735	8,726	8,270	8,416	7,217	6,685	8,319
Pseudo R-squ	0.0831	0.0684	0.0573	0.0775	0.087	0.0915	0.0917	0.0683	0.0667
Year Dummy	<b>-0.0048</b>	<b>0.0052</b>	<b>-0.0141 ***</b>	<b>0.0103 *</b>	<b>-0.0065</b>	<b>0.0056</b>	<b>-0.0131 **</b>	<b>0.0143 **</b>	<b>0.0027</b>
	<i>0.0060</i>	<i>0.0063</i>	<i>0.0063</i>	<i>0.0065</i>	<i>0.0056</i>	<i>0.0053</i>	<i>0.0058</i>	<i>0.0064</i>	<i>0.0061</i>
Treatment A	<b>0.0139 *</b>	<b>0.0221 ***</b>	<b>0.0034</b>	<b>0.0177 *</b>	<b>-0.0064</b>	<b>0.0064</b>	<b>-0.0148 *</b>	<b>0.0225 **</b>	<b>-0.0017</b>
	<i>0.0083</i>	<i>0.0090</i>	<i>0.0092</i>	<i>0.0105</i>	<i>0.0080</i>	<i>0.0089</i>	<i>0.0078</i>	<i>0.0121</i>	<i>0.0095</i>
Treatment A x Year Dummy	<b>0.0057</b>	<b>-0.0182</b>	<b>0.0156</b>	<b>-0.0211 *</b>	<b>0.0096</b>	<b>-0.0167 #</b>	<b>0.0474 ***</b>	<b>-0.0206 *</b>	<b>0.0075</b>
	<i>0.0115</i>	<i>0.0102</i>	<i>0.0152</i>	<i>0.0097</i>	<i>0.0135</i>	<i>0.0096</i>	<i>0.0204</i>	<i>0.0108</i>	<i>0.0135</i>
<b>6. Treatment Group defined based on HHRATE</b>									
Number of Observations	.	8708	10988	11293	10886	10448	8569	8175	7575
Pseudo R-squ	.	0.0626	0.0532	0.0738	0.078	0.0709	0.0743	0.0712	0.0786
Year Dummy	.	<b>0.0027</b>	<b>-0.0040</b>	<b>0.0066</b>	<b>-0.0072</b>	<b>0.0010</b>	<b>-0.0009</b>	<b>0.0131 **</b>	<b>0.0095</b>
	.	<i>0.0067</i>	<i>0.0061</i>	<i>0.0064</i>	<i>0.0054</i>	<i>0.0056</i>	<i>0.0065</i>	<i>0.0065</i>	<i>0.0069</i>
Treatment A	.	<b>0.0047</b>	<b>-0.0185 ***</b>	<b>-0.0091</b>	<b>-0.0278 ***</b>	<b>-0.0212 ***</b>	<b>-0.0103 *</b>	<b>-0.0056</b>	<b>-0.0238 ***</b>
	.	<i>0.0087</i>	<i>0.0086</i>	<i>0.0061</i>	<i>0.0061</i>	<i>0.0063</i>	<i>0.0063</i>	<i>0.0080</i>	<i>0.0071</i>
Treatment A x Year Dummy	.	<b>-0.0211 **</b>	<b>0.0033</b>	<b>-0.0186 **</b>	<b>0.0103</b>	<b>0.0074</b>	<b>0.0028</b>	<b>-0.0161 *</b>	<b>0.0502 ***</b>
	.	<i>0.0100</i>	<i>0.0090</i>	<i>0.0071</i>	<i>0.0088</i>	<i>0.0088</i>	<i>0.0097</i>	<i>0.0089</i>	<i>0.0205</i>

Source: Authors' calculations based on LFS data

Notes:

- For adult workers. Treatment group A includes individuals earning 1% above NMW or less based on the HOURPAY and HHRATE pay variables. The control group includes individuals earning between 1% and 50% above NMW.
- Values in bold show marginal effects estimates for probit regressions.
- Values in italics are estimated robust standard errors.
- # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
- Conditioning variables include individual characteristics (e.g. sex, age, race, qualifications) and job characteristics (e.g. status p/ft, temp/per, firm size, occupation, industry, location)

**Annual Difference-in-difference Regression**  
**Dependent Variable: On-the-job Search**  
 Without Conditioning Variables

	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
7. Treatment Groups defined based on HOURPAY									
Number of Observations	9,889	8,628	7,908	8,800	8,398	8,507	8,623	8,137	8,428
Pseudo R-squ	0.0022	0.0015	0.002	0.0015	0.0017	0.0014	0.0023	0.0021	0.0005
Year Dummy	<b>-0.0059</b>	<b>0.0069</b>	<b>-0.0168</b>	<b>0.0076</b>	<b>-0.0115</b> *	<b>0.0092</b>	<b>-0.0100</b>	<b>0.0143</b> **	<b>0.0009</b>
Treatment A	0.0073	0.0075	0.0072	0.0067	0.0069	0.0066	0.0066	0.0072	0.0073
Treatment A x Year Dummy	<b>0.0156</b> *	<b>0.0232</b> **	<b>-0.0022</b>	<b>0.0155</b>	<b>-0.0080</b>	<b>0.0039</b>	<b>-0.0202</b> **	<b>0.0194</b> *	<b>-0.0069</b>
Treatment B	0.0091	0.0098	0.0095	0.0091	0.0090	0.0099	0.0089	0.0106	0.0101
Treatment B x Year Dummy	<b>0.0079</b>	<b>-0.0022</b> *	<b>0.0023</b>	<b>-0.0219</b> *	<b>0.0142</b>	<b>-0.0203</b> #	<b>0.0456</b> ***	<b>-0.0235</b> *	<b>0.0135</b>
Treatment B x Year Dummy	0.0132	0.0113	0.0170	0.0113	0.0156	0.0114	0.0192	0.0109	0.0154
Treatment B x Year Dummy	<b>0.0252</b> *	<b>0.0057</b>	<b>-0.0121</b>	<b>-0.0087</b>	<b>0.0148</b>	<b>0.0187</b>	<b>-0.0074</b>	<b>-0.0096</b> *	<b>-0.0112</b>
Treatment B x Year Dummy	0.0144	0.0132	0.0117	0.0120	0.0126	0.0131	0.0117	0.0112	0.0124
Treatment B x Year Dummy	<b>-0.0163</b>	<b>-0.0179</b>	<b>0.0077</b>	<b>0.0245</b>	<b>0.0053</b>	<b>-0.0199</b>	<b>-0.0034</b>	<b>-0.0022</b>	<b>0.0128</b>
Treatment B x Year Dummy	0.0156	0.0159	0.0200	0.0211	0.0172	0.0132	0.0168	0.0172	0.0200

	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
8. Treatment Group defined based on HRRATE									
Number of Observations	.	8,628	7,908	8,800	8,398	8,507	8,623	8,137	8,428
Pseudo R-squ	.	0.0012	0.0012	0.001	0.0023	0.0014	0.0004	0.0009	0.0025
Year Dummy	.	<b>0.0017</b>	<b>-0.0088</b>	<b>0.0085</b>	<b>-0.0081</b>	<b>0.0012</b>	<b>-0.0058</b>	<b>0.0091</b>	<b>-0.0014</b>
Treatment A	.	0.0688	0.0070	0.0067	0.0068	0.0066	0.0067	0.0072	0.0070
Treatment A	.	<b>0.0210</b> *	<b>0.0047</b>	<b>-0.0007</b>	<b>-0.0161</b> *	<b>-0.0173</b> *	<b>-0.0072</b>	<b>0.0063</b>	<b>0.0058</b>
Treatment A x Year Dummy	.	0.0119	0.0098	0.0096	0.0085	0.0086	0.0088	0.0099	0.0105
Treatment A x Year Dummy	.	<b>-0.0134</b>	<b>-0.0128</b>	<b>-0.0153</b>	<b>-0.0015</b>	<b>0.0160</b>	<b>0.0117</b>	<b>-0.0005</b>	<b>0.0336</b> *
Treatment B	.	0.0134	0.0131	0.0120	0.0141	0.0128	0.0147	0.0137	0.0204
Treatment B	.	<b>0.0263</b>	<b>-0.0066</b>	<b>-0.0007</b>	<b>0.0047</b>	<b>0.0088</b>	<b>-0.0095</b>	<b>-0.0036</b>	<b>-0.0111</b>
Treatment B x Year Dummy	.	0.0188	0.0145	0.0134	0.0119	0.0128	0.0130	0.0114	0.0120
Treatment B x Year Dummy	.	<b>-0.0268</b>	<b>0.0029</b>	<b>0.0056</b>	<b>0.0032</b>	<b>-0.0195</b>	<b>0.0058</b>	<b>-0.0059</b>	<b>0.0353</b> *
Treatment B x Year Dummy	.	0.0170	0.8920	0.0188	0.0175	0.0147	0.0194	0.0161	0.0230

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers. Treatment group A includes individuals earning 1% above NMW or less based on the HOURPAY and HRRATE pay variables. Treatment group B includes individuals earning between 1% and 10% above NMW. The control group includes individuals earning between 10% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.

**Annual Difference-in-difference Regression**  
**Dependent Variable: On-the-job Search**  
 With Conditioning Variables

	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
9. Treatment Groups defined based on HOURPAY									
Number of Observations	9,846	8,529	7,735	8,726	8,270	8,416	7,217	6,885	8,319
Pseudo R-squ	0.0842	0.0686	0.0573	0.0783	0.0898	0.0932	0.0918	0.0684	0.0667
Year Dummy	<b>-0.0021</b> 0.0066	<b>0.0080</b> 0.0069	<b>-0.0150</b> ** 0.0068	<b>0.0069</b> 0.0060	<b>-0.0079</b> 0.0061	<b>0.0092</b> 0.0058	<b>-0.0135</b> ** 0.0063	<b>0.0153</b> ** 0.0070	<b>0.0019</b> 0.0067
Treatment A	<b>0.0191</b> ** 0.0087	<b>0.0244</b> **** 0.0094	<b>0.0026</b> 0.0093	<b>0.0184</b> * 0.0107	<b>-0.0017</b> 0.0085	<b>0.0114</b> 0.0095	<b>-0.0145</b> * 0.0079	<b>0.0223</b> * 0.0124	<b>-0.0026</b> 0.0097
Treatment A x Year Dummy	<b>0.0029</b> 0.0116	<b>-0.0205</b> * 0.0102	<b>0.0167</b> 0.0156	<b>-0.0183</b> # 0.0102	<b>0.0111</b> 0.0139	<b>-0.0196</b> * 0.0093	<b>0.0481</b> *** 0.0209	<b>-0.0214</b> * 0.0109	<b>0.0083</b> 0.0139
Treatment B	<b>0.0312</b> ** 0.0140	<b>0.0121</b> 0.0129	<b>-0.0051</b> 0.0117	<b>0.0017</b> 0.0119	<b>0.0247</b> * 0.0126	<b>0.0321</b> *** 0.0134	<b>0.0026</b> 0.0114	<b>0.0001</b> 0.0134	<b>-0.0053</b> 0.0118
Treatment B x Year Dummy	<b>-0.0161</b> 0.0135	<b>-0.0155</b> 0.0145	<b>0.0066</b> 0.0186	<b>0.0208</b> 0.0190	<b>0.0081</b> 0.0159	<b>-0.0211</b> * 0.0103	<b>0.0018</b> 0.0171	<b>-0.0062</b> 0.0162	<b>0.0057</b> 0.0175

10. Treatment Group defined based on HHRATE

Number of Observations	.	8,708	10,988	11,293	10,886	10,448	8,569	8,175	7,575
Pseudo R-squ	.	0.0632	0.0534	0.0742	0.0785	0.0713	0.0744	0.0723	0.0796
Year Dummy	.	<b>0.0053</b> 0.0072	<b>-0.0041</b> 0.0066	<b>0.0056</b> 0.0060	<b>-0.0075</b> 0.0060	<b>0.0029</b> 0.0061	<b>0.0013</b> 0.0074	<b>0.0163</b> ** 0.0075	<b>0.0017</b> 0.0077
Treatment A	.	<b>0.0082</b> 0.0090	<b>-0.0175</b> *** 0.0068	<b>-0.0081</b> 0.0063	<b>-0.0259</b> *** 0.0063	<b>-0.0191</b> *** 0.0065	<b>-0.0097</b> 0.0065	<b>-0.0067</b> 0.0084	<b>-0.0263</b> *** 0.0072
Treatment A x Year Dummy	.	<b>-0.0238</b> ** 0.0102	<b>0.0034</b> 0.0094	<b>-0.0177</b> ** 0.0075	<b>0.0106</b> 0.0093	<b>0.0054</b> 0.0091	<b>0.0006</b> 0.0101	<b>-0.0190</b> * 0.0093	<b>0.0626</b> *** 0.0227
Treatment B	.	<b>0.0242</b> 0.0171	<b>0.0103</b> 0.0138	<b>0.0098</b> 0.0119	<b>0.0111</b> 0.0102	<b>0.0144</b> 0.0114	<b>0.0044</b> 0.0121	<b>-0.0064</b> 0.0111	<b>-0.0115</b> 0.0104
Treatment B x Year Dummy	.	<b>-0.0139</b> 0.0156	<b>-0.0022</b> 0.0163	<b>0.0014</b> 0.0143	<b>0.0022</b> 0.0134	<b>-0.0094</b> 0.0123	<b>-0.0091</b> 0.0139	<b>-0.0127</b> 0.0130	<b>0.0368</b> ** 0.0214

Source: Authors' calculations based on LFS data

NOTES:

1. For adult workers. Treatment group A includes individuals earning 1% above NMW or less based on the HOURPAY and HHRATE pay variables. Treatment group B includes individuals earning between 1% and 10% above NMW. The control group includes individuals earning between 10% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g. sex, age, race, qualifications) and job characteristics (e.g. status, pft, temp/perm, firm size, occupation, industry, location)

**Annual Difference-in-difference Regression**  
**Dependent Variable: Pay-Related On-the-job Search**  
 With Conditioning Variables

	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Number of Observations	9,550	8,333	7,334	8,219	7,664	8,053	6,884	5,881	7,910
Pseudo R-squ	0.093	0.0876	0.0821	0.1044	0.0964	0.0999	0.1321	0.1156	0.0926
Year Dummy	<b>-0.0030</b>	<b>-0.0022</b>	<b>-0.0025</b>	<b>0.0037</b>	<b>-0.0002</b>	<b>-0.0003</b>	<b>-0.0040 *</b>	<b>0.0020</b>	<b>0.0053 *</b>
	0.0328	0.0031	0.0031	0.0025	0.0029	0.0026	0.0022	0.0026	0.0028
Treatment A	<b>0.0099 **</b>	<b>0.0073 *</b>	<b>0.0064</b>	<b>0.0047</b>	<b>-0.0028</b>	<b>0.0010</b>	<b>-0.0050</b>	<b>-0.0012</b>	<b>-0.0029</b>
	0.0049	0.0046	0.0052	0.0052	0.0043	0.0044	0.0029	0.0047	0.0047
Treatment A x Year Dummy	<b>-0.0028</b>	<b>-0.0007</b>	<b>-0.0014</b>	<b>-0.0065</b>	<b>0.0024</b>	<b>-0.0070</b>	<b>0.0066</b>	<b>0.0001</b>	<b>0.0066</b>
	0.0056	0.0059	0.0062	0.0042	0.0074	0.0042	0.0089	0.0064	0.0079

**12. Treatment Group defined based on HRRATE**

Number of Observations	.	8,284	10,453	10,635	10,173	9,989	8,282	7,297	6,744
Pseudo R-squ	.	0.0978	0.0756	0.0885	0.0956	0.0966	0.1167	0.1113	0.1072
Year Dummy	.	<b>0.0028</b>	<b>-0.0037</b>	<b>0.0039</b>	<b>0.0000</b>	<b>0.0003</b>	<b>-0.0025</b>	<b>0.0007</b>	<b>0.0049</b>
	.	0.0031	0.0030	0.0025	0.0026	0.0026	0.0025	0.0025	0.0032
Treatment A	.	<b>0.0063 #</b>	<b>-0.0066 **</b>	<b>-0.0001</b>	<b>-0.0073 **</b>	<b>-0.0060 **</b>	<b>-0.0004</b>	<b>-0.0045</b>	<b>-0.0040</b>
	.	0.0042	0.0033	0.0029	0.0031	0.0031	0.0025	0.0031	0.0033
Treatment A x Year Dummy	.	<b>-0.0117 ***</b>	<b>0.0032</b>	<b>-0.0070 **</b>	<b>0.0021</b>	<b>0.0011</b>	<b>-0.0018</b>	<b>0.0003</b>	<b>0.0215 **</b>
	.	0.0041	0.0047	0.0029	0.0043	0.0041	0.0036	0.0041	0.0121

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers. The treatment groups include individuals earning 1% above NMW or less based on the HOURPAY and HRRATE pay variables. The control group includes individuals earning between 1% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 10 per cent, \* = significant at less than 5 per cent, \*\* = significant at less than 1 per cent, \*\*\* = significant at less than 20 per cent.
5. Conditioning variables include individual characteristics (e.g. sex, age, race, qualifications) and job characteristics (e.g. status pfti, tempperm, firm size, occupation, industry, location)

## Pooled Difference-in-difference Regressions (1998-2007)

### Dependent Variables: On-the-job Search & Pay-related on-the-job search

With Conditioning Variables

	Treatment group defined by HOURPAY			
	Introduction of NMW		NMW Upratings (Bite)	
	Coeff.	S.E.	Coeff.	S.E.
<b>ALL ON-THE-JOB SEARCH</b>				
13 ALL	<b>-0.0072</b>	<i>0.0033</i> **	<b>-0.0049</b>	<i>0.0120</i>
14 MEN	<b>-0.0084</b>	<i>0.0072</i>	<b>-0.0317</b>	<i>0.0247</i> #
15 WOMEN	<b>-0.0071</b>	<i>0.0046</i> #	<b>0.0037</b>	<i>0.0105</i>
16 NORTH	<b>-0.0062</b>	<i>0.0043</i> #	<b>-0.0023</b>	<i>0.0074</i>
17 SOUTH	<b>-0.0084</b>	<i>0.0047</i> *	<b>-0.0308</b>	<i>0.0221</i> #
18 PART-TIME	<b>-0.0145</b>	<i>0.0045</i> ***	<b>-0.0073</b>	<i>0.0091</i>
19 FULL-TIME	<b>0.0008</b>	<i>0.0043</i>	<b>0.0039</b>	<i>0.0200</i>
20 LOW PAID SECTORS	<b>-0.0177</b>	<i>0.0033</i> ***	<b>0.0200</b>	<i>0.0149</i> #
<b>PAY-RELATED ON-THE-JOB SEARCH</b>				
21 ALL	<b>-0.0047</b>	<i>0.0014</i> ***	<b>-0.0055</b>	<i>0.0065</i>
22 MEN	<b>-0.0104</b>	<i>0.0050</i> **	<b>-0.0201</b>	<i>0.0155</i> #
23 WOMEN	<b>-0.0028</b>	<i>0.0014</i> **	<b>-0.0026</b>	<i>0.0051</i>
24 NORTH	<b>-0.0032</b>	<i>0.0960</i> *	<b>-0.0069</b>	<i>0.0045</i> #
25 SOUTH	<b>-0.0065</b>	<i>0.0019</i> ***	<b>-0.0116</b>	<i>0.0098</i>
26 PART-TIME	<b>-0.0055</b>	<i>0.0018</i> ***	<b>-0.0100</b>	<i>0.0043</i> **
27 FULL-TIME	<b>-0.0039</b>	<i>0.0028</i> #	<b>0.0025</b>	<i>0.0112</i>
28 LOW PAID SECTORS	<b>-0.0070</b>	<i>0.0034</i> **	<b>-0.0084</b>	<i>0.0060</i> #

Source: Authors' calculations based on LFS data

#### Notes:

1. For adult workers. The treatment groups include individuals earning 1% above NMW or less based on the HOURPAY pay variable. The control group includes individuals earning between 1% and 50% above NMW. 'Bite' variable is adult NMW as % of median wage by region and broad sector.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors (cluster adjusted for bite).
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g. sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

**Pooled Difference-in-difference Regressions (1998-2007)**  
**Dependent Variables: On-the-job Search & Pay-related on-the-job search**

With Conditioning Variables

	Treatment group defined by HRRATE			
	Introduction of NMW		NMW Upratings (Bite)	
	Coeff.	S.E.	Coeff.	S.E.
<b>ALL ON-THE-JOB SEARCH</b>				
29 ALL	<b>-0.0091</b>	<i>0.0035</i> ***	<b>0.0497</b>	<i>0.0454</i>
30 MEN	<b>-0.0070</b>	<i>0.0073</i>	<b>-0.0078</b>	<i>0.0806</i>
31 WOMEN	<b>-0.0105</b>	<i>0.0059</i> *	<b>0.0827</b>	<i>0.0649</i>
32 NORTH	<b>-0.0071</b>	<i>0.0039</i> *	<b>-0.0318</b>	<i>0.1053</i>
33 SOUTH	<b>-0.0110</b>	<i>0.0060</i> *	<b>-0.0684</b>	<i>0.0548</i>
34 PART-TIME	<b>-0.0216</b>	<i>0.0047</i> ***	<b>0.0304</b>	<i>0.0747</i>
35 FULL-TIME	<b>0.0034</b>	<i>0.0037</i>	<b>0.0555</b>	<i>0.0633</i>
36 LOW PAID SECTORS	<b>-0.0250</b>	<i>0.0080</i> ***	<b>0.0565</b>	<i>0.0947</i>
<b>PAY-RELATED ON-THE-JOB SEARCH</b>				
37 ALL	<b>-0.0038</b>	<i>0.0020</i> **	<b>0.0233</b>	<i>0.0211</i>
38 MEN	<b>-0.0083</b>	<i>0.0045</i> **	<b>0.0393</b>	<i>0.0540</i>
39 WOMEN	<b>-0.0014</b>	<i>0.0016</i>	<b>0.0170</b>	<i>0.0266</i>
40 NORTH	<b>-0.0027</b>	<i>0.0026</i>	<b>0.0035</b>	<i>0.0655</i>
41 SOUTH	<b>-0.0056</b>	<i>0.0027</i> **	<b>-0.0063</b>	<i>0.0275</i>
42 PART-TIME	<b>-0.0052</b>	<i>0.0023</i> ***	<b>-0.0127</b>	<i>0.0268</i>
43 FULL-TIME	<b>-0.0017</b>	<i>0.0038</i>	<b>0.0540</b>	<i>0.0391</i> #
44 LOW PAID SECTORS	<b>-0.0051</b>	<i>0.0058</i>	<b>0.0449</b>	<i>0.0514</i>

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers. The treatment groups include individuals earning 1% above NMW or less based on the HRRATE pay variable. The control group includes individuals earning between 1% and 50% above NMW. 'Bite' variable is adult NMW as % of median wage by region and broad sector.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors (cluster adjusted for bite).
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g. sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

**Annual Difference-in-difference Regressions**  
**Dependent Variable: Movements from low paid jobs**  
 With Conditioning Variables

	2001-2002	2002-2003	2003-2004
<b>45. Treatment Group defined based on HOURPAY</b>			
Number of Observations	4,496	2,619	2,288
Pseudo R-squ	0.0372	0.0359	0.0404
Year Dummy	<b>-0.0351</b> *** <i>0.0104</i>	<b>0.0067</b> <i>0.0121</i>	<b>-0.0087</b> <i>0.0126</i>
Treatment A	<b>-0.0142</b> <i>0.0139</i>	<b>0.0099</b> <i>0.0186</i>	<b>0.0228</b> <i>0.0191</i>
Treatment A x Year Dummy	<b>0.0426</b> # <i>0.0320</i>	<b>0.0127</b> <i>0.0268</i>	<b>-0.0217</b> <i>0.0224</i>
<b>46. Treatment Group defined based on HRRATE</b>			
Number of Observations	3,566	2,012	1,657
Pseudo R-squ	0.0283	0.0519	0.0509
Year Dummy	<b>-0.0282</b> ** <i>0.0115</i>	<b>0.0042</b> <i>0.0131</i>	<b>-0.0031</b> <i>0.0142</i>
Treatment A	<b>0.0051</b> <i>0.0738</i>	<b>0.0095</b> <i>0.0255</i>	<b>0.0499</b> # <i>0.0357</i>
Treatment A x Year Dummy	<b>0.0167</b> <i>0.0843</i>	<b>0.0386</b> <i>0.0462</i>	<b>-0.0584</b> * <i>0.0194</i>

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers based on origin jobs. The treatment groups include individuals earning 1% above NMW or less based on the HOURPAY or HRRATE pay variables. The control group includes individuals earning between 1% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g. sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

**Annual Difference-in-difference Regressions**  
**Dependent Variable: Movements from low paid jobs**  
With Conditioning Variables

	2001-2002	2002-2003	2003-2004
<b>47. Treatment Group defined based on HOURPAY</b>			
Number of Observations	4,496	2,619	2,288
Pseudo R-squ	0.0374	0.0362	0.0414
Year Dummy	<b>-0.0376 ***</b> 0.0114	<b>0.0083</b> 0.0132	<b>-0.0061</b> 0.0136
Treatment A	<b>-0.0123</b> 0.0142	<b>0.0088</b> 0.0191	<b>0.0201</b> 0.0194
Treatment A x Year Dummy	<b>0.0429 #</b> 0.0327	<b>0.0111</b> 0.0272	<b>-0.0236</b> 0.0222
Treatment B	<b>0.0131</b> 0.0172	<b>-0.0032</b> 0.0235	<b>-0.0108</b> 0.0203
Treatment B x Year Dummy	<b>-0.0029</b> 0.0313	<b>-0.0097</b> 0.0302	<b>-0.0202</b> 0.0306
<b>48. Treatment Group defined based on HRRATE</b>			
Number of Observations	3,566	2,012	1,657
Pseudo R-squ	0.0285	0.0531	0.0538
Year Dummy	<b>-0.0283 **</b> 0.0127	<b>0.0055</b> 0.0145	<b>-0.0004</b> 0.0155
Treatment A	<b>0.0037</b> 0.0731	<b>0.0047</b> 0.0251	<b>0.0420 #</b> 0.0350
Treatment A x Year Dummy	<b>0.0175</b> 0.0848	<b>0.0369</b> 0.0464	<b>-0.0590 *</b> 0.0189
Treatment B	<b>-0.0303</b> 0.0351	<b>-0.0164</b> 0.0210	<b>-0.0219</b> 0.0200
Treatment B x Year Dummy	<b>0.0345</b> 0.0618	<b>-0.0079</b> 0.0315	<b>-0.0187</b> 0.0333

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers based on origin jobs. Treatment group A includes individuals earning 1% above NMW or less based on the HOURPAY and HRRATE pay variables. Treatment group B includes individuals earning between 1% and 10% above NMW. The control group includes individuals earning between 10% and 50% above NMW.

2. Values in bold show marginal effects estimates for probit regressions.

**Annual Difference-in-difference Regressions**  
**Dependent Variable: Movements to low paid jobs**

	Defined by HOURPAY Minimum Wage Workers		Defined by HRRATE Minimum Wage Workers	
	Coeff.	S.E.	Coeff.	S.E.
<b>2001-2002</b>				
49 ALL	<b>0.0426</b>	<i>0.0320</i>	<b>0.0167</b>	<i>0.0843</i>
50 MEN	<b>0.0018</b>	<i>0.0646</i>	.	.
51 WOMEN	<b>0.0371</b>	<i>0.0335</i>	<b>-0.0112</b>	<i>0.0743</i>
52 NORTH	<b>0.0540</b>	<i>0.0392</i> #	<b>-0.0330</b>	<i>0.0655</i>
53 SOUTH	<b>0.0130</b>	<i>0.0528</i>	.	.
54 PART-TIME	<b>0.0597</b>	<i>0.0400</i> *	<b>0.0907</b>	<i>0.1406</i>
55 FULL-TIME	<b>-0.0543</b>	<i>0.0392</i>	<b>-0.0787</b>	<i>0.0551</i>
<b>2002-2003</b>				
56 ALL	<b>0.0127</b>	<i>0.0268</i>	<b>0.0386</b>	<i>0.0462</i>
57 MEN	<b>0.0189</b>	<i>0.0650</i>	<b>0.0373</b>	<i>0.1052</i>
58 WOMEN	<b>0.0125</b>	<i>0.0294</i>	<b>0.0290</b>	<i>0.0482</i>
59 NORTH	<b>0.0145</b>	<i>0.0311</i>	<b>0.0797</b>	<i>0.0614</i> #
60 SOUTH	<b>-0.0082</b>	<i>0.0460</i>	.	.
61 PART-TIME	<b>-0.0447</b>	<i>0.0192</i> *	<b>-0.0324</b>	<i>0.0305</i>
62 FULL-TIME	<b>0.2263</b>	<i>0.1073</i> ***	<b>0.3209</b>	<i>0.1690</i>
<b>2003-2004</b>				
63 ALL	<b>-0.0217</b>	<i>0.0224</i>	<b>-0.0584</b>	<i>0.0194</i> *
64 MEN	<b>0.0301</b>	<i>0.0667</i>	<b>0.0655</b>	<i>0.1360</i>
65 WOMEN	<b>-0.0364</b>	<i>0.0211</i> #	<b>-0.0735</b>	<i>0.0137</i> **
66 NORTH	<b>-0.0239</b>	<i>0.0246</i>	<b>-0.0667</b>	<i>0.0162</i> **
67 SOUTH	<b>0.0057</b>	<i>0.0580</i>	.	.
68 PART-TIME	<b>-0.0284</b>	<i>0.0281</i>	<b>-0.0544</b>	<i>0.0262</i>
69 FULL-TIME	<b>-0.0228</b>	<i>0.0323</i>	<b>-0.0756</b>	<i>0.0200</i> *

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers based on destination jobs. The treatment groups include individuals earning 1% above NMW or less based on the HRRATE pay variable. The control group includes individuals earning between 1% and 50% above NMW. 'Bite' variable is adult NMW as % of median wage by region and broad sector.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors (cluster adjusted for bite).
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* =
5. Conditioning variables include individual characteristics (e.g.sex, age, race, qualifications) and job characteristics (e.g. status pt/ft, temp/perm, firm size, occupation, industry, location)

**Annual Difference-in-difference Regressions**  
**Dependent Variable: Movements to low paid jobs**  
 With Conditioning Variables

	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
<b>70. Treatment Group defined based on HOURPAY</b>									
Number of Observations	9,508	8,572	7,572	7,786	8,080	7,650	6584	6440	7850
Pseudo R-squ	0.0673	0.073	0.078	0.0616	0.0623	0.0613	0.066	0.0751	0.0697
Year Dummy	<b>-0.0007</b>	<b>0.0158</b> **	<b>0.0130</b> #	<b>-0.0160</b> *	<b>-0.0002</b>	<b>0.0029</b>	<b>-0.0178</b> **	<b>-0.0121</b> #	<b>0.0131</b> *
	0.0072	0.0074	0.0082	0.0082	0.0077	0.0078	0.0082	0.0081	0.0074
Treatment A	<b>0.0129</b> #	<b>0.0228</b> **	<b>-0.0210</b> *	<b>0.0082</b>	<b>0.0013</b>	<b>-0.0110</b>	<b>0.0083</b>	<b>0.0083</b>	<b>0.0290</b> **
	0.0099	0.0106	0.0115	0.0133	0.0114	0.0118	0.0122	0.0133	0.0121
Treatment A x Year Dummy	<b>0.0086</b>	<b>-0.0370</b> ***	<b>0.0326</b> *	<b>-0.0487</b>	<b>-0.0112</b>	<b>0.0191</b>	<b>0.0047</b>	<b>0.0271</b> #	<b>-0.0263</b> **
	0.0140	0.0117	0.0205	0.0170	0.0154	0.0188	0.0186	0.0190	0.0122
<b>71. Treatment Group defined based on HRRATE</b>									
Number of Observations	.	8,728	10,798	10,777	10812	10165	8242	8032	7306
Pseudo R-squ	.	0.0759	0.0842	0.069	0.069	0.0756	0.0723	0.0743	0.0781
Year Dummy	.	<b>0.0079</b>	<b>0.0167</b> **	<b>-0.0151</b>	<b>0.0024</b>	<b>0.0053</b>	<b>-0.0219</b> ***	<b>0.0064</b>	<b>0.0016</b>
	.	0.0076	0.0072	0.0073	0.0069	0.0070	0.0079	0.0080	0.0081
Treatment A	.	<b>-0.0166</b> #	<b>-0.0483</b> ***	<b>-0.0522</b> ***	<b>-0.0374</b> ***	<b>-0.0600</b> ***	<b>-0.0491</b> ***	<b>-0.0216</b> **	<b>-0.0311</b> ***
	.	0.0103	0.0082	0.0087	0.0079	0.0085	0.0085	0.0099	0.0087
Treatment A x Year Dummy	.	<b>-0.0301</b> ***	<b>-0.0066</b>	<b>0.0157</b> #	<b>-0.0182</b> *	<b>0.0105</b>	<b>0.0270</b> **	<b>-0.0050</b>	<b>0.0402</b> **
	.	0.0119	0.0104	0.0117	0.0098	0.0114	0.0141	0.0118	0.0213

Source: Authors' calculations based on LFS data

Notes:

1. For adult workers based on destination jobs. The treatment groups include individuals earning 1% above NMW or less based on the HRRATE pay variable. The control group includes individuals earning between 1% and 50% above NMW.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors.
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include individual characteristics (e.g. sex, age, race, qualifications) and job characteristics (e.g. status p/ft, temp/perm, firm size, occupation, industry, location)



## Dependent Variables: Vacancies & Hard-to-fill Vacancies

### Annual difference-in-difference regressions based on low pay sectors (treatment)

	2003-2004		2004-2005	
	Coeff.	S.E.	Coeff.	S.E.
<b>All Vacancies</b>				
81 ALL	<b>-0.0271</b>	<i>0.0070</i> ***	<b>-0.0268</b>	<i>0.0069</i> ***
82 Managers	<b>-0.0045</b>	<i>0.0024</i> *	<b>0.0001</b>	<i>0.0207</i>
83 Professionals	<b>-0.0366</b>	<i>0.0019</i> #	<b>0.0004</b>	<i>0.0027</i>
84 Associate Professionals	<b>-0.0020</b>	<i>0.0032</i>	<b>0.0040</b>	<i>0.0038</i>
85 Administrative & Secretarial	<b>-0.0171</b>	<i>0.0025</i> ***	<b>-0.0021</b>	<i>0.0036</i>
86 Skilled Trades	<b>-0.0034</b>	<i>0.0020</i> #	<b>0.0019</b>	<i>0.0022</i>
87 Sales	<b>0.0001</b>	<i>0.0024</i>	<b>-0.0037</b>	<i>0.0017</i> **
88 Personal Services	<b>-0.0017</b>	<i>0.0004</i> ***	<b>-0.0024</b>	<i>0.0009</i> **
89 Machine Operators	<b>0.0058</b>	<i>0.0025</i> ***	<b>-0.0008</b>	<i>0.0017</i>
90 Elementary Occs	<b>0.0005</b>	<i>0.0023</i>	<b>-0.0077</b>	<i>0.0019</i> ***
<b>'Hard-to-fill' vacancies (1)</b>				
91 ALL	<b>-0.0158</b>	<i>0.0044</i> ***	<b>-0.0054</b>	<i>0.0046</i>
92 Managers	<b>-0.0014</b>	<i>0.0010</i>	<b>-0.0006</b>	<i>0.0010</i>
93 Professionals	<b>-0.0020</b>	<i>0.0009</i> #	<b>0.0001</b>	<i>0.0017</i>
94 Associate Professionals	<b>-0.0007</b>	<i>0.0019</i>	<b>0.0027</b>	<i>0.0024</i>
95 Administrative & Secretarial	<b>-0.0053</b>	<i>0.0010</i> ***	<b>-0.0019</b>	<i>0.0015</i>
96 Skilled Trades	<b>-0.0009</b>	<i>0.0015</i>	<b>0.0012</b>	<i>0.0016</i>
97 Sales	<b>-0.0007</b>	<i>0.0012</i>	<b>-0.0011</b>	<i>0.0010</i>
98 Personal Services	<b>-0.0001</b>	<i>0.0003</i>	<b>-0.0013</b>	<i>0.0005</i> **
99 Machine Operators	<b>0.0012</b>	<i>0.0015</i>	<b>0.0012</b>	<i>0.0013</i>
100 Elementary Occs	<b>-0.0011</b>	<i>0.0012</i>	<b>-0.0005</b>	<i>0.0012</i>
<b>'Hard-to-fill' vacancies (2)</b>				
119 ALL	<b>-0.0152</b>	<i>0.0158</i>	<b>0.0111</b>	<i>0.0162</i>
120 Managers	<b>0.0667</b>	<i>0.0557</i>	<b>-0.0401</b>	<i>0.0519</i>
121 Professionals	<b>-0.1046</b>	<i>0.1388</i>	<b>0.0209</b>	<i>0.1651</i>
122 Associate Professionals	<b>0.0172</b>	<i>0.0718</i>	<b>0.0270</b>	<i>0.0699</i>
123 Administrative & Secretarial	<b>-0.0365</b>	<i>0.0405</i>	<b>-0.0152</b>	<i>0.0472</i>
124 Skilled Trades	<b>0.0362</b>	<i>0.0445</i>	<b>0.0060</b>	<i>0.0451</i>
125 Sales	<b>0.0125</b>	<i>0.0305</i>	<b>-0.0442</b>	<i>0.0306</i> #
126 Personal Services	<b>0.1188</b>	<i>0.0451</i> ***	<b>-0.0802</b>	<i>0.0404</i> **
127 Machine Operators	<b>-0.0737</b>	<i>0.0672</i>	<b>0.1090</b>	<i>0.0649</i> *
128 Elementary Occs	<b>-0.0388</b>	<i>0.0315</i>	<b>0.0790</b>	<i>0.0326</i> **

Source: Authors' calculations based on NESS data

#### Notes:

1. The treatment groups include in LPC-defined low pay sectors. The control groups are all other firms. 'Hard-to-fill' vacancies: (1) are relative to firms not reporting vacancies; (2) are relative to firms reporting vacancies.

2. Values in bold show marginal effects estimates for probit regressions.

3. Values in italics are estimated robust standard errors.

4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.

5. Conditioning variables include firm characteristics (firm size, industry, location)

## Dependent Variables: Vacancies & Hard-to-fill Vacancies

### Annual difference-in-difference regressions based on NMW 'bite' in low pay sectors (treatment)

	2003-4		2004-5	
	Coeff.	S.E.	Coeff.	S.E.
<b>All Vacancies</b>				
101 ALL	<b>0.0491</b>	<i>0.1057</i>	<b>0.0766</b>	<i>0.1829</i>
102 Managers	<b>0.0088</b>	<i>0.0219</i>	<b>0.0594</b>	<i>0.0333</i> *
103 Professionals	<b>0.0154</b>	<i>0.0138</i>	<b>-0.0115</b>	<i>0.0247</i>
104 Associate Professionals	<b>-0.0427</b>	<i>0.0183</i> **	<b>-0.0769</b>	<i>0.0411</i> *
105 Administrative & Secretarial	<b>-0.0028</b>	<i>0.0256</i>	<b>-0.0500</b>	<i>0.0300</i> *
106 Skilled Trades	<b>-0.0267</b>	<i>0.0184</i> #	<b>0.0115</b>	<i>0.0189</i>
107 Sales	<b>0.0442</b>	<i>0.0193</i> **	<b>0.0250</b>	<i>0.0314</i>
108 Personal Services	<b>-0.0193</b>	<i>0.0035</i> ***	<b>-0.0245</b>	<i>0.0090</i> ***
109 Machine Operators	<b>-0.0197</b>	<i>0.0131</i> #	<b>0.0139</b>	<i>0.0248</i>
110 Elementary Occs	<b>-0.0207</b>	<i>0.0136</i> #	<b>-0.0090</b>	<i>0.0385</i>
<b>'Hard-to-fill' vacancies (1)</b>				
111 ALL	<b>0.0251</b>	<i>0.0554</i>	<b>0.0383</b>	<i>0.1417</i>
112 Managers	<b>0.0079</b>	<i>0.0103</i>	<b>0.0118</b>	<i>0.0101</i>
113 Professionals	<b>-0.0024</b>	<i>0.0083</i>	<b>-0.0022</b>	<i>0.0128</i>
114 Associate Professionals	<b>-0.0100</b>	<i>0.0155</i>	<b>-0.0349</b>	<i>0.0268</i> #
115 Administrative & Secretarial	<b>0.0008</b>	<i>0.0126</i>	<b>0.0104</b>	<i>0.0129</i>
116 Skilled Trades	<b>-0.0202</b>	<i>0.0145</i> #	<b>0.0016</b>	<i>0.0094</i>
117 Sales	<b>0.0117</b>	<i>0.0901</i> #	<b>0.0072</b>	<i>0.0176</i>
118 Personal Services	<b>-0.0077</b>	<i>0.0027</i> ***	<b>-0.0166</b>	<i>0.0056</i>
119 Machine Operators	<b>-0.0037</b>	<i>0.0110</i>	<b>0.0133</b>	<i>0.0209</i>
120 Elementary Occs	<b>0.0238</b>	<i>0.0082</i> ***	<b>0.0099</b>	<i>0.0242</i>
<b>'Hard-to-fill' vacancies (2)</b>				
119 ALL	<b>0.1385</b>	<i>0.0709</i> *	<b>0.0250</b>	<i>0.3727</i>
120 Managers	<b>0.4654</b>	<i>0.2434</i> *	<b>-0.1490</b>	<i>0.3427</i>
121 Professionals	<b>-0.5536</b>	<i>1.0406</i>	<b>0.4478</b>	<i>1.0322</i>
122 Associate Professionals	<b>0.2991</b>	<i>0.3267</i>	<b>-0.3628</b>	<i>0.6419</i>
123 Administrative & Secretarial	<b>0.1294</b>	<i>0.2856</i>	<b>0.8983</b>	<i>0.4465</i> **
124 Skilled Trades	<b>-0.3683</b>	<i>0.3076</i>	<b>-0.2819</b>	<i>0.3598</i>
125 Sales	<b>0.0217</b>	<i>0.1332</i>	<b>-0.1176</b>	<i>0.2666</i>
126 Personal Services	<b>0.3836</b>	<i>0.2635</i> #	<b>-0.6411</b>	<i>0.3883</i> *
127 Machine Operators	<b>0.0428</b>	<i>0.6771</i>	<b>0.3791</b>	<i>0.8856</i>
128 Elementary Occs	<b>0.8770</b>	<i>0.1351</i> ***	<b>0.4108</b>	<i>0.4615</i>

Source: Authors' calculations based on NESS data

#### Notes:

- The treatment groups include in LPC-defined low pay sectors. The control groups are all other firms. 'Hard-to-fill' vacancies: (1) are relative to firms not reporting vacancies; (2) are relative to firms reporting vacancies. 'Bite' variable is adult NMW as % of median wage by region and broad sector.
- Values in bold show marginal effects estimates for probit regressions.
- Values in italics are estimated robust standard errors (cluster adjusted for bite).
- # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
- Conditioning variables include firm characteristics (firm size, industry, location)

## Dependent Variables: Vacancies & Hard-to-fill Vacancies

### Pooled difference-in-difference regressions based on NMW bite in low paid sectors (treatment)

	All Vacancies		Hard-to-fill Vacancies (1)		Hard-to-fill Vacancies (2)	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
121 All Occupations	<b>0.1593</b>	0.0155 ***	<b>0.0839</b>	0.0105 ***	<b>0.0077</b>	0.0337 **
122 Managers	<b>-0.1076</b>	0.0032 ***	<b>-0.0015</b>	0.0014	<b>0.1369</b>	0.0564 **
123 Professionals	<b>-0.0307</b>	0.0053 ***	<b>-0.0139</b>	0.0025 **	<b>-0.2910</b>	0.2405
124 Associate Professionals	<b>-0.0593</b>	0.0055 ***	<b>-0.0216</b>	0.0025 ***	<b>-0.0277</b>	0.0724
125 Administrative & Secretarial	<b>-0.0538</b>	0.0070 ***	<b>-0.0092</b>	0.0024 ***	<b>0.1143</b>	0.0391 ***
126 Skilled Trades	<b>0.0091</b>	0.0115	<b>0.0049</b>	0.0074	<b>-0.0511</b>	0.0537
127 Personal Services	<b>0.0167</b>	0.0011 ***	<b>0.0066</b>	0.0006 ***	<b>-0.0560</b>	0.0550
128 Sales	<b>-0.0063</b>	0.0102	<b>-0.0040</b>	0.0030 #	<b>-0.1196</b>	0.1050
129 Machine Operators	<b>-0.0065</b>	0.0042 #	<b>-0.0032</b>	0.0028	<b>-0.0425</b>	0.1440
130 Elementary Occs	<b>0.0639</b>	0.0024 ***	<b>0.0255</b>	0.0096 ***	<b>0.0663</b>	0.0419 #

Source: Authors' calculations based on NESS data

#### Notes:

1. The treatment groups include in LPC-defined low pay sectors. The control groups are all other firms. 'Hard-to-fill' vacancies: (1) are relative to firms not reporting vacancies; (2) are relative to firms reporting vacancies. 'Bite' variable is adult NMW as % of median wage by region and broad sector.
2. Values in bold show marginal effects estimates for probit regressions.
3. Values in italics are estimated robust standard errors (cluster adjusted for bite).
4. # = significant at less than 20 per cent, \* = significant at less than 10 per cent, \*\* = significant at less than 5 per cent, \*\*\* = significant at less than 1 per cent.
5. Conditioning variables include firm characteristics (firm size, industry, location)



Appendix D

About us

## Who we are

### Experian's Business Strategies Division

Experian's Business Strategies Division provides an understanding of consumers, markets and economies in the UK and around the world, past, present and future. Its focus is consumer profiling and market segmentation, retail property analysis, economic forecasting and public policy research, supporting businesses, policy makers and investors in making tactical and strategic decisions. As part of the Experian group, it has access to a wealth of research data and innovative software solutions. The division's economic research team is devoted to analysing national, regional and local economies for a range of public and private sector clients. Its statisticians, econometricians, sociologists, geographers, market researchers and economists carry out extensive research into the underlying drivers of social, economic and market change.

For more information, visit [www.business-strategies.co.uk](http://www.business-strategies.co.uk)

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### Experian

Experian is a global leader in providing information, analytical and marketing services to organisations and consumers to help manage the risk and reward of commercial and financial decisions.

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