The impact of the National Living Wage on wages, employment, and hours

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Abstract

This report covers the first of our internal econometric analyses of the effect of the NLW. We compare the labour market outcomes of workers whose pay is under the incoming minimum wage with those whose pay is slightly higher. We find strong evidence that the introduction of the NLW and its first uprating led to increased pay for affected workers. We find evidence that the introduction of the NLW may have led to slight declines in employment retention for low-paid women working part-time, but not for any other groups. We find no evidence of positive pay effects in 2018, but some evidence of positive employment retention effects for women working part-time. Our analyses suggests that workers earning just above the NLW saw faster pay growth than NLW workers in 2019. We find no evidence of hours effects in any year. Over the first four years of the NLW we find evidence of increases in real hourly wages, but no evidence of an impact on employment retention. We do find some evidence of a reduction in the number of hours worked by male part-time employees, but this is in a specification which we have limited ability to test.

Introduction

Background

1 The introduction of the National Living Wage (NLW) in April 2016 was a significant departure from the previous method of setting the National Minimum Wage (NMW). The NLW was introduced at a level 7.5 per cent higher than the previous rate and with a four-year target implying significant increases in the years to follow. The Government's remit to the Low Pay Commission (LPC) set a target level for the NLW of 60 per cent of median earnings by October 2020, subject to sustained economic growth.

2 In 2019 the Government asked Professor Arindrajit Dube to consider international evidence on the impacts of minimum wages and the implications for UK policy. One of Professor Dube's recommendations was that the LPC establishes a set of "off the shelf" methods that we could use to evaluate the NLW in-house. This gave added impetus to our effort to undertake more econometric work in house and this report sets out the first of our attempts to re-use methodology developed for us by external researchers on commissioned projects.

3 The initial findings from this piece of research fed into our evidence base for our recommendations in 2020. The Low Pay Commission (2020) contained a high-level summary of the initial findings and the methodology used in this research. This is the first of two different methods we have used in-house to econometrically analyse the effects of the NLW and this report covers the initial results from the first of these. This paper uses two different control groups and analyses the impact after each NLW uprating as well as covering the four-year effects. The aim of this publication is to be as transparent as possible so the results can be replicated and scrutinised by others. The Stata code used is available from us and will be published in due course.[1]

4 External transparency is one part of our scrutiny and quality assurance process. We have also convened a group of experts who advise on the best methods and make recommendations for further work. This group includes external academics and researchers. Furthermore, two of our then Commissioners, Professors Sarah Brown and Richard Dickens, who are experts in research methods and labour market economics provided views and feedback.

5 The methodology used in this analysis builds on the research of Aitken, Dolton, & Riley (2018). That research project was initially commissioned in 2017 to examine the impact of the introduction of the NLW in April 2016 and the first uprating in April 2017 on wages, employment retention[2] and hours of work. As part of the contract the researchers shared their statistical code with us, and this code forms the basis of the research in this paper.

[1] This is our first version of using this methodology. We welcome any feedback on our analysis to enable us to improve it for any subsequent analyses. Please send any comments and views to our email address: lpc@lowpay.gov.uk

[2] Whereby workers remain in employment, but not necessarily in the same job.

Existing literature

6 There is a considerable body of evidence examining the effects of minimum wages on pay, employment, and hours. A pioneering study by Card & Krueger (1994) using a quasi-experimental approach to examine an increase in the minimum wage in New Jersey inspired a large increase in quantitative studies of minimum wages. Much of the early work was focused on the United States of America, but there now exists a considerable body of research examining minimum wages across the world.

7 The NMW was introduced in 1999 and increased by varying amounts each year according to the LPC's recommendations. The recommendations were based on a remit from the Government that aimed to maximise the level of the minimum wage without detrimental impacts on employment. There have been a series of studies of the effect of the introduction of the NMW and some of the subsequent increases on earnings, employment, and hours. These include (Stewart, 2004a and 2004b, and Dickens, Rebecca, & Wilkinson (2015) among other research. These studies have generally found evidence that the NMW led to wage increases, but have found little to no evidence of employment and hours effects.

8 The introduction of the NLW in 2016 produced a series of new research projects examining how outcomes changed following the substantially larger increases in the wage floor under the new NLW remit. Since 2017 we have commissioned four research projects looking at the employment effects of the NLW, with different projects covering different periods. Aitken, Dolton, & Riley (2018) looked at the introduction of the NLW and its first uprating in 2017. The researchers used difference-in-difference analysis to compare the outcomes of workers who earned below the incoming NLW with those whose earnings were slightly higher. They found no robust effect from the NLW on overall minimum wage employment retention, but did find some evidence of a negative impact on employment retention of 2.5 percentage points for women working part-time (an elasticity of between -0.35 and -0.2). The authors also found evidence of a decrease of 9.3 percentage points in retention of women working part-time in the retail industry. They also found weak evidence of a fall in hours worked by male full-time workers in the hospitality industry of around 1 hour 45 minutes following the 2016 introduction of the NLW. This was, however, reversed in the subsequent year. The authors concluded that the NLW had had little adverse impact on employment retention overall.

9 Capuano, Cockett, Gray, & Papoutsaki (2019) examined the effect of the introduction of the NLW and the subsequent upratings in 2017 and 2018. They took a similar approach to Aitken, Dolton, & Riley (2018), comparing employment outcomes of workers earning the NLW to those earning just above. However, instead of using the Annual Survey of Hours and Earnings (ASHE) for their analysis, they used the Labour Force Survey. The authors found that the introduction of the NLW reduced employment retention for both male and female part-time employees. The employment retention elasticities from the NLW were estimated at -0.56 for women working part-time and -0.72 per cent for men working part-time. The effects were largest for women working part-time in the public sector.

10 The authors found little evidence that the 2017 or 2018 upratings affected employment retention for men or women, working full-time or part-time, with one exception. The authors did note a finding of a positive employment retention effect for women working part-timer in the

private sector in 2018. The authors found little evidence of an effect from the NLW on working hours. They did find some evidence that men who worked full-time experienced a reduction in working hours following the introduction of the NLW in 2016, but this was not apparent in both data sets.

11 Dickens & Lind (2018) used the variation in minimum wage 'bite' across travel-to-work areas in the UK to model the impact of the NLW introduction and the 2017 uprating. This approach enables the researchers to capture all entry and exit from employment and the labour market, and not just employment retention. The research found a strong wage effect in both years and a modest, but statistically significant, negative effect on employment for part-time women workers in 2017, but not in 2016. The authors interpret this by saying that a 10 per cent increase in the bite is associated with a 2.9 per cent lower employment rate. The results suggested that those who would have been in employment without the higher minimum wage are economically inactive instead. The authors' estimate of employment loss from the increase of the NLW to the 2020 level, assuming 2017 employment effect, was within the band of employment loss expected by the Office for Budget Responsibility (OBR) at the time of the introduction of the NLW. OBR (2015) estimated job loss to be between 20,000 and 110,000.

12 McGuinness, McVicar, & Park (2017) examined the effect of the introduction of the NMW and the NLW on employment retention and hours worked using the differences in minimum wages across the border between Northern Ireland and the Republic of Ireland. No employment effects were found for the period covering the introduction of the NLW in 2016 – although the sterling depreciation at this time following the EU referendum could have obscured any impact from the NLW.

Methodology

Difference-in-difference approach

13 The methodology used in this paper follows a difference-in-difference approach – a standard approach in assessing the impact of a minimum wage. This method was first used to examine the impact of minimum wages by Linneman (1982) in the USA, and is the approach taken by Stewart (2004a and 2004b; Stewart & Swaffield (2008); Dickens, Riley, & Wilkinson (2015); Aitken, Dolton, & Riley (2018); and Capuano, Cockett, Gray, & Papoutsaki (2019).

14 The difference-in-difference approach used here stratifies workers into three groups: a 'treated' group, who earn less than the incoming minimum wage, and therefore are likely to see faster increases in their wage than they would have in the absence of the increase in the minimum wage; a 'control' group who are similar to the 'treated' group, but who have not seen their wages affected by the minimum wage; and a third group who are excluded from the analysis.

15 Individuals are observed in different time periods. The period before a minimum wage increase is the 'control' period, and the period after an increase is the 'treatment' period. The methodology compares the difference in the outcomes for treated and control individuals in the control period to the differences in outcomes in the treatment period, while controlling for other factors. This 'difference-in-difference', the change in relative outcomes, measures the effect of the treatment – the increase in the minimum wage.

16 The analysis in this paper uses two definitions of the treatment group. These are:

a. Those who earn between the current minimum and the incoming minimum wage. This group includes all workers whose pay is directly affected by the increase in the minimum wage.

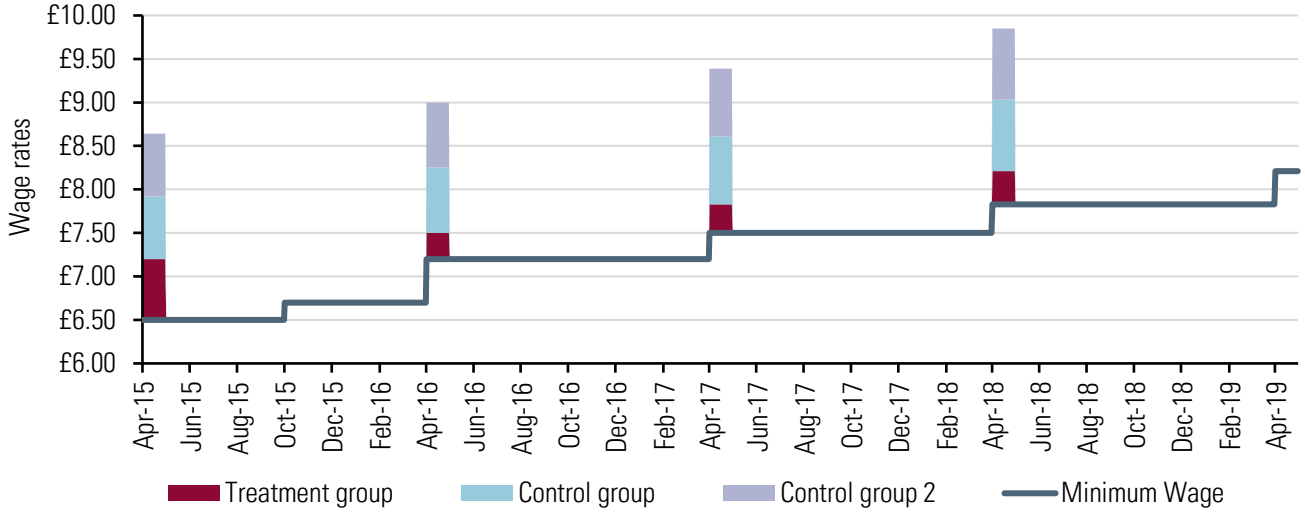
b. Those who earn at the current minimum, or up to 0.5 per cent above it. This group only includes the workers whose pay is most affected by the increase in the minimum wage.

17 We also run a regression assuming a linear relationship between the effect and the wage increase needed to meet the incoming minimum wage. This is termed the 'wage gap' definition (with the gap calculated by dividing the incoming NLW by the individual's current wage). We only include those workers who are aged 25 and over – the group for whom the NLW acts as a wage floor, and we also exclude workers approaching retirement age.

18 Defining a control group is difficult in the UK. The absence of geographic variation in minimum wages means that we cannot identify a group who earned the same as the treated workers before the intervention, but are unaffected by the increased minimum wage. Instead, we examine workers who were earning above the incoming minimum wage, and are therefore not directly affected by the increase in the wage floor. In choosing the wage band of employees to act as a control group, there is a trade-off between maximising comparability with the treated group and minimising 'spillovers'. The closer that the control groups is to the treated group in wage terms, the more similar that they are, but the higher the risk that the results could be coloured by 'spillovers' – effects from the minimum wage that apply to workers who are not directly affected by the pay increase, but whose pay or hours are affected as their employers respond to a higher minimum wage. Spillovers could occur due to employers maintaining differentials between these staff and the minimum wage or through employers redesigning their workforce structure to respond to a higher minimum wage.

19 In the analyses in this document, we use two control groups. The first control group is defined as those earning between the incoming NLW and 10 per cent above it. This is consistent with the definition used in Aitken, Dolton, & Riley (2018), and the second control group uses a definition of individuals paid between 10 and 20 per cent above the incoming minimum wage, as used in Capuano, Cockett, Gray, & Papoutsaki (2019). Figure 1 shows the pay bands associated with the control and treatment groups used in the analysis.

Figure 1: Treatment and control groups



Source: LPC analysis

20 We follow Aitken, Dolton, & Riley (2018) and Capuano, Cockett, Gray, & Papoutsaki (2019) in using the period before the introduction of the NLW in 2015 as the pre-treatment period. While in this period the NMW was increasing the wage floor, the increases were significantly lower than the increases during the NLW period. In the control (pre-treatment) years, we define the treated group as those earning between the then current NMW and 10.8 per cent above this (the increase in the wage floor following the introduction of the NLW), so that the control and treatment wage groups represent a similar section of the pay distribution as in the post-NLW period.

21 The dataset that we use is the Annual Survey of Hours and Earnings (ASHE). ASHE is a yearly sample of the same 1 per cent of individuals, provided that they are in employment and is conducted each April (see Data section for more detail). The longitudinal nature of ASHE enables us to create measures of individual wage growth, employment retention and changes in hours.

22 We consider three measures of the effects of the minimum wage on workers:

a. The change in log real wages: $\ln(\text{real wage}_{t+1}) - \ln(\text{real wage}_t)$

b. Employment retention: Probability $(\text{Employed}_{i;t+1} = 1 \mid \text{Employed}_{i;t} = 1)$

c. Change in hours conditional on remaining in employment: $\text{Hours}_{t+1} - \text{Hours}$

23 We therefore estimate the following regression:

$$\gamma_{it} = \gamma_0 + \gamma_1 D_{it} + \delta(T_t \cdot D_{it}) + \beta X_{it} + Y_t + \varepsilon_{it} \quad (1)$$

24 Where:

γ_{it} is the outcome of interest, as described in paragraph 22;

D_{it} = 1 if the individual is in the treatment and 0 otherwise;

T_t = 1 if the period is post-treatment and 0 otherwise;

X_{it} are the individual, year specific controls, and Y_t are a set of year dummies for common time effects; and

δ is the coefficient of interest.

25 The parameter γ_1 measures the baseline average difference in outcomes between the treatment and control groups (the normal difference), and is the estimated treatment effect of the NMW/NLW change.

26 For the difference-in-difference approach to hold we need the following two identification assumptions to be true. Firstly, common trends – that, absence of the intervention, the treatment and control groups would see similar changes in outcomes. Secondly, that there are no spillovers from the treatment into the control group. If the incoming minimum wage leads to effects in the control group, then any estimates of minimum wage effects would be biased towards zero.

27 There are also possible measurement issues. Firstly, employment retention may not be a good measure of the employment effects from the minimum wage. If the higher wage floor instead discourages hiring of previously unemployed workers, then this methodology would not pick that up. Individuals with multiple jobs are excluded in this analysis as they could belong in multiple groups depending on their pay – i.e. an individual could be both in the treated group, if one of their jobs paid below the incoming minimum wage, and in the control group if their other job paid slightly above the incoming minimum wage. The measure of hours used is paid hours from payroll data, which do not include some useful information, for example whether any extra non-paid hours workers were performed. There are also potential issues with differential response rates across the sample in the data source.

28 We have also extended the analysis to examine the four-year effect of the NLW. We define two new treatment groups – those that earned less than the nominal value of the 2019 NLW in 2015 and those earning less than the equivalent real 2019 value of the NLW in 2015. For the latter, we adjust the 2019 NLW into 2015 real terms using the Consumer Price Index. We also create wage gap measures for these groups. We define our control group as those that earn up to 10 per cent above the incoming NLW in nominal terms. We then analyse the four-year wage growth, hours change and employment retention for these groups. These are simply the individual's percentage wage growth between the base year and four years later, the change in hours for the same period, and whether or not an individual is in employment (in the dataset) four years later.

Estimation and interpretation

29 Moulton (1990) showed that difference-in-difference estimations of the type used in this research can be susceptible to within-group correlation of errors, while Bertrand, Duflo, & Mullainathan (2004) found that serial correlation of errors could also be an issue. Therefore, following Aitken, Dolton, & Riley (2018) we use the generalised form of the Moulton factor to correct the conventionally estimated standard errors.

30 We have currently only produced coefficient estimates, Moulton-corrected standard errors and confidence intervals at the 5 per cent significance level, to test that the effect is different from zero. We recognise that this limits the ability to interpret the findings and therefore intend to calculate the elasticities associated with the coefficients and include these figures in subsequent reports.

31 We run 'placebo' tests on the data as a check on the robustness of our results. We do this by running the regression while using a pre-NLW year as the 'treatment' year. If the regressions estimate statistically significant results it suggests that the assumptions that underpin our use of a

difference-in-difference approach are less valid. We run our placebo regression using 2013 as the treatment year, and 2009-2011 as the control years. We are unable to run placebo tests on the four-year regressions, due to the limited number of years in our dataset.

Data

32 The dataset that we use is the Annual Survey of Hours and Earnings (ASHE). ASHE has benefits over the other possible dataset used in regression analyses of this type, the Labour Force Survey (LFS). Firstly, the measures of hourly pay in ASHE are more reliable than in the LFS. Secondly, sample sizes are considerably larger. ASHE is a yearly sample of 1 per cent of individuals paid through the HM Revenue and Customs tax system – Pay As Your Earn (PAYE) – which is based on their National Insurance number. Data is provided by employers with any employees with the relevant National Insurance numbers. Prior to 2014, employers were only required to submit data for employees who were earning at or above the PAYE threshold, although larger employers typically submitted data for all the relevant employees. Therefore, workers may have still been in employment, but not be included if their pay fell below the PAYE threshold. From 2014 onwards all employers are required to submit ASHE data for all relevant employees, if any employee at the company earned at or over the PAYE threshold. The longitudinal nature of ASHE enables us to create measures of individual wage growth, employment retention and changes in hours.

33 ASHE is collected for a reference week in April each year. Before the introduction of the NLW in 2016 the minimum wage was uprated in October, so data were collected six months after the minimum wage increased. However, since the NLW increases occur in April, the post-NLW measurements only occur a few weeks after the increase in the wage floor.

34 ASHE contains limited demographic information. Information is collected on an individual's age, gender, home address, occupation, industry, and workplace location as well as the number of employees at that employer. No information is available on disability, ethnicity, or educational qualifications.

35 We do not include observations where there are inconsistencies in gender or age over time. We also exclude observations of individuals who have suffered a 'loss of pay', who have multiple jobs, or have unrealistic hours recorded (over 112 weekly hours). We exclude individuals who are under 25 – the age cut-off for NLW eligibility – as well as those approaching retirement age.

36 Unfortunately, there are issues with attrition in ASHE. Around 25 to 30 per cent of the ASHE sample in a year do not appear in the sample in the next year, whereas the Annual Population Survey (a household survey covering around 230,000 individuals a quarter), finds that that only around eight per cent of employees at a given point are not in employment 12 months later. For our regression methodology to provide a good estimate of the employment effect, we have to assume that any pattern in non-response from employers is unaffected by the introduction of the NLW. That is that any relative difference in attrition between the treatment and control groups is consistent over the period. Any change in relative non-completion of ASHE following the introduction of the NLW may also bias our estimates of wage and hours effects, if the individuals affected are not representative of the treatment or control group population as a whole.

37 Table 1 shows the number of individuals in each of our treatment and control groups, by gender and full-time status for the employment retention regression. Sample sizes are significant, with around 10,000 in both the control and treatment groups for men and women working full-time. Sample sizes are significantly smaller for men working part-time – particularly in control group 2, but still of a reasonable size, suggesting that findings that only apply to this group may require caution when interpreting. Sample sizes for women working part-time are significant, with around 20,000 in the treatment group each year, and over 10,000 in each of the control groups.

Table 1: Sample sizes for regression analysis

	Full-time men			Full-time women		
	Treatment	Control 1	Control 2	Treatment	Control 1	Control 2
2013	11,057	9,954	11,406	10,301	8,197	8,644
2014	11,371	10,342	11,436	10,453	8,544	8,645
2015	11,422	10,188	11,761	10,657	8,525	8,823
2016	10,658	10,752	11,838	9,777	8,917	8,961
2017	10,947	10,967	12,184	10,081	9,176	9,256
2018	11,277	11,295	12,108	10,329	9,582	9,270
	Part-time men			Part-time women		
	Treatment	Control 1	Control 2	Treatment	Control 1	Control 2
2013	5,798	2,331	1,601	19,836	11,335	8,695
2014	6,067	2,478	1,661	20,241	11,642	8,825
2015	6,236	2,387	1,667	20,581	11,627	8,836
2016	5,652	2,590	1,641	18,816	12,059	8,949
2017	5,916	2,609	1,569	19,487	12,387	9,080
2018	6,000	2,539	1,579	19,934	12,272	8,848

Source: LPC analysis of ASHE data.

38 We use the Consumer Price Index to convert nominal wages into real wages. As set out in paragraph 22 we define wage growth as the change in the natural log real wage ($\ln(\text{real wage}_{t+1}) - \ln(\text{real wage}_t)$). We use the hrpayx variable, which measures hourly pay excluding overtime and shift premium pay, to define the hourly wage. This is consistent with the definition of hourly pay that is used to calculate compliance with the minimum wage. We use total paid hours worked as our measure of hours worked. Employment retention is a dummy variable that takes the value of one if an individual is in the ASHE dataset (and therefore in employment) in the dataset subsequent to the NLW increase, and a zero if they are not in the dataset.

39 Table 2 shows the mean wage, hours worked and employment retention rates for the treatment and control groups. Workers in the control group are paid around 60-80 pence more, are typically between 4 and 8 percentage points more likely to be retained in employment and work 2.5-3.5 more hours a week on average.

Table 2: Mean wages, hours worked and employment retention rates in treatment year.

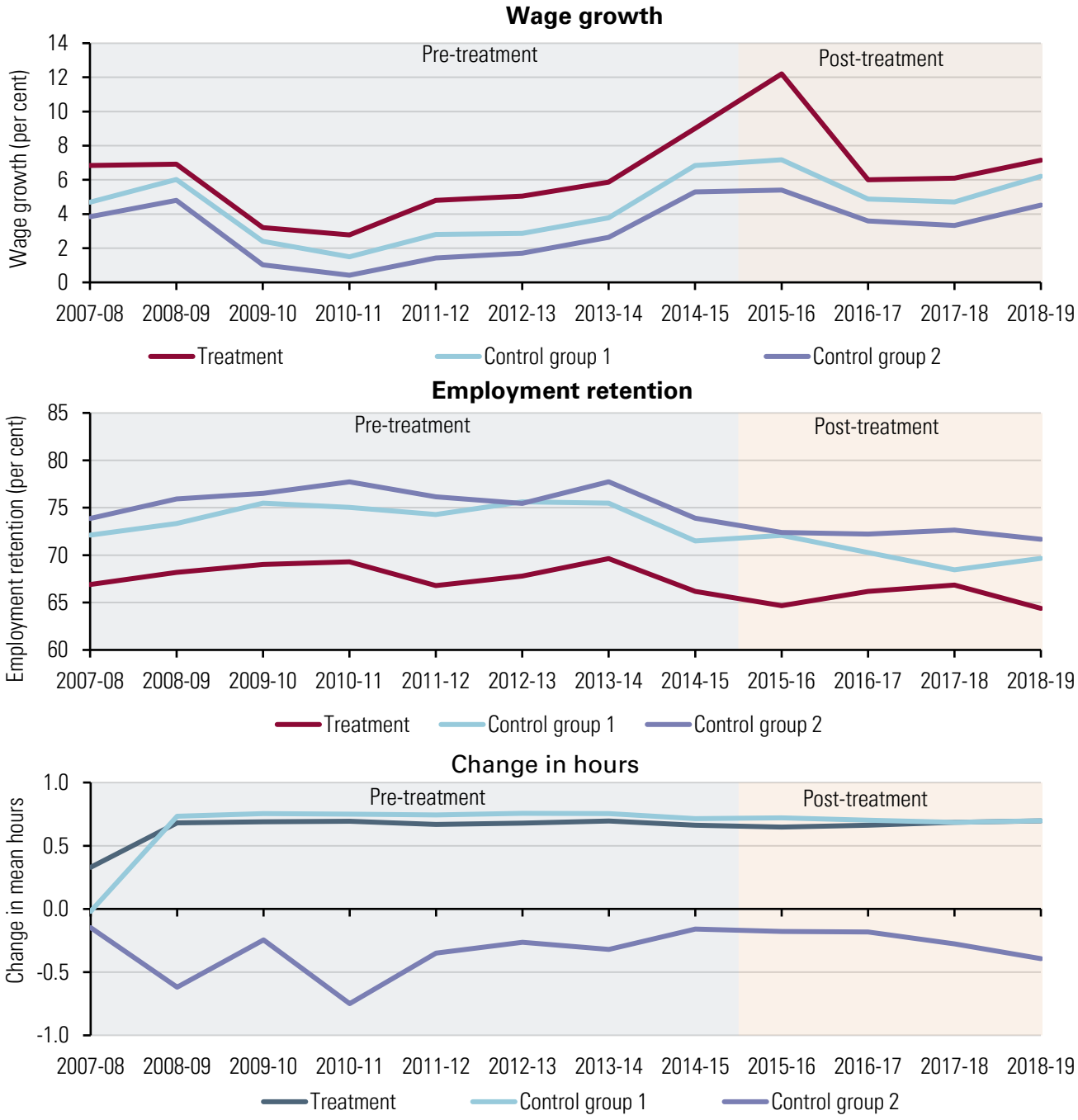
	Mean Wage			Average employment retention			Mean hours worked		
	Treatment	Control 1	Control 2	Treatment	Control 1	Control 2	Treatment	Control 1	Control 2
2012	£5.57	£6.22	£6.81	66.9	72.1	73.9	27.7	31.3	33.8
2013	£5.77	£6.42	£7.02	68.2	73.3	75.9	27.7	31.8	34.3
2014	£5.97	£6.66	£7.29	69.0	75.5	76.5	27.8	31.1	33.6
2015	£6.04	£6.74	£7.39	69.3	75.0	77.7	27.8	31.2	33.4
2016	£6.17	£6.90	£7.54	66.8	74.3	76.2	28.0	31.4	33.6
2017	£6.31	£7.06	£7.74	67.8	75.6	75.5	27.9	30.9	33.4
2018	£6.42	£7.20	£7.89	69.6	75.5	77.7	27.9	31.3	33.5
2019	£6.54	£7.33	£8.04	66.2	71.5	73.9	28.0	31.1	33.2

Source: LPC analysis of ASHE data.

Note: Employment retention requires a subsequent year of data to be calculated, therefore we lack an estimate for 2019.

40 Figure 2 shows wage growth, employment retention, and change in hours worked for the treatment and control groups. We can see that wages and employment retention appear to be under common trends in the pre-treatment period. The trends in changes in hours worked appear less similar for control group 2, but are similar for control group 1.

Figure 2: Trends in wage growth, employment retention and changes in hours, by treatment and control group.



Source: ASHE

Results

41 We estimate the three different specifications, one when all workers earning between the existing minimum wage and the incoming minimum wage ('all affected workers'), one where we only include those workers earning at the existing minimum wage or 0.5 per cent above ('minimum wage workers only'), and one where the effect is weighted by the difference between the individuals current wage and the incoming minimum wage for all workers who earn less than the incoming minimum wage ('wage gap'). We estimate these specifications for all workers together

and separately for men working full-time, women working full-time men, men working part-time and women working part-time.

42 All of the specifications estimated include controls for age, age squared, a dummy for being in the same job, occupation fixed effects, industry fixed effects, region of work fixed effects, and year fixed effects. The coefficients on these variables are not reported here. As discussed in paragraph 29, we use the Moulton correction for standard errors, these are shown below the coefficients. We also report the 95 per cent confidence interval for the estimate.

Main results

43 Table 3 shows the outputs we estimate of the effect of the introduction of the NLW and its subsequent upratings on hourly wages when compared to control group 1. In 2016, the NLW increased pay for all the groups. Real pay growth was around 4 percentage points faster for full-time treated workers, and 5 percentage points for part-time treated workers than for the control group. In 2017 the NLW again increased pay for all the treated groups. Real pay growth was around 1 percentage point higher due to the NLW for each of the sub-groups examined. In 2016, when we restrict analysis to those earning at, or close to the existing minimum wage, wage growth is higher, which is to be expected as these are the people who are furthest away from the incoming NLW, and who therefore experience the largest increase in wages. However, in 2017 the coefficients are very similar suggesting that most affected workers experienced similar increases in wages. These effects are consistent with the findings of Aitken, Dolton, & Riley (2018).

44 However, in 2018 there was no evidence of an effect from the NLW on pay. Wages increased for workers directly affected by the incoming minimum wage by a similar amount to those workers earning just above the incoming minimum wage. Workers at the old minimum wage saw smaller increases in wages than those earning just above the incoming NLW. In 2019, there was evidence that workers earning above the incoming NLW saw faster wage growth, of the order of 0.5-1.0 percentage points, than those directly affected by the incoming NLW. We think that the NLW has caused significant wage spillovers, resulting in the wages for workers earning slightly above the NLW growing faster. This is consistent with the evidence presented in Low Pay Commission (2020) and the findings of Avram & Harkness (2019). In 2018 and 2019 these spillovers may have caused the findings of negligible and negative wage effects. As discussed in paragraph 25, the existence of spillovers would result in this difference-in-difference technique becoming a poor estimator of any effects. For this reason, we added the analysis of the second control group.

45 Table 4 shows the results for the second group. The results are very similar to those for the first control group. They suggest that the 2016 introduction of the NLW and the first uprating in 2017 increased wages. The results suggest slightly stronger wage growth than when compared with the first control group, around 6 percentage points for all workers in 2016 and slightly under 2 percentage points in 2017. As with the first control group, we find no evidence of pay effects in 2018. We also find some limited evidence of negative relative pay growth in 2018, albeit where we have statistically significant results, it is of a smaller extent than when compared with our first control group.

Table 3: Effect of the NLW on real wage growth – Control group 1

		All	FT men	FT women	PT men	PT women
Effect of the 2016 introduction of the NLW	All affected workers	0.047***	0.042***	0.043***	0.053***	0.051***
		(0.002)	(0.003)	(0.002)	(0.003)	(0.003)
		[0.044,0.051]	[0.036,0.048]	[0.040,0.047]	[0.048,0.058]	[0.046,0.057]
	Minimum wage workers only	0.065***	0.063***	0.061***	0.068***	0.069***
		(0.001)	(0.007)	(0.002)	(0.002)	(0.003)
		[0.062,0.067]	[0.049,0.077]	[0.056,0.065]	[0.064,0.073]	[0.063,0.074]
	Wage gap	0.046***	0.041***	0.042***	0.051***	0.049***
		(0.001)	(0.003)	(0.001)	(0.002)	(0.002)
		[0.043,0.049]	[0.035,0.046]	[0.039,0.045]	[0.046,0.055]	[0.044,0.054]
Effect of the 2017 uprating of the NLW	All affected workers	0.011***	0.010**	0.013***	0.011***	0.009***
		(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
		[0.008,0.014]	[0.004,0.016]	[0.010,0.016]	[0.006,0.017]	[0.005,0.014]
	Minimum wage workers only	0.008***	0.007**	0.010**	0.012***	0.008**
		(0.001)	(0.003)	(0.003)	(0.002)	(0.003)
		[0.006,0.010]	[0.003,0.012]	[0.003,0.016]	[0.008,0.015]	[0.003,0.013]
	Wage gap	0.010***	0.010**	0.013***	0.011***	0.009***
		(0.001)	(0.003)	(0.002)	(0.003)	(0.002)
		[0.008,0.013]	[0.004,0.016]	[0.010,0.016]	[0.006,0.016]	[0.006,0.013]
Effect of the 2018 uprating of the NLW	All affected workers	-0.001	-0.001	0.000	-0.002	0.000
		(0.001)	(0.003)	(0.002)	(0.003)	(0.002)
		[-0.003,0.002]	[-0.006,0.004]	[-0.003,0.004]	[-0.007,0.003]	[-0.004,0.005]
	Minimum wage workers only	-0.006***	-0.008**	-0.005*	-0.006	-0.006*
		(0.001)	(0.003)	(0.002)	(0.004)	(0.003)
		[-0.009,-0.004]	[-0.014,-0.003]	[-0.010,-0.000]	[-0.012,0.001]	[-0.011,-0.000]
	Wage gap	0.000	-0.001	0.001	-0.001	0.000
		(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
		[-0.003,0.002]	[-0.005,0.004]	[-0.003,0.004]	[-0.006,0.004]	[-0.004,0.005]
Effect of the 2019 uprating of the NLW	All affected workers	-0.007***	-0.004	-0.006**	-0.009***	-0.009***
		(0.001)	(0.002)	(0.002)	(0.003)	(0.002)
		[-0.009,-0.005]	[-0.008,0.001]	[-0.010,-0.002]	[-0.014,-0.004]	[-0.013,-0.005]
	Minimum wage workers only	-0.014***	-0.011***	-0.015**	-0.012***	-0.015***
		(0.001)	(0.003)	(0.005)	(0.003)	(0.002)
		[-0.017,-0.011]	[-0.017,-0.005]	[-0.025,-0.005]	[-0.017,-0.007]	[-0.019,-0.012]
	Wage gap	-0.007***	-0.004+	-0.006**	-0.009***	-0.009***
		(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
		[-0.009,-0.005]	[-0.008,0.001]	[-0.010,-0.002]	[-0.014,-0.004]	[-0.012,-0.005]

Source: LPC estimates using ASHE.

Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

Table 4: Effect of the NLW on real wage growth – Control group 2

		All	FT men	FT women	PT men	PT women
Effect of the 2016 introduction of the NLW	All affected workers	0.056***	0.052***	0.054***	0.064***	0.057***
		(0.005)	(0.007)	(0.005)	(0.010)	(0.008)
		[0.045,0.066]	[0.039,0.065]	[0.043,0.064]	[0.044,0.083]	[0.042,0.072]
	Minimum wage workers only	0.072***	0.073***	0.071***	0.079***	0.075***
		(0.007)	(0.017)	(0.007)	(0.004)	(0.007)
		[0.058,0.086]	[0.039,0.107]	[0.057,0.085]	[0.070,0.087]	[0.062,0.088]
	Wage gap	0.053***	0.050***	0.051***	0.061***	0.055***
		(0.005)	(0.006)	(0.005)	(0.009)	(0.007)
		[0.044,0.063]	[0.038,0.062]	[0.042,0.061]	[0.044,0.078]	[0.042,0.069]
Effect of the 2017 uprating of the NLW	All affected workers	0.017***	0.016*	0.019***	0.018**	0.016**
		(0.004)	(0.006)	(0.004)	(0.006)	(0.006)
		[0.008,0.025]	[0.004,0.029]	[0.012,0.027]	[0.006,0.030]	[0.004,0.028]
	Minimum wage workers only	0.014*	0.014	0.016***	0.018***	0.014*
		(0.006)	(0.011)	(0.004)	(0.003)	(0.007)
		[0.002,0.026]	[-0.008,0.036]	[0.008,0.024]	[0.012,0.024]	[0.000,0.027]
	Wage gap	0.016***	0.016**	0.019***	0.017**	0.015**
		(0.004)	(0.006)	(0.004)	(0.006)	(0.006)
		[0.008,0.024]	[0.004,0.028]	[0.011,0.026]	[0.006,0.028]	[0.004,0.027]
Effect of the 2018 uprating of the NLW	All affected workers	0.006	0.004	0.010*	0.001	0.008
		(0.004)	(0.005)	(0.004)	(0.006)	(0.006)
		[-0.002,0.015]	[-0.005,0.014]	[0.001,0.018]	[-0.011,0.014]	[-0.004,0.021]
	Minimum wage workers only	0.000	-0.003	0.004	0.007+	0.002
		(0.005)	(0.005)	(0.004)	(0.004)	(0.007)
		[-0.009,0.009]	[-0.013,0.007]	[-0.004,0.012]	[-0.001,0.014]	[-0.011,0.016]
	Wage gap	0.006	0.004	0.010*	0.001	0.008
		(0.004)	(0.005)	(0.004)	(0.006)	(0.006)
		[-0.002,0.014]	[-0.005,0.014]	[0.002,0.018]	[-0.010,0.013]	[-0.003,0.020]
Effect of the 2019 uprating of the NLW	All affected workers	-0.007+	-0.004	-0.002	-0.013*	-0.014+
		(0.004)	(0.005)	(0.003)	(0.006)	(0.007)
		[-0.015,0.001]	[-0.013,0.006]	[-0.008,0.005]	[-0.025,-0.002]	[-0.028,0.000]
	Minimum wage workers only	-0.014***	-0.011*	-0.011***	-0.011***	-0.020**
		(0.004)	(0.005)	(0.003)	(0.003)	(0.007)
		[-0.022,-0.007]	[-0.020,-0.001]	[-0.017,-0.006]	[-0.017,-0.005]	[-0.034,-0.007]
	Wage gap	-0.007+	-0.003	-0.002	-0.013*	-0.013*
		(0.004)	(0.004)	(0.003)	(0.005)	(0.007)
		[-0.014,0.001]	[-0.012,0.005]	[-0.008,0.004]	[-0.024,-0.003]	[-0.026,-0.000]

Source: LPC estimates using ASHE.

Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

46 Table 5 shows the estimated effects of the NLW on employment retention using our first control group. In 2016 we found evidence of negative employment retention effects for part-time women, which is consistent with the findings of Aitken, Dolton, & Riley (2018) and Capuano, Cockett, Gray, & Papoutsaki (2019). Employment retention was around 2 percentage points lower for women working part-time, who were affected by the NLW. There is no evidence of an employment retention effect in 2017. There was evidence of positive employment retention effects for part-time workers in 2018. However, this should be taken in the context that pay was not found to have increased for NLW employees relative to the control group. In 2019 there was evidence of negative employment retention effects for women working full-time, of around 2-4 percentage points. It is difficult to be confident in this finding, which suggests a negative effect from the minimum wage on employment, given that we find that pay growth was higher for the control workers (who earned above the incoming NLW) in this period – meaning that NLW workers were becoming relatively cheaper at this time. The positive employment effects in 2018 are consistent with the findings of Capuano, Cockett, Gray, & Papoutsaki (2019).

47 Table 6 shows the effect of the NLW on employment retention using the second control group. We find no evidence of an employment retention effect in 2016. In 2017 we find limited evidence of positive employment effects for women working part-time. We also find positive employment effects for part-time workers in 2018. However, we do not find wage effects in 2018 which again casts doubt on this being linked to the NLW. In 2019 we find similar negative employment effects for women working full-time than we find in our first control approach. We also find evidence of a positive employment effect for men working part-time. However, similarly to our findings with the first control group, we are less sure about linking this to the NLW given that pay growth was higher for the workers in the control group.

48 Table 7 shows the estimated effects of the NLW on hours, conditional on remaining in employment for the first control group. There is no evidence that the introduction of the NLW had an effect on hours worked. Similarly, in 2017 we find no evidence of an effect on hours worked. There is weak evidence of negative hours effects for women working full-time in 2018, but this should be viewed in the context of no difference in pay growth between the treated and control group. In 2019, again we see no evidence of an effect from the minimum wage on hours.

49 Table 8 shows the estimated effects of the NLW on hours, conditional on remaining in employment for the second control group. This group also looked as if there were inconsistent prior trends. There is very weak evidence that the introduction of the NLW reduced hours worked by male part-time workers. We find no evidence of any effect on hours worked from the NLW upratings in 2017 and 2018. In 2019 we see weak evidence of a positive hours effect from the minimum wage for men working part-time. However, this is in a context of lower pay growth for men working part-time at the minimum wage. Overall, the analyses seem to find little evidence of a relative fall in hours worked by those whose wages are directly affected by the incoming minimum wage.

Table 5: Effect of the NLW on employment retention – Control group 1

		All	FT men	FT women	PT men	PT women
Effect of the 2016 introduction of the NLW	All affected workers	-0.008	0.015	0.004	-0.018	-0.024*
		(0.007)	(0.013)	(0.013)	(0.024)	(0.011)
		[-0.020,0.005]	[-0.010,0.040]	[-0.021,0.028]	[-0.065,0.028]	[-0.044,-0.003]
	Minimum wage workers only	0.002	0.058**	-0.017	-0.004	-0.015
		(0.009)	(0.019)	(0.019)	(0.027)	(0.014)
		[-0.015,0.020]	[0.022,0.095]	[-0.054,0.021]	[-0.057,0.050]	[-0.042,0.013]
	Wage gap	-0.007	0.015	0.003	-0.016	-0.021*
		(0.006)	(0.012)	(0.012)	(0.022)	(0.010)
		[-0.019,0.005]	[-0.008,0.039]	[-0.020,0.027]	[-0.059,0.026]	[-0.041,-0.002]
Effect of the 2017 uprating of the NLW	All affected workers	0.012+	0.016	0.01	0.004	0.016
		(0.007)	(0.013)	(0.013)	(0.023)	(0.011)
		[-0.001,0.026]	[-0.009,0.042]	[-0.016,0.036]	[-0.040,0.049]	[-0.005,0.038]
	Minimum wage workers only	0.031***	0.027	0.003	0.039	0.038**
		(0.008)	(0.016)	(0.017)	(0.025)	(0.013)
		[0.014,0.047]	[-0.006,0.059]	[-0.030,0.037]	[-0.011,0.088]	[0.012,0.064]
	Wage gap	0.012+	0.016	0.009	0.005	0.017
		(0.006)	(0.012)	(0.013)	(0.022)	(0.011)
		[-0.000,0.025]	[-0.008,0.040]	[-0.016,0.034]	[-0.037,0.048]	[-0.004,0.037]
Effect of the 2018 uprating of the NLW	All affected workers	0.032***	0.008	0.029*	0.073***	0.046***
		(0.006)	(0.012)	(0.013)	(0.022)	(0.011)
		[0.020,0.045]	[-0.017,0.032]	[0.004,0.054]	[0.030,0.116]	[0.026,0.067]
	Minimum wage workers only	0.051***	0.016	0.01	0.100***	0.075***
		(0.008)	(0.016)	(0.017)	(0.025)	(0.013)
		[0.035,0.067]	[-0.015,0.048]	[-0.022,0.043]	[0.052,0.149]	[0.050,0.100]
	Wage gap	0.032***	0.008	0.027*	0.070***	0.046***
		(0.006)	(0.012)	(0.012)	(0.021)	(0.010)
		[0.019,0.044]	[-0.016,0.031]	[0.003,0.051]	[0.029,0.112]	[0.026,0.066]
Effect of the 2019 uprating of the NLW	All affected workers	-0.006	-0.009	-0.027*	0.022	-0.006
		(0.006)	(0.012)	(0.012)	(0.022)	(0.010)
		[-0.018,0.006]	[-0.033,0.015]	[-0.051,-0.003]	[-0.022,0.065]	[-0.027,0.014]
	Minimum wage workers only	0.002	-0.013	-0.034*	0.019	0.014
		(0.008)	(0.017)	(0.017)	(0.025)	(0.013)
		[-0.014,0.018]	[-0.045,0.020]	[-0.068,-0.001]	[-0.030,0.068]	[-0.011,0.040]
	Wage gap	-0.006	-0.009	-0.027*	0.02	-0.005
		(0.006)	(0.012)	(0.012)	(0.021)	(0.010)
		[-0.018,0.006]	[-0.032,0.014]	[-0.050,-0.004]	[-0.021,0.062]	[-0.025,0.015]

Source: LPC estimates using ASHE.

Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

Table 6: Effect of the NLW on employment retention – Control group 2

		All	FT men	FT women	PT men	PT women
Effect of the 2016 introduction of the NLW	All affected workers	0.004	0.006	0.010	0.021	0.009
		(0.007)	(0.012)	(0.013)	(0.028)	(0.012)
		[-0.010,0.017]	[-0.018,0.030]	[-0.015,0.034]	[-0.033,0.075]	[-0.015,0.032]
	Minimum wage workers only	0.013	0.046*	-0.012	0.039	0.019
		(0.009)	(0.018)	(0.019)	(0.031)	(0.015)
		[-0.005,0.031]	[0.010,0.082]	[-0.049,0.024]	[-0.022,0.100]	[-0.011,0.049]
	Wage gap	0.004	0.006	0.009	0.020	0.009
		(0.006)	(0.011)	(0.012)	(0.025)	(0.011)
		[-0.009,0.016]	[-0.016,0.029]	[-0.014,0.032]	[-0.030,0.070]	[-0.013,0.030]
Effect of the 2017 uprating of the NLW	All affected workers	0.010	0.014	0.009	-0.016	0.020+
		(0.007)	(0.013)	(0.013)	(0.028)	(0.012)
		[-0.004,0.024]	[-0.012,0.039]	[-0.017,0.035]	[-0.071,0.040]	[-0.004,0.044]
	Minimum wage workers only	0.028**	0.024	-0.001	0.020	0.042**
		(0.009)	(0.016)	(0.017)	(0.031)	(0.015)
		[0.011,0.044]	[-0.008,0.056]	[-0.034,0.033]	[-0.041,0.080]	[0.014,0.071]
	Wage gap	0.010	0.013	0.007	-0.013	0.020+
		(0.007)	(0.012)	(0.013)	(0.027)	(0.012)
		[-0.004,0.023]	[-0.011,0.037]	[-0.018,0.033]	[-0.066,0.041]	[-0.003,0.043]
Effect of the 2018 uprating of the NLW	All affected workers	0.012+	0.005	0.016	0.093**	0.006
		(0.007)	(0.012)	(0.013)	(0.029)	(0.012)
		[-0.002,0.025]	[-0.019,0.029]	[-0.010,0.041]	[0.035,0.150]	[-0.018,0.029]
	Minimum wage workers only	0.030***	0.014	-0.005	0.119***	0.035*
		(0.008)	(0.016)	(0.017)	(0.032)	(0.014)
		[0.014,0.046]	[-0.017,0.045]	[-0.038,0.028]	[0.057,0.181]	[0.007,0.062]
	Wage gap	0.011+	0.005	0.014	0.091**	0.007
		(0.007)	(0.012)	(0.012)	(0.028)	(0.011)
		[-0.001,0.024]	[-0.018,0.028]	[-0.010,0.038]	[0.035,0.146]	[-0.016,0.029]
Effect of the 2019 uprating of the NLW	All affected workers	-0.004	-0.018	-0.029*	0.077**	0.004
		(0.007)	(0.012)	(0.013)	(0.029)	(0.012)
		[-0.017,0.010]	[-0.042,0.006]	[-0.054,-0.004]	[0.020,0.134]	[-0.020,0.028]
	Minimum wage workers only	0.006	-0.020	-0.037*	0.075*	0.026+
		(0.008)	(0.016)	(0.017)	(0.032)	(0.015)
		[-0.011,0.022]	[-0.052,0.012]	[-0.070,-0.003]	[0.013,0.137]	[-0.003,0.055]
	Wage gap	-0.004	-0.018	-0.029*	0.073**	0.004
		(0.007)	(0.012)	(0.012)	(0.028)	(0.012)
		[-0.016,0.009]	[-0.041,0.005]	[-0.053,-0.005]	[0.018,0.128]	[-0.019,0.027]

Source: LPC estimates using ASHE.

Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

Table 7: Effect of the NLW on total hours worked – Control group 1

		All	FT men	FT women	PT men	PT women
Effect of the 2016 introduction of the NLW	All affected workers	-0.030	-0.146	0.034	-0.488	0.070
		(0.146)	(0.261)	(0.204)	(0.613)	(0.151)
		[-0.317,0.257]	[-0.658,0.367]	[-0.365,0.434]	[-1.689,0.713]	[-0.226,0.365]
	Minimum wage workers only	0.027	-0.154	0.204	-0.413	0.064
		(0.497)	(1.048)	(1.044)	(0.781)	(0.569)
		[-0.947,1.002]	[-2.208,1.900]	[-1.842,2.249]	[-1.943,1.117]	[-1.051,1.179]
	Wage gap	-0.022	-0.136	0.046	-0.444	0.066
		(0.138)	(0.244)	(0.190)	(0.575)	(0.143)
		[-0.292,0.248]	[-0.615,0.343]	[-0.327,0.419]	[-1.570,0.682]	[-0.214,0.346]
Effect of the 2017 uprating of the NLW	All affected workers	0.043	0.083	-0.144	-0.355	0.189
		(0.183)	(0.175)	(0.146)	(0.525)	(0.172)
		[-0.317,0.402]	[-0.260,0.425]	[-0.431,0.142]	[-1.385,0.675]	[-0.148,0.525]
	Minimum wage workers only	0.027	0.202	-0.269	-0.302	0.171
		(0.526)	(0.492)	(0.549)	(0.571)	(0.521)
		[-1.004,1.058]	[-0.763,1.167]	[-1.344,0.807]	[-1.422,0.818]	[-0.849,1.192]
	Wage gap	0.044	0.085	-0.140	-0.322	0.183
		(0.177)	(0.168)	(0.140)	(0.511)	(0.167)
		[-0.304,0.392]	[-0.244,0.413]	[-0.414,0.134]	[-1.323,0.679]	[-0.146,0.511]
Effect of the 2018 uprating of the NLW	All affected workers	-0.063	0.016	-0.378+	-0.341	0.092
		(0.126)	(0.210)	(0.208)	(0.586)	(0.127)
		[-0.310,0.184]	[-0.396,0.428]	[-0.785,0.029]	[-1.491,0.808]	[-0.157,0.341]
	Minimum wage workers only	-0.049	0.051	-0.292	-0.557	0.104
		(0.414)	(0.502)	(0.743)	(0.675)	(0.433)
		[-0.860,0.762]	[-0.933,1.035]	[-1.747,1.164]	[-1.880,0.766]	[-0.743,0.952]
	Wage gap	-0.061	0.015	-0.364+	-0.336	0.088
		(0.121)	(0.202)	(0.200)	(0.567)	(0.124)
		[-0.298,0.177]	[-0.380,0.411]	[-0.756,0.027]	[-1.447,0.775]	[-0.155,0.330]
Effect of the 2019 uprating of the NLW	All affected workers	-0.001	-0.052	-0.026	0.011	-0.021
		(0.177)	(0.171)	(0.207)	(0.599)	(0.162)
		[-0.348,0.346]	[-0.388,0.283]	[-0.431,0.379]	[-1.163,1.185]	[-0.339,0.297]
	Minimum wage workers only	0.040	-0.020	-0.268	0.008	0.166
		(0.457)	(0.537)	(0.647)	(0.591)	(0.448)
		[-0.856,0.936]	[-1.071,1.032]	[-1.536,1.000]	[-1.150,1.167]	[-0.712,1.045]
	Wage gap	0.002	-0.050	-0.027	0.008	-0.013
		(0.170)	(0.165)	(0.198)	(0.579)	(0.157)
		[-0.331,0.336]	[-0.373,0.274]	[-0.416,0.362]	[-1.126,1.143]	[-0.322,0.295]

Source: LPC estimates using ASHE.

Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

Table 8: Effect of the NLW on total hours worked – Control group 2

		All	FT men	FT women	PT men	PT women
Effect of the 2016 introduction of the NLW	All affected workers	-0.114	-0.124	-0.126	-1.525+	-0.078
		(0.168)	(0.322)	(0.341)	(0.822)	(0.121)
		[-0.444,0.215]	[-0.756,0.508]	[-0.795,0.542]	[-3.137,0.087]	[-0.316,0.161]
	Minimum wage workers only	-0.014	-0.069	0.070	-1.247	-0.084
		(0.481)	(1.346)	(1.039)	(1.082)	(0.452)
		[-0.957,0.929]	[-2.707,2.569]	[-1.966,2.105]	[-3.368,0.874]	[-0.971,0.803]
	Wage gap	-0.101	-0.115	-0.103	-1.383+	-0.072
		(0.158)	(0.302)	(0.321)	(0.770)	(0.115)
		[-0.410,0.209]	[-0.707,0.477]	[-0.732,0.525]	[-2.891,0.126]	[-0.298,0.154]
Effect of the 2017 uprating of the NLW	All affected workers	-0.016	0.076	-0.191	-0.711	0.059
		(0.183)	(0.252)	(0.273)	(0.750)	(0.145)
		[-0.375,0.344]	[-0.419,0.571]	[-0.726,0.344]	[-2.181,0.760]	[-0.224,0.342]
	Minimum wage workers only	0.014	0.278	-0.122	-0.557	0.029
		(0.459)	(0.817)	(0.797)	(0.898)	(0.406)
		[-0.885,0.913]	[-1.324,1.879]	[-1.685,1.441]	[-2.317,1.203]	[-0.767,0.825]
	Wage gap	-0.014	0.077	-0.189	-0.673	0.056
		(0.178)	(0.242)	(0.262)	(0.730)	(0.141)
		[-0.362,0.334]	[-0.398,0.552]	[-0.701,0.324]	[-2.103,0.758]	[-0.221,0.333]
Effect of the 2018 uprating of the NLW	All affected workers	-0.027	0.050	-0.224	-0.271	0.076
		(0.163)	(0.288)	(0.311)	(0.711)	(0.145)
		[-0.347,0.293]	[-0.515,0.615]	[-0.833,0.385]	[-1.664,1.123]	[-0.209,0.361]
	Minimum wage workers only	-0.004	0.113	-0.182	-0.335	0.076
		(0.420)	(0.899)	(0.773)	(0.800)	(0.395)
		[-0.828,0.819]	[-1.648,1.875]	[-1.698,1.333]	[-1.902,1.233]	[-0.698,0.850]
	Wage gap	-0.027	0.047	-0.221	-0.293	0.072
		(0.157)	(0.277)	(0.299)	(0.688)	(0.141)
		[-0.335,0.281]	[-0.495,0.589]	[-0.808,0.365]	[-1.642,1.056]	[-0.205,0.349]
Effect of the 2019 uprating of the NLW	All affected workers	0.049	-0.046	0.047	1.062+	0.060
		(0.177)	(0.276)	(0.324)	(0.548)	(0.173)
		[-0.299,0.397]	[-0.588,0.496]	[-0.588,0.683]	[-0.012,2.136]	[-0.279,0.399]
	Minimum wage workers only	0.074	-0.026	-0.275	1.061+	0.243
		(0.377)	(0.862)	(0.788)	(0.578)	(0.396)
		[-0.666,0.813]	[-1.716,1.663]	[-1.819,1.268]	[-0.071,2.193]	[-0.532,1.019]
	Wage gap	0.048	-0.044	0.038	0.999+	0.064
		(0.171)	(0.266)	(0.312)	(0.532)	(0.167)
		[-0.286,0.383]	[-0.566,0.477]	[-0.573,0.650]	[-0.044,2.043]	[-0.264,0.392]

Source: LPC estimates using ASHE.

Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

Placebo tests

50 As outlined in paragraph 31 we have also run 'placebo tests' on the data. These take the form of estimating a hypothetical NLW effect in a year where the increase in the minimum wage was substantially smaller. The year 2013 was chosen, estimating a hypothetical increase of 10.8 per cent, when the actual increase in the minimum wage was only 1.9 per cent. Table 9 shows that there were no consistent findings of significant effects in any of the measures. Similar analysis using control group 2 (not shown here) gives similar estimates with no statistically significant results. These findings suggests that our methodology has some use in estimating the effects of the NLW.

Table 9: Placebo estimates, assuming a hypothetical NLW introduction in 2013 – Control group 1

		All	FT men	FT women	PT men	PT women
Wage growth	All affected workers	0.001	-0.002	0.003	-0.002	0.003
		(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
		[-0.002,0.005]	[-0.009,0.004]	[-0.001,0.007]	[-0.007,0.003]	[-0.002,0.007]
	Minimum wage workers only	0.000	-0.005	0.003	-0.006*	0.003
		(0.003)	(0.011)	(0.003)	(0.003)	(0.006)
		[-0.006,0.007]	[-0.026,0.015]	[-0.003,0.009]	[-0.011,-0.000]	[-0.008,0.014]
	Wage gap	0.001	-0.002	0.003	-0.002	0.003
		(0.001)	(0.003)	(0.002)	(0.002)	(0.002)
		[-0.001,0.004]	[-0.008,0.004]	[-0.001,0.007]	[-0.006,0.003]	[-0.002,0.007]
Employment retention	All affected workers	-0.001	-0.003	-0.004	-0.024	0.010
		(0.008)	(0.015)	(0.015)	(0.027)	(0.012)
		[-0.016,0.014]	[-0.032,0.026]	[-0.034,0.026]	[-0.077,0.029]	[-0.014,0.033]
	Minimum wage workers only	0.026*	0.007	0.040+	-0.021	0.049**
		(0.011)	(0.022)	(0.024)	(0.033)	(0.017)
		[0.005,0.047]	[-0.037,0.051]	[-0.007,0.088]	[-0.085,0.043]	[0.015,0.082]
	Wage gap	0.000	-0.002	-0.002	-0.019	0.010
		(0.007)	(0.014)	(0.014)	(0.025)	(0.011)
		[-0.014,0.014]	[-0.029,0.025]	[-0.030,0.026]	[-0.069,0.030]	[-0.012,0.033]
Change in hours	All affected workers	0.024	-0.171	0.176	0.265	0.007
		(0.150)	(0.251)	(0.244)	(0.480)	(0.193)
		[-0.271,0.319]	[-0.663,0.322]	[-0.302,0.654]	[-0.677,1.207]	[-0.370,0.385]
	Minimum wage workers only	0.119	-0.276	0.256	0.406	-0.012
		(0.634)	(1.519)	(1.166)	(0.695)	(0.753)
		[-1.123,1.362]	[-3.253,2.700]	[-2.028,2.541]	[-0.957,1.769]	[-1.487,1.463]
	Wage gap	0.026	-0.163	0.171	0.270	0.007
		(0.142)	(0.236)	(0.228)	(0.446)	(0.182)
		[-0.252,0.304]	[-0.625,0.298]	[-0.276,0.617]	[-0.604,1.145]	[-0.350,0.364]

Source: LPC estimates using ASHE.

Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

Four-year results

51 We also examined the impact of the NLW across the whole four-year period. We compare the differences in outcomes for workers in 2019 versus their wage status in 2015. The approach is therefore broadly similar to the standard approach we took above, but instead of comparing year 't' with year 't+1' we instead compare with year 't+4'. We created two definitions of treatment groups. These groups, similar to the approach used in the one-year analysis, define the treatment group as those who earned less than the 2019 NLW in 2015 (or the equivalent amount above the NMW for the years prior to 2015). The difference between the two groups is that for one we just look at the nominal NLW, for the other we use the CPI index to adjust for inflation. We also examined the four-year effects using our standard treatment group (earning less than the incoming 2016 NLW) and using a wage gap approach. Our control group was composed of those who earned between the 2019 NLW and 10 per cent above it (in nominal terms). Due to the limited period of our data, we were unable to perform placebo tests on this four-year approach in the pre-period.

52 Table 10 shows the outputs we estimate of the effect of the introduction of the NLW on hourly wages four years later. The evidence suggests that for all groups, except for men working full-time, the NLW increased hourly pay. Real pay increased by between 3 and 5 percentage points more for minimum wage workers, when looking at all employees and at female full-time employees, depending on what approach is used. For men and women working part-time, pay increased by 4 to 5 percentage points for minimum wage workers relative to similar workers earning above the NLW.

Table 10: Effect of the NLW on real wage growth – four-year estimates

	All	FT men	FT women	PT men	PT women
Below nominal 2019 NLW	0.034+	0.025	0.032+	0.052*	0.040*
	(0.020)	(0.029)	(0.017)	(0.021)	(0.017)
	[-0.005,0.072]	[-0.031,0.081]	[-0.001,0.066]	[0.011,0.093]	[0.008,0.073]
Below real 2019 NLW	0.040*	0.032	0.040**	0.052**	0.045**
	(0.017)	(0.028)	(0.014)	(0.019)	(0.015)
	[0.007,0.074]	[-0.022,0.087]	[0.013,0.067]	[0.016,0.089]	[0.017,0.074]
Below 2016 NLW	0.047***	0.040+	0.048***	0.050**	0.051***
	(0.009)	(0.024)	(0.004)	(0.016)	(0.008)
	[0.030,0.064]	[-0.007,0.088]	[0.039,0.056]	[0.019,0.081]	[0.036,0.066]
Wage gap nominal 2019 NLW	0.033+	0.025	0.032*	0.040**	0.040**
	(0.017)	(0.028)	(0.015)	(0.015)	(0.015)
	[-0.001,0.067]	[-0.030,0.080]	[0.003,0.060]	[0.010,0.069]	[0.011,0.068]
Wage gap real 2019 NLW	0.037**	0.030	0.037***	0.043**	0.043***
	(0.014)	(0.025)	(0.010)	(0.014)	(0.012)
	[0.010,0.065]	[-0.018,0.079]	[0.017,0.057]	[0.016,0.070]	[0.019,0.066]

Source: LPC estimates using ASHE.

Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

53 Table 11 shows the estimated effects of the introduction of the NLW on employment retention four years later. The analysis finds no evidence of employment effects.

Table 11: Effect of the NLW on employment retention – four-year estimates

	All	FT men	FT women	PT men	PT women
Below nominal 2019 NLW	0.011	-0.002	0.027	0.004	0.003
	(0.026)	(0.029)	(0.025)	(0.035)	(0.022)
	[-0.041,0.062]	[-0.058,0.055]	[-0.023,0.076]	[-0.065,0.073]	[-0.041,0.047]
Below real 2019 NLW	0.016	0.003	0.032	0.006	0.008
	(0.025)	(0.027)	(0.023)	(0.037)	(0.023)
	[-0.033,0.064]	[-0.051,0.056]	[-0.013,0.077]	[-0.067,0.079]	[-0.037,0.052]
Below 2016 NLW	0.021**	0.003	0.034*	0.021	0.015
	(0.007)	(0.013)	(0.014)	(0.030)	(0.013)
	[0.007,0.035]	[-0.022,0.028]	[0.008,0.061]	[-0.038,0.081]	[-0.011,0.042]
Wage gap nominal 2019 NLW	0.011	0.000	0.024	0.008	0.007
	(0.023)	(0.026)	(0.023)	(0.027)	(0.019)
	[-0.034,0.056]	[-0.051,0.051]	[-0.021,0.068]	[-0.045,0.061]	[-0.031,0.045]
Wage gap real 2019 NLW	0.018	0.006	0.030	0.014	0.013
	(0.020)	(0.023)	(0.019)	(0.030)	(0.019)
	[-0.022,0.058]	[-0.039,0.050]	[-0.008,0.069]	[-0.046,0.073]	[-0.025,0.050]

Source: LPC estimates using ASHE.

Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

54 Table 12 shows the estimated effects of the introduction of the NLW on total hours worked four years later. The analysis finds evidence of a reduction in the number of hours worked for men working part-time. The findings suggest that male part-time employees affected by the NLW were working around 1.9 to 2.7 fewer hours a week relative to workers who were not affected by the NLW. This contrasts with what we found when we looked at each year individually where we found weak to no evidence of any hours effects. This may suggest that the effect in each year was too small to detect, but over the four years it became easier to spot.

Table 12: Effect of the NLW on total hours worked – four-year estimates

	All	FT men	FT women	PT men	PT women
Below nominal 2019 NLW	-0.086	-0.057	0.087	-1.923+	-0.016
	(0.360)	(0.296)	(0.371)	(1.040)	(0.267)
	[-0.791,0.619]	[-0.636,0.523]	[-0.640,0.814]	[-3.962,0.116]	[-0.540,0.507]
Below real 2019 NLW	-0.135	-0.206	0.076	-2.236*	0.016
	(0.380)	(0.340)	(0.357)	(1.046)	(0.282)
	[-0.880,0.610]	[-0.872,0.460]	[-0.623,0.776]	[-4.286,-0.186]	[-0.536,0.567]
Below 2016 NLW	-0.104	-0.155	-0.020	-2.699*	0.101
	(0.686)	(0.579)	(0.609)	(1.091)	(0.627)
	[-1.449,1.242]	[-1.290,0.979]	[-1.215,1.174]	[-4.837,-0.561]	[-1.129,1.330]
Wage gap nominal 2019 NLW	-0.088	-0.071	0.053	-1.932*	-0.003
	(0.373)	(0.311)	(0.365)	(0.834)	(0.230)
	[-0.819,0.643]	[-0.680,0.538]	[-0.662,0.767]	[-3.567,-0.296]	[-0.454,0.448]
Wage gap real 2019 NLW	-0.123	-0.174	0.049	-2.090*	0.016
	(0.372)	(0.335)	(0.329)	(0.888)	(0.254)
	[-0.851,0.606]	[-0.831,0.482]	[-0.596,0.694]	[-3.829,-0.350]	[-0.481,0.513]

Source: LPC estimates using ASHE.
Note: + denotes statistically significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%.

Conclusion

55 This analysis updates and extends research that we commissioned examining the impact of the introduction of the NLW and the 2017 uprating on hourly pay, employment retention and hours worked. We have extended the research to examine the impact of the 2018 and 2019 upratings, used different control groups and examined the four-year effects of the introduction of the NLW.

56 Consistent with the similar studies we commissioned that used individual pay data to track employment retention and changes in hours we find that the 2016 introduction of the NLW and the 2017 uprating increased the wages of affected employees. We find evidence that the 2016 introduction led to a decrease in employment retention for women working part-time, but no strong evidence of employment effects for any other group in 2016, nor for any group of workers in 2017. We also find no evidence of hours effects in either of those years. Our analysis finds no evidence of positive wage effects from either the 2018 or 2019 upratings, which suggests that our identification methodology is limited in these years. Nonetheless we find no evidence of negative employment retention effects from these upratings, but instead find some evidence of positive employment retention effects. It appears that the methodology used in this paper may not be able to adequately test the impact of the upratings in 2018 and 2019. Over the four-year period following the introduction of the NLW we find evidence of positive pay effects for all groups, except for male full-time employees, and no evidence of employment retention effects. We do find evidence of a fall in total hours worked for male part-time employees.

57 Overall, while we find some evidence of negative effects from the NLW, these are fairly small, and should be viewed against the significant positive impacts from the policy. Our results also suggest that the methodology used here has limited applicability to the 2018 and 2019

upratings of the NLW, so alternative methods will need to be used to estimate any effects from the NLW from those upratings.

58 This project represents the first step in our in-house econometric programme. We have published our analysis of productivity by geography and industry. We will shortly be publishing our research into the effects of the NLW that uses variation in minimum wage use and labour market outcomes in geographic, age and gender cells. We also intend to further the analysis in this paper, for example, taking account of potential attrition bias.

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