LONGER-TERM IMPLICATIONS OF THE NMW:

A RE-EXAMINATION OF EMPLOYER-PROVIDED TRAINING

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Summary

- This report examines the provision of employer-provided education and training following the introduction and subsequent uprating of the National Minimum Wage (NMW) in the UK.

- The impact of the NMW on training provision is clearly an important issue. If employers' reaction to the NMW is to reduce their training provision for low-paid workers – who already receive below average training - then any positive impact of the NMW on low pay and pay inequality may be offset by longer-term detrimental consequences for low-paid employees. The adverse consequences may include poorer long-term employment prospects if skills are not renewed and updated through training.

- As shown by Acemoglu and Pischke (1999), the impact of a NMW on employers' training provision is theoretically ambiguous. Empirically, recent work by Arulampalam *et al* (2004) using the BHPS has revealed some evidence that training of workers whose pay was affected by the introduction of the NMW in April 1999 may have marginally increased.

- This paper investigates the robustness of this finding by extending the analysis to:
    - an alternative dataset - the Labour Force Survey (LFS);
    - the impact over subsequent upratings of the NMW;
    - different forms of training, distinguishing between on-the job training and off-the-job training; and
    - heterogeneity in any impact of the NMW on training provision - by gender, age group and across industrial sectors.

- Difference-in-differences techniques are employed in order to investigate the impact on training provision for workers whose pay is affected by the NMW compared to workers who are otherwise similar, but are unaffected by the NMW.

- The results reveal that neither the introduction nor the subsequent upratings of the NMW appear to have had any significant impact on the provision of job-related education and training. This result holds for both men and women, as well as for adults and younger workers entitled to the lower youth development rate, and is robust to a number of possible variations in specification, including different measures of pay and alternative comparison groups.

- Thus, the evidence suggests that employers' reaction to the minimum wage has not been manifested in any increase or decrease in their provision of job-related education and training for those workers receiving the NMW.

LONGER-TERM IMPLICATIONS OF THE NMW:

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1. Introduction

This paper examines the impact of the introduction and subsequent uprating of the National Minimum Wage (NMW) on employer-provided training utilising the Labour Force Survey (LFS). As such, it extends the analysis in Arulampalam *et al* (2004) which demonstrates using BHPS wave 8 (conducted in 1998) and wave 10 (conducted in 2000) that the introduction of the NMW increased the probability of training by 8-11% for individuals affected by the minimum wage. Their analysis is extended here in order to investigate the robustness of this important finding which is consistent with a non-competitive labour market for low-paid workers. By employing standard difference-in-differences techniques on Labour Force Survey (LFS) data, this paper also complements several other studies of the impact of the minimum wage using the same methodology and dataset. These have included the impact on employment (Stewart, 2003, 2004); on employment transitions (Stewart, 2002); on hours of work (Stewart and Swaffield, 2004); and on second job holding (Robinson and Wadsworth, 2004). Finally, this paper can also be seen to supplement the qualitative findings reported by Rainbird *et al* (2002) of the impact of the NMW on training in three low-pay sectors.

2. Data and methodology

There are several papers which employ classical and modified difference-in-differences techniques to the issue of examining the impact of the NMW on labour

market outcomes. This paper employs these techniques to the issue of concern here taking full advantage of the developments advanced by these previous authors. Our work is most closely related to the analysis of the employment effects of the NMW as conducted by Mark Stewart (2002, 2004).

The LFS is the primary data source employed here. Potential alternatives which have been used for previous investigations of the impact of the NMW include NES/ASHE and BHPS. While the NES/ASHE data has the benefit of large sample sizes, it contains no information on employer-provided training. And although the BHPS does include all the necessary variables, the sample sizes which are available – especially for some of the more disaggregated analyses by gender, age and industrial sector – are rather too small for robust statistical analyses. While it is recognised that there are some important weaknesses with the LFS for this type of analysis – in particular there have been some concerns raised regarding the reliability of the LFS as a source of information on low pay – to some extent, at least, these issues have been addressed (Stewart, 2002; Manning and Dickens, 2002). As well as the matter of the ONS-recommended measure of hourly pay (HOURPAY in the LFS) which uses *usual* paid hours rather than *actual* paid hours in the pay reference period, it is now recognised that the hourly rate variable (HRRATE) where available (since Spring 1999) may provide a 'better' indicator of low pay than the HOURPAY variable. Moreover, no other data source has the required information on both training receipt and pay, as well as the other individual and workplace controls required for the estimation of conditional difference-in-differences training propensities.

There are three basic training incidence questions in the LFS which refer to the receipt of training: job related education or training in the last week; job related education or training in the last 4 weeks; and job related education or training in the last 3 months (13 weeks). Subsequent questions enquire about the type of training received, distinguishing between on-the-job training and off-the-job training. Figure 1 illustrates the reported incidence of different types of training in the last 4 weeks (ED4WK) for a number of different groups of workers. The data are for employees only (excluding full-time students) taken from successive pooled quarterly LFS surveys amalgamated into annual datasets. Hence the data for the year 1998 pre-dates the introduction of the NMW on 1st April 1999, while that for 2000 post-dates its introduction.

The receipt of any kind of training in the last 4 weeks is shown separately for men and women, and for three different levels of real relative pay (by gender). Off-the-job training and on-the-job training (and both forms of training) are separately identified for training received in the last 4 weeks. A consistent identification over time of those on 'low pay' is provided by the bottom decile of the standard derived pay measure in the LFS (HOURPAY) for each year deflated using the monthly RPI index. The receipt of training for this group of low paid workers can be contrasted with that for the remainder who earn less than the median (10-50th percentile), and also with those earning above median hourly pay.

As is well-known, the low-paid typically receive less training, especially less off-the-job training. Figure 1 confirms this pattern. Training provision for men in the bottom decile of pay was increasing in the late 1990s, while that for women was fluctuating.

For individuals in the 2nd to 5th deciles, training provision was marginally increasing for both men and women, but was little different from that for the bottom decile. For those above median pay, training provision remained high. Overall, women receive slightly more training than men.[1]

Of course, the bottom decile of hourly pay does not coincide with the level of the minimum wage. However, Figure 1 does serve to illustrate that the impact of the NMW on training requires a careful choice of control group with which to compare the training receipt of those affected by the introduction and subsequent upratings of the NMW. Clearly, it is not appropriate to use all those unaffected by the NMW as the control group since, on average, their level of training receipt would be far in excess of that of the treatment group. Moreover, the aggregate picture may serve to hide important sub-group differences. One focus of this paper is to investigate these differences as far as the data allow – including differences according to the type of training and by industrial sector.

Standard difference-in-difference techniques are employed to reveal the impact of the NMW on training provision. The LFS respondents are matched across successive quarterly surveys using observations taken one year apart (i.e. from individuals' wave 1 and wave 5 interviews). Individuals whose pay is affected by the introduction of the NMW in April 1999 and the two subsequent upratings in October 2000 and October 2001 are compared with otherwise similar individuals who pay is unaffected. That is, for both groups of individuals, the incidence of training is

[1] There were a number of studies in the 1980s and early 1990s which highlighted gender discrimination in training access (e.g. Green, 1991; 1993), but attention has rather changed focus now that the raw gap in training receipt between men and women appears to have closed. More recently, greater attention has been paid to ethnic differences in training receipt (e.g. Shields and Wheatley Price, 1999a; 1999b).

compared for periods before and after the NMW introduction or uprating. The difference between these differences provides the classic linear difference-in-differences estimate (see, for example, Meyer, 1995; Angrist and Kreuger, 1999). While this can be obtained directly from the twice-differenced means, a more convenient formulation is the equivalent linear regression which includes period and group dummy variables, including identifiers for those in neither 'treatment' nor 'control' groups. The coefficient of interest is that on the interactive dummy between the treatment group (those affected by the NMW) and the period after the NMW introduction (or uprating). This provides the standard linear difference-in-differences estimate directly together with its associated standard error (and thus t-ratio).

Of course, an individual's receipt of employer-provided training will depend on rather more than their position in the relative pay distribution and whether their pay was affected by the introduction and/or subsequent upratings of the NMW. Thus the linear difference-in-differences estimate is also contrasted with a regression-adjusted estimate which takes account of the other determinants of training provision that may differ systematically between those affected by the NMW. Concerns over potential identification issues may also be alleviated in this manner. Employers' provision of training derives from the business and product market conditions facing the establishment, and the current skills of the workforce and those available in the labour market from which the establishment recruits its new employees. Much of the extant research evidence confirms the predictions of human capital theory as a framework for understanding the determinants of training provision and thus this is utilised as the basic model here. Thus, for example, the amount of training that individuals receive is positively related to their qualifications such that the better

qualified receive more training in general (see, for example, Green, 1993; Veum, 1995; Booth, 1991, 1993).[2] Given the strong positive correlation between qualifications and earnings, it is therefore unsurprising that those at the bottom of the pay distribution receive less training than individuals further up the pay distribution as shown in Figure 1.

The control variables included in the regression-adjusted difference-in-differences estimate are: experience and experience squared, where experience is defined as age minus age left full-time education and thus is a measure of *potential* labour market experience; age left full-time education; tenure and tenure squared, where tenure is number of months in current employment; public sector dummy; non-white ethnic group; industrial sector (9 categories); occupational group (SOC major group – 9 categories); establishment size (8 categories); part-time status; permanent job status; highest qualification attained (6 categories); workplace location (21 categories); monthly time dummies. Individuals not in the treatment or control groups are also separately identified.

3. Training incidence and the introduction of the NMW

This section reports the results on the impact of the introduction of the NMW on the incidence of training for a number of groups within the labour market. The results are

[2] The LFS reveals that the proportion of employees receiving training rose steadily through the 1980s but has been fairly constant since the mid-1990s. However, while training participation may be constant, the duration of training spells is falling, so that the 'volume' of training may actually be in decline (Felstead *et al*, 1997). In comparison with other European countries, training provision in Britain is actually quite high, but much of it is of low level - for example, concerned with induction or health and safety - rather than directed towards productivity enhancing activities (Felstead *et al*, 1997). Moreover, the number of hours of formal training per participant is lower in the UK than all other major European countries (European Commission, 2002).

distinguished between men and women, and between 'adult' (22 years old and over) and 'youth' (aged 18 to 21 years) employees, where age (and all other individual characteristics, including pay) are gathered from the interviewees' responses in their first (wave 1) interview. Attention is restricted here to the training questions subsequently asked one year (wave 5) after the respondents were first interviewed for the LFS. Full-time students are excluded from the analysis.

For the analysis of the introduction of the NMW, the quarterly LFS have been pooled for the period around its introduction, from Spring (March-May) 1997 (the first survey for which the earning questions were asked in the first (wave 1) interview) to Spring 2000 (March-May 2000). Individuals are matched on their wave 1 and wave 5 questionnaire responses using the LFS system variables, and cross-checks are made to ensure that the matching is accurate. The assessment period before the introduction of the NMW therefore comprises wave 5 observations from March 1998 up to March 1999, while that spanning the introduction of the NMW includes wave 5 observations from April 1999 to March 2000[3] (such that when these individuals were observed one year earlier this was before the introduction of the NMW). These assessment periods therefore provide approximately equally sized samples for the before and after NMW introduction periods.

Table 2 reports the impact of the introduction of the NMW on the incidence of training in the last week (Panel A), last 4 weeks (Panel B) and last 13 weeks (Panel C) for all employees aged 18-59 years, and separately for adult men and women, young people, and young men and women as defined above. Within each panel, the

[3] Cases are selected using the month of interview date (REFDTE) given on the LFS datasets.

differences in the incidence of training are reported for the 'treatment' group - comprising those earning less than the NMW in real terms when it was introduced - and the control group - defined here to be those who earn between the NMW and 15% above the relevant (adult or youth) NMW. This is consistent with the definition of the control group used by Arulampalam *et al* (2004), although the sensitivity of the results to this choice of control group is investigated below. The two lines labelled 'after' and 'before' refer to the period with the introduction of the NMW and without the NMW respectively. Mean training incidence for the two groups – treatment and control – and for the two periods are presented separately, together with their difference and robust (to heteroskedasticity) t-ratio (this is simply produced from the regression equivalent to the associated standard t-test for differences in means, but using the Huber-White standard errors in the construction of the t-statistic). For none of the training incidence measures (i.e. training in the last week, last 4 weeks or last 13 weeks) is the difference for either treatment or control group significantly different before and after the NMW was introduced.

The next line of each panel in Table 2 reports the linear difference-in-differences estimate together with its robust t-ratio. For all employees, and for both adult men and adult women, the differences are small in magnitude as compared to the mean level of training provision, and none of the differences-in-differences are statistically significantly different from zero. There is greater volatility in the training incidence rates for young men and women than for their older counterparts, and typically young people receive more training than older individuals, consistent with the standard human capital model of training provision.[4] However, once again, none of

[4] The sample sizes are relatively small here, and the volatility may be a consequence of this.

the linear difference-in-differences estimates for young men or young women are statistically significant.

The final section of each panel reports the regression-adjusted difference-in-differences estimate. This is reported as the change in the conditional probability of training receipt as derived from a probit specification. Conditioning on the range of control variables listed in the previous section has little impact on the linear difference-in-differences estimates or their statistical significance. The one exception is that the receipt of training in the last 13 weeks for young men affected by the introduction of the NMW *increases* relative to the control group (z-ratio 2.67), but this is the only coefficient of 12 (3 training incidence questions for each of 4 age-gender groups of employees) which achieves significance. Thus, a tentative preliminary conclusion is that the introduction of the NMW had no discernible impact on the incidence of training for those affected by its provisions.

Table 3 reports the results obtained for the type of training provision, distinguishing between on-the-job training only (Panel A), off-the-job training only (Panel B) and both types of training (Panel C). Once again the control group is defined as those earning between the NMW and 15% above the NMW. The format of the table is identical to Table 2. No differences in training provision for any of the training types are found following the introduction of the NMW in April 1999. Thus there would appear to be no evidence that employers substituted (cheaper) on-the-job training for (more expensive) off-the-job training as a response to meeting the increased pay requirements associated with the introduction of the NMW.

Finally, Table 4 reports the sensitivity of the results obtained above for any training in the last 4 weeks according to different definitions of the control group. The results for the control group defined as NMW+10%, NMW+15% (as in Table 2) and NMW+20% are presented and linear and regression-adjusted difference-in-differences are computed in each case. As can be seen, the results are unaffected by the 'width' of the control group.

4. Further analyses

A number of further 'experiments' are reported in this section.

4.1 Wage gap measure

The wage gap measure utilises the *magnitude* of the gap between the minimum and current wage rather than simply a (1,0) indicator of whether the wage is below the NMW (see, for example, Stewart, 2002; Currie and Fallick, 1996). The wage gap measure therefore gives greater weight to those whose wage has had to be increased more in order to comply with the requirements of the NMW. The results for the receipt of any training in the last 4 weeks are reported in Table 5. Once again, for all workers, and for each separate gender-age group, the estimated impact of the introduction of the NMW is very small, and is statistically insignificant. The reported elasticities are evaluated at the means of the other control variables and are very small. Taking the first column for all workers as an example, an increase in a representative individual's wage of 10% in order to comply with the introduction of the NMW in April 1999 would reduce the probability of receiving training in the 4 week period by 0.4%.

4.2 Low pay sectors

There are a number of low paying industrial sectors in which the impact of the NMW can be expected to be particularly high given the increase in labour costs that the introduction and subsequent uprating of the NMW will imply. They include agriculture, food processing, textiles and clothing, retail, hospitality, cleaning, social care and hairdressing. This subsection provides separate estimates for these industrial sectors in order to investigate whether there is any adverse on training provision in these particular sectors. Results for both the indicator and wage gap measures are reported in Table 6 using the same table formats as utilised previously. The numbers of young people working in these sectors is too few for robust estimates to be obtained separately for young men and young women, and hence these groups are combined.

it is apparent that there are neither substantive nor statistically significant differences in training provision between those affected and those unaffected by the introduction of the NMW in these low paying sectors.

4.3 Upratings of the NMW

This sub-section investigates the first two adult upratings of the NMW which took place in October 2000 (from £3.60 to £3.70) and October 2001 (from £3.70 to £4.10).[5] The results are reported in Table 7. For both upratings, there are important choices to be made over the comparison periods that are selected (see Stewart, 2004, for further details). The period over which the comparisons should be made

[5] The sample sizes for young people are too small for reliable estimates to be obtained.

between those affected and unaffected by the uprating of the minimum wage is one in which the minimum wage did not change but is as similar as possible to the period spanning the uprating. One potential choice is the period before the minimum wage was introduced in April 1999 (i.e. the period used for the assessment of the introduction of the NMW in Section 3), but as this becomes increasingly more removed temporally for the subsequent upratings of the NMW, the claim that it is similar to the period spanning the upratings becomes more and more questionable. Over time, other influences affecting training propensities will serve to affect the legitimacy of the claim that the labour market conditions are similar and that the only changing factor impacting on training provision is the uprating to the NMW.[6]

However, there are alternative choices for the comparison period. For the 2000 uprating, we can utilise the period immediately prior to the uprating in which the minimum did not change – that is, for wave 1 observations between April 1999 and September 1999 (and thus these individuals' wave 5 observations are between April 2000 and September 2000). This is the 'minimum comparator group' as reported in column B1 of Table 7. One consequence of having only a 6 month window is that cell sizes are rather reduced. Therefore, as an alternative, given that we have already found that the introduction of the NMW in April 1999 had no significant impact on training provision, then it may be legitimate to utilise *all* observations prior to the October 2000 uprating as the comparator group – that is, all wave 1 observations from before September 1999. This is termed the 'maximum comparator group' in column B2 of Table 7. For both of these alternative comparator periods, the

[6] For example, as noted by Stewart, 2003, there was a slow down in employment growth in 2000 and 2001 as compared to the late 1990s.

linear difference-in-difference estimate is small and statistically insignificantly different from zero.[7]

For the October 2001 uprating, once again there is a choice to be made for the comparison group. In this case, however, we cannot use the period immediately before the uprating to define a 'no-change' comparison group because the gap between the upratings in October 2000 and October 2001 is only 12 months and hence no individuals can have wave 1 and wave 5 observations within this window. There are a number of possible alternatives. For the 'minimum' comparator group, we choose individuals with wave 1 observations from April 1999 to September 2000 (that is, covering the no change period plus the first uprating) and thus wave 5 observations between April 2000 and September 2001. For the maximum comparator group, we again utilise all possible observations as the comparator group – that is, all wave 1 observations from before September 2000 (and hence wave 5 observations before September 2001). The results of these estimates are presented in columns C1 and C2 of Table 7 respectively. Once again, the differences in differences are small in magnitude and are not statistically significant.

The subsequent upratings annually in October of each year present similar problems as the October 2001 uprating in that there are no 'no-change' comparison periods because the upratings are always only 12 months apart. Thus any comparison group must necessarily include one (or more) previous upratings to the NMW, or must comprise the no-change period (April 1999 and September 1999) and/or the period

[7] Using just the period prior to the April 1999 introduction as first suggested above produced similar results to those reported in Table 7 and thus the use of the this 'maximum' comparator group does not appear to be adversely affecting the estimates despite the fact that it spans the introduction of the NMW.

prior to the introduction of the NMW - both of which become increasing temporally removed for the subsequent upratings and hence arguably not really sufficiently similar for legitimate comparisons. Hence, given the rather unsatisfactory nature of such comparisons, the impact of the subsequent upratings to the NMW in October 2003, 2004 and 2005 are not investigated here.

4.4 Alternative measures of wages

The basic analysis reported above uses the standard ONS derived variable HOURPAY as the measure of individuals' hourly pay. For this measure, pay received in the last pay period (converted to a weekly basis) is divided by the *usual* number of paid hours per week. As suggested by Stewart (2002), *actual* hours worked in the pay period would be a more appropriate divisor. The second panel of Table 7 reports the results obtained when pay is computed using actual hours worked as the divisor for earnings. While the difference-in-differences is rather larger than that based on using usual hours reported in the first panel of Table 7, the magnitude is still rather small, and the difference is still statistically insignificantly different from zero. A similar result holds for the upratings in October 2000 and October 2001, irrespective of the comparison groups utilised.

As noted above, the LFS has relatively recently started to record additional information on pay for those who are paid a fixed hourly rate (HRRATE). While this is, of course, only a subsample of all individuals, proportionally more lower paid workers fall into this category (Dickens and Manning, 2002). Results using this measure of pay are only available for the NMW upratings in 2000 and 2001 given that it has only been collated since Spring 1999. The final row of Table utilises *only*

this measure of pay to compute the estimates (rather than mixing hourly paid workers with the pay rates for salaried workers). Given the fall in sample observations, the maximum comparator group is utilised. The results once again indicate no change in training provision as the result of the upratings to the NMW.

Finally, the results are also robust to restricting the sample to individuals who are with the *same* employer one year later (although this is potentially problematic since the low paid have higher job turnover and hence fewer are retained); and also to the restriction that individuals should still be 'in employment' at wave 5 which strictly is unnecessary (since individuals may have lost their job after training receipt but they still received some training in the previous period).

5. Conclusions

The impact of the NMW on training provision is clearly an important issue. If employers' reaction to the introduction and subsequent uprating of the NMW is to reduce their training provision for low-paid workers, then any positive impact of the NMW on low pay (and pay inequality) may be offset by longer-term detrimental consequences for low-paid individuals' (and aggregate) productivity, and perhaps subsequently their employment prospects.

The information that has been compiled to date by Arulampalam *et al* (2004) indicates that, at least at the aggregate level, (conditional) training probabilities may actually have increased for those affected by the introduction of the NMW. However, the BHPS contains relatively few individuals who are low paid (for example, the

treatment group defined by whether the individual reports that their wage increased as a result of the introduction of the NMW has only 99 individuals). This paper therefore investigates the robustness of this existing evidence utilising standard difference-in-differences estimation techniques applied to LFS data.

The findings presented here reveal that the introduction of the NMW and its subsequent upratings appear to have had no statistically significant impact on the provision of employer-provided job-related education and training. This result holds for both men and women, and for adults and those young workers entitled to the lower youth development rate, and it is robust to a number of statistical and methodological variations.

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Table 1: National Minimum Wage rates 1999-2006

Adult Rate (for workers aged 22+)		**Development Rate** (for workers aged 18-21)		**16-17 Year Olds Rate**	
1 Apr 1999	£3.60	1 Apr 1999	£3.00	-	-
1 Oct 2000	£3.70	1 June 2000	£3.20	-	-
1 Oct 2001	£4.10	1 Oct 2001	£3.50	-	-
1 Oct 2002	£4.20	1 Oct 2002	£3.60	-	-
1 Oct 2003	£4.50	1 Oct 2003	£3.80	-	-
1 Oct 2004	£4.85	1 Oct 2004	£4.10	1 Oct 2004	£3.00
1 Oct 2005	£5.05	1 Oct 2005	£4.25	1 Oct 2005	£3.00
1 Oct 2006	£5.35	1 Oct 2006	£4.45	1 Oct 2006	£3.30

Source: LPC (http://www.lowpay.gov.uk/)

Table 2: Impact of introduction of NMW on training incidence

		all workers	adult men	adult women	young people	young men	young women
A: Training in last week							
wage<nmw	after	0.042	0.028	0.037	0.143	0.203	0.085
	before	0.049	0.023	0.047	0.135	0.158	0.104
	difference	-0.006	0.005	-0.010	0.008	0.044	-0.019
	robust t-ratio	-1.00	0.52	-1.37	0.20	0.73	-0.40
nmw<=wage<1.15nmw	after	0.033	0.031	0.029	0.101	0.082	0.125
	before	0.037	0.025	0.033	0.135	0.153	0.111
	difference	-0.004	0.006	-0.004	-0.033	-0.071	0.014
	robust t-ratio	-0.58	0.49	-0.60	-0.72	-1.15	0.20
difference-in-differences	linear DinD	-0.003	-0.001	-0.005	0.042	0.115	-0.033
	robust t-ratio	-0.29	-0.05	-0.55	0.68	1.34	-0.39
	probit DinD	0.011	0.024	0.006	0.048	0.152	-0.033
	robust z-ratio	1.03	1.03	0.42	0.88	1.86	-0.59
B: Training in last 4 weeks							
wage<nmw	after	0.091	0.065	0.084	0.243	0.304	0.183
	before	0.084	0.050	0.083	0.185	0.208	0.156
	difference	0.007	0.015	0.001	0.057	0.096	0.027
	robust t-ratio	0.81	1.00	0.15	1.23	1.40	0.44
nmw<=wage<1.15nmw	after	0.069	0.068	0.061	0.191	0.204	0.175
	before	0.065	0.044	0.063	0.173	0.186	0.156
	difference	0.004	0.023	-0.003	0.018	0.018	0.019
	robust t-ratio	0.47	1.34	-0.28	0.32	0.23	0.24
difference-in-differences	linear DinD	0.003	-0.008	0.004	0.039	0.079	0.008
	robust t-ratio	0.23	-0.35	0.30	0.54	0.76	0.08
	probit DinD	0.002	-0.017	0.005	0.066	0.113	0.063
	robust z-ratio	0.11	-0.48	0.25	0.87	1.22	0.54
C: Training in last 13 weeks							
wage<nmw	after	0.163	0.113	0.159	0.364	0.435	0.296
	before	0.149	0.114	0.143	0.292	0.347	0.221
	difference	0.014	-0.002	0.016	0.072	0.088	0.075
	robust t-ratio	1.28	-0.08	1.23	1.36	1.15	1.04
nmw<=wage<1.15nmw	after	0.129	0.138	0.117	0.247	0.245	0.250
	before	0.129	0.106	0.123	0.288	0.339	0.222
	difference	0.000	0.032	-0.006	-0.041	-0.094	0.028
	robust t-ratio	0.02	1.31	-0.44	-0.64	-1.07	0.30
difference-in-differences	linear DinD	0.014	-0.034	0.022	0.113	0.182	0.047
	robust t-ratio	0.87	-1.06	1.18	1.37	1.57	0.40
	probit DinD	0.007	-0.041	0.023	0.153	0.318	0.052
	robust z-ratio	0.36	-1.17	0.99	1.85	2.67	0.44
	NOBS linear	50,955	24,052	25,160	1,743	925	818
	NOBS probit	50,522	23,799	25,011	1,712	909	803

Table 3: Impact of introduction of NMW on training type

Training in last 4 weeks		all workers	adult men	adult women	young people	young men	young women
A: On-the-job training only							
wage<nmw	after	0.032	0.015	0.032	0.086	0.087	0.085
	before	0.029	0.015	0.030	0.056	0.059	0.052
	difference	0.003	0.001	0.002	0.030	0.028	0.033
	robust t-ratio	0.59	0.08	0.33	1.01	0.66	0.78
nmw<=wage<1.15nmw	after	0.028	0.037	0.024	0.045	0.061	0.025
	before	0.028	0.020	0.028	0.058	0.034	0.089
	difference	0.000	0.017	-0.004	-0.013	0.027	-0.064
	robust t-ratio	0.01	1.37	-0.62	-0.40	0.65	-1.29
difference-in-differences	linear DinD	0.003	-0.017	0.006	0.042	0.000	0.096
	robust t-ratio	0.39	-1.12	0.67	0.98	0.00	1.49
	probit DinD	-0.003	-0.010	0.003	-0.011	0.015	0.001
	robust z-ratio	-0.42	-0.74	0.31	-0.37	0.38	0.03
B: Off-the-job training only							
wage<nmw	after	0.042	0.037	0.039	0.093	0.116	0.070
	before	0.039	0.027	0.038	0.079	0.089	0.065
	difference	0.003	0.010	0.001	0.014	0.027	0.005
	robust t-ratio	0.51	0.86	0.09	0.45	0.56	0.13
nmw<=wage<1.15nmw	after	0.029	0.028	0.025	0.079	0.020	0.150
	before	0.029	0.025	0.026	0.077	0.085	0.067
	difference	0.000	0.003	-0.001	0.002	-0.064	0.083
	robust t-ratio	0.04	0.25	-0.10	0.04	-1.54	1.22
difference-in-differences	linear DinD	0.003	0.007	0.001	0.012	0.091	-0.078
	robust t-ratio	0.34	0.41	0.13	0.25	1.43	-0.98
	probit DinD	0.006	0.017	-0.000	0.060	0.072	0.049
	robust z-ratio	0.55	0.75	0.03	1.44	1.59	0.85
C: Both On- and Off-the-job training							
wage<nmw	after	0.016	0.013	0.013	0.064	0.101	0.028
	before	0.016	0.008	0.014	0.051	0.059	0.039
	difference	0.001	0.005	-0.001	0.014	0.042	-0.011
	robust t-ratio	0.20	0.70	-0.28	0.52	0.97	-0.36
nmw<=wage<1.15nmw	after	0.013	0.003	0.011	0.067	0.122	0.000
	before	0.009	0.000	0.009	0.038	0.068	0.000
	difference	0.004	0.003	0.002	0.029	0.055	0.00
	robust t-ratio	1.06	1.00	0.46	0.88	0.95	0.00
difference-in-differences	linear DinD	-0.003	0.002	-0.003	-0.015	-0.013	-0.011
	robust t-ratio	-0.59	0.22	-0.53	-0.36	-0.18	-0.36
	probit DinD	-0.000	0.001	0.001	-0.005	0.012	-0.000
	robust z-ratio	-0.01	0.12	0.12	-0.29	0.81	-0.84
	NOBS linear	50,955	24,052	25,160	1,743	925	818
	NOBS probit	50,522	23,799	25,011	1,712	909	803

Table 4: Sensitivity to control group definition

Training in last 4 weeks		all workers	adult men	adult women	young people	young men	young women
wage<nmw	after	0.091	0.065	0.084	0.243	0.304	0.183
	before	0.084	0.050	0.083	0.185	0.208	0.156
	difference	0.007	0.015	0.001	0.057	0.096	0.027
	robust t-ratio	0.81	1.00	0.15	1.23	1.40	0.44
nmw<=wage<1.10nmw	after	0.066	0.071	0.058	0.154	0.179	0.125
	before	0.068	0.060	0.061	0.176	0.190	0.156
	difference	-0.003	0.011	-0.004	-0.022	-0.012	-0.031
	robust t-ratio	-0.26	0.43	-0.31	-0.32	-0.12	-0.33
difference-in-differences	linear DinD	0.010	0.005	0.005	0.079	0.108	0.059
	robust t-ratio	0.70	0.16	0.33	0.97	0.93	0.52
	probit DinD	0.005	0.010	0.003	0.059	0.126	0.036
	robust z-ratio	0.38	0.35	0.17	0.85	1.38	0.37
nmw<=wage<1.15nmw	after	0.069	0.068	0.061	0.191	0.204	0.175
	before	0.065	0.044	0.063	0.173	0.186	0.156
	difference	0.004	0.023	-0.003	0.018	0.018	0.019
	robust t-ratio	0.47	1.34	-0.28	0.32	0.23	0.24
difference-in-differences	linear DinD	0.003	-0.008	0.004	0.040	0.079	0.008
	robust t-ratio	0.23	-0.35	0.30	0.054	0.76	0.08
	probit DinD	0.002	-0.017	0.005	0.066	0.113	0.063
	robust z-ratio	0.11	-0.48	0.25	0.87	1.22	0.54
nmw<=wage<1.20nmw	after	0.078	0.068	0.068	0.228	0.219	0.238
	before	0.068	0.045	0.066	0.180	0.181	0.179
	difference	0.010	0.024	0.002	0.048	0.038	0.059
	robust t-ratio	1.31	1.66	0.25	0.99	0.57	0.82
difference-in-differences	linear DinD	-0.003	-0.009	-0.001	0.009	0.058	-0.032
	robust t-ratio	-0.27	-0.41	-0.05	0.14	0.61	-0.34
	probit DinD	-0.001	0.003	-0.000	0.022	0.085	-0.001
	robust z-ratio	-0.10	0.09	-0.00	0.38	1.14	-0.01
	NOBS linear	50,955	24,052	25,160	1,753	925	818
	NOBS probit	50,522	23,799	25,011	1,712	905	803

Notes to Table 2, Table 3 and Table 4:

1. The lines in the table labelled 'before' and 'after' refer to the period prior to the introduction of the NMW and immediately after its introduction respectively. Mean training incidence for the two groups – 'treatment' (wage less than the NMW before its introduction) and 'control' (wage just above the NMW) – and for the two periods, are presented separately, together with their difference and robust (to heteroskedasticity) t-ratio.
2. The next line of each panel reports the linear difference-in-differences (DinD) estimate between the treatment group and the control group, together with its robust t-ratio. This is the unconditional difference in the probability of training receipt between those who were earning less than the NMW and those who were earning just above the NMW.
3. The final section of each panel reports the regression-adjusted (probit) difference-in-differences (DinD) estimate. Control variables in the probit difference-in-differences estimates are: experience and experience squared; age left full-time education; tenure and tenure squared; public sector dummy; non-white ethnic group; industrial sector (9 categories); occupational group (9 categories); establishment size (8 categories); part-time status; permanent job status; highest qualification attained (6 categories); workplace location (21 categories); monthly time dummies, and a gender dummy when the estimates are not separated by gender.

Table 5: Wage gap measure

Training in last 4 weeks	all workers	adult men	adult women	young people	young men	young women
linear equation (no controls)	-0.003	0.009	-0.011	0.002	0.028	-0.047
robust t-ratio	-0.29	0.41	-0.71	0.03	0.25	-0.64
implied elasticity	-0.0004	0.0007	-0.0013	0.0003	0.0048	-0.0064
probit equation (with controls)	-0.008	0.004	-0.013	-0.003	0.041	-0.068
robust z-ratio	-0.65	0.18	-0.75	-0.06	0.58	-0.81
implied elasticity	-0.0010	0.0004	-0.0019	-0.0006	0.0108	-0.0117
NOBS linear	50,955	24,052	25,160	1,743	925	818
NOBS probit	50,522	23,799	25,011	1,712	905	803

Notes to Table 5:

1. The wage gap measure utilises the magnitude of the gap between the minimum and current wage rather than simply an indicator of whether the wage is below the NMW. The reported elasticity is evaluated at the means of the other control variables.
2. The linear (probit) estimate is the unconditional (conditional) difference in the probability of training receipt between those who were earning less than the NMW and the control group comprising those who were earning just above the NMW.
3. Control variables in the probit estimates are: experience and experience squared; age left full-time education; tenure and tenure squared; public sector dummy; non-white ethnic group; industrial sector (9 categories); occupational group (9 categories); establishment size (8 categories); part-time status; permanent job status; highest qualification attained (6 categories); workplace location (21 categories); monthly time dummies and a gender dummy when the estimates are not separated by gender.

Table 6: Low pay sectors

Training in last 4 weeks		all workers	adult men	adult women	young people
Dummy variable measure					
wage<nmw	after	0.083	0.067	0.079	0.169
	before	0.073	0.057	0.071	0.138
	difference	0.010	0.011	0.008	0.030
	robust t-ratio	0.97	0.45	0.71	0.056
nmw<=wage<1.15nmw	after	0.066	0.063	0.063	0.114
	before	0.069	0.048	0.066	0.183
	difference	-0.004	0.015	-0.003	-0.070
	robust t-ratio	-0.32	0.59	-0.19	-1.00
difference-in-differences	linear DinD	0.014	-0.005	0.011	0.100
	robust t-ratio	0.89	-0.14	0.62	1.13
	probit DinD	0.021	0.022	0.017	0.108
	robust z-ratio	1.16	0.59	0.82	1.19
Wage gap measure					
	linear equation (no controls)	0.002	0.007	-0.005	0.047
	robust t-ratio	0.14	0.19	-0.25	0.66
	implied elasticity	0.0005	0.0012	-0.0010	0.0113
	probit equation (with controls)	-0.005	0.002	-0.009	0.058
	robust z-ratio	-0.35	0.05	-0.43	0.76
	implied elasticity	-0.0013	0.0004	-0.0023	0.0175
	NOBS linear	14,703	4,641	9,311	751
	NOBS probit	14,588	4,593	9,260	721

Notes to Table 6:

1. The wage gap measure utilises the magnitude of the gap between the minimum and current wage rather than simply an indicator of whether the wage is below the NMW. The reported elasticity is evaluated at the means of the other control variables.
2. The linear (probit) difference-in-differences (DinD) estimate is the unconditional (conditional) difference in the probability of training receipt between those who were earning less than the NMW and the control group comprising those who were earning just above the NMW.
3. Control variables in the probit difference-in-differences estimates are: experience and experience squared; age left full-time education; tenure and tenure squared; public sector dummy; non-white ethnic group; industrial sector (9 categories); occupational group (9 categories); establishment size (8 categories); part-time status; permanent job status; highest qualification attained (6 categories); workplace location (21 categories); monthly time dummies and a gender dummy when the estimates are not separated by gender.

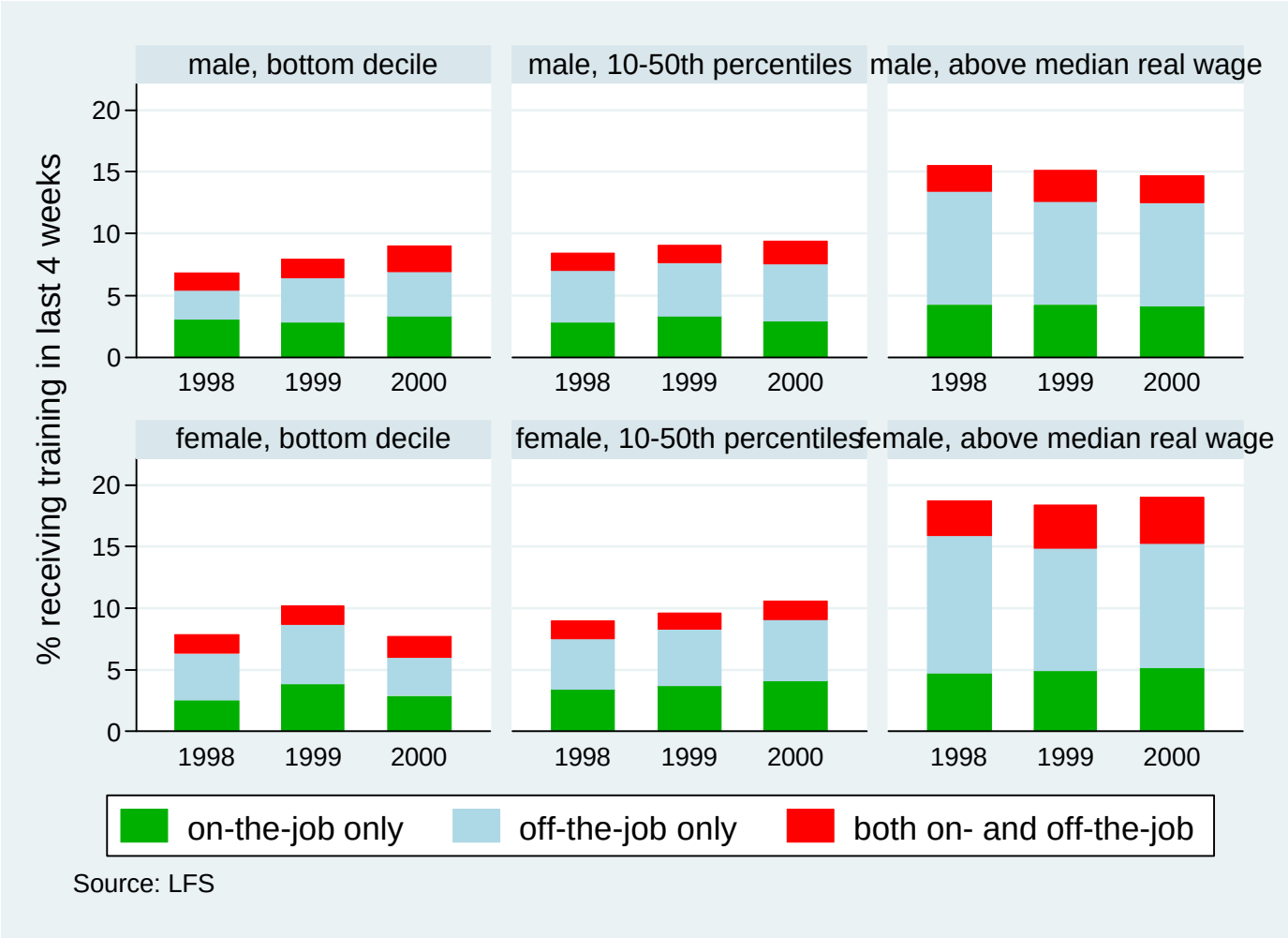
Table 7: NMW upratings and robustness checks

Training in last 4 weeks		All adult workers				
Comparison *nmw<w<1.15nmw*		A	B1	B2	C1	C2
		Intro. April 1999	Uprating 1: Oct 2000 Comparator group:		Uprating 2: Oct 2001 Comparator group:	
			minimum	maximum	minimum	maximum
I: Wage based on USUAL hours	linear DinD	0.003	-0.013	-0.006	0.003	-0.001
	robust t-ratio	0.23	-0.23	-0.37	0.24	-0.06
	probit DinD	0.002	0.072	0.019	0.001	0.003
	robust z-ratio	0.11	0.63	0.91	0.08	-0.19
II: Wage based on ACTUAL hours	linear DinD	0.010	-0.024	-0.009	0.049	0.025
	robust t-ratio	0.78	-0.78	-0.57	1.84	1.96
	probit DinD	0.011	0.002	0.007	0.043	0.022
	robust z-ratio	0.58	0.05	0.39	1.28	1.27
III: Wage based on HRRATE	linear DinD			0.024		-0.005
	robust t-ratio			1.29		-0.36
	probit DinD			0.060		-0.008
	robust z-ratio			1.78		-0.43

Notes to Table 7:

1. The linear (probit) difference-in-differences (DinD) estimate is the unconditional (conditional) difference in the probability of training receipt between those who were earning less than the NMW and the control group comprising those who were earning just above the NMW.
2. Control variables in the probit difference-in-differences estimates are: experience and experience squared; age left full-time education; tenure and tenure squared; public sector dummy; non-white ethnic group; industrial sector (9 categories); occupational group (9 categories); establishment size (8 categories); part-time status; permanent job status; highest qualification attained (6 categories); workplace location (21 categories); monthly time dummies and a gender dummy when the estimates are not separated by gender.
3. The wage based on USUAL hours is the ONS recommended measure for hourly pay which divides pay received in the last pay period by the usual number of paid hours. The wage based on ACTUAL hours uses the actual number of paid hours as the divisor. The wage based on HRRATE uses the information for those workers paid a fixed hourly rate which has been gathered since Spring 1999.
4. The selection of the comparator group against which to measure the impact of the NMW upratings is described in the text.

Figure 1: Percentage reporting receipt of training in last 4 weeks by gender and pay deciles



Source: LFS