National Statistics feature

Do company wage policies persist in the face of minimum wages?

By **Katherine Lam**, **Catrin Ormerod**, **Felix Ritchie** and **Prabhat Vaze**, Social and Economic Micro Analysis and Reporting Division, Office for National Statistics

Key points

- This article investigates how the wage rate for a job reacts to changes in the national minimum wage (NMW).
- There is evidence that as the NMW increases, the salaries of all low-paid individuals increase by much the same amount regardless of their distance from the minimum wage.
- This article introduces the concept of the company minimum wage (CMW), that is, the minimum wage paid by a particular company in a particular year.
- There is evidence to suggest that these CMWs are set relative to 'focus' points, such as £5.00, £5.50, despite the fact that the NMW does not reflect these round numbers. This suggests firms have some flexibility in the way they set wages and they are not wholly driven by the NMW.
- There is evidence that companies prefer to maintain wage differentials relative to general labour market conditions. The NMW contrbutes to the absolute level of wages, but it is not the only or the dominant factor.

Introduction

The national minimum wage (NMW) was introduced in the UK in 1999 by the government as a direct response to the perceived growth in inequality in wages throughout the 1980s and 1990s. This was the first time the UK had had a minimum wage since the effective abolition of most Wages Councils in 1980. The ongoing role of the Low Pay Commission (LPC) is to make recommendations on the coverage and level of a national minimum wage.

Classical economic theory suggests that placing a lower bound on the amount a worker can be paid will lead to excess supply and therefore unemployment. Alternative theories, based upon imperfect knowledge of markets, can demonstrate a much wider range of responses so that it is difficult to predict the impact of the NMW.

The majority of studies on the NMW have looked at this from the viewpoint of the worker. From the results of previous research three common trends seem to emerge in the literature:

- the NMW does appear to be reducing inequality at the bottom of the wage distribution;
- there is little evidence of a negative employment effect;
- there is some evidence of increased training provision.

However, jobs at this level have a low bargaining power and so there is little opportunity for workers to influence wages. These are set by the firm with little or no reference to the worker.

ONS has employed two novel mechanisms to examine the effect of the national minimum wage (NMW) on company wage setting policies. The first exploits a variable unique among large scale datasets to examine the changing wage for a job. The second links employer and employee data together to look more broadly at how and if companies' wage policies respond to changes in the NMW. The analysis suggests that there are indeed strong company effects and that, far from being profit-maximisers, firms in this ▶

sector of the market are using relatively simple rules-of-thumb when setting wages.

The next section describes the NMW and reviews recent work in the UK and abroad on minimum wages and the impact on individuals, companies and the labour market in general. This is followed by a description of the datasets used and how they can provide a unique view on the operation of the labour market. The article then looks at how wages change in response to the changes in the NMW, and identifies evidence for a relatively rigid wage structure. Finally, it tries to identify directly companies' own minimum wage policies and examines the question of whether these are more affected by the NMW or by other companies' wage policies.

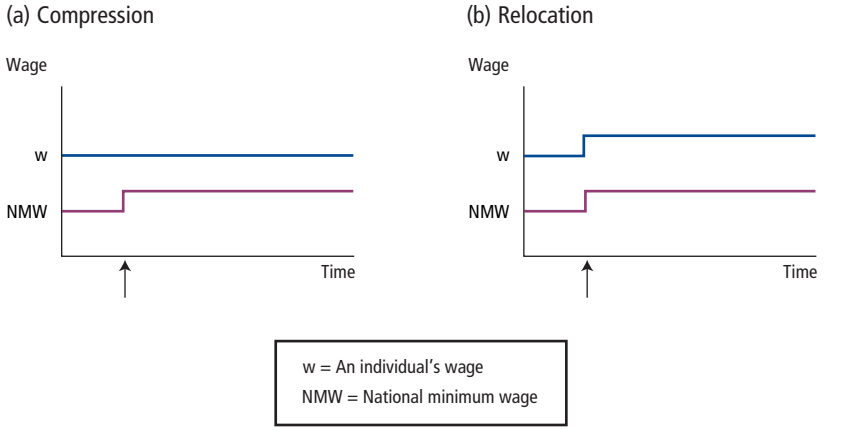
The impact of the NMW

The national minimum wage

The hourly NMW rates in April of each year are listed in **Table 1**.

Figure 1

An illustration of changes in wages relative to the national minimum wage



According to the LPC, about one million low-paid workers have benefited from the NMW (LPC, 2005).[1] In general, the NMW rose in line with the Average Earnings Index (AEI), but in 2001 and 2002 it rose significantly faster: the adult rate grew 10.8 per cent compared with 3.8 per cent for average earnings. The LPC also recommended a bigger rise in the NMW than the AEI in 2005 and 2006 subject to economic conditions. The justification for this was that there appeared to be no significant impact on aggregate employment or inflation (LPC, 2003; 2005), but that the NMW did boost pay for those at the bottom of the wage distribution without spillover effects further up the earnings curve.

Table 1

Hourly adult[a] national minimum wages; United Kingdom; April, 1999 to 2005

£ and per cent

	National minimum wage				Change from previous year			
	Actual £	Adjusted by AEI[b] £	Adjusted by CPI[c] £	Average Earnings Index[b] 1999=100	NMW %	NMW adjusted by AEI %	NMW adjusted by CPI %	AEI %
1999	3.60	3.60	3.6	**100.0**	–	–	–	–
2000	3.60	3.45	3.58	**104.3**	*0.0*	*-4.2*	*-0.6*	**4.3**
2001	3.70	3.38	3.64	**109.4**	*2.8*	*-2.0*	*5.5*	**4.9**
2002	4.10	3.61	3.98	**113.6**	*10.8*	*6.8*	*8.0*	**3.8**
2003	4.20	3.60	4.02	**116.5**	*2.4*	*-0.2*	*1.4*	**2.6**
2004	4.50	3.69	4.25	**121.8**	*7.1*	*2.5*	*6.8*	**4.5**
2005	4.85	3.82	4.50	**127.0**	*7.8*	*3.4*	*3.4*	**4.3**

Sources: Office for National Statistics; Low Pay Commission

a Adult rate (workers aged 22 and above).
b Average Earnings Index (AEI) in April not seasonally adjusted and including bonuses.
c Consumer Prices Index (CPI) all items.

Table 2

An example of relocation and compression

Year 1 NMW £4.00		Year 2 NMW £4.20			
		Pure compression		Pure relocation	
Wage £	Difference from NMW £	Wage £	Difference from NMW £	Wage £	Difference from NMW £
4.00	0.00	4.20	0.00	4.20	0.00
4.10	0.10	4.20	0.00	4.30	0.1
4.20	0.20	4.20	0.00	4.40	0.2
4.30	0.30	4.30	0.10	4.50	0.3
4.40	0.40	4.30	0.20	4.60	0.4

Source: Office for National Statistics

After adjustment for general wage inflation using the AEI, the NMW shows a decrease in real value from 1999 to 2001, a rise in 2002, a, slight decrease in 2003 and a rise from 2004 to 2005. The dynamics of wage inflation at the low-pay end of the labour market are not fully understood, therefore throughout this investigation unadjusted NMW will be used.

The terms 'compression' and 'relocation' are used here to describe the impact of the changing NMW on wages near the NMW. The difference between the two is the key to understanding the labour market effects of the NMW.

Compression occurs when an increase in the minimum wage has no effect on wages above the new level, but raises those below it just up to the new NMW, as shown in panel (a) of **Figure 1**. Relocation implies that an increase in the NMW leads to a concomitant increase in wage rates to maintain a differential, as shown in panel (b) of **Figure 1**. Note that this analysis is in terms of monetary units, not percentages. This is more appropriate for this market segment, where jobs are advertised as '30p over the NMW' not '17 per cent over the NMW'. Pure compression implies a more competitive market, where differences in wages are partly the result of human capital differences.

To illustrate this, consider two years where the NMW rises from £4.00 to £4.20. Ignoring wage inflation, under compression and relocation there are two different effects on the wage (see **Table 2**). Under relocation, this year's wage gap (the difference between an individual's wage and the NMW) should be a good predictor of next year's wage gap. Under compression, there should be little or no relationship for those whose wages this year are less than next year's NMW – wages should rise just to the NMW, irrespective of the starting point. For those above next year's NMW, wages do not adjust and hence the difference between the wage and the NMW falls, consistently for all workers.

Economic impact

Much of the recent research has focused on providing empirical evidence on whether the NMW has a positive or negative effect on the British economy in terms of employment and inflation. There are also a number of studies that have focused on the incidence of minimum wages for particular groups in the labour market. For example, sectors with low real wages (such as hospitality, care homes, and personal services) are likely to be more affected (Machin and Wilson, 2003; Dickens and Manning, 2002). Their findings suggest that the NMW has strongly reduced wage inequality, since there has been little evidence of spillover effects higher up the wage distribution. Similar conclusions were reached by Heasman (2003). The NMW is likely to especially affect female-intensive sectors of employment, namely the retail sector, cleaners, childcare workers and care assistants. According to various empirical studies, there is no evidence of a negative effect in these occupations (see Stewart (2002) for a review).

Studies suggest the NMW has had no overall effect on employment. Microdata studies of the likelihood of individuals being in employment (Stewart, 2002) indicate no adverse aggregate employment effects for any demographic group associated with the upratings of the NMW. Although Machin and Wilson (2003) reported some evidence of job losses from both the April 1999 introduction of the NMW and the subsequent upratings, the magnitude of the effect is often on the margin of statistical significance.

Stewart and Swaffield (2005) examined the effect of the NMW on hours worked for employees near the NMW. Using two large-scale surveys they found a significant reduction in paid hours for those workers whose pay was raised to the NMW. Overall, ▶

- the evidence from the research studies seems to suggest that the introduction of the NMW has led to marginal changes in the labour market, rather than any great structural shift.

A naïve view of labour markets suggests that the increase in minimum wages should lead to compression of the wage distribution and lower employment or worked hours. However, it is not clear that companies operating in the low-wage part of the labour market follow a narrow model where an appropriate wage is chosen for each worker. Firms seem to have some flexibility in setting wages.

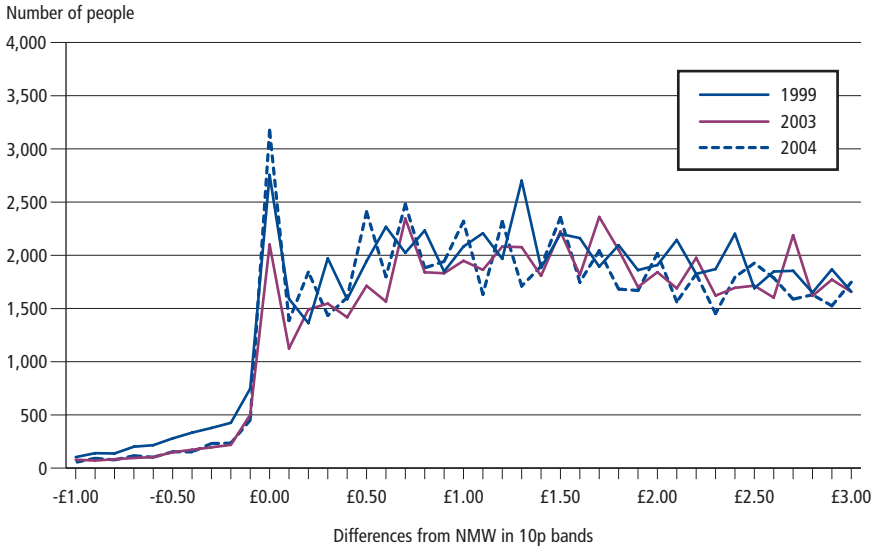
There have been a few qualitative studies and studies based on small-scale observations which look at company effects. Card and Krueger (1995) used small-scale studies of several minimum wage schemes in the US and found that firms responded in many ways to increased wages, of which reduction in employment was only one. Grimshaw and Caroll (2002) looked at a range of actions taken by small firms in response to the NMW. Using qualitative case-study methods to explore the ways in which small firms have made adjustments to pay structures and the number employed, they found evidence of firms' adjustment to the NMW by reducing both staff hours and staff levels.

Other studies found that some companies were operating explicit policies to keep their lowest pay rates above the minimum wage (Income Data Services, 2004; Cronin and Thewlis, 2004). Some companies needed to increase pay rates further up pay structures to maintain wage differentials with the lowest grades (IDS, 2004). Similar findings from Cronin and Thewlis (2004) found that staff being paid well above the NMW when it was introduced in 1999 were now beginning to see their differentials with lower-skilled or less experienced staff being eroded. Therefore, increases in pay further up the pay structure were due to workers' demand for the restoration of differentials. However, this was not the case for smaller firms due to the nature of employee/employer relations. For small firms, it is more likely that pay differentials are being squeezed.

In summary, there is both theoretical support and qualitative evidence for the idea that firms have the flexibility to set their own wages and use it in the low-pay segment of the labour market. The rest of this article presents ONS analyses of large-scale survey data for evidence to support this conjecture.

Figure 2

Distribution of distances from national minimum wage; United Kingdom; 1999, 2003 and 2004



Sources: Annual Survey of Hours and Earnings; Office for National Statistics

a Wages shown in 10p bands from the NMW, for example £0.00 represents wages greater than or equal to £0.00 but less than £0.10 above the NMW.

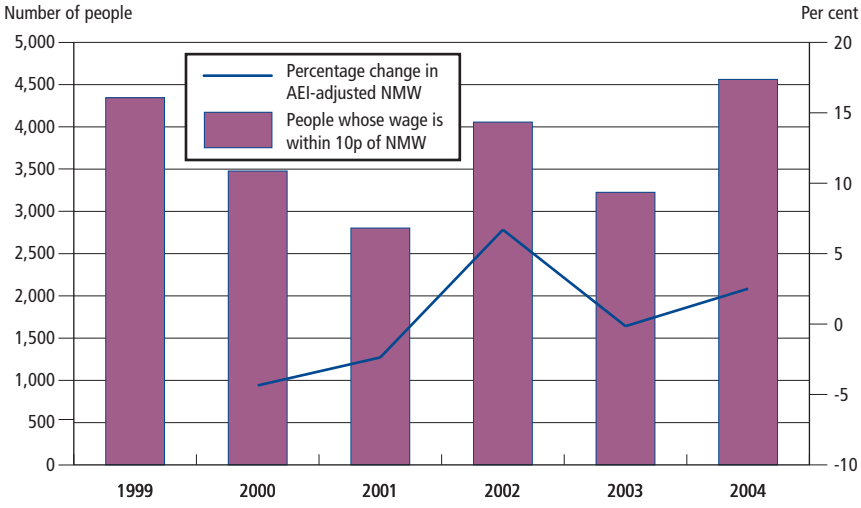
Data

This study used the Annual Survey of Hours and Earnings (ASHE)[2,3] for 1998 to 2004, and a 1 per cent sample of PAYE (Pay As You Earn) tax records for those aged 16 and over. Sampling for the ASHE is random but selected individuals are recorded repeatedly while in employment (periods without employment are recorded as missing values). The ASHE is a statutory survey of employers requesting individual level information about their employees, carried out in April each year. Information requested includes details of employees' hours, earnings and pension arrangements.

One feature of the ASHE, unique among large surveys, is the ability to identify whether an individual is doing the same job within the company. This effectively gives the rate for the job in successive years. One difficulty with doing linked employer/employee analysis is that intra-company moves are rarely identified. As these can account for half of all moves and have significantly different characteristics

Figure 3

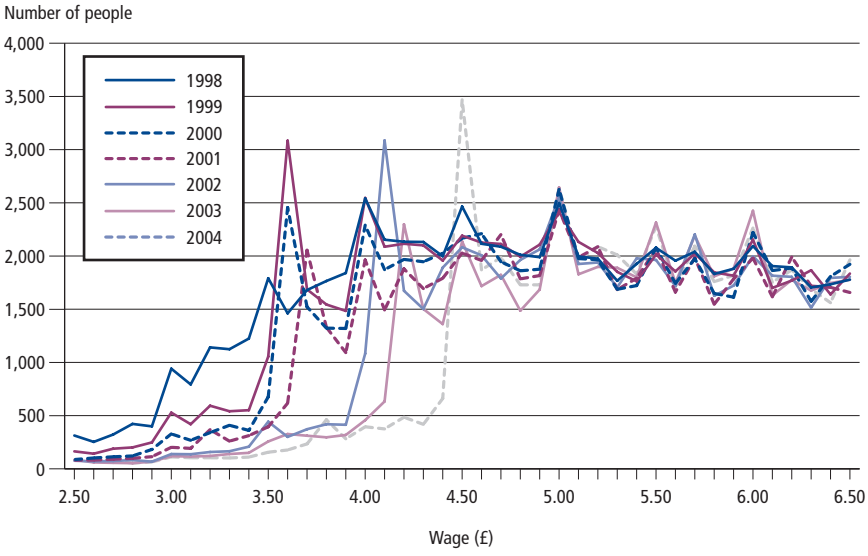
Number of people paid within 10p of national minimum wage and changes in NMW rates; United Kingdom; 1999 to 2004



Source: Office for National Statistics

Figure 4

Distribution of hourly wages;[a] United Kingdom; 1998 to 2004



Sources: Annual Survey of Hours and Earnings

a Wages shown in 10p bands from the NMW, for example £0.00 represents wages greater than or equal to £0.00 but less than £0.10 above the NMW.

from between-company moves (Hart and Ritchie 2003), this can seriously distort inferences about the value of jobs. Hence, the availability of the same-job marker is crucial for evaluating companies' reactions to a changing environment.

The ASHE data are linked with the Inter-Departmental Business Register (IDBR) through a common identifier. The IDBR captures the structure of the ownership and control of firms and plants using three different levels of aggregation categories: 'local units' or establishments, 'enterprises' or firms, and 'enterprise groups'.[4] There are some difficulties with making inferences on this linked employer-employee data (for example, PAYE data may be grouped at a 'sub-enterprise' level which does not relate to an IDBR structure), but in general this linking allows for bringing firm data into employee models, and vice-versa.

Do jobs maintain their value?

Is there evidence of compression?

Figure 2 shows the difference between the hourly wage and the NMW in 10p bands for individuals' main job. Apart from the initial spike around the minimum wage and a drop just below the NMW, little clear pattern emerges over time or over the wage distribution. The differences are fairly evenly distributed except at the minimum wage, and even then the minimum wage is not always the most common wage.

If there were significant compression of wages, there should be a continual increase in the spike and a shift in the distribution towards the left. It is not clear from this diagram that either of these is happening. Certainly there is no ratcheting-up over time of the initial spike. **Figure 3** shows the numbers at the NMW in each year and the corresponding change in the NMW. There is a strong relationship between the size of the increase in the NMW and the change in the numbers at the minimum wage. In ▶

2000, 2001 and 2003, for example, the NMW increased by less than average wages, if at all, and the numbers at the minimum wage went down as wages were increased beyond the legal minimum. In contrast, 2002 and 2004 saw a large increase in those being caught by the relatively high NMW. The implication is that wage rates and the NMW do not move in tandem. Wages are being set with respect to external market conditions, which the NMW may or may not influence.

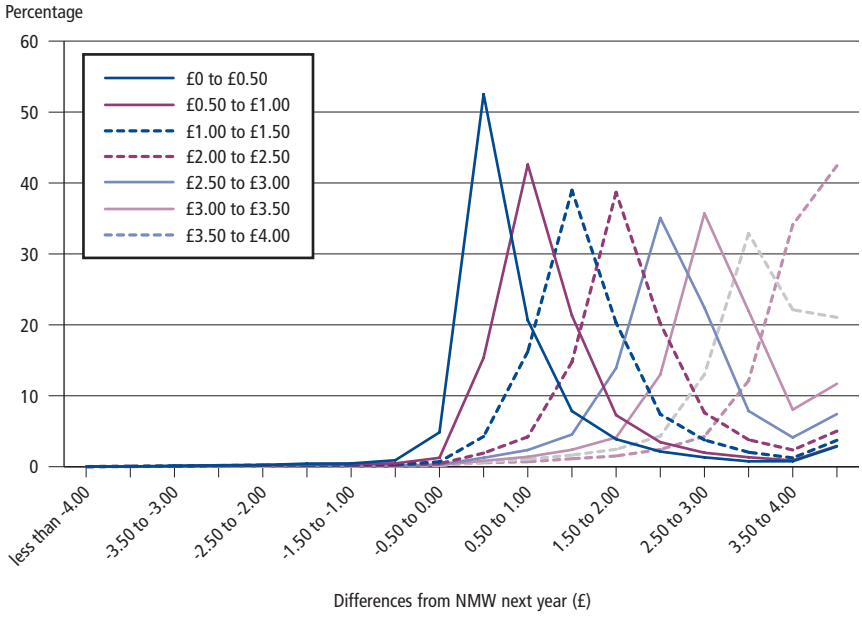
Figure 4 provides further evidence that factors other than the NMW are at work. This shows numbers paid at absolute wage rates, rather than at relative rates. What is striking in this graph is the peak of wages at round numbers or 'focal points': £5.00, £5.50, £5.75, £6.00 and so on. Moreover, this pattern is even evident in the 1998 data (peaks at £3.00, £3.25, £4.00, £5.00 and so on) before the introduction of the NMW and hence is not a product of the latter.

Figure 5 focuses on movement of wages around the NMW in 50 pence bands, for those remaining in the same job and the same company. It plots the proportion of individuals in each band in one year against the band they were in the following year. Each line gives an indication of the chance of moving into pay bands measured relative to the NMW for different starting points.[5] The lines are averages over the period 1999 to 2004 as the yearly figures are almost identical.

Three features of **Figure 5** are worth noting. First, the highest probability is that of remaining in the same segment (relative to the NMW) in the following year. This is as true for those on the minimum wage (indicated by the high peak for those who are £0 to £0.50 above the NMW) as for other groups. This finding supports Sloane, Murphy, Jones and Jones' (2004) model of 'low pay persistence' among workers at the minimum wage. Second, the peaks decrease to the right, suggesting that the further away from the NMW, the lower the probability of staying in the same band. Finally, regardless of where individuals start, the probability of moving to another band depends only upon the distance to the next band. For example, there is roughly a 20 per cent chance of moving up one band irrespective of current salary position. As these probabilities are constant over time, this implies that the structure of the wage distribution shows persistence in the face of rises in the minimum wage.

Figure 5

Probability of moving[a] to certain distance from NMW[b] next year by distance from NMW this year; United Kingdom; average 1999-2004



Sources: Annual Survey of Hours and Earnings; Office for National Statistics

a Covers people in the same job in both years.
b In 50p bands.or equal to £0.00 but less than £0.10 above the NMW.

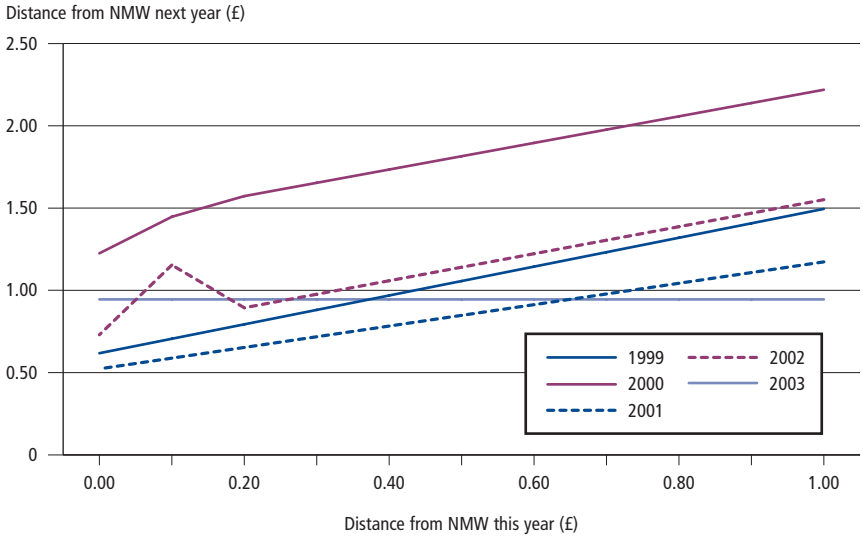
Testing for evidence of relocation

These results so far indicate that there is inertia in the structure of wages – that the NMW is not simply picking up more and more workers as the NMW covers higher wages, but the whole market adjusts. Referring to the earlier illustration of wage compression and relocation, the next step is to test this more rigorously using regression modelling (see **Technical note**). The model attempts to estimate how much the difference from the NMW in the previous period determines where an individual's wage will be relative to the NMW in this period. If the previous period significantly determines where you are in the current period, this implies relocation.

The model was run for each of the years 1999 to 2003 separately. For each estimate, the data were restricted to those who had been in the same job for two consecutive years. Alternative estimates additionally excluded those whose

Figure 6

Estimated distance from NMW next year by distance this year for employees earning up to £1 above NMW[a]; United Kingdom; 1999 to 2003

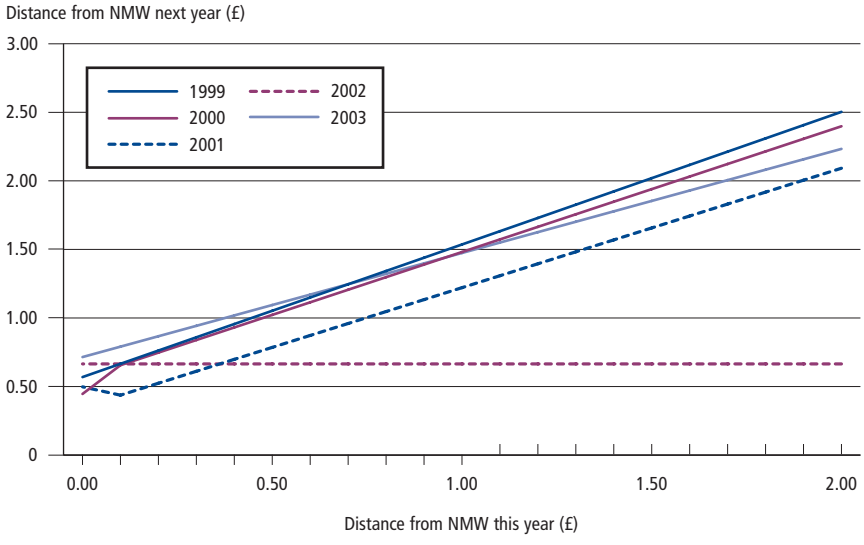


Source: Office for National Statistics

a This year.

Figure 7

Estimated distance from NMW next year by distance this year for employees earning up to £2 above NMW[a]; United Kingdom; 1999 to 2003



Source: Office for National Statistics

a This year.

pay was affected by absence or who had unusual pay patterns. The different exclusions made no noticeable difference to the results. The regression model was run for four non-exclusive subsets of employees: those earning up to £1, £2, £3 and £4 over the NMW in the second of each pair of years. There was no significant difference between the latter three groups and so only two sets of results are reported (see **Figures 6** and **7**). The details of the model and the results are shown in the **Technical note**.

As the lines cross the axis at a positive value this indicates that, on average, all workers receive a minimum increase regardless of their distance from the NMW. If the line is sloped this indicates that workers get an additional increase dependent upon how far they are from the NMW. The steeper the line the more the distance from the NMW affects the increase in wages the following year.

In summary, these results provide much stronger support for relocation than compression. Only in one year is there an indication of compression in the below-NMW segment, and this is only at the 10 per cent significance level (that is, there is a 10 per cent chance that the result is false).

There is evidence of only partial relocation/compression for those just above the NMW. This is shown by the flatter slope estimated for employees earning up to £1 above the NMW compared with that for those earning up to £2 above the NMW. In short, looking at individual wages, the evidence suggests that there is a surprisingly rigid labour market whereby the wages for a job do move in lock-step with the NMW. ▶

Evaluating companies' minimum wage policies

How do actual minimum wages compare with the official minimum?

Qualitative evidence suggests that some companies set their effective minimum wage above the NMW in order to maintain a competitive edge. Some reference to the NMW might also provide the foundation for a pay scale. Using the linked employer-employee data (ASHE-IDBR) a variable for 'company minimum wage' (CMW) was constructed. The company minimum wage for a year is defined as the minimum wage the company paid to an employee in the ASHE sample in that particular year. The relationship between the CMW and the NMW can be investigated to see whether this is a result of the NMW or a feature of the wider labour market at the lower end of the wage distribution.

Figure 8 shows the minimum wages paid by all companies in the sample, in 10p bands, up to £7.00. The line for 2000 shows lower numbers than other years, due to the smaller number of matched companies in the sample for this year.

The results in **Figure 8** are similar to **Figure 4**, which presented wages for all individuals, except that the peaks at round numbers are even more striking. This is a reasonable result: if companies use these 'focus' points as the foundations for wage rates, it is to be expected that a graph of minima would show more pronounced peaks than one which also included wages of those above the minima.

For each year the most common company minimum wage is equal to the NMW but this only accounts for a relatively small proportion of companies. Further away from the NMW the charts converge and peak at 'round' salaries, that is, £5.00, £5.50, £6.00 and so on. This supports the anecdotal evidence that companies pay their lowest earning staff at the NMW or at some round number above it.

The pattern for 1998 (before the implementation of the NMW) is similar to other years once £4.00 is reached. Again, this suggests that NMW only partially affects those at the low end of the pay distribution, as the tendency to set pay scales at certain round points clearly pre-dates the NMW and appears to be largely unaffected by it.

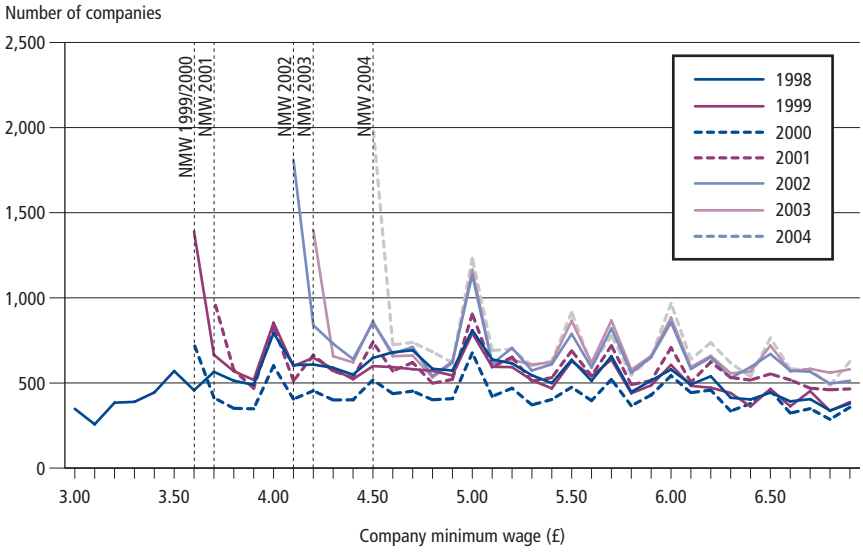
In later analysis only companies with a low CMW and at least ten individuals in the ASHE sample are included. Investigation is focused on large companies as there is evidence that fixed company pay policies are a feature of larger companies (Cronin and Thewlis, 2004). Smaller companies are more disparate in their responses and are also less likely to have fixed policies.

Only companies with a low CMW are examined to overcome problems with the definition of the CMW. Most obviously, the person with the lowest wage may not be included in a company's ASHE sample. If, for example, only one employee is sampled from a company, it is more likely that this would be a higher-paid member of staff as such employees tend to have more stable job profiles.

A second problem concerns pay scales. It may be that a company's notional pay scale extends down to the NMW; if, however, there is no-one at that point of the scale at the time of the survey, then the company will appear to have a CMW greater than the NMW. This is an insoluble problem when dealing with only observed wages; although there is a counter-argument that the company's effective minimum wage is the lowest wage at which it can hire workers, irrespective of its pay scales.

Figure 8

Distribution of company minimum wages for employees aged 22 and over; United Kingdom; 1998 to 2004



Source: Annual Survey of Hours and Earnings; Inter-Departmental Business Register

Hence, the CMWs discussed in this section are likely to be an overestimate of the actual, real or notional minimum wages companies would wish to pay. Nevertheless, there is reason to believe that this is a good approximation of how companies operate.

Are there consistent company effects?

Figure 8 shows that wages tend to cluster around certain round values. As these data come from companies observed over time, it should be possible to test whether there are persistent company-specific effects – what might be termed a 'pay policy'. The regression model used is described in the **Technical note**.

The retail industry was selected as an alternative example because it is well-known that many employees in this industry are paid at the minimum wage, the occupation of the employees paid at this level is likely to be similar across companies, and this sector is dominated by large companies that appear to follow a variety of wage policies. The preponderance of large companies and the structure of employment in the retailing sector (dominated by employees on low wages) also increase confidence that the CMW is being measured effectively.

The results show that there are greater variations between companies than within companies (a company effect). This suggests that companies do have pay policies but these are significantly different from each other, being set relative to some general market conditions. Having chosen these relative wage differentials, companies seem to maintain these differences over time. The picture for the retail sector alone is similar, taking into account that retail companies are more similar to each other than all companies.

This model indicates whether there are significant company effects but does not, by itself, indicate whether any significant effect is due to the difference from the NMW or to more general labour market conditions. The NMW only appears to have an indirect effect. Separate analyses on the difference from the NMW, and on the level of the CMW, seem to indicate that firm's position relative to the rest of the market is the more important factor. However, these results are based on a subset of the data where the CMW is above the NMW and so may be subject to selection bias, and are therefore not reported here. Further work is being carried out to investigate the drivers behind a company's decision to pay the NMW. Overall, there once again seems to be more evidence that companies both have significant power in setting wages and are using it to set wages relative to other companies.

Conclusion

Two themes stand out from this paper. First, the structural basis of wages at the bottom of the wage distribution appears to be resilient to changes in the NMW. There is strong evidence of wages moving up in parallel (relocation), rather than compression of the wage distribution. This can be seen in the company minimum wages, but also in the way wages for a job have changed. As the NMW increases in general, the salaries of all individuals increase by much the same amount regardless of their distance from the minimum wage. This is an important new result as the ASHE is one of the few large-scale surveys that can identify these effects.

Second, this seems to be occurring because companies have significant power to set wages at an appropriate level. This can be seen in the way individual wages have responded to the NMW. While a large number of companies pay the NMW, this is not the majority, nor does it seem to be increasing particularly. As important in setting wages is the prevalence of the 'focus' points: £4.50, £5.00, £5.50, £5.75, and so on, implying that companies are willing to absorb the extra labour cost at this end of the labour market rather than maximise the return per worker.

Finally, this analysis suggests that firms set wages relative to well-defined round amounts; however, the NMW does not follow these 'focus' points. For example, given the importance of the £5 mark in **Figure 8**, how will the market react to the 2006 NMW of £5.05? **Figure 8** also showed that the size of the change in the NMW is important in determining how many employees are caught by the NMW. There is clearly more research to be done on these two different effects, but this article has tried to give a deeper insight into the structures which determine how the NMW impacts on the labour market.

Notes

1. Rates can be lowered by giving allowance for accommodation, for example (LPC, 2003); this analysis only concentrates on those paid at or above the minimum wage.
2. ASHE replaced the widely-used New Earnings Survey (NES) in 2004, with improvements to the coverage of employees (especially the low-paid) and to the weighting of earnings estimates. The NES results for 1998 to 2003 have been reworked onto the new basis but the 2004 figures may be expected to reflect the low-paid better. The data variables collected remain broadly the same up to 2004.
3. This analysis uses the ONS Business Data Linking (BDL) datasets, which are unweighted research datasets constructed from official surveys and may not exactly match official published tabulations.
4. For further information on the structure of the IDBR, see Criscuolo, Haskel and Martin (1998).
5. The analysis was also carried out at 10p bands; however, because of small numbers in the transition matrices, except around the round points, these tended to be much more erratic. In addition, using a wider band allowed for some inaccuracy in the calculation of the wage rates and in the effect of inflation.

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Further information

For further information, contact:
Catrin Ormerod,
Room 2164,
Office for National Statistics,
Cardiff Road,
Newport NP10 8XG,
E-mail: *catrin.ormerod@ons.gov.uk*
Tel: 01633 812019.

Technical note

Regression to test for compression or relocation

The model regresses the current difference between the NMW at time t_{+1}, x_t, on the previous difference from the NMW at time t, x_{t+1}. In other words, how much does the difference from the NMW in the previous period determine where you are in this period? If the previous period significantly determines where you are in the current period, that is, $\beta \approx 1$, then this implies relocation.

Define

$w_{it} \equiv wage_t$

$x_{it} \equiv wage_{it} - NMW_t$

$d_{it} \equiv 1 \text{ if } w_{it} \leq NMW_{t+1}$

Then

$$x_{it+1} = \alpha + x_{it}\beta + d_{it}(\gamma + x_{it}\delta) + \varepsilon_{it+1} \qquad (1)$$

Table 3

Coefficient estimates of distance from NMW at t+1

	1999	2000	2001	2002	2003
0-£1 from NMW					
Coefficients in equation 1					
β_t	0.877***	0.808***	0.65***	0.821***	0.411
	-0.054	*-0.071*	*-0.14*	*-0.078*	*-0.438*
d_t		-0.186***	-0.025	-0.123	-0.384
		-0.07	*-0.124*	*-0.119*	*-0.42*
δ_t		1.411*	0.326	3.417*	0.895
		-0.855	*-0.297*	*-2.042*	*-0.597*
α_t	0.618***	0.632***	0.523***	0.73***	0.945**
	-0.035	*-0.05*	*-0.107*	*-0.051*	*-0.408*
Number of observations	10,217	8,681	7,359	9,714	8,455
R-squared	0.02	0.03	0.01	0.02	0.00
0-£2 from NMW					
Coefficients in equation 1					
β_t	0.967***	0.917***	0.871***	0.937***	0.759***
	-0.024	*-0.023*	*-0.027*	*-0.043*	*-0.134*
d_t		-0.118**	0.148**	-0.059	-0.155
		-0.056	*-0.073*	*-0.114*	*-0.227*
δ_t		1.303	0.105	3.301	0.547
		-0.853	*-0.263*	*-2.041*	*-0.428*
α_t	0.569***	0.564***	0.35***	0.665***	0.715***
	-0.026	*-0.029*	*-0.038*	*-0.039*	*-0.206*
Number of observations	22,372	20,240	18,226	20,538	19,555
R-squared	0.09	0.11	0.07	0.03	0.00

Source: Office for National Statistics

Notes
Standard errors are shown below estimates.
** Significant at 10 per cent level*
*** significant at 5 per cent*
**** significant at 1 per cent.*

Technical note

Table 4

Values of coefficients under alternative hypotheses

	Pure compression	Pure relocation
α	NMW_t-NMW_{t+1}	0
β	1	1
γ	-α	0
δ	-β	0

Source: Office for National Statistics

gives a testable hypothesis on the relative size of compression/relocation effects. Under the alternative hypotheses the predicted values of the coefficients are shown in **Table 4** and illustrated in **Figure 9**.

The model was run for each of the years 1999 to 2003 separately using standard robust variance estimates. For each estimate the data was restricted to those who had been in the same job for both periods, *t* and *t+1*. Alternative estimates additionally excluded those whose pay was affected by absence or who had unusual pay patterns. The coefficient estimates were robust to these different specifications. It was run for four non-exclusive subsets: those earnings up to £1, £2, £3 and £4 over the NMW in time *t+1*. There were no significant differences between the latter three groups and so only the results for those earning up to £0 to £1 and £0 to £2 over the minimum wage are included here (see **Table 3** and **Figures 6** and **7** in the main article).

Regression model to test for company effects

Since some observations are censored at the NMW, a Tobit model was used. A Tobit model is used when some of the observations cannot go below a particular point (censored) – the NMW in this case.

The Tobit Model is defined as follows:

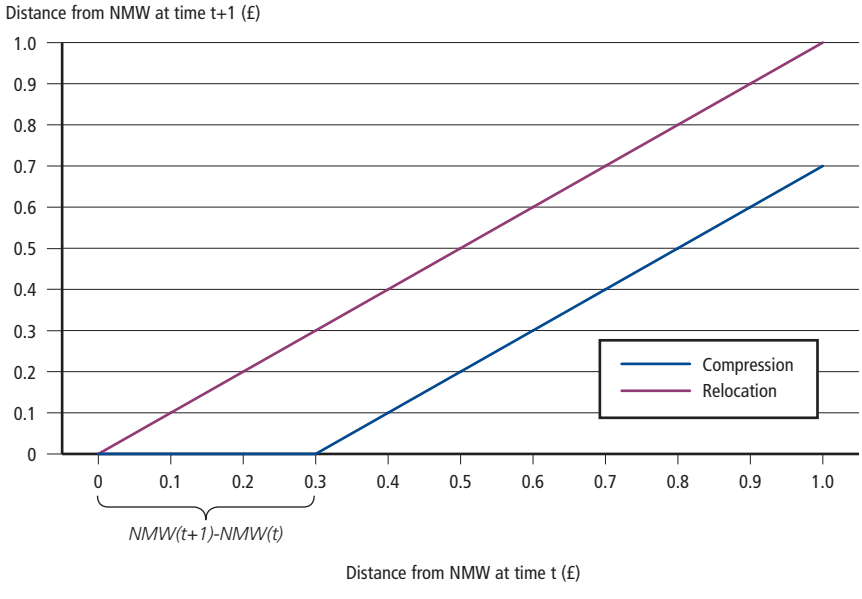
$$x_{ft} = 0$$
$$x_{ft} = f(Z_{ft}) + \alpha_f + \varepsilon_{ft}$$

Where:

w_{ft}	wage for company *f* at time *t*
NMW_t	national minimum wage at time *t*
x_{ft}	w_{ft} - NMW_t
$f(Z_{ft})$	linear function of explanatory variables
α_f	effect for company *f*
ε_{ft}	error term for company *f* at time *t*

Figure 9

Values of coefficients under alternative hypotheses



Source: Office for National Statistics

Technical note

Table 5

Standard deviation of company and individual effects

	All industries		Retail industry	
Model	σ_α	σ_ε	σ_α	σ_ε
Tobit simple	1.41	0.82	0.67	0.32
Tobit extended	1.27	0.80	0.63	0.32

Source: Office for National Statistics

The model was run with a simple *f(Z)* and a more complex *f(Z)*, and for both all industries and the retail sector alone. The simple model included: number of employees at enterprise level and plant level, industry and regional dummies. The more complex model included these variables plus gender, information on the type of job and whether covered by collective bargaining agreement.

The standard deviation of the coefficients α and ε for all industries and the retail industry are reported in Table 5. The standard deviation of the α coefficients is greater than the standard deviations of the ε coefficients, which implies that there are greater variations between companies than within companies. The picture for the retail sector alone is similar. The standard deviation of the α coefficients is smaller than for the all industry model but this is to be expected as retail companies are more similar to each other than all companies.