The impact of the National Minimum Wage on UK Businesses

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Executive Summary

This study analyses the impact of the National Minimum Wage (NMW) on UK businesses. Business outcomes considered include labour costs, productivity, profitability and the probability of exit. Specifically, the study aims to build evidence of relevance to understanding how the NMW has affected the behaviour of smaller and larger firms and firms in the low-paying sectors and how it has impacted upon businesses during the recession.

We examine the impacts of the NMW following in broad terms the approach in Draca *et al.* (2005, 2011). This is a difference-in-differences approach applied in the main to firm level data. The basic idea is to look at a group of firms that were more affected by the introduction of the NMW and its subsequent up-ratings (treatment group) than a comparison set of firms (control group). By more affected we mean where labour costs rose by more due to the imposition of and increases in the wage floor.

Firms are allocated to treatment and control groups according to their average labour costs before the policy change. This quasi-experimental setting enables us to compare what happened to our outcomes of interest before and after the introduction/uprating of the NMW in low-wage firms to what happened to these outcomes across the same period for a comparison group of firms whose labour costs were not much affected by the introduction of the NMW.

We explore the relationship between the NMW and firms' average labour costs, which underpins the evaluation methodology that we use in this study, in the Workplace Employment Relations Study and in the Annual Survey of Hours and Earnings linked to the Annual Business Survey. This validates the difference-in-differences methodology used here, but also points to difficulties in making direct comparisons of the magnitudes of NMW impact estimates across the low-paying industries and more widely.

We use two business datasets for our analysis: Financial Analysis Made Easy (FAME), a UK wide commercial dataset available from Bureau van Dijk, and the Annual Respondents Database (ARD) for Great Britain, incorporating one of the key ONS business surveys used to inform aggregate estimates of production activity for the National Accounts. The data available at this time allow us to look at the introduction and upratings of the NMW from 1999 up to 2011.

Analysing FAME and the ARD we find evidence to suggest that the NMW led to increases in labour costs amongst low-paying firms upon introduction, but also following the above average earnings increases of the mid-2000s and after the recession when NMW upratings were modest but real average wages were falling and some workers experienced nominal pay cuts. We carry out a number of falsification tests to evaluate the robustness of our results.

Our results suggest that these labour cost increases amongst low-paying firms may have been met by increases in labour productivity, confirming (qualitatively) the conclusions of some previous studies regarding firms' productivity responses to the NMW (Galindo-Rueda & Pereira, 2004; Rizov & Croucher, 2011). Our findings do not suggest that these increases in labour productivity arose because of reductions in employment. The evidence suggests that these labour productivity increases may have been associated with increases in TFP (total factor productivity). This finding is consistent with efficiency wage and training responses to increased labour costs from the NMW. We cannot rule out that the labour productivity increases we find are associated with increases in average hours worked. This is because we cannot control for average hours worked at the firm-level (only at the industry level, which we do by including industry-year effects). The available evidence is unclear about the effects of the NMW on average hours. Dickens, Riley and Wilkinson (forthcoming) find that employers may have shifted away from part-time workers towards full-time workers in response to the NMW, which would tend to increase average hours worked in low-paying firms. Stewart & Swaffield (2008) find that minimum wage workers' hours decreased in response to the introduction of the NMW, which would tend to reduce average hours worked in low-paying firms.

We find no evidence that the NMW increased the rate of business exit. We find that, in some models, trends in profit margins differed between lower and higher average labour cost businesses (similar to Draca *et al*, 2005 and 2011). However these differences were mostly not significant and we generally do not find robust evidence to suggest that trends in profit margins differed substantially between lower and higher average labour cost businesses. The finding of significant reductions in profit margins in some models only points perhaps to heterogeneous responses across different types of firms.

We consider impact estimates for SMEs and large firms and for firms in low-paying sectors. These are generally less robust than estimates we derive for the full sample (for example, less consistent or failing falsification tests). However, by and large they suggest that the NMW increased labour costs for low-paying firms regardless of size and in the low-paying sectors. There is also evidence to suggest that these increases in average labour costs may have been accompanied by increases in labour productivity. Where we find negative profit effects these tend to be concentrated amongst low-paying SMEs.

1. Introduction

This study analyses the impact of the National Minimum Wage (NMW) on UK businesses. Business outcomes considered include labour costs, productivity, profitability and the probability of exit. Specifically, the study aims to build evidence of relevance to understanding how the NMW has affected the behaviour of smaller and larger firms and firms in the low-paying sectors and how it has impacted upon businesses during the recession.

We examine the impacts of the NMW following in broad terms the approach in Draca *et al.* (2005, 2011). This is a difference-in-differences approach applied in the main to firm level data. The basic idea is to look at a group of firms that were more affected by the introduction of the NMW and its subsequent up-ratings (treatment group) than a comparison set of firms (control group). By more affected we mean where labour costs rose by more due to the imposition of and increases in the wage floor. Firms are allocated to treatment and control groups according to their average labour costs before the policy change. This quasi-experimental setting enables us to compare what happened to our outcomes of interest before and after the introduction/uprating of the NMW in low-wage firms to what happened to these outcomes across the same period for a comparison group of firms whose labour costs were not much affected by the introduction of the NMW. The data available at this time allow us to look at the introduction and upratings of the NMW from 1999 up to 2011.

There is relatively little firm-level evidence on the impacts of the NMW during recession and of the NMW upratings since then. One exception is Riley and Rosazza Bondibene (2013), and our analysis here builds on this earlier analysis, which only covered the initial years since the onset of the recession in 2008. The analysis in this paper uses data to 2012. In comparison to Riley and Rosazza (2013), we also make several improvements to the methodology and data analysed.[1]

The report is structured as follows. Section 2 describes our research methods. Section 3 details the FAME (Financial Analysis Made Easy) and ARD (Annual Respondents Database) data. Section

[1] We develop a live register of companies using historical FAME (Financial Analysis Made Easy) extracts provided by Bureau Van Dijk, allowing us to include in the analysis companies that operated at some point during the 2000s, but that have subsequently exited the market and have been deleted from the current vintage of the FAME data. We use post-recession data from the ARD (Annual Respondents Database), as well as FAME, and exploit the longitudinal element of the ARD, making it possible to better control for changes in sample composition over time than when using the repeated cross-sections data. The use of the longitudinal data also avoids the situation where we need to define treatment and control groups based on endogenous outcomes, as in the analysis of the ARD in Riley & Rosazza Bondibene (2013). Finally, we explore the suitability of using average labour costs to define treatment and control groups over different time periods and for different sub-groups of firms.

4 then explores the relationship between the NMW and firms' average labour costs, which underpins the evaluation methodology that we use. Results are presented in section 5. Section 6 summarises and concludes.

2. Methodology

To estimate the impact of the NMW on firm behaviour we follow Galindo-Rueda & Pereira (2004), Draca *et al.* (2005, 2011) and Riley & Rosazza Bondibene (2013) in applying a difference-in-differences estimator to firm-level data.

Galindo-Rueda & Pereira (2004) were the first to adopt this approach to analysing the impacts of the NMW on UK businesses. They studied the impact of the introduction of the NMW on firms' productivity using the Annual Survey of Hours and Earnings (ASHE) linked (by firm identifier or by sector/region) to the ARD and found some evidence that low-paying service sector firms reduced hiring and increased labour productivity. A key limitation of their study is that because the ASHE only ever represents 1% of a particular firm's workers, it is only possible to derive meaningful indicators of exposure to the NMW for very large firms when using the linked employee-employer data. Linking the ASHE to the ARD by sector and region instead allowed them to generate an indicator of exposure for the business population more generally but, by construction, this cannot be a very precise measure of a firm's exposure to the NMW.

Draca *et al.* (2005, 2011) got round this issue by using average labour costs to differentiate between firms that were likely to be affected by the NMW and firms that were not. Importantly, they (Draca *et al.*, 2011) show a correlation between average wages paid by the firm and the proportion of low-paid workers in a firm's workforce, suggesting that average wages are a means of identifying NMW exposure. The Draca *et al.* papers looked at companies that file consolidated accounts (held in FAME) to study the impact of the introduction of the NMW and very early upratings on firms' profits. Their results suggest that firms responded to the increases in average labour costs associated with the introduction of the NMW by cutting profits. Draca *et al.* (2011) also presented some additional impact estimates of the NMW on firms' employment and turnover per employee. These were not statistically significant. Rizov & Croucher (2011) applied a similar methodology to look at the impacts of the NMW on productivity over the entire period 1999-2009. They found that labour costs and productivity had increased by more amongst low-paying firms (small and large and in different low pay sectors) than other firms in the post-NMW period, but the analysis did not provide substantiating evidence as to the validity of the evaluation approach.

Riley and Rosazza Bondibene (2013) looked at companies in FAME and in the ARD to examine the impact of the NMW on several indicators of firm performance, focusing not only on the

introduction of the policy but also on the recent recession. As in Draca *et al.* (2005, 2011) they used average labour costs to distinguish between treatment and control firms. They presented results based on similar models to those in the Draca *et al.* papers (longitudinal panel models), which suggested that firms responded to the increases in average labour costs associated with the introduction of the NMW by raising productivity. They also presented alternative models (repeated cross section models) where firms were selected for the treatment and control groups based on their characteristics in the current year, akin to some employee level studies (e.g. Swaffield, 2009; Dickens, Riley & Wilkinson, 2012). These models suggested that in addition to increasing productivity firms responded to the introduction of the NMW by cutting profit margins.

In this study we focus on the longitudinal panel models. These allow us to derive impact estimates based on a balanced panel of firms. We prefer this to using repeated cross sections of firms because of the substantial heterogeneity in behaviour across firms. Informed by the analysis of the link between the NMW and firms' average labour costs (see Section 4) we select firms for the treatment and control groups based on their average labour costs in a particular year (before the policy change). We then track outcomes for these two groups of firms up to four years later, comparing the difference in performance between these two groups to the difference in performance in the years before the particular change in the NMW. We derive impact estimates for three periods: the introduction of the NMW up to 2002; an intermediate phase from 2003 to 2006 when annual increases in the NMW were relatively generous; and the years after the financial crisis from 2009 to 2012 when UK economic growth stagnated.

More formally we estimate the impact of the NMW in a standard difference-in-differences framework as shown in equation (1), where *p=0* refers to the period before the introduction/uprating of the NMW and *p=1* refers to the period after the introduction/uprating of the NMW.

$$y_{it} = constant + \propto LOWPAY_i + \beta D_{p=1} + \gamma LOWPAY_i * D_{p=1} + \delta X_{it} + \varepsilon_{it} \qquad (1)$$

In this set-up y_{it} is the outcome of interest for firm *i* at time *t*. $LOWPAY$ is a dummy variable equal to one if the firm is in the treatment group and zero otherwise. $D_{p=1}$ is a dummy variable equal to one if *p=1*, i.e. if the policy change has taken place, and zero otherwise. The X_{it} are controls for firm characteristics intended to net out differences between firms unrelated to the NMW. ε_{it} is an error term and the rest are parameters to be estimated. In this example γ measures the impact of the introduction/uprating of the NMW on outcome y.

We estimate equation (1) for our three periods of interest, selecting firms for the treatment and control groups in 1998 (the year prior to the introduction of the NMW), 2002 (before the sharp increases of the early/mid 2000s), and 2008 (after which NMW increases have been relatively

modest and the economy characterised by general weakness).[2] For the latter two periods that we consider, outcomes in the pre-policy years used to benchmark the difference in performance between the treatment and control groups after the policy change may of course be affected by the fact that the NMW is already in place. Therefore these impact estimates measure the effect on businesses of the change in the NMW between the before and after periods, rather than the effect of the NMW against a counterfactual of no NMW. During the recession period our impact estimate might also be interpreted as the difference between the impact of a given wage floor during a period of slow economic growth and its impact in a period of stable economic growth. Because increases in the NMW since recession have been quite muted, this interpretation seems quite reasonable.

We could evaluate the more recent impacts of the NMW by estimating equation (1) over a longer time period, tracking outcomes for the cohort of companies selected in the year prior to introduction of the NMW over this longer period. But, as discussed in Riley & Rosazza Bondibene (2013), there are several reasons why this seems inappropriate. In particular, the sample will shrink substantially and will become less representative of the group of firms that are affected by the policy.

We carry out a number of falsifications tests. First, as in Draca *et al*. (2005, 2011) and in Riley & Rosazza Bondibene (2013) we estimate the same models on a pre-NMW period during the mid-1990s. If we detect similar "policy effects" when the policy is not in place this casts doubt on the validity of the identification strategy. We are unable to carry out this falsification test with the ARD because these data are not available (except for manufacturing) before 1998. Second, for each period that we analyse we choose two groups of firms from further up the distribution of average labour costs. These are chosen to be sufficiently high up the distribution that it is very unlikely that either group should be affected by the NMW. Again, if we detect "policy effects" for these groups that should be unaffected by the policy then this casts doubt on the validity of the identification strategy.

Outcome measures examined include total labour costs per head; labour productivity; and profitability (measured as the ratio of gross profits to value added to proxy price-cost margins). Because our results suggest that firms responded to the NMW by increasing labour productivity we also explore impacts on employment, the ratio of capital to labour and a measure of total factor productivity.

[2] We do not choose 2007, the year before recession, as the base period because firms' labour costs in 2008 would have been affected by the above average earnings increase in the NMW in October 2007.

Finally, we examine the impact of the NMW on the probability of exit (business failure) in a similar approach.

3. Data

We use two business datasets for our analysis: FAME, a UK wide commercial dataset available from Bureau van Dijk, and the ARD for Great Britain, incorporating one of the key ONS business surveys used to inform aggregate estimates of production activity for the National Accounts.

Financial Analysis Made Easy (FAME)

FAME contains financial data on the population of UK registered companies. Drawbacks are that for many companies data items are missing, because there are no reporting requirements. Reporting requirements are particularly light for small companies (i.e. those with less than 50 employees)[3]. The main attractions of FAME in conducting this research, in comparison to other commercial datasets and/or ONS datasets, are: the availability of data covering the 1990s before the introduction of the NMW, which can be used to test the validity of the identification strategy; the coverage of non-listed companies; and the availability of longitudinal data for some small companies.

We extract data on all companies who at some point during April 1 1993 and 31 March 2013 filed an account with Companies House. We retain for our main sample accounts that cover turnover, profits, employment, remuneration, and fixed capital. We use as proxies for our outcomes of interest the following:

- *Average wages:* remuneration/employment
- *Labour productivity:* we examine two measures: turnover/employment and (remuneration + profits)/employment; the latter of these is a proxy for a gross-value added measure of labour productivity and is our preferred measure; the turnover based measure is used for comparability to previous studies that use FAME (turnover includes GVA and material costs).
- *Price to cost margins:* EBIT margin (ratio of earnings before interest and tax to turnover)[4]

[3] Small companies are required to file full accounts if both their turnover and assets exceed the thresholds set out in the relevant Companies Act at the time of filing.

[4] The EBITDA margin (ratio of earnings before interest, tax and depreciation to turnover) used in Draca *et al.* (2005, 2011) is not available consistently over time and hence we use EBIT. We also estimated EBITDA models for the introduction of the NMW and for the intermediate phase. These estimates were very similar to our EBIT models.

- *Employment:* number of employees
- *Capital labour ratio:* fixed assets/employment
- *log TFP (total factor productivity):* log ((remuneration + profits)/employment) - (1-α)log (capital labour ratio), where α is the firm average labour share over the relevant time period.
- *Company exit:* exit dummy coded to unity for time periods after the last observed filing date

The current vintage of the FAME data includes accounting records for the last decade for all companies that were active at some point during the last 4 years. Key company characteristics and ownership structures are not provided on an annual basis, but are provided as a recent snapshot. This means that the historical sample is biased towards surviving firms and makes it difficult to identify ownership structures at each point in time. Historical ownership structures are necessary in order to avoid double counting company activity (e.g. when companies file group accounts). To ensure that all active companies are included in the data at each point in time (and to accurately capture ownership structures) one can extract annual snapshots of the data from annual historical discs that can be provided by Bureau van Dijk. We have constructed a comprehensive database by extracting this information for all companies filing accounts in each financial year 2002 – 2012. The data prior to 2002 is collated from the 2002 disc.

FAME company data has previously been used by Draca *et al.* (2005, 2011) to study the impacts of the NMW on firm profitability (and other outcomes; in the 2011 version), using data to 2002; and by Rizov and Croucher (2011) to estimate the impact of the NMW on sectoral productivity for firms in different size groups, using data to 2009. Draca *et al.* (2005, 2011) focus on consolidated accounts only; Rizov and Croucher (2011) focus on unconsolidated accounts only. Consolidated accounts may be filed by companies that operate in a group. Stand alone companies more typically file unconsolidated accounts. As in Riley & Rosazza Bondibene (2013) we include both consolidated and unconsolidated accounts in order to retain sufficient numbers of smaller companies, and delete all subsidiary accounts (where a single parent has at least 50% control) to avoid double counting. This process is improved in our current database because we use historical ownership structures.

As in our analysis of the ARD data we exclude companies with less than 10 employees, and focus on market sector companies in the non-agriculture and non-financial industries.

Annual Respondents Database (ARD)

The Annual Respondents Database (ARD) is an establishment level business survey (or set of surveys) conducted by the Office for National Statistics (ONS) that is widely used in the study of firm behaviour and productivity analysis. The ARD has previously been used to study the impacts

of the NMW on plant-level productivity, profitability and exit by Forth *et al.* (2009). They use data for the period 1999-2006 and do not use a difference-in-differences approach. Galindo-Rueda & Pereira (2004) use the ARD to study the impact of the introduction of the NMW on productivity, employment and unit labour costs, using a difference-in-differences approach on 1997-2001 data. Neither of these studies identifies exposure to the NMW using average labour costs (wages) as we do in this study. The only study which uses the ARD and a similar identification strategy to evaluate the impact of the NMW on businesses is Riley and Rosazza Bondibene (2013). However, unlike our previous use of the ARD, we now exploit the longitudinal element of the survey. This means we are better able to control for changes in sample composition over time than before.

The ARD holds information on the nature of production in British businesses and is essentially a census of larger establishments and a stratified (by industry, region and employment size) random sample of establishments with less than 250 employees (SMEs). It covers businesses in the non-financial non-agriculture market sectors.[5] Data are available for 1997-2012 and for manufacturing back to 1974. It is possible to use the data at both the establishment level and the enterprise level. We undertake our analysis at the level of the enterprise, which corresponds to the smallest legal unit in the ARD and hence the smallest unit with a decision making capacity. The enterprise is also more comparable than the establishment to the concept of a company that we use in FAME. Our study focuses on the period from 1998 to 2012 when most of the two-digit SIC categories are available, including the service industries which include the main low-paying sectors.

The sampling frame is the Inter-Departmental Business Register (IDBR), a list of all UK incorporated businesses and other businesses registered for tax purposes (employee or sales taxes). The ARD includes basic information (e.g. industry, ownership structure, and indicative employment) for all businesses in the sampling frame. In the sectors that we consider this population includes more than 1.5 million businesses covering employment of just under 16 million, a little less than three fifths the number employed in the British economy as a whole.

Sampling probabilities in the ARD vary by size of firm. In particular, the probability of observing in the survey a specific micro business (a business employing less than 10 employees) in a

[5] The ARD includes partial coverage of the agricultural sector (we exclude these businesses) as well as businesses in "non-market" service sectors such as education, health and social work. We exclude businesses in these latter sectors where inputs and outputs are thought not to be directly comparable, making productivity analysis difficult to undertake. We also exclude businesses in the mining and quarrying, and utilities sectors (typically very large businesses with erratic patterns of output) and in the real estate sector, where output mostly reflects imputed housing rents.

specific year is just 1%. As a result, the probability of observing a micro business in two separate years (conditional on being live) is very low; 0.01% of the population of continuing micro firms. Following our calculations micro businesses account for a sizable share of economic activity in Britain: 90% of businesses in the sectors we consider are micro businesses and these account for 20% of employed persons there. But, the longitudinal sample is insufficient to support analysis of this group of firms and therefore we drop them from our analysis and focus on the sample of firms with 10 or more employees.

In using the longitudinal data we are unable to create a balanced panel of firms with annual observations as we do with the FAME data (except for large firms), because once surveyed (for two consecutive years) firms are excluded from the sample for at least a year and may not be included thereafter. Instead we create a panel of firms observed for two years at four year intervals.

Our proxies for our outcomes of interest using the ARD are[6]:

- *Average wages:* total labour cost[7] /employment
- *Labour productivity:* GVA at factor costs/employment
- *Price to cost margins:* (GVA at factor costs – total labour costs)/ GVA at factor costs
- *Employment:* number of employees[8]
- *Capital labour ratio:* Plant & Machinery capital stock[9]/employment

[6] We truncate the top and the bottom 1% of the labour productivity and total labour costs distribution within 1-digit industry sectors in each annual survey. We also truncate the longitudinal data to eliminate further outlying observations.

[7] This represents amounts paid during the year to employees. This includes all overtime payments, bonuses, commissions, payments in kind, benefits in kind, holiday pay, employer's national insurance contributions, payments into pension funds by employers and redundancy payments less any amount reimbursed for this purpose from government sources. No deduction is made for income tax or employee's national insurance contributions etc. Payment to working proprietors, travelling expenses, lodging allowances, etc are excluded (ABI, Background Information, Archive Data).

[8] We use indicative employment information collected from a variety of sources and sometimes imputed from turnover. We use this indicative measure of employment as our measure of employment as we do not have a consistent series of year average or point in time employment estimates for surveyed businesses. For those years where we are able to make the comparison this indicative employment measure corresponds very closely with the point in time measure of employment, except in the earlier years of the survey where there is some discrepancy.

- *log TFP (total factor productivity):* log (labour productivity) - (1-α)log (capital labour ratio), where α is the industry average labour share over the relevant time period.

Other data

The ARD and FAME financial information is published in current values. GVA deflators published by the ONS are used to construct real labour productivity values; these are available at the 2- and sometimes the 3-digit sector level.[10] They are also used to construct a measure of real producer wages. Separately, in order to allocate firms to the treatment and control groups, we deflate average labour costs with the average earnings index, benchmarking low pay against average wages in the economy.

We use the Workplace Employment Relations Study (WERS) 1998, 2004 and 2011 to map the link between the proportion of NMW workers in the firm and the firm's average labour costs. For consistency across years, and as with the analysis of other datasets, we exclude all micro establishments.

We link the Annual Survey of Hours and Earnings (ASHE) by firm identifier to the ARD in order to evaluate the distribution of average labour costs across different types of employees (NMW workers and other workers).

4. NMW workers and firms' average labour costs

As highlighted above, one of the main difficulties with firm-level analysis of NMW impacts is defining a suitable set of firms to allocate to the treatment group (and the control group). We follow *Draca et al.* (2005, 2011) and distinguish treated from untreated firms by looking at the distribution of average labour costs (or average wages and salaries paid) per head across firms. We assume that those firms at the bottom of the distribution of average labour costs per employee are more exposed to the NMW and assign these to the treatment group. The control group is made up of firms from further up the distribution of average labour costs per employee. Using WERS 1998 Draca *et al.* (2011) show that NMW workers were concentrated in firms with low average labour costs when the NMW was introduced, suggesting that average

[9] These were made available by Richard Harris. The methodology underlying the construction of these is described in Harris (2005) "Deriving Measures of Plant-level Capital Stock in UK Manufacturing, 1973-2001", Report for the Department of Trade & Industry.

[10] Before 2008 industry was coded to the UK Standard Industrial Classification 2003. From 2008 onwards this changed to the UK Standard Industrial Classification 2007. To maintain continuity in the sectors that we analyse this requires us to drop a few 3-digit sectors.

wages were a reasonable means of identifying firms' NMW exposure then. Whether this is also the case for later upratings and for different size firms has not been assessed.

Here we further explore how one might define treatment and control groups when analysing the impacts of the NMW on business outcomes. We examine the link between minimum wage workers and workplace average labour costs as in Draca et al. (2011), but using three cross sections of WERS (1998, 2004 and 2011). This allows us to assess whether the distribution of NMW workers across firms has changed over time and hence whether alternative cut-offs to define treatment firms and control firms are necessary for later upratings. We look at the concentration of NMW workers across the distribution of firms' average labour costs separately for different size firms and for the low-paying industries. This tells us whether the selection of treatment and control groups used to identify NMW effects in the business population can also be used to identify NMW effects within these sub-groups of firms. We also examine these issues using the ASHE linked to the ARD to check whether employees that are paid the NMW, which may differ from employees with low observed weekly wages (because individuals may work less than full time), tend to locate in companies with low average labour costs. Here we cannot generate a measure of NMW workers per firm because the ASHE is but a 1% sample of employees. Instead we look at the distribution of average labour costs for two groups of workers: employees paid the NMW and employees paid more than the NMW. If the distribution of employer average labour costs across NMW workers lies significantly to the left of the distribution of employer average labour costs across workers that are paid more than the NMW, then this further validates the use of firm average labour costs as a means of distinguishing between treatment and control firms.[11]

In Figures 1-3 we plot the proportion of workers paid the NMW against the establishment's average annual wage for each cross-section of WERS. The y-axis shows the proportion of workers paid below the NMW in the establishment. The x-axis shows the average annual wage at the workplace. This is divided in bins for 5 percentiles from lowest (left) to highest (right). We mark thresholds £8,000, £10,000, £12,000 and £14,000 with vertical lines[12,13]. These figures suggest that when the NMW was introduced minimum wage workers were concentrated in

[11] The distributions are indicative only. The linked ASHE-ARD are not re-weighted to population totals.

[12] In 2004 and 2011 we adjust the thresholds (£8,000, £10,000, £12,000 and £14,000) by the percentage increase in the average earnings index from the year of introduction to the year of analysis (equivalent to approximately £12,000, £15,000, £18,000 and £21,000 in 2008 prices).

[13] The threshold of £12,000 was used in the Draca et al. papers; Riley & Rosazza Bondibene (2013) used three thresholds £8,000, £10,000, £12,000.

firms that paid low average wages and that this pattern has persisted over time. Indeed the distributions shown in Figures 1-3 are very similar. However, following the stagnation in wages that accompanied the recession, the lowest paying firms appear to have a higher proportion of workers paid at or below the NMW in 2011 than in 1998 and 2004.

The concentration of minimum wage workers in workplaces that pay low average wages is also evident amongst firms in the LPC defined low-paying sectors (Figures 4-6) and within both the SMEs and larger business populations (Figures 7-12).

These figures suggest that the thresholds used to distinguish treatment from control firms in our previous analysis are reasonable. Moreover, there is not obviously one clear threshold for the analysis, suggesting that there is merit in applying different cut-offs to test the robustness of the results. In what follows we use £10,000, £12,000 and £14,000 thresholds. We do not consider the £8,000 threshold. Although the WERS analysis suggests that at least 15% of establishments have average labour costs below £8,000 (in 1998 prices) there are relatively few such businesses in the FAME and ARD panel data; particularly for sub-groups of firms. This is due to light reporting requirements for small companies (defined as such by turnover, assets and/or employment) and the sampling stratification in the ARD.

One important point to notice is that although the concentration of low-paid workers amongst low-paying firms is evident for the economy as a whole (Figures 1-3) and amongst firms in LPC low-paying sectors (Figures 4-6) , there is a striking difference between these two distributions. Our WERS analysis shows that the great majority of the firms in the low-paying sectors have a high concentration of low-paid workers (perhaps by definition!). This makes it more difficult to find a suitable control group for detecting NMW impacts amongst firms in the low-paying sectors. In other words, almost all firms in the low-paying sectors are affected by the NMW, therefore the treated are being compared with a control group of firms which still have a relatively high proportion of low-paid workers. Thus it is possible that our methodology might underestimate the impact of the NMW on wages in these sectors compared to analogous estimates derived for the economy as a whole. One alternative for consideration is to select a control group of firms from another industry, but this is not ideal if there are industry specific trends. For these reasons we advise caution in making direct comparison of the magnitudes of our impact estimates across sub-groups.

Figures 13-24 use the ASHE linked to the ARD to show the distribution of average enterprise labour costs (deflated to 1998 values by annual changes in the National Minimum Wage) for two groups: employees paid at or below the minimum wage rate (blue line) and employees paid above the minimum wage rate (red line). For each of these figures we do a Kolmogorov-Smirnov test which suggests that the distributions of average enterprise labour costs are different for

these two groups of employees (see Appendix Table A3). In line with the WERS analysis, these figures confirm that workers paid at or below the NMW are concentrated in establishments with low average labour costs. This pattern again seems to persist over time and is evident within SMEs, larger companies, amongst LPC defined low-paying sectors and other market sectors. We also run probit regressions looking at the probability of being an employee paid at or below the minimum wage. We find a statistically significant negative association between average enterprise labour costs and the probability of being a minimum wage worker (see Appendix Table A4). In other words, if a person works in an enterprise that pays its employees on average a low wage, then it is more likely that this person is paid at or below the NMW. We also find that this relationship is more negative and statistically significant for employees in low-paying sectors.

5. Results

Our main results are based on FAME. These are reported for our three periods of interest in Table 1 (NMW introduction), Table 2 (Intermediate phase), and Table 3 (Recession period) for firms in all sectors[14]. We carry out falsification (placebo) tests (Tables 4-7), which largely support the interpretation of our reported impact estimates as being associated with the NMW. In Table 4 we report impact estimates from a pre-NMW period (historical placebo) and in Tables 5-7 from groups of high-paying firms that should largely be unaffected by the NMW (which we call the vertical placebo).

We also estimate NMW impacts for sub-groups of firms: firms in the low-paying sectors, using the Low Pay Commission definition of low-paying industries[15], SMEs employing 249 employees or less, large sized firms employing at least 250 employees, and SMEs in the low-paying sectors. These are reported in Table 8 (NMW introduction), Table 9 (Intermediate phase), and Table 10 (Recession period). Again we carry out falsification tests (Tables 11-14). In Table 11 we report impact estimates, for the sub-groups we consider, from a pre-NMW period. In Tables 12-14 we report the vertical placebo tests for these sub-groups. As with the full sample analysis these mostly suggest that we can interpret impact estimates during the policy period as being associated with the NMW, although this is not always the case.

We assess differences in business exit rates between low- and less low-paying firms in Table 15. We also assess differences in *sample* exit rates between low- and less low-paying firms. The

[14] Excluding agriculture, finance, and public sectors.

[15] We use the Low Pay Commission definition of low-paying industries. These include: retail, hospitability, social care, food processing, leisure, travel and sport, cleaning, security, textile and clothing, hairdressing.

concern is that because reporting is related to business performance (e.g. size of turnover and employment) the sample that we use to evaluate NMW impacts may depend on the impacts of the NMW on business performance (in which case we would have a sample selection issue). This is investigated in Table 16.

Our results based on the ARD are reported in Table 17 for all three periods of interest. Vertical placebo tests are also reported in this table (we are unable to estimate the historical placebo with the ARD). ARD difference-in-difference estimates for the sub-groups we consider are reported in Table 18 (NMW introduction), Table 19 (Intermediate phase), and Table 20 (Recession period).

The nature of the ARD data is such that we have fewer years in our data panel. In Table 21 we estimate these "ARD style" models using FAME and report in Table 22 the equivalent impact estimates from the pre-NMW period to check the validity of this alternate model.

In section 5.1 we discuss the results based on the FAME data. We first discuss our analysis of labour costs, checking that treatment and control groups are defined such that we see bigger wage increases amongst firms in the treatment group than amongst firms in the control group following the introduction and further upratings of the NMW. We also check that wages for these two groups follow similar trends in the period before the NMW was introduced (historical placebo), and for two groups chosen from further up the distribution of labour costs (vertical placebo). Having done this we then look at how the NMW might have affected other firm outcomes. In section 5.2 we report estimates based on the ARD.

With the exception of profit margins the dependent variable is specified in logs so that coefficients can be interpreted as the percentage change in the outcome of interest relative to the counterfactual (0.01 is equivalent to 1%). Profit margin coeffients measure the percentage point change in profit margins relative to the counterfactual (0.01 is equivalent to 1 percentage point). We report estimates based on OLS regression and robust regression, the latter of which adds less weight to outlying observations.

5.1 Performance differences between treatment and control firms (FAME)

We experiment with different cut-offs to define treated and control firms: £10,000, £12,000 and £14,000 per annum. These are then adjusted in line with the average earnings index (or the NMW) as we move further away from NMW introduction. In the FAME sample that we use these cut-offs correspond to broadly the 9th, 14th and 20th percentiles of the distribution of average labour costs, which at the lower end is relatively stable over time. The estimation sample that we consider includes treatment and control firms chosen in the year before the policy change (discussed above) that we can observe in each of the 3 years before the policy

change and in each of the four years after.[16] In the regressions we include firm level controls: whether a firm is a start-up, young, files group accounts, exports, is foreign-owned. We also include industry specific time dummies so that performance levels are assessed relative to the industry-year mean.

The number of firms in the treatment and control samples are shown for each cut-off, time period and sub-group in Appendix Table B1 (and Table B2 for the vertical placebo). Sample sizes are 7 times the number of treatment and control firms (because we track firms for 7 years).

Labour costs

Looking first at labour costs for the full sample in Tables 1-3 we see that these rose on average around 4% more for low-paying firms than for firms in the control group. These effects are evident in all NMW periods, but do not appear in the data in the period before the NMW (Table 4), nor do they appear between the groups further up the distribution of average labour costs (vertical placebo; Tables 5-7). In Tables 1-3 when we use robust regression it appears that the magnitude of the increase in labour costs associated with the NMW is diminishing over time, with the largest impacts upon introduction and the smallest impacts following the recession of 2008.

Looking at sub-groups in the period before the NMW in Table 11 we generally observe common trends between the treatment and control groups (no significant labour cost impacts), although the common trends assumption fails for SMEs when we use the £14,000 cut-off. The vertical placebo estimates for sub-groups of firms in Tables 12-14 are mostly insignificant, so that we might interpret estimates during the policy period as being associated with the NMW. There is one exception. In Table 13, during the intermediate phase, when we use robust regression, we find some evidence of labour cost increases amongst firms in the low-paying sectors that should not be affected by the NMW. As discussed in the previous section there are relatively few firms in the low-paying sectors that are likely to be completely unaffected by the NMW and thus these tests are based on relatively small samples of firms, which may contribute to the failure of some of the falsification tests for this group.

In Table 8 it appears that the increase in labour costs for low-paying firms associated with the introduction of the NMW were concentrated amongst firms in the low-paying sectors and SMEs, but are also evident (albeit less prominent) for large firms. During the intermediate phase (Table 9) significant increases in labour costs are more sporadic, but are present for most sub-groups depending on the threshold considered and the estimator used. During the recession/stagnation

[16] We restrict the before period to 3 years because of data and policy constraints in the pre-NMW period. Results are very similar when we include (where possible) in the before period 4 years of data.

phase (Table 10) we detect significant increases in labour costs for all sub-groups for at least some thresholds/estimators, but the most consistent impacts appear amongst the group of SMEs (note that both the falsification tests for SMEs from the pre-NMW period (Table 11) and from further up the wage distribution (Table 14) suggest these increases in labour costs for SMEs during the recession period may be biased upwards; i.e. the estimated increase in labour costs for SMEs in Table 10 may overstate the extent to which SME labour costs increased due to the NMW).

Profit margins

We next consider profitability for the full sample of firms. We find no significant profit effects in the period before the introduction of the NMW (Table 4), nor do we find significant profit effects during the NMW periods in the vertical placebo (Tables 5-7) with the exception of the intermediate phase (Table 6). Looking at the periods and thresholds where we might expect to see policy effects amongst low-paying firms we generally do not find any. There is some suggestion that low-paying firms reduced profit margins in the recession period when we use the £10,000 threshold (Table 3).

In Table 11, which concerns sub-groups in the pre-NMW period, we find common trends in profit margins between the treatment and control groups (except when we use the £10,000 threshold and robust regression we find a positive effect in the pre-NMW period for large firms). We find no effects on profit margins for any sub-groups upon the introduction of the NMW (Table 8). The falsification tests from further up the wage distribution (Table 12) are mostly insignificant, except for in the case of large firms. We find a negative profit effect during the intermediate phase (Table 9) for low-paying firms in the low-paying sectors and for low-paying SMEs in the low-paying sectors when we consider the £14,000 threshold. But, we find similar effects for these sub-groups of firms further up the distribution of labour costs (Table 13), which makes us less confident that the negative profit effects for these firms during the intermediate phase arise because of the NMW. In Table 10 it appears that the reductions in profit margins that we find in the recession period are concentrated amongst low-paying SMEs and are also evident in the low-paying sectors. Falsification tests using higher-paying firms (Table 14) and historical data (Table 11) support the idea that this is associated with the NMW.

Labour productivity

We consider two measures of labour productivity: a (preferred) GVA based measure and a turnover based measure. Looking at the introduction phase (1999-2002) in Table 1 we find significant positive labour productivity impacts on both measures when we use the £12,000 and £14,000 cut-offs. We find no significant "policy effects" on labour productivity in the pre-NMW period (Table 4) or in the vertical placebo upon introduction of the NMW in the full sample (Table 5). These findings suggest that firms may have responded to the introduction of the

NMW by increasing labour productivity. In the intermediate phase (Table 2) we observe significant positive effects on the GVA measure, but not the turnover measure. These are not apparent when we use robust regression. Moreover, we also find positive labour productivity effects further up the wage distribution (Table 6), casting doubt on the interpretation of these positive productivity effects as being related to the increases in the NMW over this period. In the recession phase we find positive labour productivity impacts on the GVA based measure of labour productivity; these are significant when we use robust regression (Table 3). Vertical placebo tests for this period (Table 7) give us some confidence in the identification strategy. We also find some evidence of labour productivity increases following recession on the turnover based measure, but these are also evident further up the wage distribution and therefore less easily interpreted as NMW effects.

In Table 11 we find common trends in labour productivity for all sub-groups in the pre-NMW period (i.e. no significant estimates, except for the large firm and SME firm groups when using the £14,000 threshold). During the NMW introduction phase (Table 8) we find positive and significant labour productivity difference-in-difference estimates for low-paying firms in low-paying sectors on both labour productivity measures and all thresholds/estimation methods. These effects also appear for SMEs in low-paying sectors. We do not find significant productivity effects further up the distribution of labour costs (Table 12), pointing toward the NMW as an explanation for these productivity trends. There is also some evidence of labour productivity increases for the other sub-groups. During the intermediate phase (Table 9) we detect positive labour productivity impacts for low-paying SMEs and firms in the low-paying sectors on the GVA based measure (for some thresholds), but we also find evidence of (smaller) productivity effects in the vertical placebo (Table 13), suggesting that it is unlikely that the NMW alone is responsible for these trends. During the recession phase (Table 10) we find evidence of positive labour productivity impacts for SMEs and for SMEs in the low-paying sectors. The absence of these effects for firms that should be unaffected by the NMW (Table 14) suggests these trends may be associated with the presence of a wage floor at a time when real wages were stagnant or falling.

Capital labour ratios, total factor productivity and employment

Our results so far suggest that low-paying firms may have responded to increases in labour costs that arose with the NMW by increasing labour productivity. By definition, increases in labour productivity come about either from a rise in the capital intensity of production or from a rise in total factor productivity (TFP). Therefore we also estimate "treatment effects" on capital labour ratios and total factor productivity. These are not significant in the pre-NMW period in the full sample (Table 4) as we would expect if our identification strategy is valid. When the NMW was introduced we find positive effects on GVA per head (as discussed above), which appear to have

come about due to an increase in TFP rather than via an increase in the capital labour ratio (Table 1). These effects are absent in the vertical placebo (Table 5). During the intermediate phase the positive and significant treatment effects for GVA per head in some models are mirrored in positive and significant treatment effects for TFP (Table 2). But, as with GVA per head, we also find evidence of positive treatment effects for TFP for firms that should not be affected by the NMW (Table 6). The positive labour productivity effects that we find for the recession period (Table 3) are associated with increases in TFP rather than capital labour substitution. As at introduction falsification tests further up the distribution of labour costs (Table 7) support a minimum wage interpretation.

When we consider sub-groups, the falsification tests are not always passed in the pre-NMW period (Table 11); for SMEs in particular we find significant "policy" effects in the pre-NMW period. We observe that TFP is rising more quickly amongst low-paying SMEs and the capital labour ratio is falling relative to the control group. Turning to the NMW periods, we generally find some statistically significant impacts on TFP (and no statistically significant changes in the capital labour ratio) for all sub-groups associated with the introduction of the NMW (Table 8). Thus the labour productivity increases that we find upon introduction appear to be associated with increases in efficiency rather than capital labour substitution. These effects are particularly evident amongst low-paying firms in the low paying sectors (and note that we do not find any evidence of such effects in the pre-NMW period (Table 11), nor do we find such effects for firms that are less likely to be affected by the NMW (Table 12); i.e. falsification tests are passed for this group). During the intermediate phase (Table 9) we find some evidence of TFP increases amongst low-paying firms in the low-paying sectors; these are not statistically significant in the vertical placebo (Table 13). We also find these effects for low-paying SMEs during the intermediate phase, but these are also present in the vertical placebo. In the recession period we find some evidence of positive TFP effects associated with the NMW for low-paying SMEs and low-paying SMEs in the low-paying sectors (Table 10); falsification tests based on high-paying firms support this finding (Table 14). We generally find no change in the capital intensity of production for any sub-groups.

Finally we check whether the labour productivity effects that we find for low-paying firms are associated with a reduction in employment. We do not find any statistically significant employment effects for the full sample during any of the NMW periods of interest (Tables 1-3). Falsification tests suggest that we are conducting a valid experiment. We find no employment effects in the pre-NMW period (Table 4). We find a negative employment effect in some vertical placebo models (Tables 5-7), but generally these are not statistically significant.

Looking at sub-groups of firms at the introduction of the NMW (Table 8) we generally find no employment effects associated with the NMW. In all models but one, the employment estimate

is statistically no different from zero. When we look at SMEs in the low-paying sectors we find a negative employment effect when we use the £14,000 threshold. But, this effect is also present in the pre-NMW period (Table 11) and for higher-paying SME groups (Table 12), which suggests that this drop in employment for SMEs in low-paying sectors has little to do with the NMW. We generally find no employment effects during the intermediate (Table 9) or recession (Table 10) phases for any sub-groups; nor do we find these effects in the vertical placebos (Tables 13-14).

Business exit rates and sample selection

In Table 15 we show difference-in-differences estimates of the impact of the NMW on company exit rates. In these models we compare four year exit rates for three cohorts of firms (treatment and controls) selected right before the introduction of the NMW (1998), before the generous increases of the mid-2000s (2002), or right at the outset of recession and stagnation in UK economic performance (2008) to four year exit rates for a cohort of firms selected in the pre-NMW period (1995). For each cohort we restrict the sample to those firms that report financial variables in the three years before the policy change (as in the analysis above).

We find no evidence of a change in exit rates for low-paying companies following the introduction of the NMW for any of the groups of firm that we consider. This is generally the case for later periods (the intermediate phase and recession period) too. There is a negative and significant (at the 10 per cent level) effect for large companies when we use the £14,000 threshold, but this disappears when we use alternative thresholds to define treatment and control firms. There is in any case no evidence that the NMW should have *increased* closure rates for low-paying companies.

In Table 16 we show difference-in-differences estimates of the impact of the NMW on *sample* exit rates. Firms may exit the sample if they close *or* if they fail to report financial information. Companies are not obliged to report all the information that we use to study the NMW and business performance in the previous section. In particular, smaller companies (defined by Companies House from a combination of assets, turnover and employment) have very light reporting requirements. This opens up the possibility that selection for the sample for analysis is dependent on the impacts of the NMW, which in turn could lead to biased estimates of NMW impacts on business outcomes. To see this, note that in the regression results above we consider a (balanced) panel of firms. This has the benefit of allowing us to compare the same set of firms before and after the policy intervention, and thus our estimates are not affected by any spurious changes in sample composition. This is generally useful given the heterogeneity of firms' performance. But, if the NMW affects business (or, in particular, sample) exit and entry rates, e.g. because of the link between reporting and business scale, then our estimates in the

previous section are calculated only for the sample of firms that did not shrink/exit due to the NMW and that did not expand/enter due to the NMW and that therefore we observe.[17]

The scenario that causes most concern is one where the NMW causes firm performance to deteriorate and hence exit the sample. If this were the case then our estimates of NMW effects on performance in the balanced sample of firms will be biased upwards; i.e. it might look like the NMW improves performance in part because we end up ignoring those firms whose performance worsened because of the NMW. In Table 16 we generally do not find that sample exit rates increased following changes in the NMW. There is one exception. During the recession period we see that low-paying SMEs in the low-paying sectors are increasingly more likely to exit the sample than higher-paying firms. The precise nature of the sample selection bias that this might introduce is unclear, but warrants some caution in interpreting results for this particular group of firms during recession.

5.2 Performance differences between treatment and control firms (ARD)

In Tables 17-20 we use the ARD to estimate equation (1) for the following year combinations: (1997, 1998), (2001, 2002); (2001, 2002), (2005, 2006); (2007, 2008), (2011, 2012). For each pair the first two years refer to time p=0 in equation (1) and the last two years refer to time p=1. This is by necessity slightly different to the analysis of FAME above where we observe firms for seven consecutive years. As in the FAME analysis we use cut-offs at £10,000, £12,000 and £14,000 (1998 prices). In the (unweighted) ARD sample that we use here these cut-offs correspond to broadly the 14th, 20th and 27th percentiles of the distribution of average labour costs. Also as in the previous analysis we include in the regressions 2-digit industry controls interacted with year effects. Sample sizes are reported in Table B3 in the Appendix.

Labour costs

In Table 17 we show that at the introduction of the NMW average labour costs increased more amongst our treatment group of low pay firms relative to firms that paid better wages. This pattern is evident for all thresholds and estimations methods. We find evidence of these labour cost increases within SMEs, larger companies, and amongst LPC defined low-paying sectors (Table 18). This lends some credibility to the identification strategy used to examine NMW impacts on other outcomes, which basically attributes the difference in changes in outcomes over time between lower and higher average labour cost businesses to the NMW. Although we include industry-year controls in the analysis, it is important to bear in mind that there could be

[17] These issues also arise in an unbalanced panel, where we have the additional complexity that sample composition is changing over time.

other influences on business outcomes over time that affect more and less low-pay companies differently. When we are unable to take these into account in the analysis these can bias our estimates of NMW impacts. Indeed, vertical placebo tests (Table 17 and 18) suggest that our estimates of increases in labour costs may be biased upwards, possibly due to some dynamic adjustment (mean reversion) effect (we cannot look at the pre-NMW period with the ARD). Note also that the ARD labour cost estimates are (in some cases substantially) larger in magnitude than the FAME estimates discussed above. This is at least in part due to the fact that we can include only a few years in the ARD panel. We illustrate this in Table 21 where we estimate these same "ARD style" models using the FAME data. When we do this we generally get larger impact estimates than when using the full longitudinal panel. Moreover, we do not pass our standard falsification tests further up the distribution of labour costs (also in Table 21) and in the pre-NMW period (Table 22). We draw two conclusions. First, it is clearly necessary to recalibrate falsification tests with (even relatively minor) changes to the model (e.g. thresholds, controls, time periods covered) to check the validity of the identification strategy. This phenomenon is also evident in employee-level studies. Second, the effects we find with the "ARD style" model do almost certainly capture some element of dynamic adjustment and are likely biased upwards.

In Table 17 we also show ARD results for the intermediate and recession periods. We generally find that average labour costs per head increased amongst low-paying firms (the treatment group) compared to less low-paying firms (the control group). This is evident for SMEs and large firms, and for firms in LPC defined low-paying sectors (Tables 19 and 20). As might be expected, the magnitude of these average labour cost effects is generally greatest upon introduction of the NMW and smallest during the recession. This pattern was also evident when we used robust regression on the FAME data in the previous section and is in line with changes in the NMW over time giving us some confidence that we are capturing some effects that are associated with the NMW.

Labour productivity and profitability

We also estimate the difference in 4-year changes in profit margins, labour productivity (GVA per head), as well as capital labour ratios, TFP, and employment between lower and higher average labour cost businesses, using the same methodology described above.

Looking at the full sample (Table 17) we generally do not find any evidence of impacts on profit margins, except upon introduction when we use robust regression and the £10,000 threshold. These profit effects arise amongst the groups of SMEs (Table 18). Beyond these impacts we find no robust evidence to suggest there was any impact of the NMW on profit margins, in aggregate or for the sub-groups of firms that we consider.

The impact estimates in Table 17 suggest that the increases in labour costs associated with the NMW were associated with increases in labour productivity in all three periods considered and that these arose due to increases in efficiency (TFP) rather than capital labour substitution (capital labour ratio). This finding is not evident for all sub-group models and time periods (Tables 18-20). We find some evidence of these productivity effects amongst low-paying firms in low-paying sectors in all periods, for low-paying SME firms in the latter two periods and for low-paying large firms upon introduction and during the recession. But, as with the labour cost increases, there is a concern that these effects capture an element of mean reversion (the tendency for low-productivity firms to catch up to the industry average). We find some negative and significant employment coefficients, but these are not consistent across the specifications shown and usually disappear when we use robust regression.

6. Conclusion

This report re-examines the impacts of the NMW on business outcomes during its earlier phases and also considers the impacts of the NMW in the years following recession. In addition, the study makes a number of improvements to our previous study on the impact of the NMW on UK firms (Riley and Rosazza Bondibene, 2013; see footnote 2 in this report).

Our results from analysing WERS and ASHE linked to the ARD validate the difference-in-differences methodology used here, but also point to difficulties in making direct comparisons of the magnitudes of NMW impact estimates across the low-paying industries and more widely.

Analysing FAME and the ARD we find evidence to suggest that the NMW led to increases in labour costs amongst low-paying firms upon introduction, but also following the above average earnings increases of the mid-2000s and after the recession when NMW upratings were modest but real average wages were falling and some workers experienced nominal pay cuts.

Our results suggest that these labour cost increases amongst low-paying firms may have been met by increases in labour productivity, confirming (qualitatively) the conclusions of some previous studies regarding firms' productivity responses to the NMW (Galindo-Rueda & Pereira, 2004; Rizov & Croucher, 2011). Our findings do not suggest that these increases in labour productivity arose because of reductions in employment. The evidence suggests that these labour productivity increases may have been associated with increases in TFP. This finding is consistent with efficiency wage and training responses to increased labour costs from the NMW. We cannot rule out that the labour productivity increases we find are associated with increases in average hours worked. This is because we cannot control for average hours worked at the firm-level (only at the industry level, which we do by including industry-year effects). The available evidence is unclear about the effects of the NMW on average hours. Dickens, Riley and

Wilkinson (forthcoming) find that employers may have shifted away from part-time workers towards full-time workers in response to the NMW, which would tend to increase average hours worked. Stewart & Swaffield (2008) find that minimum wage workers' hours decreased in response to the introduction of the NMW, which would tend to reduce average hours worked.

We find no evidence that the NMW increased the rate of business exit. We find that, in some models, trends in profit margins differed between lower and higher average labour cost businesses (similar to Draca *et al*, 2005 and 2011). However these differences were mostly not significant and we generally do not find robust evidence to suggest that trends in profit margins differed substantially between lower and higher average labour cost businesses. The finding of significant reductions in profit margins in but a few models points perhaps to heterogeneous responses across different types of firms.

We consider impact estimates for SMEs and large firms and for firms in low-paying sectors. These are generally less robust than estimates we derive for the full sample (for example, less consistent or failing falsification tests). However, by and large they suggest that the NMW increased labour costs for low-paying firms regardless of size and in the low-paying sectors. There is also evidence to suggest that these increases in average labour costs may have been accompanied by increases in labour productivity. Where we find negative profit effects these tend to be concentrated amongst low-paying SMEs.

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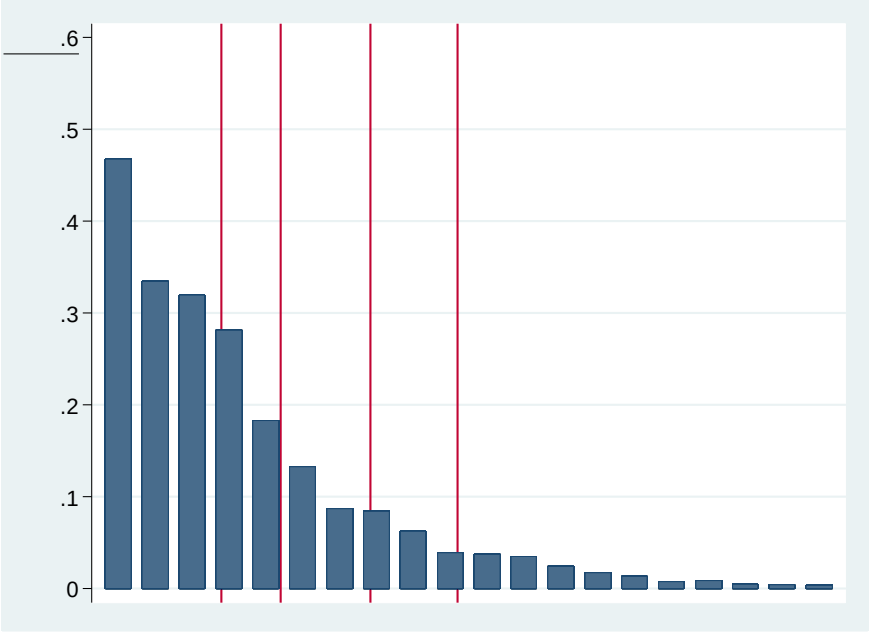
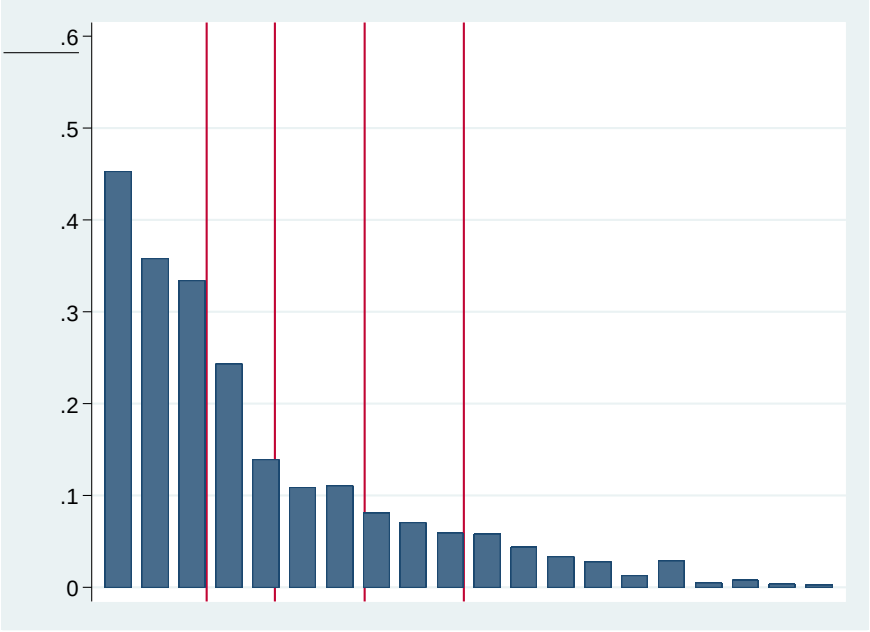
Figures

Figure 1. Proportion of low-paid workers and establishment average wages. WERS1998.



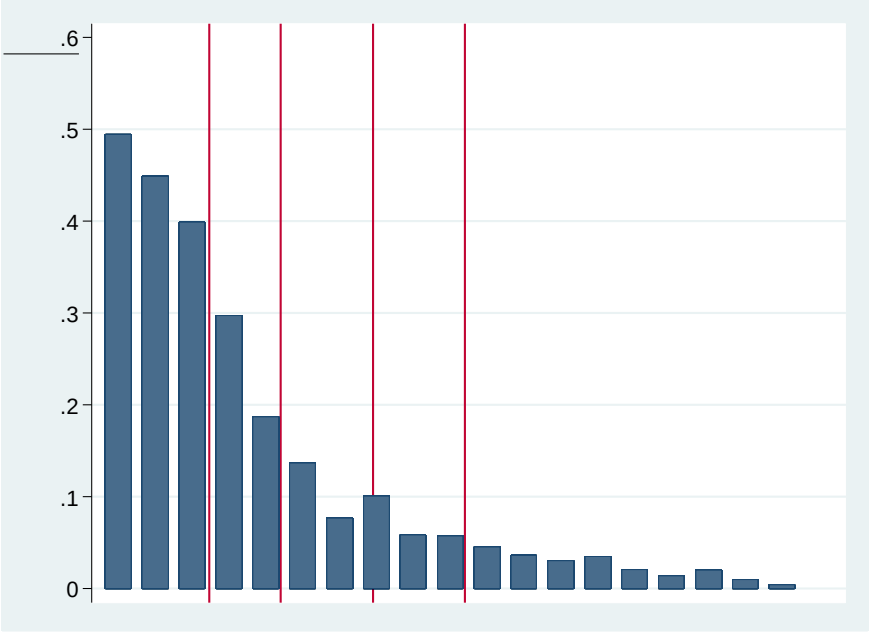
Source: WERS 1998. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices.

Figure 2. Proportion of low-paid workers and establishment average wages. WERS2004.



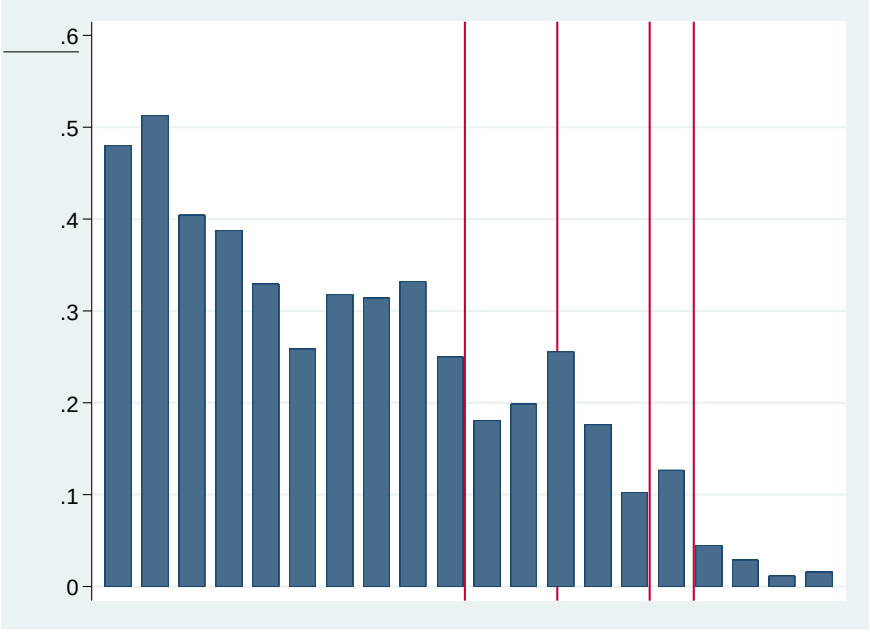
Source: WERS 2004. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices.

Figure 3. Proportion of low-paid workers and establishment average wages. WERS2011.



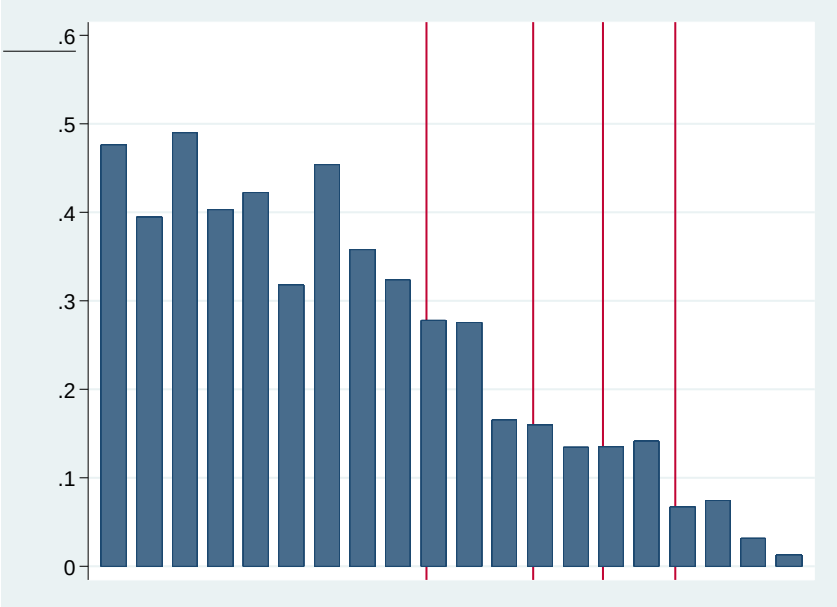
Source: WERS 2011. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices.

Figure 4. Proportion of low-paid workers and establishment average wages. Low-paying industries. WERS 1998.



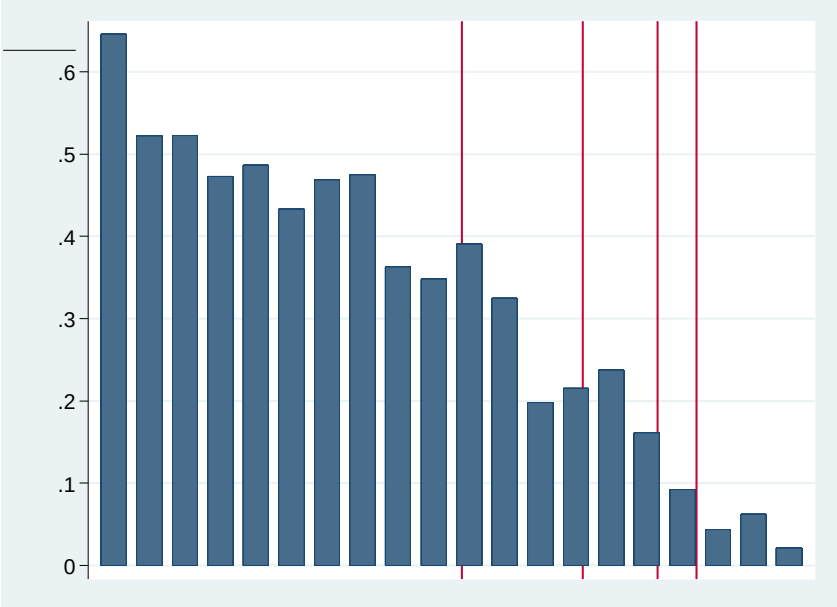
Source: WERS 1998. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices. LPC definition of low pay industries.

Figure 5. Proportion of low-paid workers and establishment average wages. Low-paying industries. WERS 2004.



Source: WERS 2004. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices. LPC definition of low pay industries.

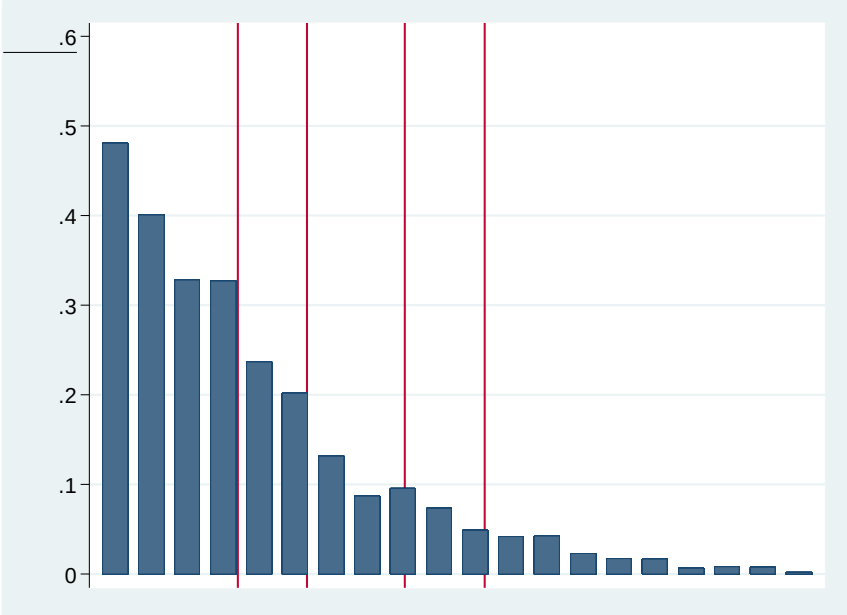
Figure 6. Proportion of low-paid workers and establishment average wages. Low-paying industries. WERS 2011.



Source: WERS 2011. Authors' calculations.

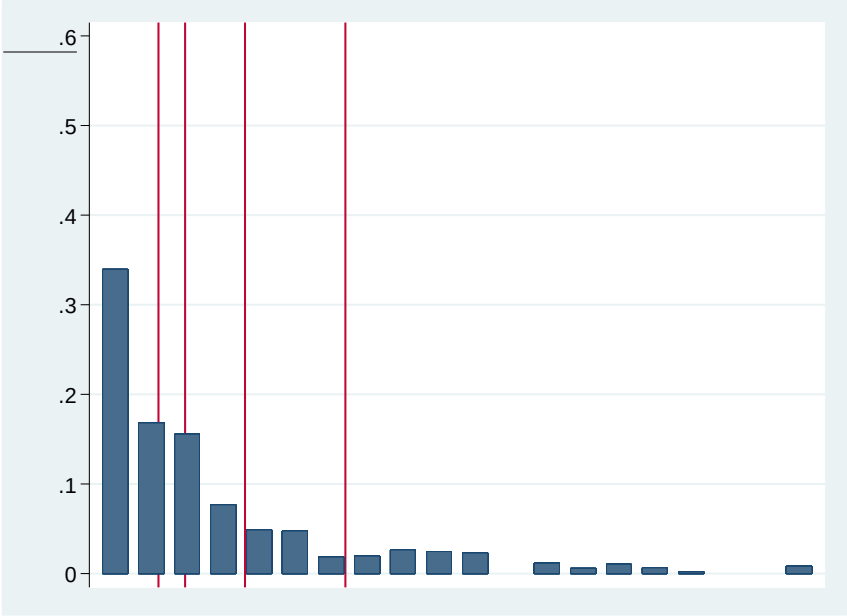
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices. LPC definition of low pay industries.

Figure 7. Proportion of low-paid workers and establishment average wages. SMEs. WERS 1998.



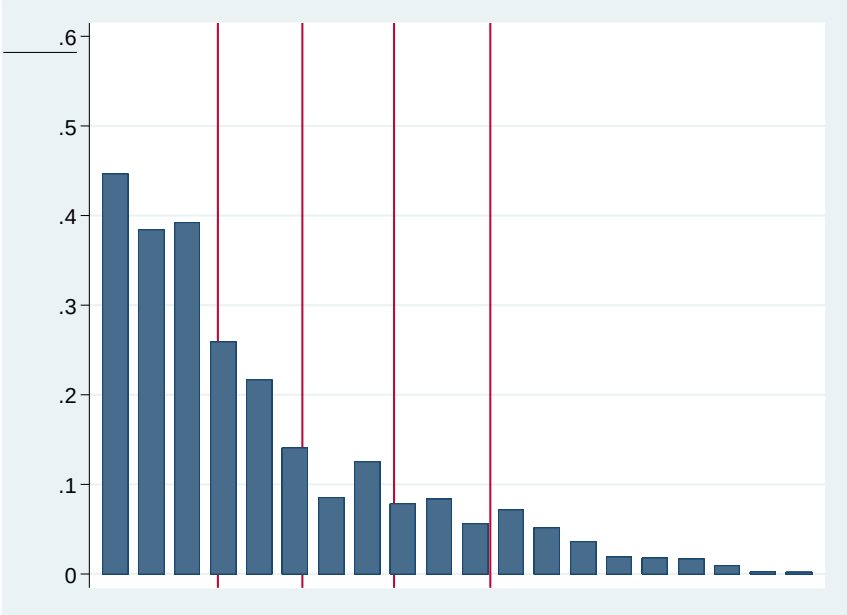
Source: WERS 1998. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices. SME establishments have less than 250 employees.

Figure 8. Proportion of low-paid workers and establishment average wages. Large establishments. WERS 1998.



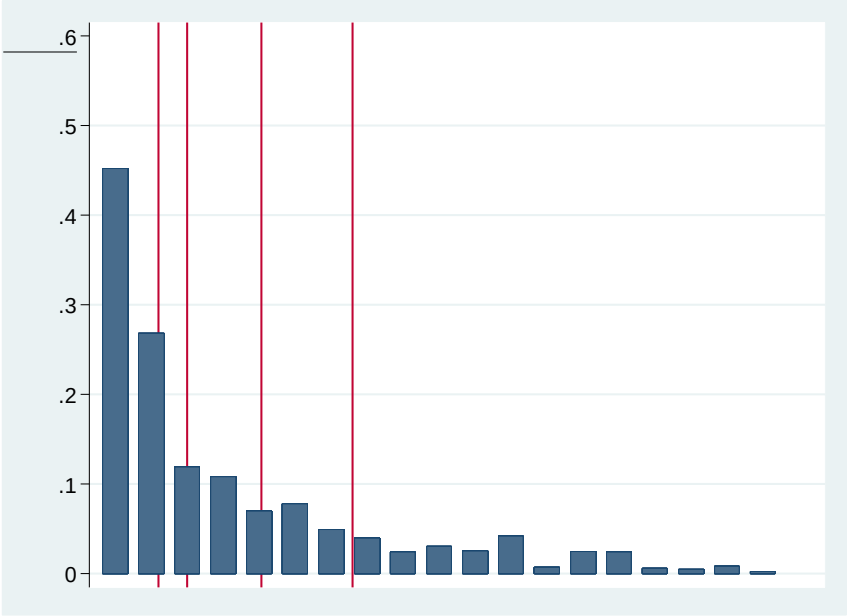
Source: WERS 1998. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices. Large establishments have 250 employees or more.

Figure 9. Proportion of low-paid workers and establishment average wages. SMEs. WERS 2004.



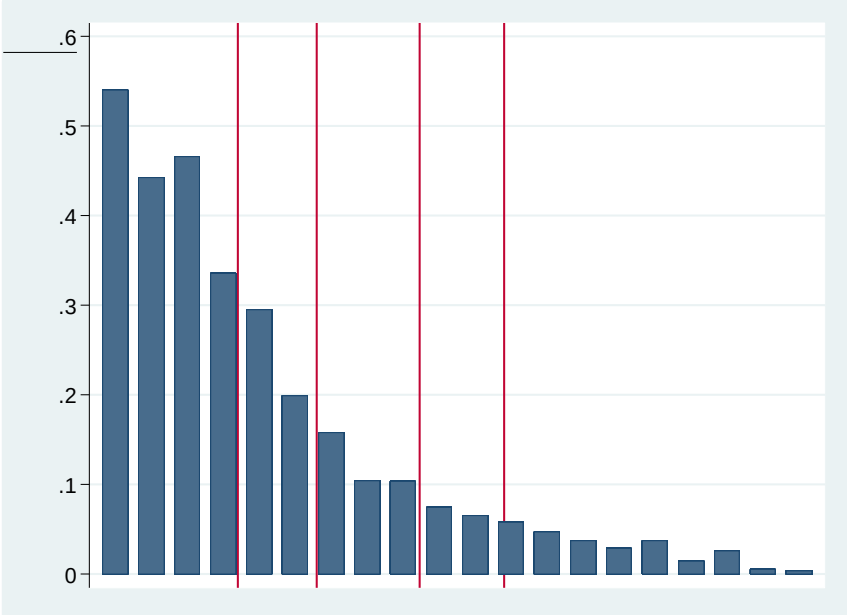
Source: WERS 2004. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices. SME establishments have less than 250 employees.

Figure 10. Proportion of low-paid workers and establishment average wages. Large establishments. WERS 2004.



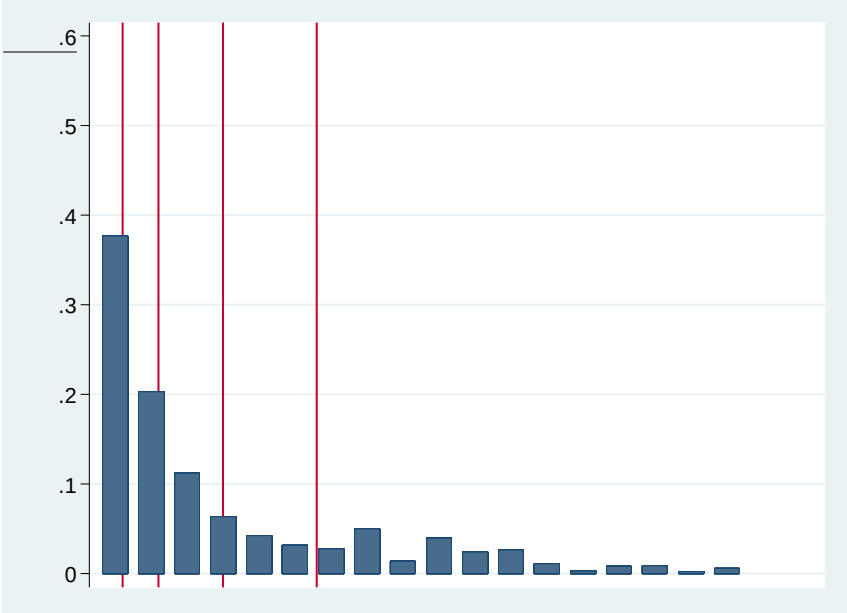
Source: WERS 2004. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices. Large establishments have 250 employees or more.

Figure 11. Proportion of low-paid workers and establishment average wages. SMEs. WERS 2011.



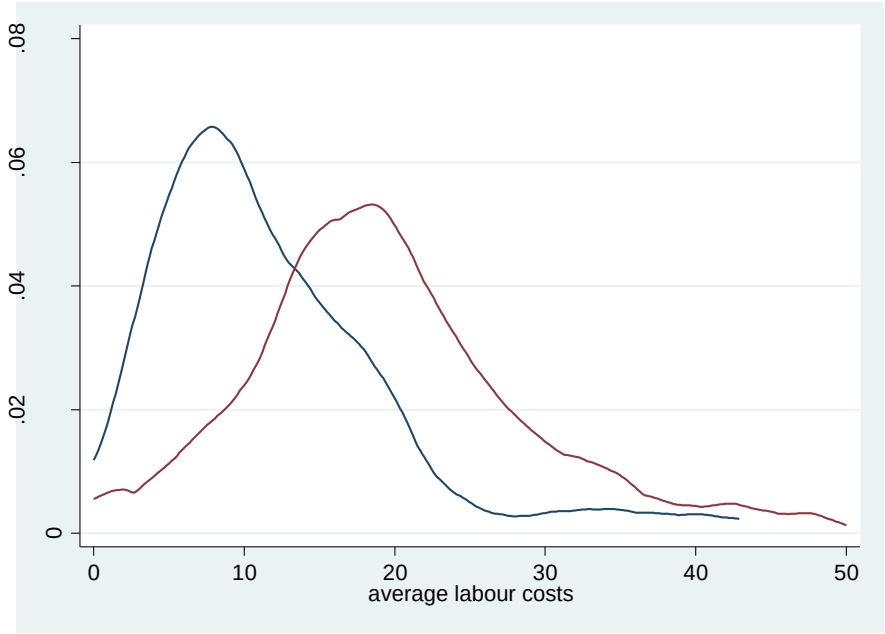
Source: WERS 2011. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices. SME establishments have less than 250 employees.

Figure 12. Proportion of low-paid workers and establishment average wages. Large establishments. WERS 2011.



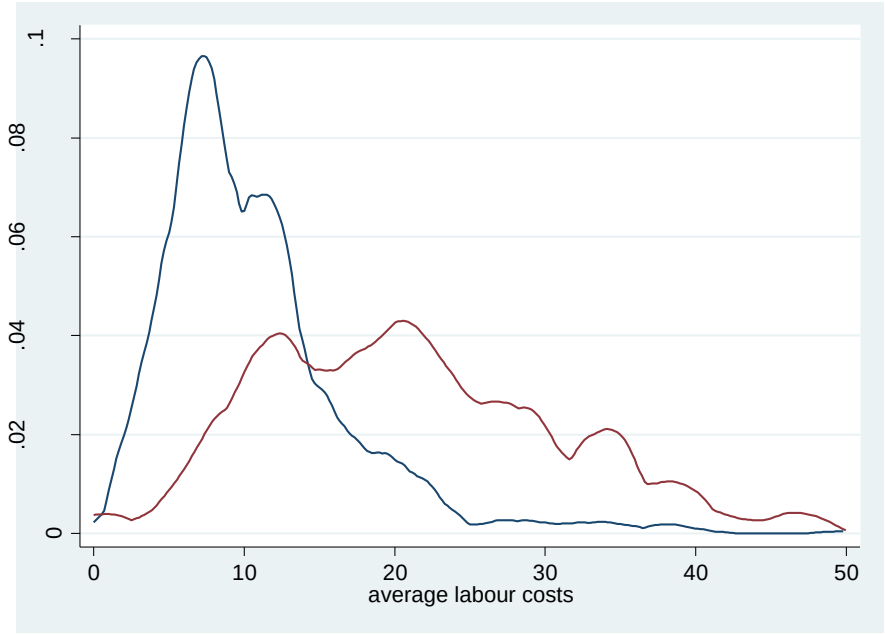
Source: WERS 2011. Authors' calculations.
Note: Vertical lines mark average wage thresholds £8,000, £10,000, £12,000 and £14,000 in 1998 prices. Large establishments have 250 employees or more.

Figure 13. Distribution of employer average labour costs amongst NMW and other employees, 1998, SMEs



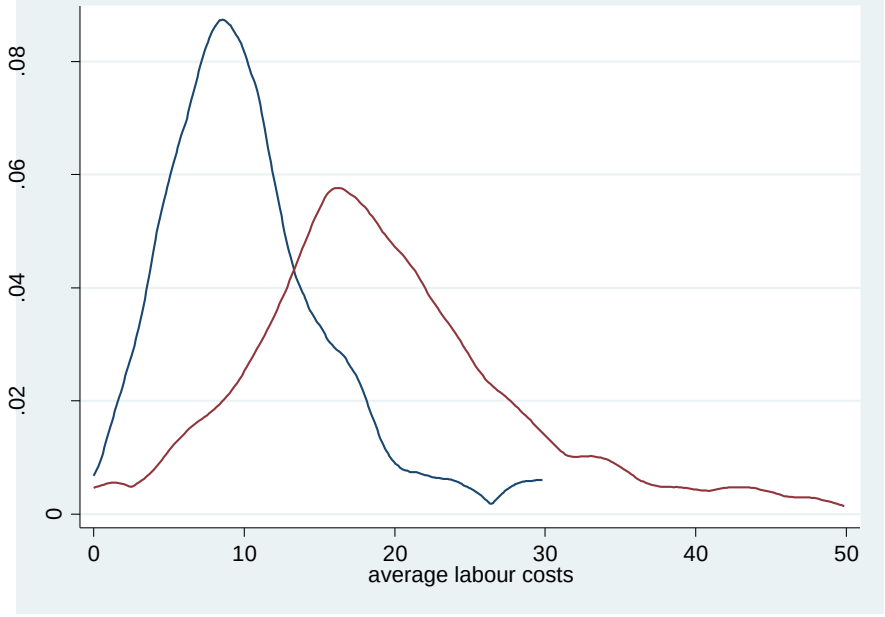
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. SME enterprises have less than 250 employees.

Figure 14. Distribution of employer average labour costs amongst NMW and other employees 1998, large firms



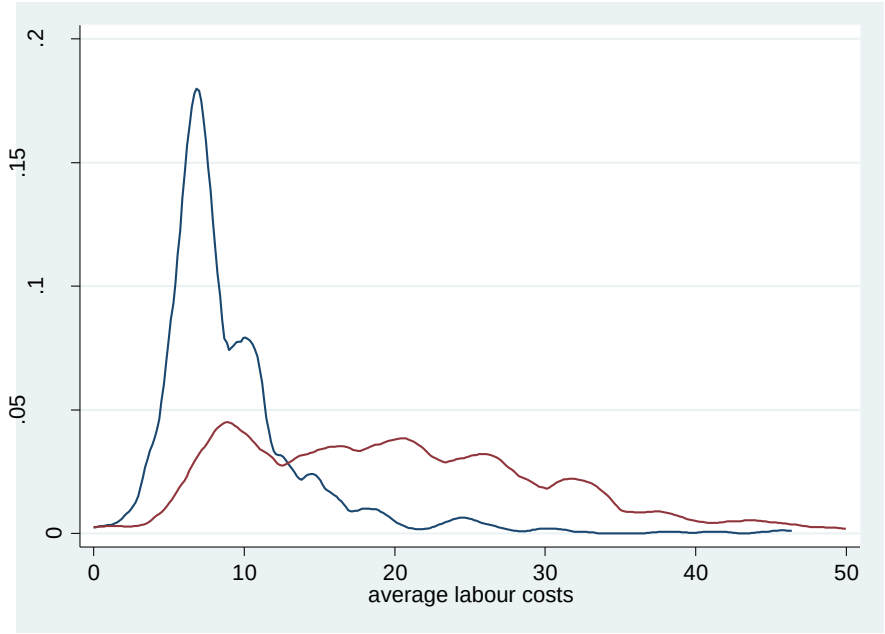
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. Large enterprises have 250 employees or more.

Figure 15. Distribution of employer average labour costs amongst NMW and other employees, 2002, SMEs



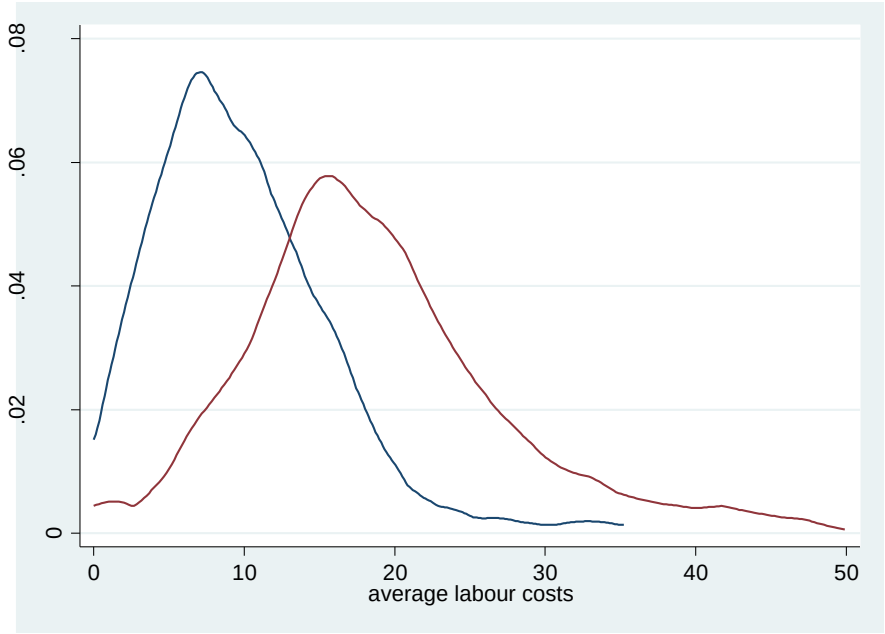
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. SME enterprises have less than 250 employees.

Figure 16. Distribution of employer average labour costs amongst NMW and other employees 2002, large firms



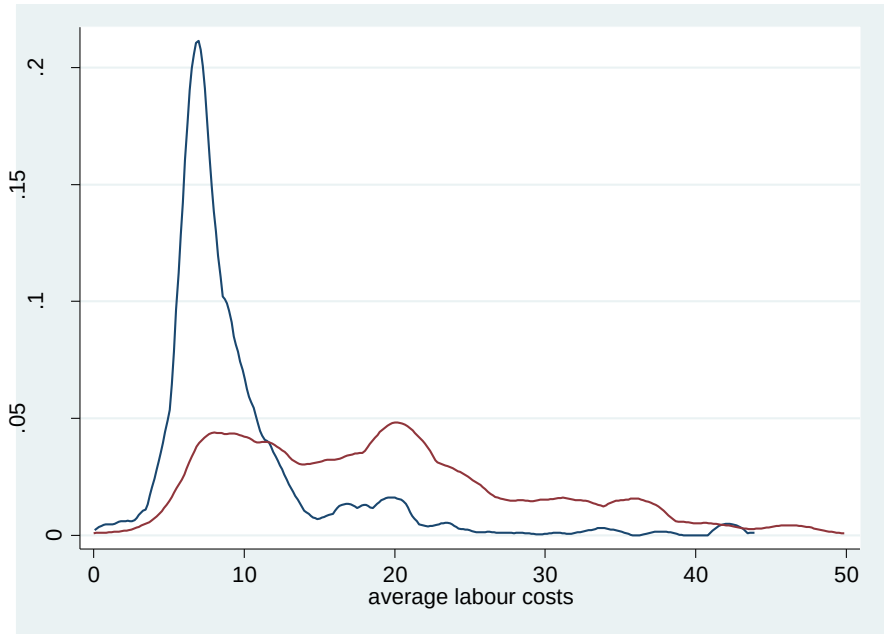
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. Large enterprises have 250 employees or more.

Figure 17. Distribution of employer average labour costs amongst NMW and other employees, 2006, SMEs



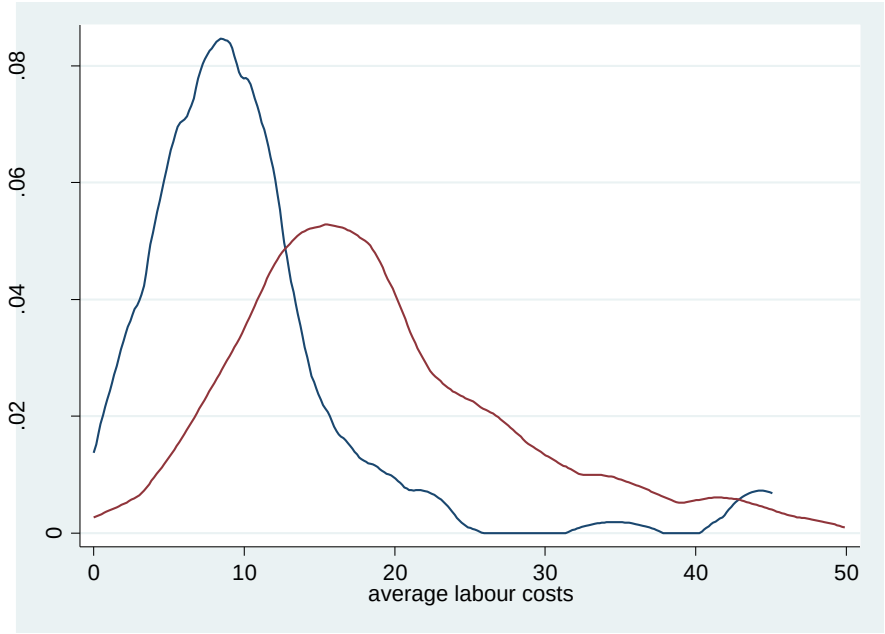
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. SME enterprises have less than 250 employees.

Figure 18. Distribution of employer average labour costs amongst NMW and other employees 2006, large firms



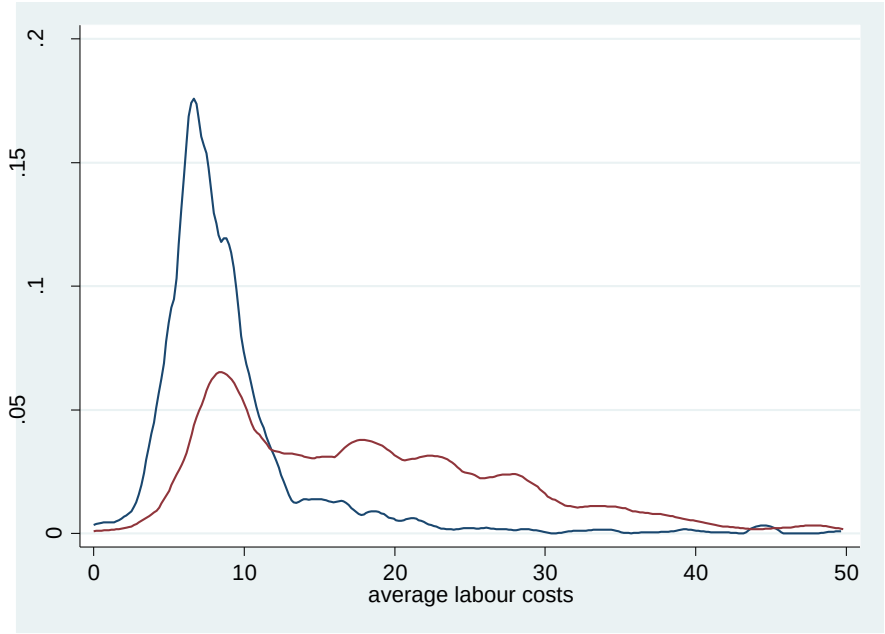
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. Large enterprises have 250 employees or more.

Figure 19. Distribution of employer average labour costs amongst NMW and other employees, 2010, SMEs



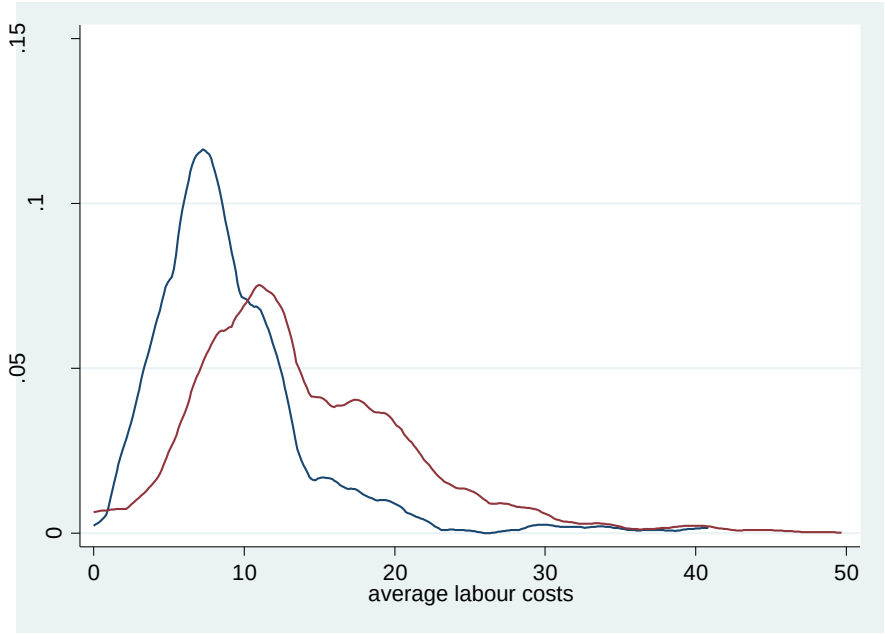
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. SME enterprises have less than 250 employees.

Figure 20. Distribution of employer average labour costs amongst NMW and other employees 2010, large firms



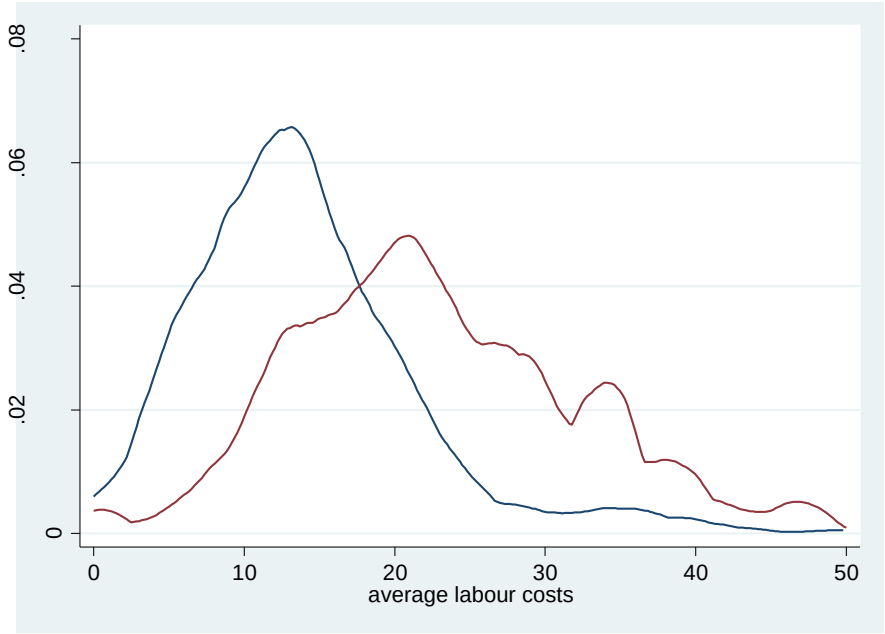
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. Large enterprises have 250 employees or more.

Figure 21. Distribution of employer average labour costs amongst NMW and other employees 1998, low-paying industries



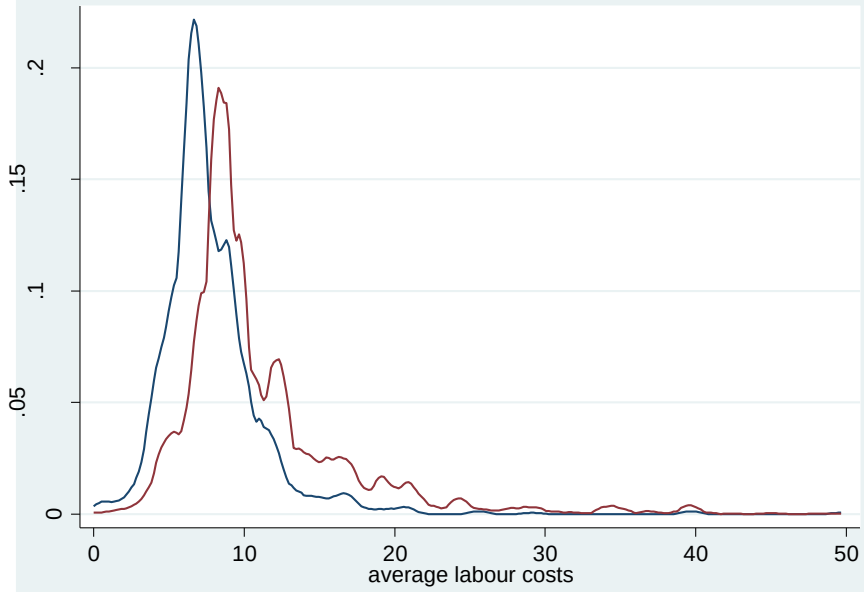
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. Low-paying industries (broadly) as defined by LPC.

Figure 22. Distribution of employer average labour costs amongst NMW and other employees 1998, other industries



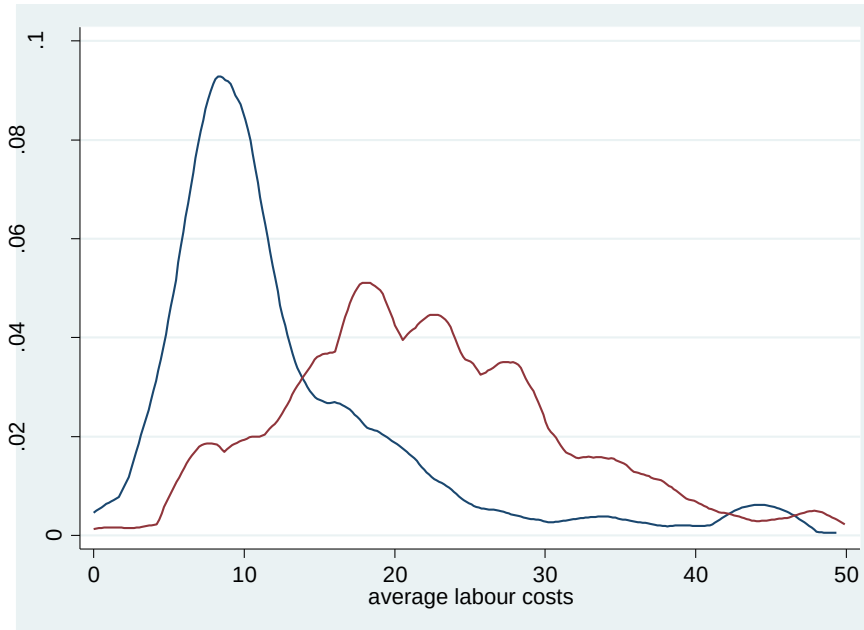
Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. Low-paying industries (broadly) as defined by LPC.

Figure 23. Distribution of employer average labour costs amongst NMW and other employees 2010, low-paying industries



Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. Low-paying industries (broadly) as defined by LPC.

Figure 24. Distribution of employer average labour costs amongst NMW and other employees 2010, other industries



Source: ASHE linked to ARD. Authors' calculations.
Note: Not population weighted. Low-paying industries (broadly) as defined by LPC.

Tables

Table 1. NMW introduction. Longitudinal panel models using FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£10,000	£12,000	£14,000	£10,000	£12,000	£14,000
POLICY ON (OFF) PERIOD: **1999-2002** (1996-1998)						
Labour costs	0.039 ***	0.042 ***	0.036 ***	0.039 ***	0.036 ***	0.033 ***
	(0.014)	(0.011)	(0.009)	(0.010)	(0.008)	(0.007)
Profit margins	0.000	0.000	0.001	0.000	0.001	0.001
	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Labour productivity (GVA measure)	0.031	0.043 **	0.042 ***	0.028 *	0.037 ***	0.040 ***
	(0.022)	(0.018)	(0.014)	(0.016)	(0.013)	(0.012)
Labour productivity (turnover measure)	0.018	0.041 **	0.030 **	0.018	0.042 *	0.025
	(0.020)	(0.016)	(0.013)	(0.026)	(0.022)	(0.020)
Employment	0.019	-0.006	0.002	0.046	0.011	0.013
	(0.031)	(0.026)	(0.021)	(0.056)	(0.048)	(0.042)
Capital labour ratio	0.044	0.025	0.016	0.029	0.021	0.013
	(0.031)	(0.026)	(0.022)	(0.043)	(0.037)	(0.032)
Total factor productivity	0.014	0.032 *	0.033 **	0.018	0.027 *	0.032 ***
	(0.021)	(0.017)	(0.014)	(0.017)	(0.014)	(0.012)

Notes: Standard errors clustered by firm in brackets; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in the year to December 31 1998 and March 31 1999; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel.

Table 2. Intermediate phase. Longitudinal panel models using FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£10,000	£12,000	£14,000	£10,000	£12,000	£14,000
POLICY ON (OFF) PERIOD: **2003-2006** (2000-2002)						
Labour costs	0.048 ***	0.042 ***	0.036 ***	0.023 **	0.021 **	0.028 ***
	(0.018)	(0.014)	(0.011)	(0.011)	(0.009)	(0.008)
Profit margins	-0.003	-0.004	-0.004	0.000	-0.002	0.000
	(0.005)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)
Labour productivity (GVA measure)	0.065 ***	0.046 **	0.021	0.005	0.003	0.010
	(0.025)	(0.021)	(0.017)	(0.018)	(0.015)	(0.013)
Labour productivity (turnover measure)	0.008	0.023	-0.005	-0.004	0.009	-0.008
	(0.020)	(0.019)	(0.016)	(0.029)	(0.025)	(0.021)
Employment	-0.018	-0.025	0.008	-0.031	-0.032	0.008
	(0.030)	(0.027)	(0.024)	(0.062)	(0.053)	(0.045)
Capital labour ratio	-0.014	0.008	-0.007	0.004	0.073	0.029
	(0.038)	(0.033)	(0.028)	(0.055)	(0.047)	(0.041)
Total factor productivity	0.074 ***	0.048 **	0.025	0.028	0.011	0.015
	(0.027)	(0.022)	(0.018)	(0.020)	(0.017)	(0.014)

Notes: Standard errors clustered by firm in brackets; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in the year to December 31 2002 and March 31 2003; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel.

Table 3. Recession period. Longitudinal panel models using FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£10,000	£12,000	£14,000	£10,000	£12,000	£14,000
POLICY ON (OFF) PERIOD: **2009-2012** (2006-2008)						
Labour costs	0.059 ***	0.043 ***	0.022 **	0.028 **	0.014	0.014 *
	(0.017)	(0.013)	(0.010)	(0.012)	(0.009)	(0.007)
Profit margins	-0.010 **	-0.005	-0.003	-0.008 ***	-0.003	-0.002
	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Labour productivity (GVA measure)	0.013	0.030	0.021	0.031 *	0.027 *	0.028 **
	(0.025)	(0.019)	(0.016)	(0.019)	(0.015)	(0.013)
Labour productivity (turnover measure)	0.051 **	0.033 *	0.013	0.034	0.017	-0.004
	(0.023)	(0.018)	(0.015)	(0.031)	(0.025)	(0.022)
Employment	-0.005	0.016	0.001	-0.039	0.005	-0.012
	(0.032)	(0.027)	(0.023)	(0.064)	(0.052)	(0.046)
Capital labour ratio	-0.030	-0.020	0.004	-0.019	-0.020	-0.004
	(0.041)	(0.036)	(0.030)	(0.059)	(0.049)	(0.042)
Total factor productivity	0.019	0.032 *	0.016	0.036 *	0.034 **	0.030 **
	(0.024)	(0.020)	(0.016)	(0.021)	(0.017)	(0.015)

Notes: Standard errors clustered by firm in brackets; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in the year to December 31 2008 and March 31 2009; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel.

Table 4. Falsification. Pre-NMW phase. Longitudinal panel models using FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£10,000	£12,000	£14,000	£10,000	£12,000	£14,000
POLICY ON (OFF) PERIOD: **1996-1999** (1993-1995)						
Labour costs	0.005	-0.003	0.011	0.004	-0.008	0.008
	(0.017)	(0.013)	(0.010)	(0.011)	(0.008)	(0.007)
Profit margins	-0.002	0.000	-0.001	0.001	0.001	0.001
	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Labour productivity (GVA measure)	0.000	-0.002	0.001	0.021	0.004	0.014
	(0.022)	(0.017)	(0.014)	(0.017)	(0.013)	(0.011)
Labour productivity (turnover measure)	-0.012	-0.005	0.005	-0.005	0.003	0.007
	(0.017)	(0.015)	(0.013)	(0.027)	(0.023)	(0.020)
Employment	-0.009	-0.002	-0.005	-0.010	-0.019	-0.019
	(0.025)	(0.022)	(0.018)	(0.057)	(0.048)	(0.041)
Capital labour ratio	-0.033	-0.034	-0.016	-0.014	-0.019	0.004
	(0.032)	(0.027)	(0.023)	(0.046)	(0.038)	(0.033)
Total factor productivity	0.009	0.007	0.004	0.016	0.010	0.014
	(0.022)	(0.017)	(0.014)	(0.017)	(0.014)	(0.012)

Notes: Standard errors clustered by firm in brackets; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in the year to December 31 1995 and March 31 1996; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel.

Table 5. Falsification. NMW introduction vertical placebo. FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£20,000	£22,000	£24,000	£20,000	£22,000	£24,000
POLICY ON (OFF) PERIOD: **1999-2002** (1996-1998)						
Labour costs	-0.002	-0.005	-0.005	0.001	0.001	0.003
	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)
Profit margins	-0.001	-0.001	-0.002	-0.001	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Labour productivity (GVA measure)	-0.001	0.002	-0.001	0.013	0.007	0.003
	(0.011)	(0.011)	(0.012)	(0.011)	(0.009)	(0.009)
Labour productivity (turnover measure)	-0.001	0.000	0.001	0.009	0.003	0.001
	(0.011)	(0.009)	(0.010)	(0.020)	(0.017)	(0.017)
Employment	-0.008	-0.018	-0.025 *	-0.014	-0.027	-0.034
	(0.015)	(0.013)	(0.014)	(0.040)	(0.033)	(0.033)
Capital labour ratio	0.031	0.030	0.046 **	0.030	0.034	0.047
	(0.022)	(0.020)	(0.021)	(0.035)	(0.030)	(0.030)
Total factor productivity	-0.007	-0.005	-0.010	0.001	-0.006	-0.007
	(0.012)	(0.011)	(0.012)	(0.012)	(0.010)	(0.010)

Notes: Standard errors clustered by firm in brackets; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in the year to December 31 1998 and March 31 1999; firms selected for neither the treatment nor the control group (with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel.

Table 6. Falsification. Intermediate phase vertical placebo. FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£20,000	£22,000	£24,000	£20,000	£22,000	£24,000
POLICY ON (OFF) PERIOD: **2003-2006** (2000-2002)						
Labour costs	0.007	0.007	0.006	0.007	0.010 **	0.006
	(0.008)	(0.007)	(0.007)	(0.006)	(0.005)	(0.005)
Profit margins	0.003	0.006 ***	0.004 *	0.001	0.003 *	0.003 *
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Labour productivity (GVA measure)	0.012	0.021	0.024 *	0.014	0.029 ***	0.030 ***
	(0.016)	(0.014)	(0.014)	(0.012)	(0.010)	(0.010)
Labour productivity (turnover measure)	0.014	0.007	0.010	0.022	0.015	0.007
	(0.014)	(0.013)	(0.013)	(0.023)	(0.019)	(0.019)
Employment	-0.038 *	-0.018	-0.001	-0.047	-0.035	-0.009
	(0.021)	(0.018)	(0.018)	(0.043)	(0.037)	(0.037)
Capital labour ratio	0.046 *	0.066 ***	0.073 ***	0.026	0.045	0.060
	(0.028)	(0.025)	(0.027)	(0.046)	(0.039)	(0.040)
Total factor productivity	0.004	0.009	0.018	0.011	0.022 *	0.025 **
	(0.017)	(0.014)	(0.015)	(0.015)	(0.012)	(0.013)

Notes: Standard errors clustered by firm in brackets; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in the year to December 31 2002 and March 31 2003; firms selected for neither the treatment nor the control group (with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel.

Table 7. Falsification. Recession period vertical placebo. FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£20,000	£22,000	£24,000	£20,000	£22,000	£24,000
POLICY ON (OFF) PERIOD: **2009-2012** (2006-2008)						
Labour costs	0.010	0.008	0.001	0.009	0.006	0.005
	(0.008)	(0.008)	(0.007)	(0.007)	(0.005)	(0.005)
Profit margins	0.003	0.002	-0.001	0.001	0.000	0.000
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)
Labour productivity (GVA measure)	0.005	0.003	-0.014	0.001	0.005	0.011
	(0.018)	(0.016)	(0.016)	(0.014)	(0.011)	(0.011)
Labour productivity (turnover measure)	0.029 *	0.023 *	0.002	0.030	0.021	0.008
	(0.016)	(0.013)	(0.013)	(0.025)	(0.021)	(0.021)
Employment	-0.045 **	-0.005	0.002	-0.031	-0.002	0.001
	(0.022)	(0.019)	(0.018)	(0.044)	(0.037)	(0.037)
Capital labour ratio	0.055	0.029	-0.005	0.044	0.032	-0.018
	(0.033)	(0.029)	(0.030)	(0.056)	(0.047)	(0.047)
Total factor productivity	-0.006	-0.005	-0.017	-0.005	-0.006	0.000
	(0.019)	(0.017)	(0.018)	(0.017)	(0.014)	(0.014)

Notes: Standard errors clustered by firm in brackets; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in the year to December 31 2008 and March 31 2009; firms selected for neither the treatment nor the control group (with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel.

Table 8. NMW introduction. Sub-groups. Longitudinal panel models using FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£10,000	£12,000	£14,000	£10,000	£12,000	£14,000
POLICY ON (OFF) PERIOD: **1999-2002** (1996-1998)						
Low pay sectors						
Labour costs	0.055 ***	0.050 ***	0.048 ***	0.051 ***	0.049 ***	0.044 ***
Profit margins	0.001	0.003	0.004	-0.002	0.001	0.000
Labour productivity (GVA measure)	0.048 **	0.056 ***	0.056 ***	0.040 **	0.054 ***	0.052 ***
Labour productivity (turnover measure)	0.046 ***	0.058 ***	0.063 ***	0.034	0.060 **	0.051 *
Employment	-0.012	-0.012	-0.026	0.017	0.017	-0.008
Capital labour ratio	0.044	0.038	0.024	0.020	0.024	0.018
Total factor productivity	0.029	0.039 *	0.044 **	0.024	0.033 *	0.037 *
SMEs						
Labour costs	0.030 *	0.034 **	0.035 ***	0.055 ***	0.042 ***	0.032 ***
Profit margins	-0.005	-0.003	-0.001	0.001	0.003	0.001
Labour productivity (GVA measure)	0.029	0.039 *	0.042 **	0.039 *	0.038 **	0.041 ***
Labour productivity (turnover measure)	0.007	0.026	0.023	0.029	0.051 *	0.025
Employment	0.015	0.011	0.004	0.020	0.000	-0.006
Capital labour ratio	0.031	0.019	0.030	0.054	0.033	0.031
Total factor productivity	0.013	0.030	0.032 *	0.005	0.020	0.027 *
Large						
Labour costs	0.049 *	0.054 ***	0.038 **	0.005	0.013	0.027 *
Profit margins	0.007	0.007	0.008	-0.001	-0.002	0.000
Labour productivity (GVA measure)	0.036	0.053 *	0.046 *	0.009	0.035	0.026
Labour productivity (turnover measure)	0.032	0.063 *	0.042	-0.016	0.006	0.013
Employment	0.017	-0.056	-0.016	0.008	-0.027	0.071
Capital labour ratio	0.041	0.020	-0.030	0.012	0.029	-0.004
Total factor productivity	0.025	0.043	0.045 *	0.035	0.031	0.042 *
SMEs in low pay sectors						
Labour costs	0.060 ***	0.052 ***	0.052 ***	0.064 ***	0.058 ***	0.049 ***
Profit margins	-0.006	-0.002	-0.002	-0.003	0.001	-0.001
Labour productivity (GVA measure)	0.048	0.061 **	0.053 **	0.042	0.052 **	0.042 *
Labour productivity (turnover measure)	0.036	0.051 **	0.057 ***	0.035	0.067 **	0.050
Employment	-0.023	-0.008	-0.043 *	-0.017	-0.015	-0.059
Capital labour ratio	0.025	0.016	0.019	0.034	0.004	0.003
Total factor productivity	0.030	0.048 *	0.043 *	0.000	0.024	0.026

Notes: Standard errors clustered by firm; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in the year to December 31 1998 and March 31 1999; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 9. Intermediate phase. Sub-groups. Longitudinal panel models using FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£10,000	£12,000	£14,000	£10,000	£12,000	£14,000
POLICY ON (OFF) PERIOD: **2003-2006** (2000-2002)						
Low pay sectors						
Labour costs	0.027	0.030 *	0.055 ***	0.025	0.022	0.044 ***
Profit margins	-0.004	-0.008	-0.010 *	-0.001	-0.001	0.002
Labour productivity (GVA measure)	0.031	0.036	0.038	-0.007	0.009	0.043 **
Labour productivity (turnover measure)	0.001	0.006	0.002	0.026	0.019	0.027
Employment	-0.003	0.010	0.034	-0.045	-0.014	0.014
Capital labour ratio	-0.063	-0.066	-0.026	-0.037	0.013	0.044
Total factor productivity	0.041	0.045 *	0.037	0.021	0.034	0.045 **
SMEs						
Labour costs	0.048 **	0.043 **	0.034 ***	0.011	0.013	0.020 **
Profit margins	0.002	-0.002	-0.005	-0.003	-0.003	-0.001
Labour productivity (GVA measure)	0.081 **	0.053 *	0.008	0.004	-0.007	-0.014
Labour productivity (turnover measure)	-0.016	0.005	-0.017	-0.006	0.010	-0.008
Employment	-0.007	-0.006	-0.001	-0.017	-0.007	0.004
Capital labour ratio	0.007	0.002	-0.013	0.018	0.053	0.006
Total factor productivity	0.079 **	0.050 *	0.009	0.016	-0.003	-0.009
Large						
Labour costs	0.034	0.040	0.036 *	0.035 *	0.034 **	0.038 ***
Profit margins	-0.008	-0.006	0.000	0.003	0.000	0.000
Labour productivity (GVA measure)	0.026	0.028	0.041	-0.002	0.010	0.041 *
Labour productivity (turnover measure)	0.008	0.030	-0.013	-0.002	0.015	-0.003
Employment	-0.057	-0.052	0.019	-0.107	-0.124 *	-0.005
Capital labour ratio	-0.079	0.002	-0.009	-0.065	0.053	0.041
Total factor productivity	0.056	0.038	0.055 *	0.042	0.040	0.055 **
SMEs in low pay sectors						
Labour costs	0.030	0.036	0.065 ***	0.015	0.013	0.040 **
Profit margins	0.000	-0.011	-0.013 **	-0.004	-0.004	0.002
Labour productivity (GVA measure)	0.048	0.048	0.041	-0.007	0.002	0.028
Labour productivity (turnover measure)	-0.014	-0.004	-0.003	0.020	0.023	0.040
Employment	-0.031	-0.017	-0.035	-0.035	-0.024	-0.034
Capital labour ratio	-0.014	-0.029	0.026	0.015	0.032	0.072
Total factor productivity	0.042	0.046	0.026	-0.001	0.007	0.015

Notes: Standard errors clustered by firm; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in the year to December 31 2002 and March 31 2003; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 10. Recession period. Sub-groups. Longitudinal panel models using FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£10,000	£12,000	£14,000	£10,000	£12,000	£14,000
POLICY ON (OFF) PERIOD: **2009-2012** (2006-2008)						
Low pay sectors						
Labour costs	0.032 *	0.020	-0.013	0.009	0.006	-0.001
Profit margins	-0.009	-0.004	0.001	-0.007 **	-0.003	0.000
Labour productivity (GVA measure)	0.007	0.038	0.027	-0.008	0.000	0.013
Labour productivity (turnover measure)	0.038	0.034	0.021	0.035	0.041	0.037
Employment	-0.028	0.022	0.003	-0.050	0.014	-0.011
Capital labour ratio	-0.048	-0.059	-0.022	-0.039	-0.037	-0.003
Total factor productivity	0.016	0.052 *	0.030	0.015	0.023	0.026
SMEs						
Labour costs	0.047 **	0.053 ***	0.016	0.055 ***	0.032 ***	0.015 *
Profit margins	-0.013 **	-0.007	-0.003	-0.012 ***	-0.006 *	-0.002
Labour productivity (GVA measure)	0.009	0.051 *	0.028	0.044	0.040 *	0.028 *
Labour productivity (turnover measure)	0.098 ***	0.075 ***	0.031	0.063	0.035	-0.004
Employment	-0.056 *	0.002	0.006	-0.057	0.009	-0.005
Capital labour ratio	-0.084	-0.038	-0.012	-0.043	-0.039	-0.013
Total factor productivity	0.022	0.061 **	0.030	0.043	0.050 **	0.035 *
Large						
Labour costs	0.074 ***	0.032	0.032 *	0.011	0.002	0.015
Profit margins	-0.004	0.001	0.000	-0.003	0.002	0.000
Labour productivity (GVA measure)	0.045	0.019	0.016	0.020	0.014	0.031
Labour productivity (turnover measure)	0.021	-0.002	-0.017	0.017	0.000	-0.012
Employment	-0.038	-0.003	-0.011	-0.058	0.028	0.033
Capital labour ratio	-0.022	-0.011	0.010	-0.061	-0.037	-0.027
Total factor productivity	0.051	0.019	0.008	0.052 *	0.040 *	0.029
SMEs in low pay sectors						
Labour costs	0.013	0.039 *	-0.009	0.009	0.011	0.013
Profit margins	-0.012	-0.003	0.005	-0.012 **	-0.003	0.001
Labour productivity (GVA measure)	-0.003	0.078 *	0.065 *	-0.004	0.021	0.031
Labour productivity (turnover measure)	0.037	0.063 *	0.038	0.020	0.046	0.046
Employment	-0.025	0.028	0.013	-0.018	0.037	-0.011
Capital labour ratio	-0.096	-0.065	-0.005	-0.078	-0.095	0.005
Total factor productivity	0.011	0.099 **	0.067 **	0.006	0.043	0.042

Notes: Standard errors clustered by firm; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in the year to December 31 2008 and March 31 2009; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 11. Falsification. Pre-NMW phase. Sub-groups. Longitudinal panel models using FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£10,000	£12,000	£14,000	£10,000	£12,000	£14,000
POLICY ON (OFF) PERIOD: **1996-1999** (1993-1995)						
Low pay sectors						
Labour costs	0.000	-0.004	0.010	-0.007	-0.018	-0.004
Profit margins	-0.004	-0.002	-0.005	-0.003	-0.003	-0.004
Labour productivity (GVA measure)	-0.025	-0.017	-0.015	-0.009	-0.018	-0.005
Labour productivity (turnover measure)	-0.017	-0.006	0.011	-0.014	-0.005	0.009
Employment	-0.047 *	-0.060 **	-0.065 ***	-0.052	-0.068	-0.072
Capital labour ratio	0.014	-0.024	-0.014	0.031	0.005	0.006
Total factor productivity	-0.029	-0.011	-0.014	-0.012	-0.006	0.000
SMEs						
Labour costs	0.015	0.004	0.026 **	0.003	-0.006	0.017 **
Profit margins	0.000	0.001	-0.002	0.000	-0.001	0.000
Labour productivity (GVA measure)	0.021	0.008	0.019	0.029	0.005	0.025 *
Labour productivity (turnover measure)	-0.002	-0.003	0.024 *	-0.008	-0.004	0.018
Employment	-0.016	-0.007	-0.016	-0.018	-0.012	-0.021
Capital labour ratio	-0.065 *	-0.058 *	-0.025	-0.040	-0.035	-0.005
Total factor productivity	0.035	0.022	0.026	0.043 **	0.024	0.032 **
Large						
Labour costs	-0.002	-0.011	-0.029	0.000	-0.007	-0.016
Profit margins	-0.003	0.004	0.003	0.006	0.008 *	0.004
Labour productivity (GVA measure)	-0.038	-0.020	-0.057 **	-0.004	0.009	-0.019
Labour productivity (turnover measure)	-0.043	-0.020	-0.069 *	-0.004	0.009	-0.011
Employment	0.009	0.015	0.030	-0.030	-0.030	-0.036
Capital labour ratio	-0.032	-0.022	-0.014	0.003	0.023	0.050
Total factor productivity	-0.022	-0.013	-0.062 **	-0.012	0.000	-0.031
SMEs in low pay sectors						
Labour costs	0.002	-0.010	0.010	-0.005	-0.023	-0.005
Profit margins	-0.001	-0.001	-0.006	-0.002	-0.004	-0.003
Labour productivity (GVA measure)	-0.009	-0.010	-0.002	0.004	-0.018	-0.004
Labour productivity (turnover measure)	-0.010	-0.016	0.023	-0.012	-0.018	0.010
Employment	-0.053 *	-0.063 **	-0.077 ***	-0.059	-0.062	-0.074
Capital labour ratio	-0.026	-0.068 *	-0.024	-0.006	-0.039	-0.016
Total factor productivity	-0.006	0.007	0.005	0.015	0.008	0.009

Notes: Standard errors clustered by firm; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in the year to December 31 1995 and March 31 1996; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 12. Falsification. NMW introduction vertical placebo. Sub-groups. FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£20,000	£22,000	£24,000	£20,000	£22,000	£24,000
POLICY ON (OFF) PERIOD: **1999-2002** (1996-1998)						
Low pay sectors						
Labour costs	0.008	0.007	0.004	0.003	0.007	0.006
Profit margins	-0.001	0.003	-0.007	-0.003	-0.002	-0.001
Labour productivity (GVA measure)	-0.013	0.025	0.011	0.000	0.021	0.017
Labour productivity (turnover measure)	-0.013	-0.003	0.003	0.019	0.031	0.017
Employment	-0.014	-0.005	-0.020	-0.024	-0.029	-0.073
Capital labour ratio	-0.012	0.019	0.067	0.030	0.064	0.109
Total factor productivity	-0.005	0.022	0.001	0.001	0.009	-0.008
SMEs						
Labour costs	-0.005	-0.008	-0.007	-0.001	0.000	0.003
Profit margins	-0.001	0.002	0.000	0.000	0.000	-0.001
Labour productivity (GVA measure)	0.002	0.007	0.003	0.011	0.006	0.004
Labour productivity (turnover measure)	-0.007	-0.002	0.003	0.001	0.001	0.000
Employment	-0.004	-0.029 **	-0.034 **	0.004	-0.031	-0.031
Capital labour ratio	0.037	0.036	0.045 *	0.041	0.047	0.054
Total factor productivity	-0.007	-0.003	-0.006	-0.006	-0.013	-0.007
Large						
Labour costs	0.009	0.003	0.004	0.010	0.005	0.001
Profit margins	0.003	-0.007 *	-0.005	-0.001	-0.006 *	-0.006 *
Labour productivity (GVA measure)	-0.002	-0.010	-0.006	0.032	0.019	0.005
Labour productivity (turnover measure)	0.026	0.012	0.002	0.045	0.021	0.021
Employment	-0.045	-0.003	-0.014	-0.054	-0.039	-0.047
Capital labour ratio	-0.001	-0.017	0.043	-0.007	-0.041	0.011
Total factor productivity	0.000	-0.011	-0.018	0.030	0.016	-0.006
SMEs in low pay sectors						
Labour costs	0.010	0.015	0.019	0.003	0.010	0.013
Profit margins	0.003	0.006	-0.002	-0.003	-0.001	0.000
Labour productivity (GVA measure)	-0.006	0.033	0.025	-0.003	0.015	0.011
Labour productivity (turnover measure)	0.000	0.005	0.016	0.021	0.033	0.022
Employment	-0.002	0.004	-0.038	0.009	-0.013	-0.060
Capital labour ratio	-0.019	0.020	0.076	0.011	0.046	0.123
Total factor productivity	0.005	0.031	0.016	0.004	0.005	-0.007

Notes: Standard errors clustered by firm; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in the year to December 31 1998 and March 31 1999; firms selected for neither the treatment nor the control group (with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 13. Falsification. Intermediate phase vertical placebo. Sub-groups. FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£20,000	£22,000	£24,000	£20,000	£22,000	£24,000
POLICY ON (OFF) PERIOD: **2003-2006** (2000-2002)						
Low pay sectors						
Labour costs	0.020	0.030	0.037	0.011	0.028 **	0.030 **
Profit margins	-0.005	0.001	0.003	-0.007 **	-0.006 **	0.002
Labour productivity (GVA measure)	0.009	0.031	0.085 *	-0.020	0.003	0.036
Labour productivity (turnover measure)	0.021	0.029	0.029	0.003	0.017	-0.008
Employment	-0.052	-0.080	-0.014	-0.063	-0.073	0.046
Capital labour ratio	-0.094	0.077	0.088	-0.115	0.023	-0.018
Total factor productivity	0.025	0.018	0.080	0.001	0.010	0.018
SMEs						
Labour costs	0.006	0.006	0.003	0.007	0.012 **	0.007
Profit margins	0.004	0.005 *	0.004	0.000	0.002	0.004 *
Labour productivity (GVA measure)	0.019	0.027	0.035 **	0.015	0.033 ***	0.042 ***
Labour productivity (turnover measure)	0.001	-0.002	0.008	0.012	0.009	0.008
Employment	-0.037 *	-0.012	0.006	-0.043	-0.020	0.004
Capital labour ratio	0.036	0.070 **	0.073 **	0.018	0.053	0.070
Total factor productivity	0.013	0.014	0.030 *	0.015	0.030 **	0.046 ***
Large						
Labour costs	0.008	0.007	0.012	0.014	0.012	0.003
Profit margins	0.000	0.010 *	0.004	0.000	0.004	0.000
Labour productivity (GVA measure)	-0.028	0.000	-0.026	-0.004	0.019	-0.002
Labour productivity (turnover measure)	0.014	0.011	0.000	-0.002	-0.010	-0.022
Employment	-0.004	0.017	0.011	-0.001	0.001	-0.022
Capital labour ratio	0.037	0.022	0.065	-0.008	0.024	0.054
Total factor productivity	-0.033	0.005	-0.028	-0.024	0.002	-0.039 *
SMEs in low pay sectors						
Labour costs	0.007	0.024	0.033	0.006	0.027 *	0.023
Profit margins	-0.008	-0.002	-0.004	-0.011 ***	-0.008 **	0.001
Labour productivity (GVA measure)	-0.020	0.029	0.068	-0.045	-0.002	0.025
Labour productivity (turnover measure)	-0.036	-0.006	0.003	-0.025	0.019	-0.011
Employment	-0.005	-0.022	0.024	0.002	-0.023	0.027
Capital labour ratio	-0.171 **	0.008	0.033	-0.177	-0.040	-0.037
Total factor productivity	0.002	0.024	0.070	-0.028	0.008	0.000

Notes: Standard errors clustered by firm; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in the year to December 31 2002 and March 31 2003; firms selected for neither the treatment nor the control group (with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 14. Falsification. Recession period vertical placebo. Sub-groups. FAME.

	OLS regression			Robust regression		
Threshold (1998 prices)	£20,000	£22,000	£24,000	£20,000	£22,000	£24,000
POLICY ON (OFF) PERIOD: **2009-2012** (2006-2008)						
Low pay sectors						
Labour costs	0.030	-0.011	-0.042	0.013	0.000	-0.018
Profit margins	0.005	0.006	0.014	-0.002	-0.004	0.005
Labour productivity (GVA measure)	-0.026	-0.049	-0.053	-0.002	-0.008	0.013
Labour productivity (turnover measure)	0.027	-0.031	-0.063	0.030	0.020	0.014
Employment	-0.040	0.042	0.073	-0.040	-0.010	0.034
Capital labour ratio	0.049	0.016	-0.068	-0.035	0.015	-0.113
Total factor productivity	-0.035	-0.057	-0.047	-0.008	-0.021	-0.014
SMEs						
Labour costs	0.019 **	0.011	0.003	0.013 *	0.007	0.010 *
Profit margins	0.001	0.000	-0.003	-0.001	-0.001	-0.001
Labour productivity (GVA measure)	0.001	-0.005	-0.020	0.001	0.002	0.009
Labour productivity (turnover measure)	0.022	0.019	-0.003	0.034	0.027	0.014
Employment	-0.035 *	0.002	0.017	-0.027	-0.008	0.009
Capital labour ratio	0.071 *	0.027	0.017	0.064	0.021	-0.006
Total factor productivity	-0.012	-0.011	-0.029	-0.014	-0.013	-0.007
Large						
Labour costs	-0.019	-0.006	-0.009	-0.008	0.000	-0.012
Profit margins	0.007	0.008 *	0.003	0.005	0.001	0.000
Labour productivity (GVA measure)	0.019	0.020	0.002	0.005	0.008	0.009
Labour productivity (turnover measure)	0.034	0.023	0.002	-0.006	-0.015	-0.040
Employment	-0.052	-0.013	-0.033	-0.059	-0.054	-0.051
Capital labour ratio	-0.050	-0.035	-0.128 **	-0.021	0.003	-0.116
Total factor productivity	0.028	0.023	0.022	0.013	0.015	0.022
SMEs in low pay sectors						
Labour costs	0.055 **	-0.008	-0.029	0.022	-0.004	-0.004
Profit margins	0.001	-0.001	0.009	-0.008	-0.007	0.006
Labour productivity (GVA measure)	-0.042	-0.090	-0.075	0.006	-0.019	0.028
Labour productivity (turnover measure)	0.032	-0.069	-0.106	0.067	0.004	-0.001
Employment	-0.058	0.023	0.093	-0.036	-0.031	0.022
Capital labour ratio	0.047	-0.071	-0.112	0.003	-0.086	-0.180
Total factor productivity	-0.051	-0.076	-0.058	-0.027	-0.025	-0.007

Notes: Standard errors clustered by firm; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in the year to December 31 2008 and March 31 2009; firms selected for neither the treatment nor the control group (with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 15. Difference-in-difference estimates of business exit rates. FAME.

	Probit regression					
Threshold (1998 prices)	£10,000		£12,000		£14,000	
All						
1998	-0.001	(0.015)	-0.011	(0.012)	-0.012	(0.010)
2002	0.003	(0.017)	0.006	(0.015)	-0.001	(0.012)
2008	-0.012	(0.017)	-0.019	(0.013)	-0.020 *	(0.012)
Low pay sectors						
1998	-0.001	(0.018)	-0.001	(0.016)	-0.006	(0.015)
2002	-0.005	(0.019)	0.031	(0.023)	0.004	(0.018)
2008	0.008	(0.025)	0.029	(0.027)	0.013	(0.024)
SMEs						
1998	0.005	(0.020)	-0.014	(0.014)	-0.011	(0.012)
2002	0.011	(0.023)	0.009	(0.018)	0.005	(0.015)
2008	-0.021	(0.022)	-0.019	(0.018)	-0.022	(0.015)
Large						
1998	-0.008	(0.022)	0.007	(0.025)	-0.010	(0.018)
2002	-0.017	(0.020)	-0.002	(0.023)	-0.025 *	(0.015)
2008	-0.010	(0.022)	-0.017	(0.018)	-0.026 *	(0.015)
SMEs in low pay sectors						
1998	0.009	(0.024)	0.003	(0.020)	0.009	(0.020)
2002	-0.004	(0.023)	0.041	(0.028)	0.005	(0.021)
2008	-0.003	(0.030)	0.052	(0.041)	0.003	(0.027)

Notes: Probability of business exit within next 4 years; marginal effects reported; standard errors clustered by firm in brackets; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs 1995, 1998, 2002 or 2008; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel (firms reporting accounts information in the year of selection and in the two years prior to selection); SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 16. Difference-in-difference estimates of sample exit rates. FAME.

	Probit regression					
Threshold (1998 prices)	£10,000		£12,000		£14,000	
All						
1998	-0.026	(0.031)	-0.013	(0.026)	-0.044 *	(0.023)
2002	-0.036	(0.034)	0.000	(0.028)	-0.013	(0.025)
2008	0.046	(0.036)	0.014	(0.030)	0.002	(0.027)
Low pay sectors						
1998	-0.032	(0.038)	0.000	(0.035)	-0.020	(0.034)
2002	-0.036	(0.043)	0.035	(0.039)	0.027	(0.038)
2008	0.057	(0.045)	0.046	(0.042)	0.045	(0.042)
SMEs						
1998	-0.001	(0.036)	0.000	(0.030)	-0.041	(0.026)
2002	-0.020	(0.040)	-0.008	(0.033)	-0.031	(0.028)
2008	0.081 *	(0.044)	0.053	(0.036)	0.019	(0.032)
Large						
1998	-0.075	(0.057)	-0.048	(0.054)	-0.045	(0.050)
2002	-0.116 **	(0.056)	-0.014	(0.057)	0.016	(0.054)
2008	-0.066	(0.063)	-0.103 *	(0.055)	-0.065	(0.053)
SMEs in low pay sectors						
1998	-0.020	(0.045)	0.010	(0.040)	-0.009	(0.038)
2002	-0.017	(0.052)	0.023	(0.046)	0.006	(0.044)
2008	0.112 **	(0.053)	0.089 *	(0.049)	0.087 *	(0.048)

Notes: Probability of sample exit within next 4 years; marginal effects reported; standard errors clustered by firm in brackets; statistical significance ***1%, **5%, *10%; controls include indicators for start-up, young (less than 5 years old), group accounts, exporter, foreign ownership; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs 1995, 1998, 2002 or 2008; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel (firms reporting accounts information in the year of selection and in the two years prior to selection); SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 17. Longitudinal panel models using the ARD.

	OLS regression				Robust regression			
Threshold (1998 prices)	£10,000	£12,000	£14,000	*£20,000 (VP)*	£10,000	£12,000	£14,000	*£20,000 (VP)*
POLICY ON (OFF) PERIOD: **2001-2002** (1997-1998)								
Labour costs	0.106 ***	0.099 ***	0.098 ***	*0.015*	0.100 ***	0.088 ***	0.098 ***	*0.022* *
Profit margins	-0.048	-0.122	-0.010	*0.035*	-0.028 *	-0.016	-0.006	*-0.002*
Labour productivity (GVA measure)	0.079 **	0.056 *	0.095 ***	*0.046*	0.084 **	0.065 **	0.092 ***	*0.024*
Employment	-0.096 **	-0.127 ***	-0.120 ***	*-0.049* *	-0.119	-0.118	-0.099	*-0.037*
Capital labour ratio	0.052	0.087	0.026	*0.162* ***	0.007	-0.028	-0.078	*0.095*
Total factor productivity	0.072	0.038	0.092 ***	*-0.009*	0.087 **	0.100 ***	0.115 ***	*-0.034*
POLICY ON (OFF) PERIOD: **2005-2006** (2001-2002)								
Labour costs	0.066 ***	0.070 ***	0.059 ***	*-0.003*	0.074 ***	0.080 ***	0.064 ***	*0.007*
Profit margins	0.072	0.057	0.054	*-0.001*	0.006	-0.010	-0.005	*-0.014*
Labour productivity (GVA measure)	0.105 ***	0.077 **	0.061 **	*-0.005*	0.074 **	0.051 *	0.028	*-0.007*
Employment	-0.108 ***	-0.089 ***	-0.104 ***	*0.040* *	-0.113	-0.110	-0.113	*0.030*
Capital labour ratio	-0.020	-0.027	-0.011	*0.010*	-0.093	-0.061	-0.012	*0.036*
Total factor productivity	0.111 **	0.085 **	0.063 **	*-0.012*	0.083 **	0.072 **	0.038	*-0.025*
POLICY ON (OFF) PERIOD: **2011-2012** (2007-2008)								
Labour costs	0.070 ***	0.071 ***	0.039 ***	*0.000*	0.088 ***	0.075 ***	0.033 **	*0.008*
Profit margins	0.739	0.278	-0.575	*0.909*	-0.006	0.027	0.009	*-0.013*
Labour productivity (GVA measure)	0.089 **	0.091 **	0.006	*0.016*	0.083 **	0.122 ***	0.046	*-0.007*
Employment	-0.012	-0.007	-0.021	*-0.037*	-0.035	-0.028	-0.030	*-0.012*
Capital labour ratio	0.081	0.063	0.003	*-0.041*	0.039	-0.007	-0.008	*-0.020*
Total factor productivity	0.053	0.064	0.004	*0.029*	0.076 *	0.085 **	0.031	*0.027*

Notes: (VP = vertical placebo); standard errors clustered by firm; statistical significance ***1%, **5%, *10%; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in 1998, 2002 or 2008; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices; or in the case of the vertical placebo with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel.

Table 18. NMW introduction. Sub-groups. Longitudinal panel models using the ARD.

	OLS regression				Robust regression			
Threshold (1998 prices)	£10,000	£12,000	£14,000	*£20,000 (VP)*	£10,000	£12,000	£14,000	*£20,000 (VP)*
POLICY ON (OFF) PERIOD: **2001-2002** (1997-1998)								
Low pay sectors								
Labour costs	0.090 ***	0.072 ***	0.069 ***	*-0.001*	0.096 ***	0.078 ***	0.079 ***	*0.029*
Profit margins	-0.118	-0.131	-0.043	*0.032*	-0.020	-0.013	-0.010	*0.023*
Labour productivity (GVA measure)	0.056	0.022	0.057	*0.118* *	0.099 **	0.064	0.080 *	*0.045*
Employment	-0.065	-0.122 ***	-0.103 **	*-0.004*	-0.091	-0.128	-0.106	*0.014*
Capital labour ratio	-0.005	0.046	-0.003	*0.088*	0.101	0.019	-0.006	*0.090*
Total factor productivity	0.072	0.014	0.067	*0.081*	0.093 **	0.095 **	0.099 **	*0.037*
SMEs								
Labour costs	0.057	0.075 ***	0.074 ***	*0.035* *	0.036	0.059 **	0.075 ***	*0.045* **
Profit margins	0.068	-0.238 *	-0.063	*0.046*	-0.074 **	-0.048 *	-0.042 *	*-0.007*
Labour productivity (GVA measure)	-0.012	-0.039	0.007	*0.091* *	-0.027	0.021	0.038	*0.028*
Employment	-0.068	-0.061	-0.046	*-0.066* **	-0.093	-0.067	-0.052	*-0.049*
Capital labour ratio	-0.035	0.257 *	0.219 **	*0.171* **	-0.034	0.008	0.111	*0.028*
Total factor productivity	-0.001	-0.126 *	-0.068	*0.035*	0.052	0.023	-0.004	*-0.010*
Large								
Labour costs	0.124 ***	0.114 ***	0.112 ***	*0.000*	0.120 ***	0.110 ***	0.112 ***	*0.008*
Profit margins	-0.108	-0.029	0.052	*-0.063*	-0.003	0.013	0.024	*-0.003*
Labour productivity (GVA measure)	0.123 ***	0.123 ***	0.166 ***	*0.008*	0.125 ***	0.097 **	0.129 ***	*0.017*
Employment	-0.096 **	-0.107 ***	-0.070 *	*-0.014*	-0.112	-0.102	-0.049	*-0.022*
Capital labour ratio	0.041	-0.056	-0.097	*0.156* **	0.020	-0.006	-0.064	*0.130*
Total factor productivity	0.129 **	0.163 ***	0.209 ***	*-0.044*	0.107 **	0.121 ***	0.153 ***	*-0.045*
SMEs in low pay sectors								
Labour costs	0.024	0.052	0.019	*0.023*	0.032	0.051	0.041	*0.016*
Profit margins	0.026	-0.176	-0.028	*0.145*	-0.054	-0.058	-0.049	*0.034*
Labour productivity (GVA measure)	-0.016	-0.061	-0.051	*0.165* *	-0.003	-0.014	-0.035	*0.086*
Employment	-0.027	-0.035	-0.009	*-0.086*	-0.080	-0.080	-0.015	*-0.057*
Capital labour ratio	-0.212	0.275	0.087	*-0.066*	0.014	-0.020	0.034	*-0.085*
Total factor productivity	0.057	-0.149	-0.076	*0.194* **	0.038	-0.023	-0.064	*0.178* *

Notes: (VP = vertical placebo); standard errors clustered by firm; statistical significance ***1%, **5%, *10%; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in 1998; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices; or in the case of the vertical placebo with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 19. Intermediate phase. Sub-groups. Longitudinal panel models using the ARD.

	OLS regression				Robust regression			
Threshold (1998 prices)	£10,000	£12,000	£14,000	*£20,000 (VP)*	£10,000	£12,000	£14,000	*£20,000 (VP)*
POLICY ON (OFF) PERIOD: **2005-2006** (2001-2002)								
Low pay sectors								
Labour costs	0.058 ***	0.081 ***	0.074 ***	*0.008*	0.066 ***	0.082 ***	0.078 ***	*0.044*
Profit margins	0.091	0.055	0.027	*0.138*	0.019	-0.002	0.014	*-0.028*
Labour productivity (GVA measure)	0.116 ***	0.097 **	0.076 *	*-0.046*	0.103 **	0.078 *	0.068	*-0.048*
Employment	-0.060	-0.092 **	-0.110 ***	*-0.004*	-0.041	-0.100	-0.105	*0.032*
Capital labour ratio	-0.013	-0.005	-0.016	*0.071*	-0.140 *	-0.071	-0.068	*0.069*
Total factor productivity	0.123 ***	0.103 **	0.088 **	*-0.071*	0.118 ***	0.090 **	0.061	*-0.075*
SMEs								
Labour costs	0.130 ***	0.110 ***	0.090 ***	*0.009*	0.123 ***	0.106 ***	0.079 ***	*0.009*
Profit margins	0.177 **	0.138 *	0.090	*-0.122*	0.018	-0.023	-0.019	*0.000*
Labour productivity (GVA measure)	0.218 ***	0.140 ***	0.099 ***	*0.013*	0.138 ***	0.073 *	0.036	*0.025*
Employment	-0.120 ***	-0.108 ***	-0.112 ***	*-0.015*	-0.127	-0.107	-0.116 *	*0.001*
Capital labour ratio	0.246 **	0.116	0.055	*-0.034*	0.039	-0.019	-0.019	*0.088*
Total factor productivity	0.145 **	0.106 **	0.082 **	*0.022*	0.070	0.064	0.051	*0.007*
Large								
Labour costs	0.031	0.034	0.030	*-0.014*	0.041 *	0.052 **	0.041 *	*0.008*
Profit margins	0.001	-0.016	0.010	*0.084*	0.002	0.007	0.014	*-0.038* *
Labour productivity (GVA measure)	0.045	0.028	0.025	*-0.038*	0.045	0.029	0.018	*-0.061*
Employment	0.012	-0.052	-0.044	*0.090* ***	0.021	-0.065	-0.040	*0.070*
Capital labour ratio	-0.198	-0.178	-0.088	*0.033*	-0.148 **	-0.054	0.007	*-0.040*
Total factor productivity	0.109 *	0.082	0.051	*-0.050*	0.101 **	0.071 *	0.021	*-0.053*
SMEs in low pay sectors								
Labour costs	0.134 ***	0.132 ***	0.099 ***	*0.052*	0.142 ***	0.133 ***	0.105 ***	*0.050*
Profit margins	0.213 **	0.127	0.035	*0.205*	0.044	-0.013	-0.004	*-0.017*
Labour productivity (GVA measure)	0.263 ***	0.179 ***	0.118 **	*-0.064*	0.204 ***	0.110 *	0.044	*0.012*
Employment	-0.186 ***	-0.162 ***	-0.179 ***	*0.010*	-0.190	-0.176 *	-0.194 *	*0.081*
Capital labour ratio	0.217	0.153	0.037	*0.243* *	-0.049	-0.015	-0.070	*0.232*
Total factor productivity	0.206 **	0.140 **	0.115 *	*-0.141*	0.174 **	0.107	0.070	*-0.087*

Notes: (VP = vertical placebo); standard errors clustered by firm; statistical significance ***1%, **5%, *10%; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in 2002; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices; or in the case of the vertical placebo with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 20. Recession period. Sub-groups. Longitudinal panel models using the ARD.

	OLS regression				Robust regression			
Threshold (1998 prices)	£10,000	£12,000	£14,000	*£20,000 (VP)*	£10,000	£12,000	£14,000	*£20,000 (VP)*
POLICY ON (OFF) PERIOD: **2011-2012** (2007-2008)								
Low pay sectors								
Labour costs	0.069 ***	0.064 ***	0.059 ***	*0.003*	0.080 ***	0.067 ***	0.049 *	*0.035*
Profit margins	1.212	1.150 *	0.131	*0.040*	0.001	0.037	0.013	*0.013*
Labour productivity (GVA measure)	0.102 **	0.144 ***	0.039	*0.062*	0.086 *	0.111 **	0.052	*0.093*
Employment	-0.006	-0.006	-0.018	*0.033*	-0.030	-0.007	0.004	*0.024*
Capital labour ratio	0.066	0.035	0.055	*-0.053*	0.005	-0.006	0.012	*0.001*
Total factor productivity	0.075	0.127 **	0.017	*0.084*	0.092 *	0.090 *	0.033	*0.118*
SMEs								
Labour costs	0.092 *	0.114 ***	0.061 *	*0.056*	0.057	0.057	0.016	*0.048*
Profit margins	0.870	1.044	-0.035	*-0.463*	-0.051	0.037	0.013	*-0.032*
Labour productivity (GVA measure)	0.176	0.280 **	0.074	*0.004*	0.054	0.205 **	0.060	*-0.016*
Employment	-0.144	-0.047	-0.065	*-0.083*	-0.191	-0.080	-0.104	*-0.094*
Capital labour ratio	0.155	0.134	-0.160	*-0.097*	0.059	0.016	-0.073	*-0.176*
Total factor productivity	0.120	0.224 **	0.134	*0.039*	-0.034	0.111	0.112	*0.036*
Large								
Labour costs	0.071 ***	0.069 ***	0.041 ***	*-0.005*	0.093 ***	0.082 ***	0.048 ***	*0.009*
Profit margins	0.641	0.143	-0.684	*0.939*	-0.002	0.019	0.000	*-0.012*
Labour productivity (GVA measure)	0.078 *	0.060	-0.006	*0.003*	0.081 **	0.101 ***	0.037	*-0.014*
Employment	-0.017	-0.006	-0.030	*-0.033*	-0.046	-0.032	-0.048	*-0.029*
Capital labour ratio	0.042	0.015	0.009	*-0.048*	0.047	0.005	0.011	*-0.004*
Total factor productivity	0.054	0.053	-0.010	*0.019*	0.081 *	0.075 *	0.024	*0.022*
SMEs in low pay sectors								
Labour costs	0.093	0.113	0.102	*n/a*	0.070	0.036	-0.013	*n/a*
Profit margins	1.669	2.619	-0.276	*n/a*	-0.054	0.079	-0.015	*n/a*
Labour productivity (GVA measure)	0.261	0.535 **	0.155	*n/a*	0.104	0.329 **	0.053	*n/a*
Employment	-0.046	-0.067	-0.083	*n/a*	-0.063	-0.066	-0.099	*n/a*
Capital labour ratio	0.299	0.293	-0.133	*n/a*	-0.019	0.087	-0.125	*n/a*
Total factor productivity	0.175	0.436 **	0.206	*n/a*	0.056	0.279	0.196	*n/a*

Notes: (VP = vertical placebo); standard errors clustered by firm; statistical significance ***1%, **5%, *10%; 2-digit industry-year effects included; treatment and control groups (as well as size or sector sub-group) selected on the basis of labour costs in 2008; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices; or in the case of the vertical placebo with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel; SMEs have less than 250 employees; low pay sectors (broadly) as defined by the Low pay Commission.

Table 21. Longitudinal panel models using FAME (similar to ARD model).

	OLS regression				Robust regression			
Threshold (1998 prices)	£10,000	£12,000	£14,000	*£20,000 (VP)*	£10,000	£12,000	£14,000	*£20,000 (VP)*
POLICY ON (OFF) PERIOD: **2001-2002** (1997-1998)								
Labour costs	0.080 ***	0.073 ***	0.059 ***	*0.013* *	0.051 ***	0.047 ***	0.045 ***	*0.018* **
Profit margins	0.005	0.005	0.001	*0.000*	0.000	0.002	0.000	*0.000*
Labour productivity (GVA measure)	0.089 ***	0.087 ***	0.072 ***	*0.010*	0.048 **	0.062 ***	0.062 ***	*0.034* **
Employment	0.000	-0.025	-0.015	*-0.013*	0.019	-0.013	-0.007	*-0.016*
Capital labour ratio	0.063 *	0.040	0.036	*0.043*	0.029	0.023	0.020	*0.042*
Total factor productivity	0.068 ***	0.072 ***	0.058 ***	*0.002*	0.034	0.046 **	0.048 ***	*0.019*
POLICY ON (OFF) PERIOD: **2005-2006** (2001-2002)								
Labour costs	0.098 ***	0.080 ***	0.067 ***	*0.016* *	0.050 ***	0.041 ***	0.051 ***	*0.018* **
Profit margins	-0.004	-0.007	-0.003	*0.001*	-0.006	-0.006 *	-0.002	*0.000*
Labour productivity (GVA measure)	0.100 ***	0.067 **	0.048 **	*0.011*	0.029	0.023	0.028 *	*0.009*
Employment	-0.058	-0.042	-0.009	*-0.052* **	-0.083	-0.054	-0.007	*-0.067*
Capital labour ratio	0.030	0.031	0.012	*0.026*	0.069	0.121 *	0.066	*0.006*
Total factor productivity	0.102 ***	0.067 **	0.049 **	*0.003*	0.041	0.014	0.020	*0.001*
POLICY ON (OFF) PERIOD: **2011-2012** (2007-2008)								
Labour costs	0.095 ***	0.065 ***	0.041 ***	*0.015* *	0.044 ***	0.019 *	0.025 ***	*0.011*
Profit margins	-0.009	-0.004	-0.002	*0.001*	-0.009 **	-0.004	-0.002	*0.002*
Labour productivity (GVA measure)	0.025	0.042 *	0.031	*0.002*	0.048 *	0.041 **	0.041 **	*0.003*
Employment	0.017	0.019	-0.013	*-0.054* *	-0.039	-0.011	-0.043	*-0.028*
Capital labour ratio	0.001	0.009	0.016	*0.076* *	0.038	0.027	0.021	*0.071*
Total factor productivity	0.025	0.040	0.023	*-0.012*	0.030	0.039 *	0.037 *	*-0.004*

Notes: (VP = vertical placebo); standard errors clustered by firm; statistical significance ***1%, **5%, *10%; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in 1998, 2002 or 2008; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices; or in the case of the vertical placebo with labour costs below £18,000 or above £32,000 in 1998 prices) are excluded from the sample; balanced panel.

Table 22. Falsification. Pre-NMW phase. Longitudinal panel models using FAME (similar to ARD model).

	OLS regression			Robust regression		
Threshold (1998 prices)	£10,000	£12,000	£14,000	£10,000	£12,000	£14,000
POLICY ON (OFF) PERIOD: **1996-1999** (1993-1995)						
Labour costs	0.047 **	0.035 **	0.041 ***	0.040 ***	0.021 *	0.030 ***
Profit margins	-0.003	0.002	0.000	0.000	0.002	0.002
Labour productivity (GVA measure)	0.036	0.044 **	0.037 **	0.057 ***	0.042 **	0.044 ***
Employment	-0.035	-0.028	-0.036 *	-0.042	-0.045	-0.051
Capital labour ratio	0.002	-0.013	0.000	0.022	-0.002	0.019
Total factor productivity	0.036	0.048 **	0.036 **	0.043 *	0.044 **	0.043 ***

Notes: Standard errors clustered by firm; statistical significance ***1%, **5%, *10%; 2-digit industry-year effects included; treatment and control groups selected on the basis of labour costs in 1995; firms selected for neither the treatment nor the control group (with labour costs above £20,000 in 1998 prices) are excluded from the sample; balanced panel.

APPENDIX A: More ASHE linked to the ARD analysis

Table A1. Number of establishment in WERS, employee level data

	1998	2004	2011
All	1781	1731	1896
Low pay sectors	519	529	TO FOLLOW
SMEs	1297	1283	1405
Large	484	448	491

Source: WERS 1998, 2004, 2011. Authors' calculations.
Note: Low Pay Commission definition of low-paying industries. SME establishments have less than 250 employees.

Table A2. Sample sizes ASHE linked to ARD

Size	Sector	Employee group	1998	2002	2006	2010
SMEs	*Low pay*	NMW	119	80	62	69
		Other	1499	1574	1150	894
	Other	NMW	114	68	62	51
		Other	6123	6470	5027	3311
Large	*Low pay*	NMW	544	503	810	1115
		Other	7567	12358	12747	18874
	Other	NMW	259	164	229	369
		Other	23842	27431	28470	32656

Source: ARD linked to ASHE 1998, 2002, 2006, 2010. Authors' calculations.
Note: Low Pay Commission definition of low-paying industries. SME enterprises have less than 250 employees.

Table A3. Test of equal average labour cost distributions between NMW and other workers

	1998	2002	2006	2010
All	0.506	0.571	0.548	0.518
SMEs	0.452	0.556	0.521	0.548
Large	0.523	0.578	0.550	0.517
Low pay sectors	0.368	0.396	0.392	0.381

Notes: ASHE linked to ARD; Kolmogorov-Smirnov statistic for equal distributions of enterprise average labour costs between NMW employees and other employees; allK-S statistics shown are statistically significant at the 1% level.

Table A4. Average labour costs and the probability of being paid at or below the NMW

	ALC		ALC*SME		ALC		ALC*low pay sector	
1998	-0.0016	(0.000)	0.0004	(0.005)	-0.0015	(0.000)	-0.0005	(0.002)
2002	-0.0010	(0.000)	0.0001	(0.320)	-0.0010	(0.000)	-0.0004	(0.001)
2006	-0.0014	(0.000)	-0.0003	(0.113)	-0.0014	(0.000)	-0.0005	(0.000)
2010	-0.0020	(0.000)	0.0003	(0.111)	-0.0017	(0.000)	-0.0015	(0.000)

Notes: ASHE linked to ARD; p-values in brackets; probit regressions of being paid at or below the NMW; marginal effects shown for enterprise average labour costs (ALC) and interaction of enterprise average labour costs with either enterprise SME status or enterprise low pay sector status; industry-year effects included; 194,611 employee-year observations.

APPENDIX B: Sample sizes of the FAME and ARD regression analysis

Table B1. Sample sizes FAME.

Policy		GROUP	Threshold £10,000		£12,000		£14,000	
OFF	ON		T	C	T	C	T	C
1993-1995	1996-1999	All	301	2057	513	1845	794	1564
		Low pay sectors	220	740	349	611	490	470
		SMEs	194	1565	337	1422	550	1209
		Large	107	492	176	423	244	355
		SMEs in low pay sectors	137	568	225	480	332	373
1996-1998	1999-2002	All	352	2035	557	1830	845	1542
		Low pay sectors	257	730	382	605	513	474
		SMEs	220	1479	354	1345	567	1132
		Large	132	556	203	485	278	410
		SMEs in low pay sectors	159	530	237	452	332	357
2000-2002	2003-2006	All	300	1724	470	1554	704	1320
		Low pay sectors	206	553	296	463	402	357
		SMEs	174	1207	289	1092	456	925
		Large	126	517	181	462	248	395
		SMEs in low pay sectors	115	378	173	320	246	247
2006-2008	2009-2012	All	267	1763	466	1564	726	1304
		Low pay sectors	184	598	296	486	413	369
		SMEs	118	1207	229	1096	398	927
		Large	149	556	237	468	328	377
		SMEs in low pay sectors	75	383	144	314	216	242

Note: These are the numbers of firms in each group. Firms are observed for 7 consecutive years and hence the number of observations is 7 times large than the numbers reported here.

Table B2. Sample sizes FAME. Vertical placebo.

Policy		GROUP	Threshold £20,000		£22,000		£24,000	
OFF	ON		T	C	T	C	T	C
1996-1998	1999-2002	All	592	2180	1118	1654	1606	1166
		Low pay sectors	149	289	235	203	302	136
		SMEs	452	1658	837	1273	1193	917
		Large	140	522	281	381	413	249
		SMEs in low pay sectors	118	248	191	175	249	117
2000-2002	2003-2006	All	497	1847	955	1389	1401	943
		Low pay sectors	103	249	198	154	268	84
		SMEs	346	1389	679	1056	1004	731
		Large	151	458	276	333	397	212
		SMEs in low pay sectors	74	191	144	121	198	67
2006-2008	2009-2012	All	483	1784	942	1325	1342	925
		Low pay sectors	97	214	176	135	229	82
		SMEs	352	1343	680	1015	978	717
		Large	131	441	262	310	364	208
		SMEs in low pay sectors	66	162	122	106	163	65

Note: These are the numbers of firms in each group. Firms are observed for 7 consecutive years and hence the number of observations is 7 times large than the numbers reported here.

Table B3. Sample sizes ARD.

Policy		GROUP	Threshold £10,000		£12,000		£14,000		*£20,000 (VP)*	
OFF	ON		T	C	T	C	T	C	*T*	*C*
1997-1998	2001-2002	All	356	1083	509	930	697	742	*340*	*920*
		Low pay sectors	257	380	349	288	423	214	*83*	*125*
		SMEs	100	472	157	415	234	337	*152*	*386*
		Large	257	612	353	516	463	405	*188*	*535*
		SMEs in low pay sectors	65	154	92	127	123	96	*40*	*60*
2001-2002	2005-2006	All	406	1339	597	1148	835	910	*396*	*1006*
		Low pay sectors	301	420	416	305	504	217	*64*	*111*
		SMEs	123	690	211	602	332	481	*211*	*475*
		Large	284	649	387	546	504	429	*185*	*531*
		SMEs in low pay sectors	77	184	120	141	155	105	*29*	*45*
2007-2008	2011-2012	All	406	967	555	818	741	632	*281*	*750*
		Low pay sectors	336	354	426	264	511	179	*58*	*85*
		SMEs	29	169	56	142	98	101	*40*	*109*
		Large	377	798	499	676	644	532	*241*	*641*
		SMEs in low pay sectors	17	40	30	27	42	15	*N/A*	*N/A*

Note: These are the numbers of firms in each group. Firms are observed for 4 years and hence the number of observations is 4 times large than the numbers reported here.