The NMW/NLW and progression out of minimum wage jobs in the UK

Final report

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A report prepared for the Low Pay Commission

December 2020

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Executive Summary

This report examines the wage progression of minimum wage job holders between 2009 and 2018. Our aim is to examine whether the substantial increases in the minimum wage rate during this period affected the wage progression of minimum wage workers.

Since 2008, the adult minimum wage rate in the UK has increased significantly relative to median hourly pay. In 2018, it reached nearly 55% of median full-time hourly pay compared with 48% in 2008. During this period, the proportion of workers covered by the minimum wage also increased from 4% in 2008 to over 10% in 2018. The proportion of low paid workers (i.e. workers paid less than 2/3 of median hourly pay) however fell considerably from around 21.5% in 2008 to 17.8 % in 2018[1].

A priori, it is not clear if and how minimum wage increases should affect the wage progression of minimum wage job holders. If minimum wage rises squeeze pay differentials at the bottom of the wage distribution, as indicated by higher coverage, incentives to progress might be lowered. To deal with costs, employers might also forego investment (including human capital investment) that can be expected to lead to higher wages later on. On the other hand, if higher minimum wages encourage skill acquisition and/ or other changes in production that lead to productivity increases they may facilitate wage progression in the long-run.

We use the UK Longitudinal Household Survey (UKHLS) to examine the wage growth of minimum wage workers and transitions out of minimum wage employment. At the time of writing, the UKHLS provides a nine year panel covering 2009-2018. We investigate transitions to three possible destinations i) employment paid above the minimum but less than two thirds of median hourly pay (low paid employment), ii) employment paid above two thirds of median hourly pay ('high' paid employment), and iii) non-employment. We focus on working age individuals who were entitled to the adult pay rate throughout the period, i.e. men aged 25-64 and women aged 25-59.

We estimate the effect of minimum wages by comparing transition probabilities out of minimum wage jobs over time in areas with different shares of minimum wage workers. If minimum wage hikes do have an effect on wage progression, we expect transition probabilities to be more affected in areas with a high share of minimum wage workers than in areas with a low share. We use Travel-to-Work Areas (TTWAs) as local geographical indicators. We calculate the share of minimum wage workers by year and TTWA using the Annual Survey of Hours and Earnings (ASHE) and merge this information into the UKHLS dataset.

We find that approximately one half of minimum wage job holders succeed in finding better paid employment within a year. Of these, four fifths progress to low paid employment and a fifth succeed in moving to 'high' paid employment. Transition rates measured over three years are somewhat higher, especially to 'high' paid employment. Minimum wage workers are more

[1] ONS, Low and high pay in the UK 2019, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/lowandhighpayuk/2019

likely to transition to 'high' paid employment in areas with higher median wages, although this difference does not account for different worker characteristics across areas.

We find limited evidence that the probability of remaining in a minimum wage job temporarily increased in 2016, when the NLW was introduced. Living in a local area with a 1 percentage point higher share of minimum wage workers increases the probability of remaining in a minimum wage job in 2016 by around 4 percentage points or 10%. For comparison, the difference between the 25th and the 75th percentile of the area share of minimum wage workers is approximately two percentage points. However, the increase is only temporary and is not robust to all the specifications we used. We find no evidence that minimum wage increases impact on the probability to progress long-term.

When we directly model yearly wage growth instead of the probability of progression, we again find no evidence that the wage growth of minimum wage workers in areas with high coverage of minimum wage workers differed from that of workers in areas with lower coverage. We conclude that there is no evidence of a lasting negative impact of minimum wages on the progression of minimum wage workers.

1. Introduction and background

The minimum wage was first introduced in the UK in 1999 at a low level but has in subsequent years increased substantially. In a context of stagnant real earnings, the minimum wage increased from 48% of median full-time hourly earnings in 2008 to 55% in 2018 and 60% in 2020, rising faster than average earnings, inflation or GDP. The increase accelerated after 2016 when the National Living Wage (NLW) was introduced. Significant further increases of the minimum wage were announced in early 2020 when the government set a new target for the NLW to reach two thirds of median earnings in 2024.

A large economic literature has been concerned with the effects of minimum wages on the employment of less productive workers. Whereas some US studies find negative effects (Neumark & Wascher, 2007), in the UK there has been no evidence that the minimum wage has had any negative impact on employment (Dolton, Bondibene, & Wadsworth, 2012; Manning, 2012; Metcalf, 2008; Stewart, 2002a, 2004). On the contrary, the minimum wage did have a significant effect on the distribution of wages, reducing inequality in its lower part (Dickens & Manning, 2002, 2004; Stewart, 2012).

As the minimum wage has increased faster than median earnings, one consequence has been a substantial increase in the share of workers that are covered. Whereas in 2008 less than 4% of workers were covered by the minimum wage, this has increased to around 10% in 2018 although increases have been consistently below projections (Low Pay Commission, 2019). The share is much higher in low paying sectors and in some local areas can exceed 50%. While reducing wage inequality at the bottom of the wage distribution, the increased 'bunching' around the minimum wage has the potential to squeeze pay differentials and limit opportunities for wage progression. In this report we examine patterns of wage progression out of minimum wage jobs and provide evidence on the extent to which this has been influenced by recent increases.

Understanding if and how the level of the minimum wage affects wage progression is important for designing and adapting minimum wage policy. Theories of human capital emphasize low individual productivity as the main explanation for low pay. However, low productivity may also be the result of employer choices regarding work organization, capital investments, work incentives and reliance on low cost rather than high value added. As a result, the expected impact of increases in the NMW/NLW on wage progression is unclear. Employers may react to the higher costs of increases in the minimum wage by reducing real pay growth for employees paid above the minimum. In the short term, they may also forgo investment in technology and/or human capital that might be expected to be accompany higher pay in the long-term. Greater bunching and squeezed wage differentials may reduce incentives to progress. In the medium and long-term, however, higher minimum wages may have a positive effect on wage progression if it induces employers to shift from competing on cost to competing on increased productivity and high value added. In turn, higher productivity can support higher wages. Finally, if high minimum wages increase unemployment and unemployment has

scarring effects (Arulampalam, 2001; Gregg & Tominey, 2005), then low skilled workers may be doubly impacted.

Unlike employment and wage growth, there is little evidence on whether minimum wages influence wage progression or the direction of the effects. A series of research reports commissioned by the Low Pay Commission have produced descriptive evidence on transitions into and out of minimum wage jobs. Using data from British Household Panel Survey (BHPS) covering 1999-2004, Bryan and Taylor (2006) find that moves into and out of minimum wage jobs are frequent but most are associated with short range upward mobility (jobs paid only slightly above the minimum) or with non-employment. In general, minimum wage workers appeared to exhibit less upward wage mobility compared to other workers, and more mobility into non-employment, although such patterns are frequently associated with low paid jobs (Cappellari, 2002; Cappellari & Jenkins, 2008; Stewart, 2007). Similar findings are reported by Jones et al (2004) who used the Labour Force Survey (LFS) to examine transitions in and out of minimum wage jobs between 1999 and 2002. They found that around half of minimum wage earners transitioned to a better paid job within 12 months. Low qualifications, having a disability, being employed in a small firm, working part-time, being in rented housing and being employed in the private sector were all associated with a lower propensity to progress to employment paid above the minimum. Using LFS data, Stewart (2002b) finds that after the introduction of the minimum wage in 1999, the probability of remaining in a low paid job or transitioning to one from unemployment decreased while the probability of remaining inactive (but wanting to work) increased. Of course, these changes may have been driven by factors other than the introduction of the minimum wage. In a study examining the timing of wage growth among low paid workers, Swaffield (2014) finds that employers tend to comply with minimum wage laws but hold down or offset wage growth during periods with relatively low minimum wage hikes. This results in wage growth at the bottom being strongly dependent on the size of the minimum wage hike.

The literature trying to identify the influence of minimum wages on wage progression is far sparser. To our knowledge, there are only two studies that aim to quantify these effects for the UK. Cai et al (2018) analyse low pay dynamics between 1991 and 2008 and test whether these changed after the introduction of the minimum wage in 1999. They find that patterns of progression in and out of low pay have remained the same and conclude that the introduction of the minimum wage has not had an effect on transitions out of low pay. Jones et al. (2013) use regional and temporal variation in the bite of the minimum wage to model the impact of minimum wage changes on flows in and out of minimum wage jobs. They find that an increased bite is weakly associated with higher inflows into minimum wage jobs, as would be expected, but not with outflows from these jobs. They also find a strong connection between the strength of the local economy and the coverage of the minimum wage. Areas with a slacker economy experienced increasing coverage whereas the proportion of workers affected by the minimum wage decreased in busier areas. In a different setting, Rinz and Voorheis (2018) use US administrative data to examine the effect of minimum wages on income mobility. They find that raising the minimum wage increases earnings mobility for those at the bottom of the wage distribution. In an older piece of research using data from the 1970s and 1980s, Neumark and Nizalova (2007) conclude that exposure to higher minimum wages at young ages (teens and

early twenties) depresses earnings at older ages, mainly due to negative effects on training, schooling and labour market experience.

In this project, we seek to shed light on the extent to which the minimum wage has influenced low pay progression in the UK post-recession (2009-2018) and before the Covid-19 pandemic. We examine wage growth and transitions out of minimum wage jobs by destination and use geographical and time variation in the minimum wage bite to estimate policy effects. The next section describes the data we use and the characteristics of our sample. The estimation methodology is detailed in section 3. Section 4 presents our main results and section 5 concludes.

2. Data

The analysis of pay dynamics requires longitudinal data. In this study, we make use of **Understanding Society**, the UK Longitudinal Household Study (UKHLS).[2] Established in 2009, it is the largest UK longitudinal survey following approximately 26,000 households. It also collects rich information about individual characteristics, their previous work history (including periods out of work), as well as information about their current job and employer. Nine waves are currently available to use, covering the period 2009-2018.

Longitudinal surveys are subject to attrition. Attrition represents a problem if individuals who drop out of the study are systematically different from those who continue to answer the survey questions. In this case, low paid workers may be more mobile and thus more likely to drop out. This could potentially bias our estimates of wage progression. Attrition in Understanding Society is significant; approximately 52% of the initial sample was still participating after 6 years[3] (see the Understanding Society User Guide: https://www.understandingsociety.ac.uk/sites/default/files/downloads/documentation/mainstage/user-guides/mainstage-user-guide.pdf). To account for this, we use the longitudinal weights provided by Understanding Society which are specifically designed to account for differential attrition.

2.1 Sample Selection and Exclusion Criteria

Following ONS official estimates and previous studies on the impact of the NMW on earnings, we focus on employees entitled to the adult rate. The age at which workers become entitled to the adult pay rate changed during the period we study (from age 22 at the start of the period, to 21 in 2010 before increasing again to 25 in 2015). To ensure consistency, we focus on individuals aged 25 and older who were entitled to receive the adult rate throughout the years covered by our data. To avoid having to deal with complications raised by partial retirement, we focus exclusively on the working age population. We thus exclude men aged 65 and over

[2] University of Essex, Institute for Social and Economic Research. (2019). *Understanding Society: Waves 1-8, 2009-2017 and Harmonised BHPS: Waves 1-18, 1991-2009*. [data collection]. *11th Edition.* UK Data Service. SN: 6614, http://doi.org/10.5255/UKDA-SN-6614-12

[3] Most of the attrition however occurs between waves 1 and 2 and is typical of panel surveys.

and women aged 60 and over. On the one hand, the probability of progressing to higher wages is likely to be low for these groups for reasons unrelated to the minimum wage while, on the other, access to significant sources of non-employment income, such as state and private pensions, potentially changes their earnings dynamics.

Our restrictions leave us with an unbalanced sample consisting of 48,431 individuals and 195,730 person-year observations. Out of these, there are 6,808 observations where the person is observed to be in a minimum wage job corresponding to 4,058 individuals. We observe 1,558 transitions to low pay, 459 transitions to 'high' pay and 327 transitions to non-employment. In our full specification, we lose some observations due to missing values on the covariates and are left with 2,478 individuals, 1,477 transitions to low pay, 449 transitions to 'high' pay and 305 transitions to non-employment.

2.2 Hourly Wages

The minimum wage is defined at the hourly level. To establish whether someone is paid at or above the minimum, we thus need to calculate nominal hourly wages. Average hourly earnings are not directly available in the UKHLS, except for a subsample of respondents who are paid by the hour. We thus use an imputation procedure to derive an hourly pay measure for the remainder of the sample. This is important not only to increase the sample size (only about a third of employees report an hourly pay figure) but to correct for bias coming from hourly paid employees being disproportionately likely to be low paid.

For all workers in our sample we have information about the usual monthly pay and the usual hours worked. We use these data to construct a derived measure which we term the '**implicit**' hourly wage. For cases where the usual monthly pay is missing, we use the total individual gross labour income measure, imputed by the UKHLS team. Both pay and hours measures include overtime work. The exclusion of reported overtime paid hours makes little difference. We have capped our measure of total weekly hours at 80 before computing our measure of *implicit* hourly pay. Finally, to avoid estimates being affected by implausibly large values, we have capped the implicit hourly pay measure at the largest observed direct measure. This affects fewer than 35 observations.

While convenient and easy to calculate, it is well known that implicit hourly pay measures derived from survey data tend to contain significant amounts of measurement error resulting in some implausibly small values and an overestimation of the proportion of low paid workers (Skinner, Stuttard, Beissel-Durrant, & Jenkins, 2002; Stewart & Swaffield, 2002). In comparison with the **direct** measure of hourly pay, the implicit measure tends to be too smooth and to underestimate 'bunching' at the minimum wage. Fig 1 shows the distribution of hourly pay using the direct and implicit measures for the subsample that report a direct measure. The implicit measure overestimates the proportion of individuals with very low values of hourly pay. In contrast, the distribution of the direct measure is much closer to what we would expect: there are virtually no individuals paid below the minimum wage and there is a much more striking spike at the minimum rate.

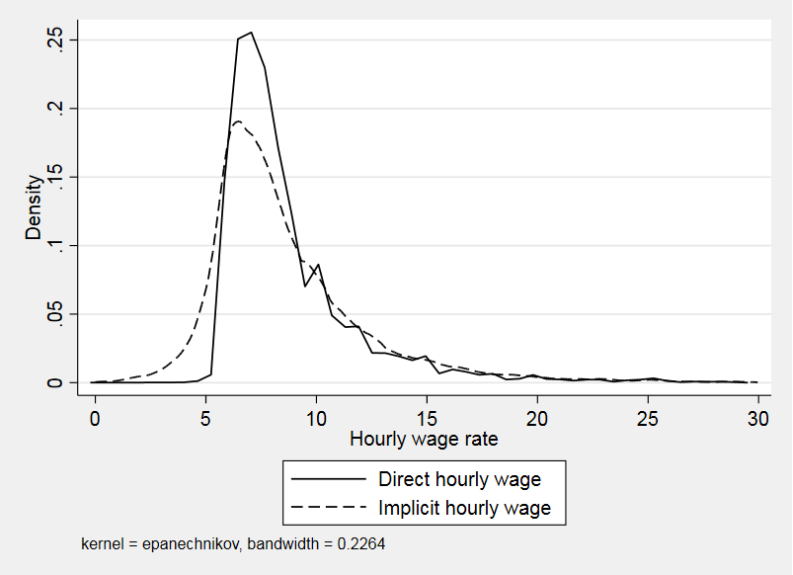


Fig 1: Density the nominal hourly wage distribution using the direct and implicit hourly wage measures, 2009-2018

As our analysis focuses on low paid individuals, and in particular on individuals paid the minimum wage, it is important to have an hourly pay measure as accurate as possible. To address this issue, we adapt an imputation procedure developed by Skinner, Stuttard et. al. (2002). The procedure assigns an imputed value to observations missing the direct hourly pay measure by matching them to a *donor* observation with a valid non-missing value. In the first step, we regress the direct measure of hourly pay on the implicit measure and other individual and job characteristics: gender, age (quadratic), qualifications (6 categories), region, marital status, the number of children aged under 5, occupation (3-digit SOC codes), industry (2 digit SIC codes), firm size, public sector, part-time employment and year. We then use this regression to predict hourly wages for all individuals in our sample of interest (employed men aged 25-64 and employed women aged 25-59) who have non-missing values for the predictor variables. Next, we use the predicted hourly wage to match observations missing direct hourly pay to a donor observation whose direct hourly wage is observed. Donors are selected randomly from the ten nearest '*neighbours.*' A neighbour is defined as an observation with a value of the predicted hourly wage within +/- 50p of the target's predicted hourly wage. For each observation that we wish to impute a value for, we first select the ten neighbours whose predicted hourly wage is closest to the target observation's predicted hourly wage (if they exist) and then randomly choose one among the 10 (or less if ten neighbours do not exist) and assign its value to the missing observation. To avoid outliers affecting our results, we exclude donors whose residuals (calculated as the difference between the observed and predicted hourly rate) lie in the top and bottom 1 % of the distribution. To reduce variance inflation, we follow Skinner, Stuttard et. al. (2002) and repeat the imputation 20 times. Our final imputed values are the means of the twenty imputations. We carry out the imputation separately for each year (note that a year usually straddles two waves in the UKHLS data).

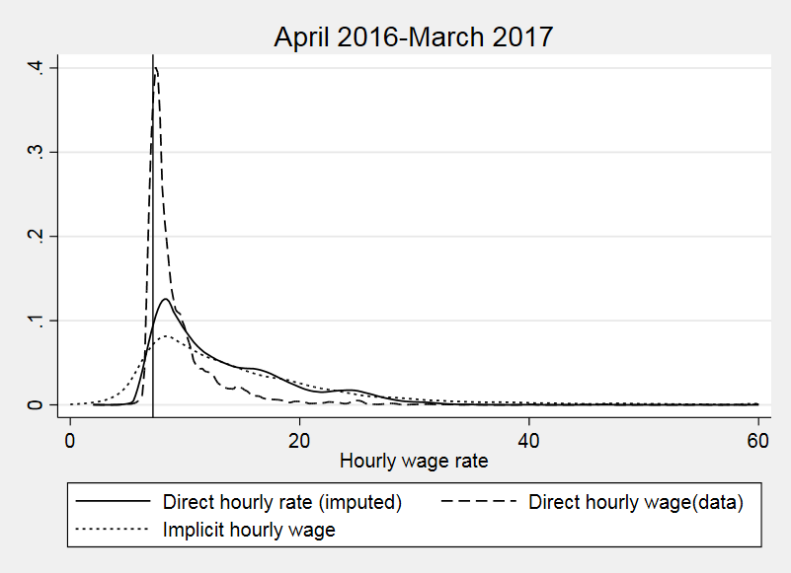


Figure 2: Hourly pay distribution according to three measures: 'direct', 'implicit', and 'direct' + imputed values

Figure 2 shows the distribution of hourly pay according to three measures: direct, implicit and direct plus imputed between April 2016 and March 2017 as well as the value of the minimum wage during this period (the vertical black line). The imputation significantly improves on the implicit measures: the imputed measure exhibits both the low density below the minimum wage level and the spike at the minimum we would expect to see. It is also preferred to the direct measure, which covers only a subset of workers who are paid by the hour and who are disproportionately low paid. The spike however is much smaller than that of the direct measure and closer to estimates obtained from administrative data. Similar results are obtained for all the years in our data (see Fig A1 in the Appendix).

A different way of assessing the quality of the imputation is to examine the share of workers covered by the minimum wage according to the three hourly pay measures. Figure 3 shows that both the direct and the implicit measures overestimate the coverage of the minimum wage significantly, the latter due to measurement error and the former due to bias from overrepresentation of low paid workers. In contrast, the imputed hourly pay measure gives estimates that are much closer to official statistics, if still a little too high. Official estimates based on the Annual Survey of Hours and Earnings (ASHE) range between around 4% in 2009 to around 8% in 2018. Further analysis shows that the overestimation is due to a too high share of low-paid workers in the observed direct hourly wage data rather than in the imputed data.

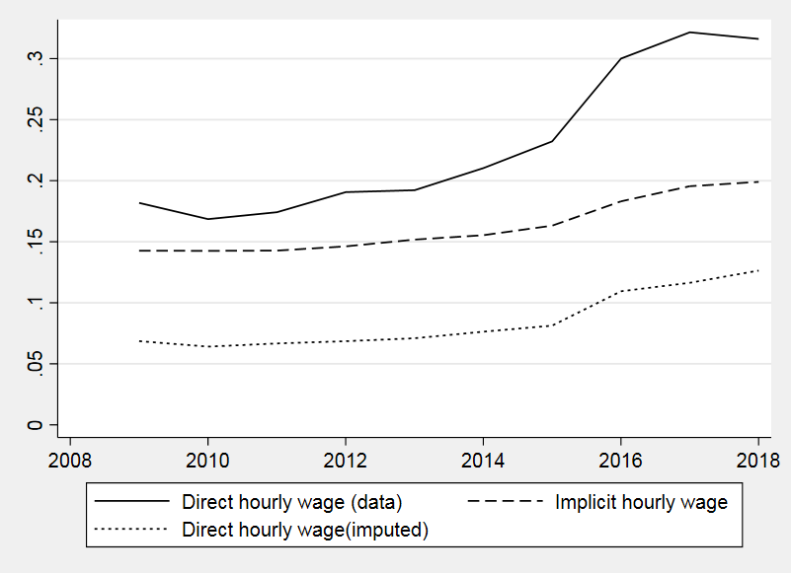


Figure 3: Proportion of workers with an hourly pay below or at the NMW/NLW level

In the UKHLS, we are unable to accurately identify cases where individual pay has been affected by absences or other factors that might legitimately depress the observed hourly rate below the minimum wage in force. However, we use information about 'usual pay' and hours of work, rather than pay over a fixed period, to determine hourly wages. This variable should be less sensitive to temporary falls in the observed wage. Ideally, we also want to avoid including workers whose pay period is partly covered by the old NMW/NLW. As the UKHLS is collected throughout the year, there is a chance that the pay period for some workers straddles the introduction/uprating of the NMW/NLW. However, as the UKHLS does not record exact information about the start of the pay period, we cannot exclude individuals whose pay might refer to a period where two levels of the minimum wage have been in force.

2.3 Transitions between minimum wage, low paid and 'high' paid employment

Based on the hourly pay rate, we define four mutually exclusive states: minimum wage employment, low-paid employment, 'high' paid employment and non-employment. **Minimum wage employment** is defined as all those workers who have an hourly pay rate at or below the NMW/NLW rate in force at the time of their interview. **Low-paid** employment is defined as employment that pays an hourly wage higher than the NMW/NLW but less than the low-pay threshold. We follow the literature and define the low-pay threshold as two-thirds of median hourly pay (Cappellari & Jenkins, 2008; D'Arcy & Finch, 2017). Because our median hourly pay is somewhat lower than official estimates, we use the official estimate of median pay based on the Annual Survey of Hours and Earnings (ASHE) when computing our low pay threshold. **High-paid employment** is defined as having an hourly pay above the low-pay threshold.

We define **transitions** between minimum wage pay, low and high pay to occur when workers move between these categories. To limit the potential for spurious transitions generated by measurement error, we count a transition as taking place only if the observed hourly wage is

5p higher than the category threshold. A similar approach has been adopted by Bryan and Taylor (2006) and Dolton et al. (2012).

UKHLS collects detailed information about the current job once per year. Thus, we have yearly observations on hourly wages which we use to determine whether a transition has taken place. One concern is that individuals may change jobs between interviews, and these transitions would be missed by our analysis. While information about hourly wages is available only for the current job, UKHLS collects information about individuals' employment history between interviews. We therefore have information about all employment and non-employment spells between the interviews. Less than 5% of our sample (209 cases) experiences an employment/ job transition between interviews. We include these cases in our descriptive analysis using transition matrices, but we drop them when estimating the discrete time model.

2.4 Local area indicators of economic activity

In the UK, the minimum wage is set at the national level, so it only varies over time. However, the proportion of workers affected by the minimum wage, and increases in it, varies not only over time but also geographically, depending on the strength of the local economy. In this study, we use travel to work areas (TTWA) as the local geographical indicator. TTWAs provide a closer approximation for local labour markets than other area based indicators (such as local authority districts). TTWAs are constructed geographical units satisfying two criteria - at least 75% of the resident economically active population works in the area and at least 75% of the actively working population resides in the area (Prothero, 2016) and are based on commuting flows data in the 2001 and 2011 censuses. There are 243 TTWAs based on the 2001 census and 228 based on the 2011 census.

The latest release of UKHLS provides both 2001 and 2011 based TTWA indicators for all the households in our dataset[4]. We use these indicators to match information on the share of minimum wage workers at the TTWA level, by year, from the Annual Survey of Hours and Earnings (ASHE)[5]. ASHE is a large employee survey covering approximately 1% of workers in the United Kingdom. The data used here is provided by the UK Data Archive and does not include information on employees in Northern Ireland (access to this data is administered separately by the Northern Ireland Statistics and Research Agency). Wage information collected by ASHE is provided by employers and thus is considered more reliable than traditional labour force surveys. The share of minimum wage workers is calculated as the proportion of workers with a wage lower or equal to the minimum wage in force plus 5p. We add 5p to the official minimum wage level to correct for possible under-reporting in the hourly wage data. The share of minimum wage workers captures the 'exposure' of the local labour market to minimum wage hikes. If minimum wage increases affect wage progression, we

[4] University of Essex, Institute for Social and Economic Research. (2018). *Understanding Society: Waves 1-8, 2009-2017 and Harmonised BHPS: Waves 1-18, 1991-2009: Special Licence Access, Travel to Work Areas*. [data collection]. *10th Edition.* UK Data Service. SN: 6675, http://doi.org/10.5255/UKDA-SN-6675-10

[5] Office for National Statistics. (2019). *Annual Survey of Hours and Earnings, 1997-2018: Secure Access*. [data collection]. *14th Edition.* UK Data Service. SN: 6689, http://doi.org/10.5255/UKDA-SN-6689-13

would expect local labour markets with a higher share of minimum wage workers to be affected more strongly.

ASHE uses 2001 TTWA codes between 2009 and 2013 and 2011 TTWA codes thereafter. In UKHLS, we have both 2001 and 2011 codes for all years between 2009 and 2017. We are thus able to accurately match ASHE derived TTWA indicators. To avoid simultaneity problems, we do not use the value of the TTWA indicator (i.e. the share of minimum wage workers) in the current year but its value in the previous year or in 2009. We thus need to lag the value of our indicator at the TTWA level. To do so, we need to address the 2014 break in the TTWA identifiers occurring in ASHE. Only a handful of TTWAs remained the same after re-coding based on the 2011 census. Thus, there is not a one-to-one correspondence between 2001 TTWA codes and 2011 ones. To get around this problem, we have loosely matched 2001 TTWA codes to 2011 ones based on maximizing the area of overlap between the two. We are then able to construct a consistent TTWA time series which we use to derive lagged and 2009 indicators. This adjustment affects only 2014 in the case of the 1 year lagged measure and 2014-2018 in the case of the 2009 based measure.

3. Estimation strategy

Our aim is to examine transitions out of NMW/NLW jobs, and the extent to which transition probabilities are affected by changes in the minimum wage. We are also interested in probing which individual and job characteristics are associated with a higher probability of progressing to better paid employment.

We first produce descriptive statistics on: (i) trends in minimum wage jobs and low pay over the period we study (2009-2018); (ii) transitions between pay states over time; and (iii) regional variations in low pay and transitions out of minimum wage jobs.

We then use transition matrices and a competing risks discrete time model to carefully look at wage progression out of minimum wage jobs. We define transitions out of minimum wage jobs over a single year; as well as over a longer period (3 years). Note that given we only have data up to 2018, we are able to examine the impact of the National Living Wage (NLW) introduced in April 2016 only on short-term (1 year) transitions.

3.1 Competing risks discrete time model

To examine patterns of wage progression in more detail, we examine exit probabilities to three potential destinations: low-paid employment, ‘high’ paid employment and non-employment. Low-paid employment is defined as employment paying an hourly wage above the minimum but below a low-pay threshold that we define, as is common in the literature, as two-thirds of median hourly earnings and ‘high’ paid employment as employment paying above the low-pay threshold. By differentiating between exits to low and high paid employment, we quantify the extent of short range versus long range mobility for minimum wage earners.

A first indication of the likely impact of the NMW/NLW increases on transition probabilities out of minimum wage jobs can be gained by examining changes across years. If years following relatively high increases in the NMW/NLW show lower (or higher) probabilities of wage progression, this suggests that wage progression might be affected by the uprating of the NMW/NLW. Obviously, concurrent economic changes and/or public policies may also affect these transition probabilities, and so yearly differences cannot be interpreted as a causal effect.

To get closer to a causal effect, we compare changes in transition probabilities, following changes in the minimum wage, across local areas. If increases in the NMW/NLW affect wage progression, areas with a higher incidence of minimum wage jobs should be affected more in periods when increases are higher. This strategy assumes that, absent NMW/NLW changes, wage progression probabilities across regions are the same.

Formally, we estimate models of the following type:

$$(1)\ h_{st} = \frac{\exp\left(\alpha_{st}+\beta_s X_{it}+\delta_s W_{it}+\gamma_s MWShare_{a,t-1}\right)}{\left(1+\sum_{ss=1}^{S}\exp\left(\alpha_{sst}+\beta_{ss}X_{it}+\delta_{ss}W_{it}+\gamma_{ss}MWShare_{a,t-1}\right)\right)}$$

where h_{st} is the hazard of leaving a minimum wage job at time t for destination s. s takes one of three possible values: low paid employment, 'high' paid employment and non-employment. X_{it} represents a vector of individual level characteristics measured at time t and W_{it} represents a vector of employer level characteristics measured at time t and $MWShare_{a,t-1}$represents the share of minimum wage workers in area a at time t-1. The share of minimum wage workers is lagged as it may take some time for minimum wage policies to affect transition probabilities. However, entering the contemporaneous share of minimum wage workers yields very similar results. It is possible that more than one year is needed for minimum wage levels to affect transition probabilities. Unfortunately, our sample size and panel length do not allow for the inclusion of more than one lag.

The coefficient of interest is γ_s. It captures the extent to which transition probabilities differ between areas with high and low shares of minimum wage workers. One concern is that any potential negative effects might be due to the structure of the local economy rather than any changes in the minimum wage. Areas with lower wages will have both a higher share of minimum wage workers and fewer higher paying jobs to which minimum wage workers can progress. Wage differences are only partly captured by other indicators such as industry, firm size, education or sector and so, to fully correct for this potential bias, we also control for the area level contemporaneous median wage level.

$$(2)\ h_{st} = \frac{\exp\left(\alpha_{st}+\beta_s X_{it}+\delta_s W_{it}+\gamma_s MWShare_{a,t-1}+\theta_s MedWage_{a,t}\right)}{\left(1+\sum_{ss=1}^{S}\exp\left(\alpha_{sst}+\beta_{ss}X_{it}+\delta_{ss}W_{it}+\gamma_{ss}MWShare_{a,t-1}+\theta_{ss}MedWage_{a,t}\right)\right)}$$

These specifications assume that the (lagged) share of minimum wage workers in an area has the same effect in every year. However, the minimum wage has not increased in a linear fashion over this period. To capture this aspect, we allow effects to vary by year. If minimum wage hikes affect wage progression, we should see an especially large effect in 2016 when the NLW was introduced.

One drawback of using the lagged share of minimum wage workers is that trends in the local economy may be driving both the share of minimum wage workers and the probability of transitioning to better paid jobs. As a robustness check, we re-estimate all our models using the local area level share of minimum wage workers in 2009 interacted with the 'bite' of the minimum wage calculated at the national level.

$$(3)\ h_{st} = \frac{\exp\left(\alpha_{st}+\beta_s X_{it}+\delta_s W_{it}+\gamma_s MWShare_{a,2009}*MWBite_{t-1}+\theta_s MedWage_{a,t}\right)}{\left(1+\sum_{ss=1}^{S}\exp\left(\alpha_{sst}+\beta_{ss}X_{it}+\delta_{ss} W_{it}+\gamma_{ss}MWShare_{a,2009}*MWBite_{t-1}+\theta_{ss}MedWage_{a,t}\right)\right)}$$

$MWBite_{t-1}$ represents the 'bite' of the minimum wage (i.e. the ratio between the NMW/NLW and median hourly earnings) at the national level in year *t-1*. This specification is essentially equivalent to a Bartik shift-share instrument, where $MWShare_{a,2009}$ represents the original shares and $MWBite_{t-1}$ the shift weights (Goldsmith-Pinkham, Sorkin, & Swift, 2018).

Since the bite of the minimum wage is calculated as the ratio between the minimum and median hourly earnings, it is possible any potential effects are driven by changes in the median rather than by changes in the minimum. For example, if median wages were to rise while the minimum wage is held constant, the bite would fall. Higher median wages could also increase the probability to transition to 'high' pay inducing thus a negative correlation between the 'bite' and transition probabilities. In the period we study, median wages have been relatively stagnant whereas the minimum wage increased considerably. Thus, the increase in the bite of the minimum wage observed during this period is due to changes in the NMW/NLW itself rather than changes in the median.

The specifications we employ are variants of a competing risks discrete time model with minimum wage employment as the origin and three possible destination states: low-paid employment, high-paid employment and non-employment. The set of coefficients γ_s, s=1,2,3 identify the impact of the minimum wage on the probability of transitions to low-paid, high-paid and non-employment if the identifying assumption holds. We allow for multiple spells per individual (i.e. individuals who exit minimum wage employment, but re-enter subsequently will have more than one spell in the data). We do not have information on how long an individual has been in a minimum wage job in the first wave. However, we do have information about the length of time an individual spent in the current job. We use this to approximate time spent in a minimum wage job before entering the study.

Discrete time models are especially suited to our case as we have yearly observations on the type of employment individuals hold. They have the advantages of being able to account for dependence on time spent in state in a flexible way, can easily accommodate time varying co-variates, are relatively robust to time-invariant individual specific unobserved heterogeneity,

and are easy to estimate using standard software (Allison, 1982; Jenkins, 1995; Nicoletti & Rondinelli, 2010).

One drawback of discrete time competing risks models is that they impose the assumption of independence of irrelevant alternatives (IIA). The IIA assumption is quite strong requiring that the processes governing transitions to the various destination states be independent. While in theory we can relax this assumption by including time invariant individual specific random effects and allowing the random effects to be correlated across equations for different destination states, in practise we are not able to estimate this model due to data constraints. The estimation of random effects requires a significant number of individuals experiencing a given transition more than once (so that a person level effect can be estimated). In addition to our sample size being relatively small, we have a relatively short panel and so the number of individuals with multiple spells is by necessity very limited.

3.2 Robustness checks: Wage growth equations

Our main results focus on *transitions* out of minimum wage jobs. Transitions have the advantage that they are easily interpretable from a mobility perspective and are less sensitive to errors in the measurement of hourly wages which are a serious concern given that around 40% of the hourly wages data among minimum wage earners and over two thirds in the entire sample are imputed. However, focusing on transitions can also have drawbacks. First, to estimate transition probabilities, we need to divide the sample of employees into minimum wage, low paid and higher paid workers. While the thresholds we use are clear and based either on legislation or on long-established practices in the literature, an arbitrary element clearly remains. Measurement error around the thresholds can be particularly problematic and bias results. While we have taken great care with our imputations and our results closely replicate official estimates, measurement error around the threshold remains a concern.

A second potential issue related to the estimate of transition probabilities are changes in the structure of the wage distribution. In particular, during the period we study, the share of low paid workers paid above the minimum fell both due to an increase in the share of minimum wage workers and due to the share of low paid workers falling. This structural change could limit the probability that minimum wage workers find low paid jobs that nonetheless pay better. Note though that this is an effect we would like to capture! The argument of the increased minimum wage coverage limiting possibilities for wage progression actually largely rests on this structural change. It is possible workers are less likely to progress to low paid jobs above the minimum but they are nonetheless better off in financial terms. In fact, if the minimum wage reaches two thirds of the median wage as scheduled before the pandemic, all low pay would be by default eliminated so the probability to transition to our low pay category would be zero but workers would nonetheless be financially better off.

To address these shortcomings and to check the robustness of our results, we also estimated hourly wage growth equations using the same geographical and temporal variation in the share of minimum wage jobs. We compare wage growth for workers on the minimum wage (and for workers in low paid jobs more generally) in areas with high and low incidence of minimum

wage jobs when the minimum wage increases. It should be noted though that wage growth estimates are probably more affected by measurement error than transition estimates and so we expect these estimates to be biased towards zero.

Wage growth models also have the disadvantage that they can only be estimated for individuals who are in continuous employment. If minimum wage increases have a negative impact on employment, we would expect workers with the lowest earning potential to be affected first. This could potentially lead to serious selection effects. Minimum wage increases will be associated with higher wage growth not because of any genuine effects but because workers who have the lowest growth potential drop out of the sample. Selection effects can also be problematic if minimum wage increases have positive employment effects due to increased labour supply, as some studies have found (Manning, 2016). In this case, the bias would be in the opposite direction. Workers with low earnings potential who otherwise might have left employment continue to be employed and depress the estimated wage growth. Note that these differential selection effects are not an issue for our transition models where transitions to non-employment are explicitly modelled.

3.1 Covariates: Individual and employer characteristics

In addition to local area wage levels and the minimum wage bite, our preferred specification includes a number of individual and job level characteristics. We include these variables with a twofold aim. First, in estimating policy effects we compare changes in transition probabilities over time and across areas. However, if wage progression patterns are different in high and low wage areas due to different characteristics of their workforce or jobs, this will bias our estimates. Thus, it is important to control for compositional differences across areas both in the types of jobs and in the types of workers. Second, we are interested in the effects of individual and job level characteristics on wage progression probabilities themselves. We include a rich set of covariates: gender, age, qualifications, household composition (including the presence of children and very young children), health status, ethnicity, immigration status, and previous experience of unemployment, and region. These variables are intended to capture either low human capital (qualification, occupation, previous unemployment etc.) or the presence of barriers to employment that may lead to lower productivity such as health status or caring responsibilities. On the employer/workplace level, we include industry, sector, and firm size. Together, these variables capture both personnel policies and some other important channels that may affect wage progression (e.g. unionisation).

4. Results

4.1 Descriptive results

We start by looking at trends in minimum wage and low pay coverage. Figure 4 shows that between 2009 and 2018, the share of workers paid at (or below) the minimum has increased whereas the share of workers paid at or below the low-pay threshold (including minimum wage workers) has fallen significantly. The share of workers paid at or below the minimum wage has

climbed from around 4 in 2009 to 8% in 2018. The share of low-paid workers on the other hand fell from around 23% in 2009 to around 19% in 2017 before climbing again slightly to 21% in 2018. The trends in our data are consistent with official estimates based on ASHE, albeit the levels are slightly higher than the corresponding ASHE based measures.

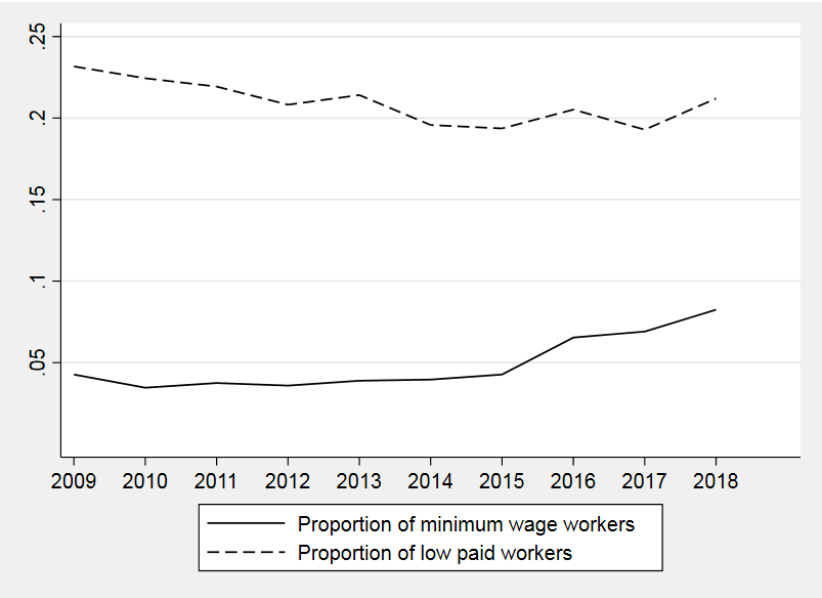


Fig 4: Proportion of workers who are paid at/below the minimum and proportion of workers paid at or below the low paid threshold by year

Figure 5 illustrates the considerable regional variation in the proportion of minimum wage and low-paid workers. Over the period we study, the share of workers in minimum wage employment varied from less than 2% in London to over 7% in Northern Ireland. Similarly, the share of low-paid workers ranged from around 11% in London to 28% in Wales and Northern Ireland. Generally, regions with a higher share of minimum wage workers also have a higher share of low-paid workers, suggesting that the share of minimum wage workers is strongly connected to the strength of the local economy and its industrial/occupational composition.

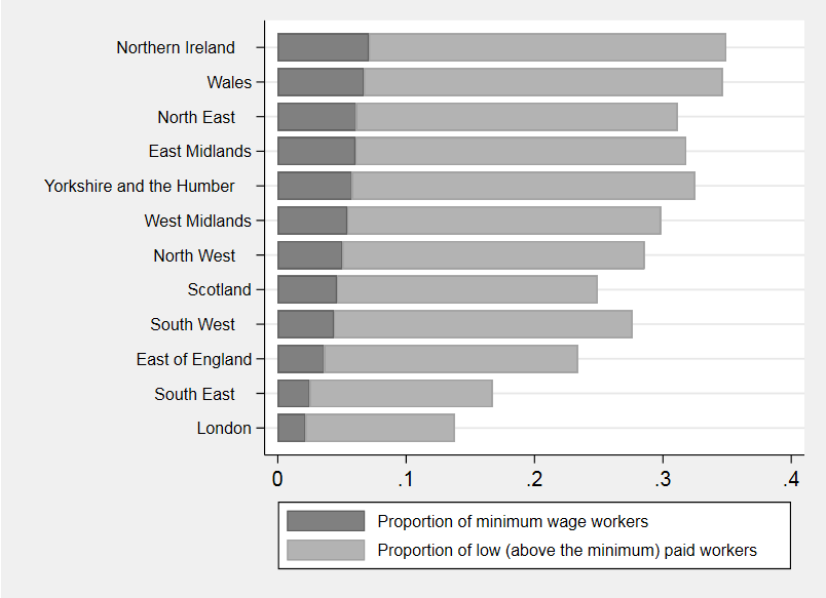


Fig 5: Proportion of workers who are paid at/below the minimum and proportion of workers paid at or below the low paid threshold by region

Next, we examine transition probabilities out of minimum wage jobs and the way they vary across time and across areas. Figure 6 shows average 1-year unadjusted transition probabilities to low (but above minimum) paid employment, 'high' paid employment and non-employment for each year between 2010 and 2018. For each year we calculate, from the stock of workers in minimum wage jobs in the previous year, the proportion that are still in a minimum wage job in the current year and the proportions transitioning to the three other states.

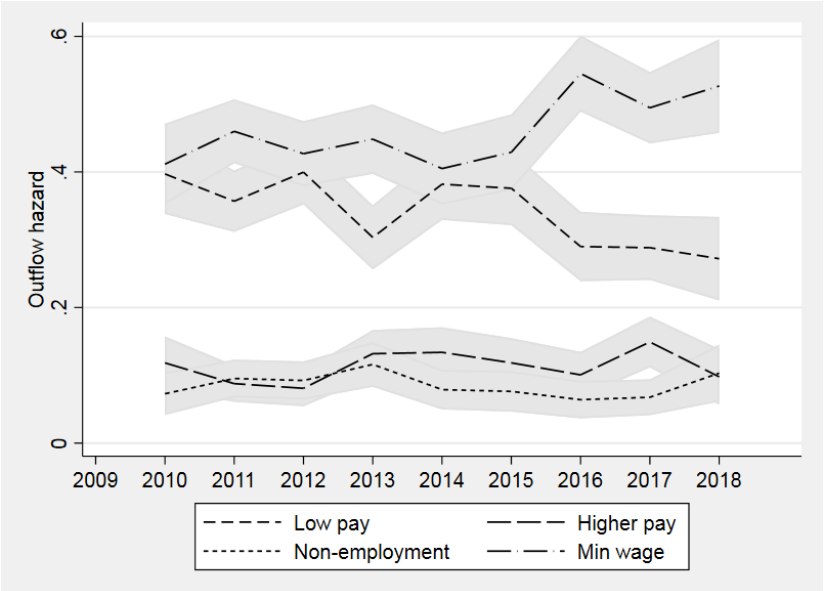


Fig 6: One-year transition probabilities to minimum wage, low paid, 'high' paid and non-employment by year

Every year, around half of minimum wage workers transition to a better paid job, around 40-50% remain in minimum wage employment while between 7% and 11% transition to non-employment. Among those transitioning to a better paid job, approximately four fifths remain in low paid employment (paid above the minimum). Only around 10% of minimum wage workers succeed in securing a 'high' paid job 12 months later.

The proportion of workers transitioning to low paid employment above the minimum fell after 2016 from around 40% to around 30%. At the same time, the proportion moving into 'high' paid employment increased slightly from around 7% to around 10%.

It is possible that minimum wage workers succeed in transitioning to 'high' paid employment over longer periods of time. To investigate this possibility, we computed 3-year transition probabilities to low-paid, 'high' paid and non-employment. These are calculated as the proportion of individuals who are low-paid, 'high' paid or non-employed in the current year as a share of those who have been in a minimum-wage job in any of the previous three years *(t-1, t-2* and *t-3*). Figure 7 plots these three-year transition probabilities. They show that while transition probabilities to low paid employment above the minimum and non-employment remain very similar, transition probabilities to 'high' paid employment are noticeably higher. They also appear to increase significantly from around 12% in 2012 to 18-20% in 2015 and subsequent years.

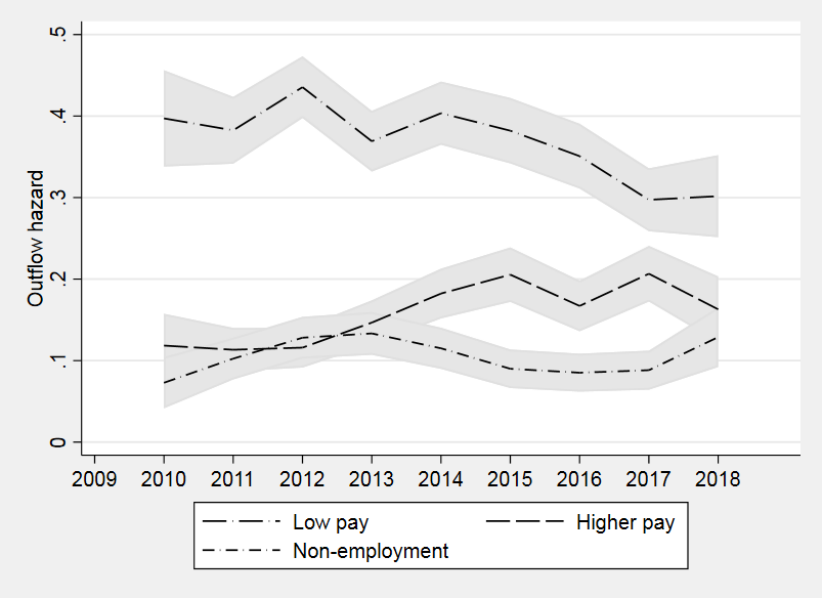


Fig 7: Three-year transition probabilities to minimum wage, low paid, 'high' paid and non-employment by year

We next examine how transition probabilities out of minimum wage jobs vary geographically. Average one-year transition probabilities to low pay, 'high' pay and non-employment by region are displayed in Figure 8. Unfortunately, small sample sizes prevent us from looking at temporal and spatial variation at the same time, so we only show averages over the entire period. London and the South East have the highest probability of transitioning to 'high' paid

employment, 20% and 19% respectively. In contrast, Northern Ireland, the North East and the North West have the lowest probabilities, between 6 to 8%.

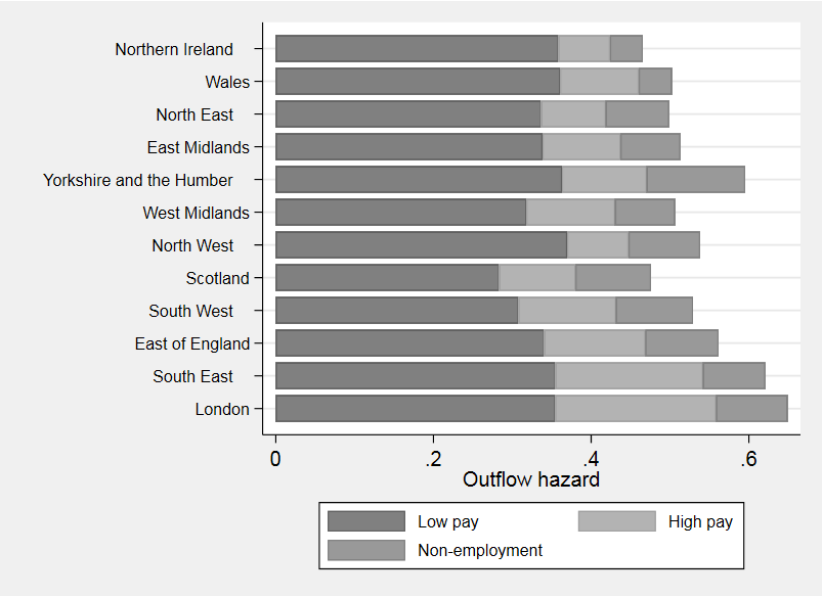


Fig 8: One-year transition probabilities to minimum wage, low paid, 'high' paid and non-employment by region

To check how transition probabilities vary with the local area economy we group the TTWAs into deciles based on their median hourly wage. We plot these *unconditional* transition probabilities by TTWA wage decile in Figure 9. The probability of transitioning from a minimum wage job to better paid employment increases as the average wage of the area goes up, especially in the upper half of the distribution. Notably, differences are strongest for transitions to 'high' paid employment. While the probability of moving from a minimum wage job to a low-paid job increases only slightly, the probability of moving to a 'high' paid job increases significantly in areas where wages are higher. This pattern suggests that chances of finding 'high' paid employment are strongly linked to the structure of the local economy. Note, however, these differences are unconditional and do not account for possible differences in worker characteristics between areas with low and high wages.

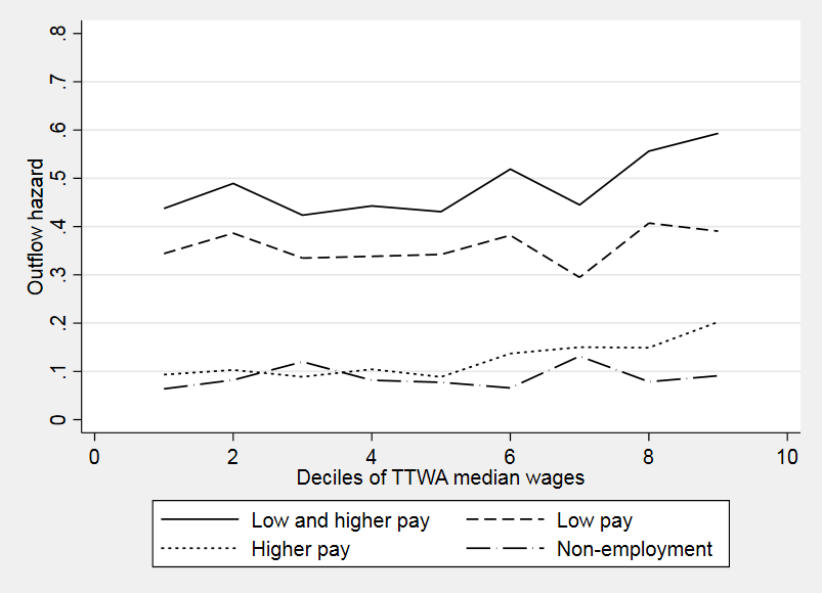


Fig 9: One-year transition probabilities to minimum wage, low paid, 'high' paid and non-employment by decile of TTWA median wages

4.2 Minimum wage effects on wage progression

To investigate potential minimum wage effects on transition probabilities out of minimum wage jobs, we estimate a discrete time competing risks model with four states: minimum wage employment, low-paid employment, 'high' paid employment and non-employment. Each year, minimum wage job holders are 'at risk' of leaving their minimum wage job for one of the other three states. If a high minimum wage discourages wage progression, we would expect areas with a higher share of minimum wage workers to be more affected. Consequently, the probability of leaving a minimum wage job for better paid employment should fall as the share of minimum wage workers in one's area increases in years when the minimum wage increases.

Figure 10 presents average marginal effects from our first specification using the lagged share of minimum wage workers in an area, but without controls for the area's median wages. To examine the effects of the introduction of the NLW in 2016, we allow effects to vary by year. The estimates show how a 1 percentage point change in the lagged share of minimum wage workers affects the probability of remaining in a minimum wage job (top left), to low-paid employment (top right), to 'high' pay (bottom left) and to non-employment (bottom right).

If the minimum wage has an adverse effect on wage progression, we would expect marginal effects of remaining in a minimum wage job to be positive as the share of minimum wage workers in an area increases, and the marginal effects for transitioning to low and higher paid jobs to be negative. Moreover, we would expect these effects to be particularly large in 2016, when the NLW was introduced. Figure 10 shows that these effects are generally very close to zero and generally statistically insignificant. The exception is 2016 when the average marginal effect on the probability to move into low paid employment is negative and statistically significant. For each 1 percentage increase in the share of minimum wage workers in the local TTWA, the probability of moving into low paid employment falls by around 4 percentage

points or around 10%. Conversely, the probability of remaining in a minimum wage job increases by around 5 percentage points. There is no effect either on the probability of transitioning to a 'higher' paid job or to non-employment. Moreover, in 2017 and 2018 the estimates revert to being close to zero and statistically insignificant. Taken together, the results suggest that the introduction of the NLW had a small and temporary negative effect on the probability of minimum wage workers progressing to low paid employment above the minimum. The effect is short-lived and does not appear in 2017 and 2018.

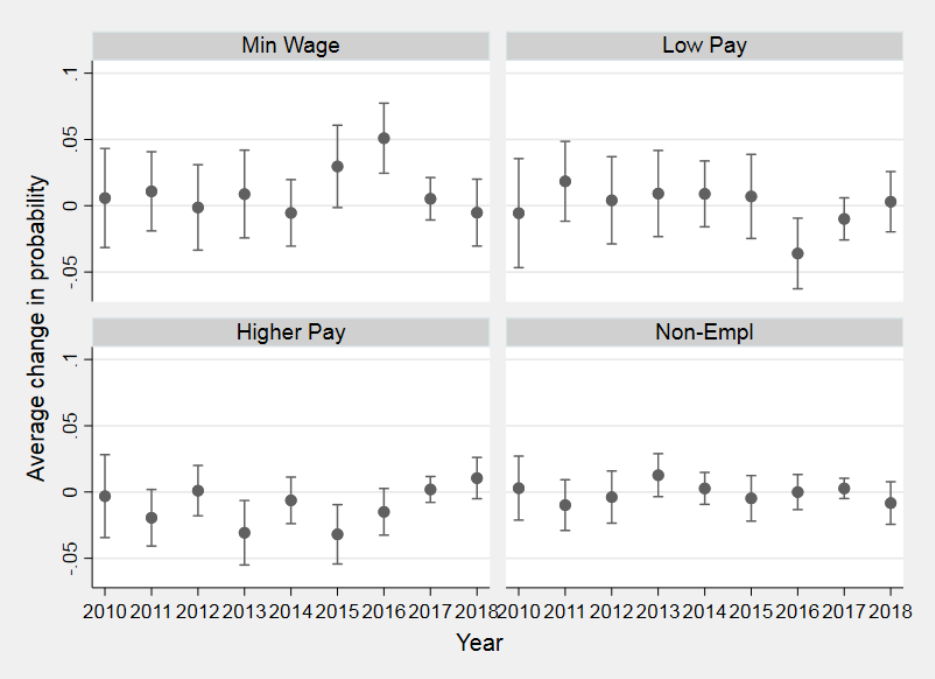


Fig 10 Average marginal effects (and 95% confidence intervals) of area lagged share of minimum wage workers by year

Figure 11 presents estimates of the model with additional controls for real median hourly pay at the TTWA-year level. Controlling for the area median hourly pay level does not change the estimated effects.

The estimated effects on the probability of moving to a higher paying job are more consistently negative. However, they are typically close to zero and statistically insignificant.

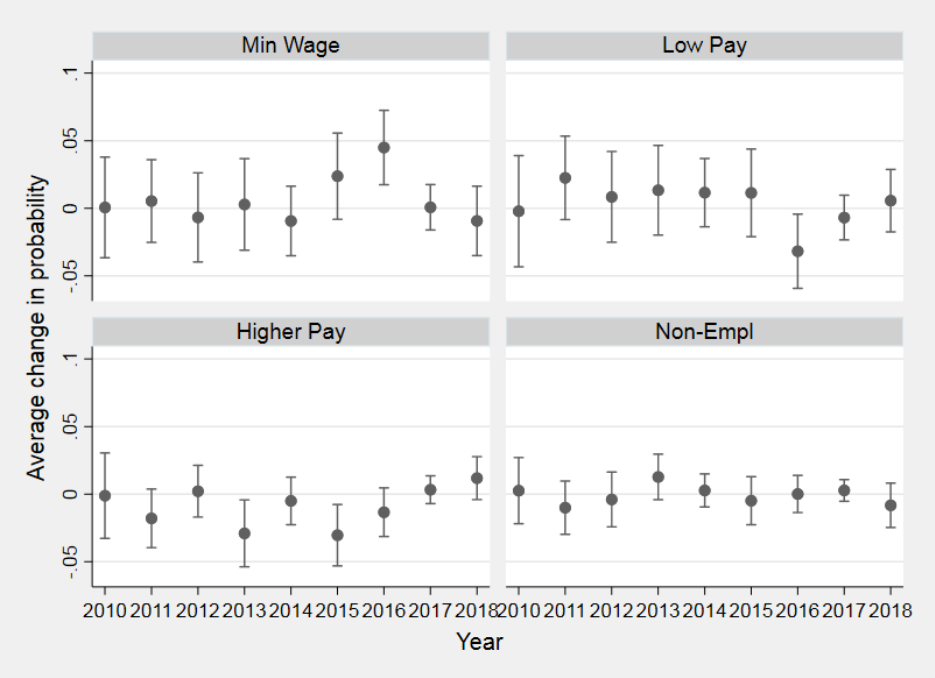


Fig 11: Average marginal effects (and 95% confidence intervals) of the lagged share of minimum wage workers, controlling for area median wages by year

As discussed above we check the robustness of our results by estimating models where we replace the lagged share of minimum wage workers with the share of minimum wage workers in 2009. We construct two specifications. First, we allow the effects of a change in the share of minimum wage workers in 2009 to vary by year. To increase the power of our model, we also calculate models where the share of minimum wage workers in 2009 is interacted with the bite of the minimum wage, calculated at the national level and lagged. This specification assumes that differences over time in the effect of the area share of minimum wage workers on transition probabilities are attributable solely to variation in the level of the minimum wage relative to national median earnings. It is an assumption that allows us to leverage variations in the level of the minimum wage over time to increase statistical power. We show estimates with and without controls for TTWA median wages.

Figure 12 shows estimates from this model. Generally, effect sizes are very similar to estimates using the lagged share of minimum wage workers but standard errors are larger. As a result, almost all estimates are statistically indistinguishable from zero. Unlike the previous specification, the 2016 estimate is in line with those for other years.

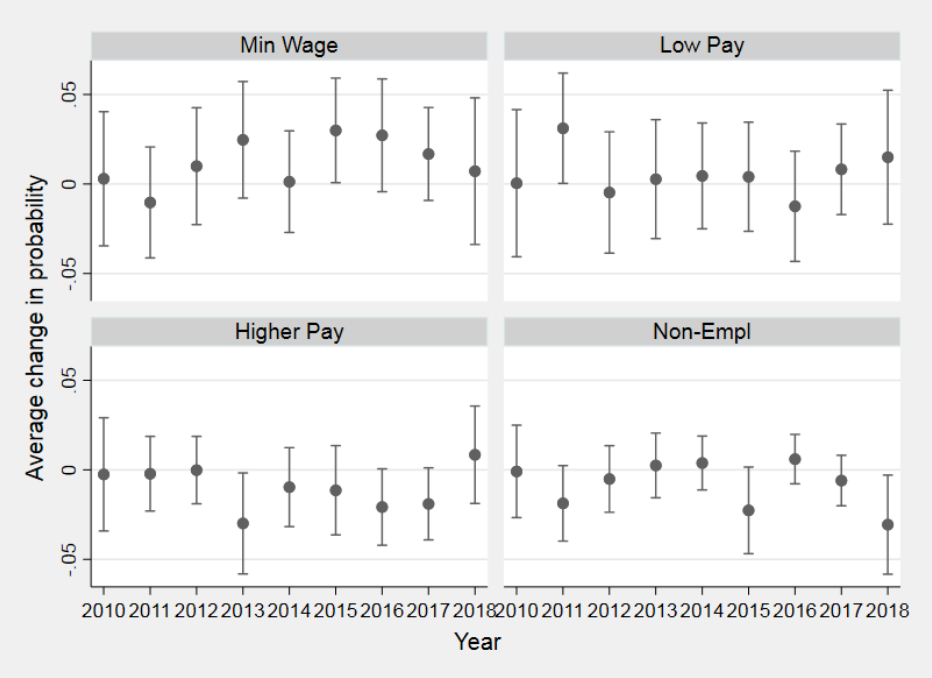


Fig 12: Average marginal effects (and 95% confidence intervals) of area's share of minimum wage workers in 2009, controlling for area median wages, by year

Results change somewhat when we force the time variation to depend on the bite of the minimum wage. Figure 13 shows estimated effects from a specification where the area share of minimum wage workers in 2009 is interacted with the bite of the minimum wage (lagged) and where controls for area wage levels is omitted. The probability of remaining in a minimum wage job increases with the value of the (lagged) bite and is statistically significant once the bite exceeds 54%. For each 1 percentage point increase in the share of minimum wage workers in the local TTWA (measured in 2009), the probability of remaining in a minimum wage job increases by between 1 and 2.5 percentage points (or 2.5 to 6.5 %), a modest effect. For comparison, going from the first to the third quartile of the distribution of the area share of minimum wage workers in 2009 is approximately 2 percentage points, corresponding to a change in the probability of remaining in a minimum wage job of around 4 percent.

The estimated effects on the probability of moving into low paid employment (above the minimum) are not only statistically insignificant but consistently very close to zero and constant across different values of the lagged bite. In contrast, the estimated effects on the probability of transitioning into higher paid employment are consistently negative but small and invariant to the size of the national bite. Finally, the probability of moving to non-employment falls as the bite of the minimum wage increases although the effects are not statistically significant.

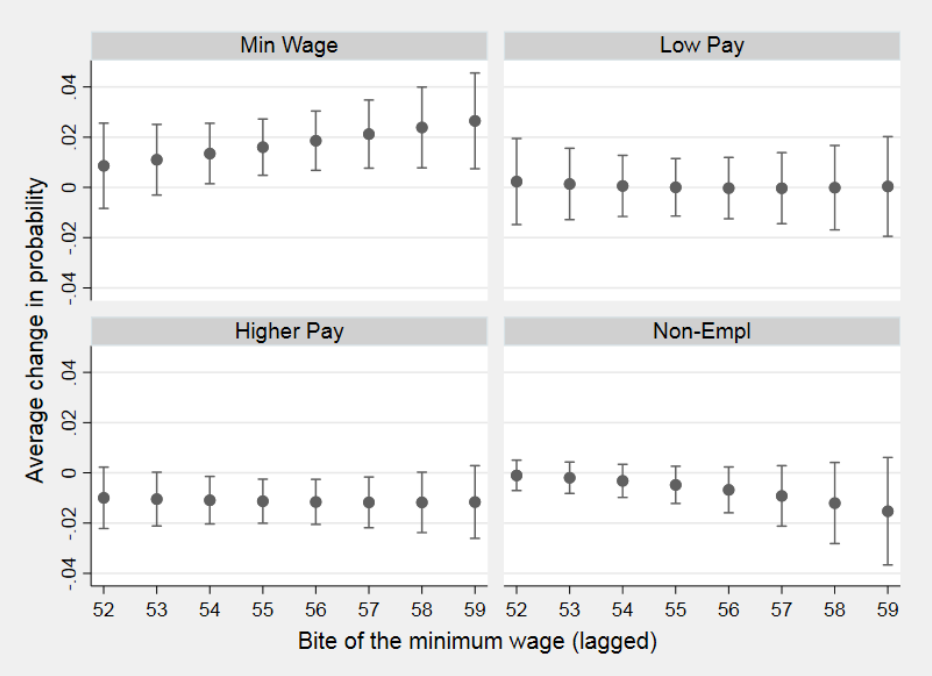


Figure 13: Average marginal effects (and 95% confidence intervals) of area's share of minimum wage workers in 2009, by bite of minimum wage

We next examine whether these effects remain after we include controls for area wage levels. Figure 14 shows this is the case. Including the areas' median wage level as an additional control variable does not change the size of the effects of interest, although standard errors are slightly larger.

We conclude that for the period we study, 2009-2018, there is limited evidence that a higher minimum wage affected wage progression. Taken together, the results indicate that there may have been a small increase in the probability of remaining on a minimum wage in 2016, when the NLW was introduced. However, this increase was relatively modest and short lived. There is no evidence that wage progression, either to low paid or high paid employment, has been impacted long-term.

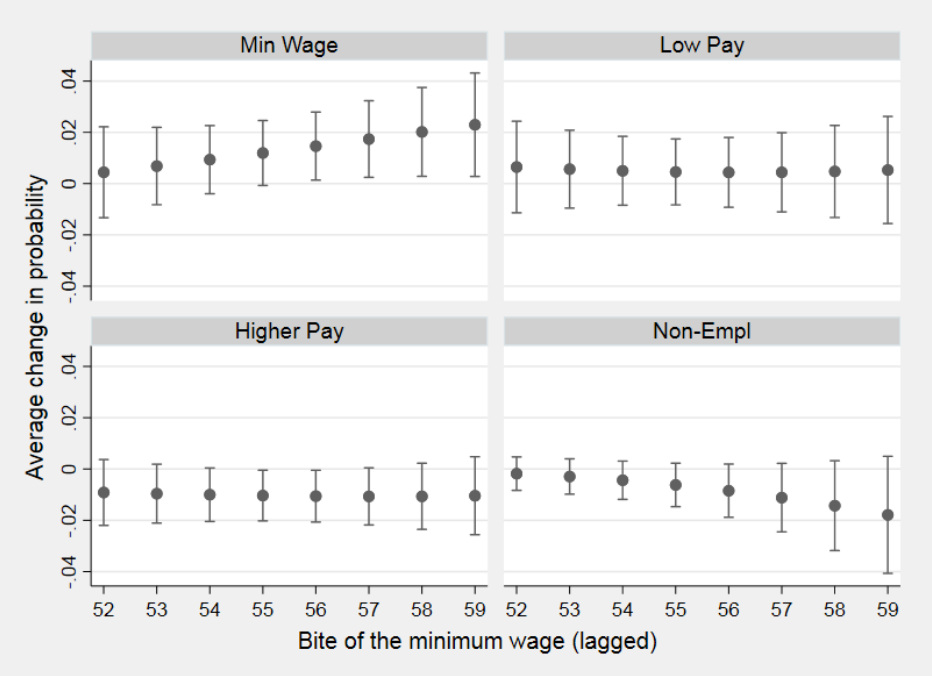


Fig 14: Average marginal effects (and 95% confidence intervals) of area's share of minimum wage workers in 2009, controlling for area median wages, by bite of minimum wage

4.3 Wage growth models

To complement results from our competing risks discrete time model, we estimate models where we directly model wage growth for minimum wage workers. Wage growth models have the advantage of not requiring any worker classification and using more information about the distribution of hourly wages. However, they are more likely to be affected by measurement error in hourly wages. They are also sensitive to selection in and out of employment. To address this latter issue, we use two transformations of the hourly wages: the log and the inverse hyperbolic sine[6] that allows us to incorporate zeros. The latter closely resembles a log transformation for values larger than two but permits the inclusion of zeros. Results using both transformations are presented below.

We model the nominal increase in hourly wages from year t to year t+1 for all workers on minimum wages in year t. For workers who remain on minimum wages, the increase will be purely driven by the statutory increase in the minimum wage. For workers who progress, the increase will be driven by both the statutory increase and their progression. Note that although in human capital theory predicts that a fall in hourly wages for those who remain continuously employed should not be possible, in practice we have a few cases where reported or imputed wages are below the minimum, so a nominal fall is possible. Explanations for this may include changes in job roles, with payments being reduced if some aspects of the job are reduced, or – cuts in wages in lieu of job losses.

[6] $\ln\left(x + \sqrt{x^2 + 1}\right)$

Table 1 shows estimated effects on the 1 year change in the log hourly wages. We instrument the effect of the minimum wage in the same way: first by using the lagged share of minimum wage workers in the local area and second by using the share of minimum wage workers in 2009, interacted with the year or with the national bite of the minimum wage. Estimates from models using the change in the inverse hyperbolic sine are shown in Table 2. A full list of estimated coefficients can be found in Tables A6-A16 in the Appendix.

Table 1: Estimated coefficients of minimum wage effects on the wage growth of minimum wage workers (continuously employed only)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Lagged share of MW workers by TTWA	-0.009	-0.007			
X 2011	0.004	0.004			
X 2012	0.007	0.007			
X 2013	0.007	0.008			
X 2014	0.006	0.006			
X 2015	-0.0006	-0.0004			
X 2016	0.006	0.006			
X 2017	0.010	0.010			
X2018	0.011	0.011			
Share or MW workers in 2009	-	-	-0.008	-0.030	-0.031
X 2011			0.004		
X 2012			-0.002		
X 2013			-0.011		
X 2014			0.004		
X 2015			-0.003		
X 2016			0.004		
X 2017			0.006		
X 2018			0.007		
National (lagged) bite	-	-	-	-0.015**	-0.015**
Share MW in 2009 X Bite	-	-	-	0.0004	0.0004
Controls for area level wages	No	Yes	Yes	No	Yes
N	3442	3442	2391	2391	2391

Source: Authors calculation based on UKHLS Waves 1-9

Table 2: Estimated coefficients of minimum wage effects on the wage growth of minimum wage workers (all workers)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Lagged share of MW workers by TTWA	-0.009	-0.008			
X 2011	0.026	0.028			
X 2012	0.016	0.016			
X 2013	-0.031	-0.031			
X 2014	0.0002	-0.0002			
X 2015	0.013	0.013			
X 2016	0.009	0.009			
X 2017	0.003	0.003			
X2018	0.034	0.034			
Share or MW workers in 2009			-0.021	-0.166	-0.159
X 2011			0.046		
X 2012			0.018		
X 2013			-0.010		
X 2014			0.001		
X 2015			0.067		
X 2016			0.006		
X 2017			0.031		
X 2018			0.066		
National (lagged) bite				-0.062**	-0.062**
Share MW in 2009 X Bite				0.003	0.003
Controls for area level wages	No		Yes	No	Yes
N	3733	3733	2607	2607	2607

Source: Authors' calculations based on UKHLS Waves 1-9

Both sets of models have very similar results. There is no evidence of any differential wage growth for workers in different TTWAs in either set of specifications. When we use the lagged share of minimum wage workers in the local area, both the main coefficient and the interactions are statistically insignificant and very close to zero. Moreover, coefficients for latter years are positive (albeit very close to zero). Thus, there is no evidence that the wage growth of minimum wage workers in areas with a high share of minimum wage workers is different from that of workers in areas with lower shares. The same is true when we use the share of minimum wage workers in 2009 interacted with the year.

The last two models use the share of minimum wage workers in the local area interacted with the bite of the minimum wage calculated at the national level. The interaction term captures whether workers in areas with a higher share of minimum wage jobs experience different wage

growth compared with the other areas when the bite increases. Results show that this is not the case. The interaction term is positive (indicating higher growth for workers in areas where the minimum wage is more prevalent) but statistically insignificant and close to zero. The only statistically significant term is the lagged bite of the minimum wage which is negative and highly significant, suggesting wage growth is lower in *all* areas when the bite increases. The most likely explanation however lies in the timing of measurement of hourly wages. Because we include year fixed effects, the lagged bite largely captures the differential wage growth of workers interviewed before and after the yearly minimum wage increase comes into force. If employers time their yearly wage reviews to coincide with the statutory increase of the minimum wage, expected wage growth for workers interviewed later on in the year - after the bite increases - is likely to be smaller purely due to this measurement timing effect. This interpretation is supported by models without year fixed effects where the effect of the lagged national bite, while still negative, is an order of magnitude smaller and statistically insignificant.

5. Conclusions

Using the UKHLS, we examined the progression of minimum wage workers in the UK between 2009 and 2018. During this period, the minimum wage increased considerably relative to median pay. Consequently, the share of workers covered by the minimum also increased substantially from around 4% to 8%. Conversely, the share of workers paid below the low pay threshold (defined as paying an hourly rate less than two thirds of the median hourly wage) decreased. We find that in any given year approximately half of minimum wage workers transition to higher pay but that the vast majority of these transitions (approximately four-fifths) are to low-paid employment. These findings are fairly stable across time and are consistent with previous work that has examined transitions out of minimum wage employment in the noughties (Bryan & Taylor, 2006; Jones et al., 2004). We also find considerable geographical variation in the transition rates out of minimum wage jobs. Whereas transition probabilities to low-paid employment are relatively constant across areas with different wage levels, the probability of moving to a 'high' paid job (defined a paying more than 2/3 of median hourly pay) increases as the wage level in an area increases. However, these are unconditional probabilities that do not account for possible differences in the characteristics of workforces in areas with different wage levels.

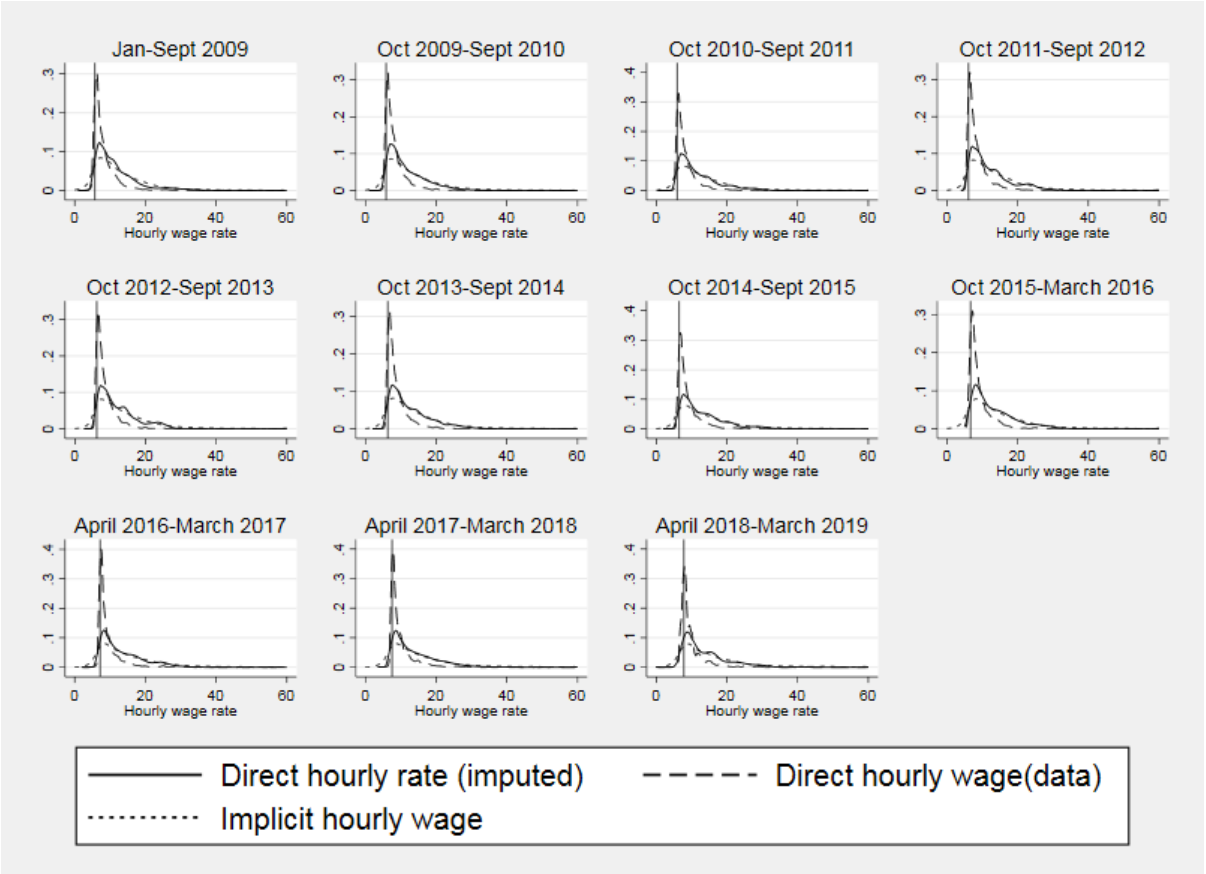
We use a competing risks discrete time model to estimate the effect of minimum wage changes on the probabilities of moving out of a minimum wage job. We examine changes in transition probabilities over time in areas with high and low shares of minimum wage workers. If minimum wage increases affect the probability of wage progression, we expect areas with higher shares of minimum wage workers to be more affected when the minimum wage increases.

Our results are robust to a variety of specifications. Overall, we find no evidence that minimum wage increases affected the wage progression of low-paid workers in the long term. Results

from our discrete time models suggest there may have been a temporary increase in the probability of remaining in a minimum wage job when the NLW was first introduced. This effect however quickly dissipates and is not robust to instrumenting the minimum wage with the 2009 share of minimum wage workers. Equally, our wage growth models failed to find any evidence that the increase of the minimum wage harmed the wage growth of minimum wage workers.

APPENDIX

Fig A1: Hourly pay distributions according to three measures: ‘direct’, ‘implicit’, and ‘direct’ + imputed values between 2009 and 2018



Note: Each graph corresponds to a period when the nominal minimum wage has been constant; the value of the minimum wage in force is shown as the vertical black line

Source: Authors calculations based on UKHLS

Table A1: Estimated coefficients of a discrete time model of transitions out of a minimum wage job using the lagged area share of minimum wage workers and not controlling for area wage level (model corresponding to Figure 10)

	Coefficient	SE	p-values	95% CI	
Transitions to LOW PAY					
Time in min wage job	-0.03	0.01	0.01	-0.06	-0.01
female	-0.11	0.09	0.26	-0.29	0.08
Age	-0.08	0.04	0.04	-0.15	-0.01
Age square	0.00	0.00	0.04	0.00	0.00
Education					
Other higher degree	0.03	0.19	0.90	-0.35	0.40
A-level etc	-0.20	0.17	0.23	-0.53	0.13
GCSE etc	-0.33	0.16	0.04	-0.64	-0.01
Other qualification	-0.36	0.18	0.04	-0.71	-0.01
No qualification	-0.58	0.18	0.00	-0.92	-0.23
Has child under 5	-0.11	0.13	0.38	-0.36	0.14
Number of children					
1	0.22	0.11	0.05	0.00	0.44
2	0.22	0.12	0.07	-0.02	0.46
3	0.39	0.15	0.01	0.09	0.69
Self-reported health status	-0.12	0.09	0.18	-0.29	0.05
Ethnic Minority (0/1)	-0.10	0.16	0.54	-0.40	0.21
Immigrant (0/1)	0.16	0.16	0.32	-0.16	0.48
Has previous unemployment spell (0/1)	-0.28	0.09	0.00	-0.47	-0.10
Firm size (logged)	0.06	0.02	0.00	0.02	0.10
Public sector	0.53	0.14	0.00	0.26	0.80
Temporary contract	0.17	0.16	0.28	-0.14	0.49
Part-time work	-0.32	0.09	0.00	-0.49	-0.16
Industry					
Manufacturing-food, beverages, textile	-0.65	0.51	0.20	-1.66	0.35
Manufacturing-basic industrial	-0.27	0.54	0.61	-1.33	0.78
Manufacturing-complex industrial	-0.78	0.59	0.18	-1.94	0.37
Construction and gas, electricity and water services	0.11	0.75	0.88	-1.35	1.58
Wholesale and retail trade	-0.27	0.48	0.57	-1.22	0.68
Transportation and storage	-0.43	0.52	0.41	-1.45	0.60
Accommodation and food services	-0.34	0.49	0.49	-1.29	0.62
Information and communication	0.78	1.26	0.54	-1.69	3.24
Finance and insurance and real-estate	0.13	0.72	0.86	-1.29	1.55
Professional, scientific and technical services	-0.74	0.69	0.28	-2.09	0.60

Administrative and support services	-0.31	0.49	0.53	-1.28	0.66
Public administration, education, health and social work	-0.38	0.49	0.44	-1.33	0.58
Arts and other	-0.52	0.51	0.30	-1.51	0.47
Region					
North West	0.05	0.19	0.81	-0.32	0.41
Yorkshire and the Humber	0.38	0.19	0.05	0.01	0.76
East Midlands	0.11	0.19	0.58	-0.27	0.49
West Midlands	-0.09	0.19	0.65	-0.47	0.29
East of England	0.24	0.21	0.27	-0.18	0.65
London	0.26	0.23	0.26	-0.19	0.71
South East	0.25	0.22	0.26	-0.18	0.69
South West	-0.08	0.21	0.69	-0.50	0.33
Wales	0.11	0.20	0.58	-0.28	0.50
Scotland	-0.15	0.21	0.47	-0.56	0.26
Year					
2011	-0.37	0.46	0.42	-1.27	0.52
2012	-0.31	0.47	0.51	-1.22	0.60
2013	-0.57	0.51	0.26	-1.56	0.42
2014	-0.47	0.45	0.30	-1.35	0.42
2015	-0.06	0.52	0.90	-1.07	0.95
2016	0.33	0.51	0.52	-0.67	1.32
2017	-0.44	0.46	0.34	-1.34	0.47
2018	-1.04	0.60	0.08	-2.23	0.14
Lagged share of min wage workers	-0.03	0.10	0.74	-0.22	0.16
Lagged share of min wage workers# Year					
2011	0.05	0.12	0.68	-0.18	0.28
2012	0.05	0.12	0.70	-0.19	0.28
2013	0.03	0.13	0.81	-0.22	0.27
2014	0.07	0.11	0.55	-0.15	0.29
2015	-0.03	0.12	0.79	-0.27	0.21
2016	-0.20	0.12	0.09	-0.43	0.03
2017	-0.01	0.10	0.92	-0.21	0.19
2018	0.06	0.11	0.61	-0.17	0.28
Constant	2.59	0.99	0.01	0.65	4.54
Transitions to HIGHER PAY					
Time in min wage job	-0.06	0.03	0.03	-0.11	-0.01
female	-0.45	0.14	0.00	-0.73	-0.17
Age	-0.09	0.06	0.10	-0.21	0.02
Age square	0.00	0.00	0.10	0.00	0.00
Education					
Other higher degree	-0.24	0.24	0.32	-0.71	0.23
A-level etc	-0.76	0.21	0.00	-1.18	-0.34
GCSE etc	-1.21	0.21	0.00	-1.62	-0.80
Other qualification	-1.34	0.25	0.00	-1.84	-0.85
No qualification	-2.17	0.29	0.00	-2.74	-1.60
Has child under 5	-0.19	0.20	0.34	-0.57	0.20
Number of children					

1	0.37	0.18	0.04	0.02	0.72
2	0.38	0.19	0.05	0.01	0.75
3	0.47	0.24	0.05	-0.01	0.95
Self-reported health status	-0.34	0.14	0.02	-0.61	-0.06
Ethnic Minority (0/1)	-0.05	0.23	0.84	-0.50	0.40
Immigrant (0/1)	-0.55	0.24	0.02	-1.03	-0.07
Has previous unemployment spell (0/1)	-0.40	0.15	0.01	-0.69	-0.11
Firm size (logged)	0.12	0.03	0.00	0.07	0.17
Public sector	0.74	0.20	0.00	0.35	1.13
Temporary contract	0.65	0.21	0.00	0.25	1.06
Part-time work	-0.84	0.13	0.00	-1.11	-0.58
Industry					
Manufacturing-food, beverages, textile	-0.77	0.90	0.40	-2.53	1.00
Manufacturing-basic industrial	0.24	0.89	0.79	-1.51	1.98
Manufacturing-complex industrial	0.72	0.91	0.43	-1.05	2.50
Construction and gas, electricity and water services	1.43	1.01	0.16	-0.54	3.41
Wholesale and retail trade	-0.44	0.84	0.60	-2.09	1.21
Transportation and storage	0.35	0.87	0.69	-1.36	2.05
Accommodation and food services	-0.65	0.85	0.45	-2.31	1.02
Information and communication	2.46	1.37	0.07	-0.23	5.14
Finance and insurance and real-estate	1.38	1.00	0.17	-0.58	3.35
Professional, scientific and technical services	1.02	0.94	0.28	-0.83	2.87
Administrative and support services	-0.01	0.85	0.99	-1.69	1.66
Public administration, education, health and social work	-0.16	0.85	0.85	-1.82	1.49
Arts and other	-0.06	0.86	0.94	-1.75	1.63
Region					
North West	-0.06	0.32	0.84	-0.70	0.57
Yorkshire and the Humber	0.41	0.32	0.21	-0.22	1.04
East Midlands	0.33	0.32	0.31	-0.30	0.96
West Midlands	-0.26	0.34	0.43	-0.92	0.40
East of England	0.46	0.34	0.18	-0.21	1.14
London	1.18	0.35	0.00	0.49	1.87
South East	0.76	0.34	0.03	0.09	1.43
South West	0.22	0.34	0.52	-0.45	0.89
Wales	0.09	0.33	0.80	-0.57	0.74
Scotland	-0.06	0.35	0.87	-0.74	0.63
Year					
2011	0.32	0.76	0.67	-1.16	1.81
2012	-0.84	0.77	0.27	-2.34	0.66

2013	0.65	0.79	0.41	-0.90	2.19
2014	-0.35	0.72	0.63	-1.77	1.07
2015	1.18	0.80	0.14	-0.38	2.74
2016	0.42	0.80	0.60	-1.15	1.98
2017	-0.64	0.68	0.34	-1.97	0.69
2018	-1.40	0.86	0.10	-3.10	0.29
Lagged share of min wage workers	-0.05	0.17	0.78	-0.38	0.29
Lagged share of min wage workers# Year					
2011	-0.22	0.23	0.32	-0.67	0.22
2012	0.06	0.22	0.77	-0.36	0.49
2013	-0.28	0.22	0.20	-0.71	0.15
2014	0.00	0.20	1.00	-0.39	0.39
2015	-0.35	0.21	0.10	-0.77	0.07
2016	-0.26	0.21	0.21	-0.66	0.15
2017	0.05	0.18	0.78	-0.29	0.39
2018					
Constant	2.53	1.54	0.10	-0.50	5.55
Transitions to NONEMPLOYMENT					
Time in min wage job	-0.04	0.03	0.20	-0.11	0.02
female	-0.25	0.16	0.13	-0.57	0.07
Age	-0.10	0.07	0.13	-0.24	0.03
Age square	0.00	0.00	0.15	0.00	0.00
Education					
Other higher degree	-0.32	0.32	0.32	-0.95	0.31
A-level etc	-0.42	0.27	0.12	-0.96	0.12
GCSE etc	-0.91	0.27	0.00	-1.43	-0.38
Other qualification	-0.50	0.29	0.08	-1.06	0.06
No qualification	-0.77	0.30	0.01	-1.35	-0.20
Has child under 5	-0.06	0.23	0.79	-0.50	0.38
Number of children					
1	0.53	0.21	0.01	0.12	0.93
2	0.44	0.22	0.05	0.01	0.88
3	0.78	0.27	0.00	0.26	1.30
Self-reported health status	0.31	0.15	0.04	0.02	0.61
Ethnic Minority (0/1)	0.13	0.27	0.63	-0.40	0.67
Immigrant (0/1)	0.12	0.28	0.65	-0.42	0.67
Has previous unemployment spell (0/1)	1.99	0.15	0.00	1.69	2.29
Firm size (logged)	-0.09	0.04	0.02	-0.16	-0.01
Public sector	0.13	0.28	0.64	-0.42	0.69
Temporary contract	0.85	0.22	0.00	0.43	1.27
Part-time work	-0.22	0.16	0.15	-0.53	0.08
Industry					
Manufacturing-food, beverages, textile	12.73	586.57	0.98	-1136.93	1162.39
Manufacturing-basic industrial	12.94	586.57	0.98	-1136.72	1162.60
Manufacturing-complex industrial	12.02	586.57	0.98	-1137.64	1161.68

Construction and gas, electricity and water services	13.68	586.57	0.98	-1135.98	1163.34
Wholesale and retail trade	12.77	586.57	0.98	-1136.89	1162.43
Transportation and storage	13.63	586.57	0.98	-1136.03	1163.29
Accommodation and food services	12.70	586.57	0.98	-1136.96	1162.36
Information and communication	16.01	586.57	0.98	-1133.66	1165.67
Finance and insurance and real-estate	13.00	586.57	0.98	-1136.66	1162.66
Professional, scientific and technical services	12.65	586.57	0.98	-1137.01	1162.31
Administrative and support services	12.86	586.57	0.98	-1136.80	1162.52
Public administration, education, health and social work	12.51	586.57	0.98	-1137.15	1162.17
Arts and other	12.82	586.57	0.98	-1136.84	1162.48
Region					
North West	0.44	0.37	0.24	-0.29	1.17
Yorkshire and the Humber	0.73	0.38	0.06	-0.02	1.48
East Midlands	0.11	0.40	0.78	-0.67	0.89
West Midlands	0.49	0.39	0.21	-0.27	1.25
East of England	0.37	0.42	0.37	-0.45	1.20
London	0.40	0.43	0.35	-0.44	1.24
South East	0.09	0.46	0.85	-0.82	0.99
South West	0.15	0.42	0.72	-0.67	0.97
Wales	0.05	0.41	0.91	-0.75	0.85
Scotland	0.30	0.41	0.46	-0.50	1.11
Year					
2011	0.94	0.84	0.26	-0.69	2.58
2012	0.21	0.90	0.82	-1.55	1.97
2013	-0.77	0.90	0.39	-2.54	1.00
2014	-0.77	0.86	0.37	-2.46	0.92
2015	0.15	0.98	0.88	-1.76	2.07
2016	-0.51	0.97	0.59	-2.41	1.38
2017	-1.25	0.90	0.17	-3.01	0.52
2018	0.44	1.02	0.66	-1.55	2.43
Lagged share of min wage workers	0.02	0.19	0.91	-0.35	0.40
Lagged share of min wage workers# Year					
2011	-0.17	0.23	0.45	-0.63	0.28
2012	-0.07	0.25	0.76	-0.56	0.41
2013	0.13	0.23	0.58	-0.32	0.57
2014	0.04	0.22	0.87	-0.40	0.47
2015	-0.18	0.24	0.45	-0.65	0.29
2016	-0.13	0.23	0.58	-0.58	0.32
2017	0.02	0.21	0.93	-0.38	0.42
2018	-0.10	0.21	0.63	-0.52	0.32
Constant	-12.42	586.57	0.98	-1162.08	1137.25
N=3711					

Source: UKHLS, Waves 1-9

Table A2: Estimated coefficients of a discrete time model of transitions out of a minimum wage job using the lagged area share of minimum wage workers and controlling for the area wage level (model corresponding to Figure 11)

	Coefficient	SE	p-values	95% CI	
Transitions to LOW PAY					
Time in min wage job	-0.03	0.01	0.02	-0.06	-0.01
female	-0.11	0.09	0.27	-0.29	0.08
Age	-0.08	0.04	0.04	-0.15	0.00
Age square	0.00	0.00	0.04	0.00	0.00
Education					
Other higher degree	0.04	0.19	0.84	-0.34	0.42
A-level etc	-0.19	0.17	0.25	-0.53	0.14
GCSE etc	-0.31	0.16	0.05	-0.63	0.00
Other qualification	-0.36	0.18	0.04	-0.71	-0.01
No qualification	-0.57	0.18	0.00	-0.92	-0.23
Has child under 5	-0.10	0.13	0.43	-0.35	0.15
Number of children					
1	0.22	0.11	0.05	0.00	0.44
2	0.21	0.12	0.08	-0.03	0.45
3	0.39	0.15	0.01	0.09	0.69
Self-reported health status	-0.12	0.09	0.17	-0.29	0.05
Ethnic Minority (0/1)	-0.12	0.16	0.46	-0.42	0.19
Immigrant (0/1)	0.17	0.16	0.31	-0.15	0.48
Has previous unemployment spell (0/1)	-0.28	0.09	0.00	-0.47	-0.10
Firm size (logged)	0.06	0.02	0.00	0.02	0.09
Public sector	0.54	0.14	0.00	0.27	0.81
Temporary contract	0.18	0.16	0.27	-0.14	0.50
Part-time work	-0.32	0.09	0.00	-0.49	-0.15
Industry					
Manufacturing-food, beverages, textile	-0.67	0.51	0.19	-1.68	0.33
Manufacturing-basic industrial	-0.27	0.54	0.61	-1.32	0.78
Manufacturing-complex industrial	-0.79	0.59	0.18	-1.94	0.36
Construction and gas, electricity and water services	0.09	0.75	0.90	-1.37	1.56
Wholesale and retail trade	-0.29	0.48	0.55	-1.24	0.66
Transportation and storage	-0.44	0.52	0.40	-1.47	0.58
Accommodation and food services	-0.36	0.49	0.46	-1.31	0.59
Information and communication	0.77	1.26	0.54	-1.69	3.24
Finance and insurance and real-estate	0.10	0.72	0.89	-1.32	1.52
Professional, scientific and technical services	-0.74	0.69	0.28	-2.09	0.60

Administrative and support services	-0.33	0.49	0.50	-1.30	0.64
Public administration, education, health and social work	-0.40	0.49	0.42	-1.35	0.56
Arts and other	-0.55	0.50	0.28	-1.54	0.44
Region					
North West	0.04	0.19	0.83	-0.33	0.41
Yorkshire and the Humber	0.39	0.19	0.04	0.01	0.77
East Midlands	0.10	0.19	0.59	-0.27	0.48
West Midlands	-0.10	0.19	0.61	-0.48	0.28
East of England	0.21	0.21	0.34	-0.21	0.62
London	-0.04	0.29	0.90	-0.61	0.54
South East	0.18	0.23	0.43	-0.27	0.62
South West	-0.07	0.21	0.73	-0.49	0.34
Wales	0.12	0.20	0.54	-0.27	0.51
Scotland	-0.16	0.21	0.44	-0.57	0.25
Year					
2011	-0.33	0.45	0.46	-1.22	0.56
2012	-0.25	0.46	0.59	-1.16	0.66
2013	-0.53	0.50	0.30	-1.52	0.46
2014	-0.39	0.45	0.40	-1.27	0.50
2015	-0.04	0.51	0.94	-1.04	0.96
2016	0.31	0.50	0.53	-0.67	1.30
2017	-0.44	0.46	0.34	-1.33	0.46
2018	-1.06	0.60	0.08	-2.24	0.12
Lagged share of min wage workers	-0.01	0.10	0.94	-0.20	0.18
Lagged share of min wage workers# Year					
2011	0.05	0.12	0.67	-0.18	0.28
2012	0.05	0.12	0.70	-0.19	0.28
2013	0.03	0.12	0.80	-0.21	0.27
2014	0.06	0.11	0.59	-0.16	0.28
2015	-0.03	0.12	0.81	-0.27	0.21
2016	-0.20	0.12	0.09	-0.43	0.03
2017	-0.01	0.10	0.89	-0.21	0.19
2018	0.05	0.11	0.64	-0.17	0.27
Median TTWA wage level	0.08	0.05	0.10	-0.02	0.17
Constant	1.58	1.17	0.18	-0.71	3.86
Transitions to HIGHER PAY					
Time in min wage job	-0.06	0.03	0.03	-0.11	-0.01
female	-0.44	0.14	0.00	-0.73	-0.16
Age	-0.09	0.06	0.10	-0.21	0.02
Age square	0.00	0.00	0.10	0.00	0.00
Education					
Other higher degree	-0.22	0.24	0.36	-0.69	0.25
A-level etc	-0.75	0.21	0.00	-1.17	-0.33
GCSE etc	-1.20	0.21	0.00	-1.61	-0.78
Other qualification	-1.34	0.25	0.00	-1.83	-0.85
No qualification	-2.17	0.29	0.00	-2.74	-1.59

Has child under 5	-0.18	0.20	0.37	-0.56	0.21
Number of children					
1	0.37	0.18	0.04	0.02	0.72
2	0.37	0.19	0.05	0.00	0.75
3	0.47	0.24	0.06	-0.01	0.95
Self-reported health status	-0.34	0.14	0.02	-0.61	-0.06
Ethnic Minority (0/1)	-0.07	0.23	0.76	-0.53	0.38
Immigrant (0/1)	-0.54	0.24	0.03	-1.02	-0.07
Has previous unemployment spell (0/1)	-0.40	0.15	0.01	-0.69	-0.11
Firm size (logged)	0.12	0.03	0.00	0.06	0.17
Public sector	0.75	0.20	0.00	0.36	1.14
Temporary contract	0.66	0.21	0.00	0.25	1.06
Part-time work	-0.84	0.13	0.00	-1.10	-0.57
Industry					
Manufacturing-food, beverages, textile	-0.80	0.90	0.37	-2.56	0.96
Manufacturing-basic industrial	0.23	0.89	0.80	-1.52	1.97
Manufacturing-complex industrial	0.70	0.90	0.44	-1.07	2.47
Construction and gas, electricity and water services	1.39	1.01	0.17	-0.58	3.37
Wholesale and retail trade	-0.48	0.84	0.57	-2.12	1.17
Transportation and storage	0.31	0.87	0.72	-1.39	2.02
Accommodation and food services	-0.69	0.85	0.42	-2.35	0.97
Information and communication	2.44	1.37	0.08	-0.25	5.13
Finance and insurance and real-estate	1.34	1.00	0.18	-0.63	3.30
Professional, scientific and technical services	1.00	0.94	0.29	-0.85	2.85
Administrative and support services	-0.05	0.85	0.95	-1.72	1.62
Public administration, education, health and social work	-0.21	0.84	0.81	-1.86	1.45
Arts and other	-0.10	0.86	0.90	-1.79	1.58
Region					
North West	-0.07	0.32	0.82	-0.71	0.56
Yorkshire and the Humber	0.42	0.32	0.20	-0.21	1.05
East Midlands	0.32	0.32	0.32	-0.31	0.96
West Midlands	-0.28	0.34	0.41	-0.94	0.38
East of England	0.43	0.35	0.22	-0.25	1.10
London	0.83	0.44	0.06	-0.04	1.70
South East	0.67	0.35	0.06	-0.02	1.36
South West	0.23	0.34	0.49	-0.43	0.90
Wales	0.10	0.33	0.76	-0.55	0.76
Scotland	-0.07	0.35	0.84	-0.76	0.62
Year					

2011	0.37	0.76	0.62	-1.11	1.86
2012	-0.75	0.76	0.32	-2.25	0.74
2013	0.71	0.79	0.37	-0.83	2.26
2014	-0.25	0.72	0.73	-1.67	1.17
2015	1.23	0.79	0.12	-0.32	2.79
2016	0.42	0.80	0.60	-1.14	1.98
2017	-0.61	0.67	0.37	-1.93	0.71
2018	-1.40	0.86	0.11	-3.08	0.29
Lagged share of min wage workers	-0.01	0.17	0.94	-0.35	0.32
Lagged share of min wage workers# Year					
2011	-0.23	0.22	0.32	-0.67	0.21
2012	0.06	0.22	0.78	-0.36	0.48
2013	-0.28	0.22	0.20	-0.71	0.14
2014	-0.01	0.20	0.95	-0.39	0.37
2015	-0.35	0.21	0.09	-0.77	0.06
2016	-0.26	0.21	0.21	-0.66	0.14
2017	0.04	0.17	0.83	-0.30	0.38
2018	0.14	0.19	0.45	-0.22	0.50
Median TTWA wage level	0.09	0.07	0.20	-0.05	0.23
Constant	1.31	1.80	0.47	-2.23	4.84
Transitions to NONEMPLOYMENT					
Time in min wage job	-0.04	0.03	0.20	-0.11	0.02
female	-0.25	0.16	0.13	-0.57	0.07
Age	-0.10	0.07	0.13	-0.24	0.03
Age square	0.00	0.00	0.15	0.00	0.00
Education					
Other higher degree	-0.31	0.32	0.34	-0.94	0.32
A-level etc	-0.42	0.27	0.13	-0.96	0.12
GCSE etc	-0.90	0.27	0.00	-1.43	-0.37
Other qualification	-0.50	0.29	0.08	-1.06	0.06
No qualification	-0.78	0.30	0.01	-1.35	-0.20
Has child under 5	-0.06	0.23	0.81	-0.50	0.39
Number of children					
1	0.53	0.21	0.01	0.12	0.93
2	0.44	0.22	0.05	0.00	0.88
3	0.78	0.27	0.00	0.26	1.30
Self-reported health status	0.31	0.15	0.04	0.02	0.61
Ethnic Minority (0/1)	0.12	0.27	0.65	-0.41	0.66
Immigrant (0/1)	0.13	0.28	0.64	-0.41	0.67
Has previous unemployment spell (0/1)	1.99	0.15	0.00	1.69	2.29
Firm size (logged)	-0.09	0.04	0.02	-0.16	-0.01
Public sector	0.13	0.28	0.63	-0.42	0.69
Temporary contract	0.85	0.22	0.00	0.43	1.28
Part-time work	-0.22	0.16	0.16	-0.53	0.09
Industry					
Manufacturing-food, beverages, textile	12.72	585.67	0.98	-1135.17	1160.61

Manufacturing-basic industrial	12.94	585.67	0.98	-1134.95	1160.83
Manufacturing-complex industrial	12.02	585.67	0.98	-1135.87	1159.91
Construction and gas, electricity and water services	13.67	585.67	0.98	-1134.22	1161.56
Wholesale and retail trade	12.76	585.67	0.98	-1135.13	1160.65
Transportation and storage	13.62	585.67	0.98	-1134.27	1161.51
Accommodation and food services	12.69	585.67	0.98	-1135.20	1160.58
Information and communication	16.01	585.67	0.98	-1131.88	1163.90
Finance and insurance and real-estate	12.99	585.67	0.98	-1134.90	1160.88
Professional, scientific and technical services	12.65	585.67	0.98	-1135.24	1160.54
Administrative and support services	12.85	585.67	0.98	-1135.04	1160.74
Public administration, education, health and social work	12.50	585.67	0.98	-1135.39	1160.39
Arts and other	12.80	585.67	0.98	-1135.09	1160.70
Region					
North West	0.44	0.37	0.24	-0.29	1.17
Yorkshire and the Humber	0.74	0.38	0.05	-0.01	1.48
East Midlands	0.11	0.40	0.78	-0.67	0.89
West Midlands	0.49	0.39	0.21	-0.27	1.25
East of England	0.36	0.42	0.39	-0.47	1.19
London	0.25	0.54	0.65	-0.81	1.31
South East	0.05	0.47	0.91	-0.87	0.97
South West	0.16	0.42	0.71	-0.66	0.98
Wales	0.06	0.41	0.89	-0.74	0.86
Scotland	0.30	0.41	0.47	-0.51	1.11
Year					
2011	0.96	0.84	0.25	-0.68	2.60
2012	0.24	0.90	0.79	-1.53	2.00
2013	-0.76	0.90	0.40	-2.52	1.01
2014	-0.74	0.87	0.39	-2.45	0.96
2015	0.16	0.98	0.87	-1.76	2.07
2016	-0.53	0.96	0.58	-2.42	1.36
2017	-1.25	0.90	0.16	-3.01	0.51
2018	0.43	1.01	0.67	-1.56	2.42
Lagged share of min wage workers	0.03	0.19	0.86	-0.35	0.41
Lagged share of min wage workers# Year					
2011	-0.17	0.23	0.46	-0.63	0.28
2012	-0.07	0.25	0.77	-0.55	0.41
2013	0.13	0.23	0.57	-0.32	0.57
2014	0.03	0.22	0.88	-0.40	0.47
2015	-0.18	0.24	0.46	-0.65	0.29
2016	-0.12	0.23	0.59	-0.58	0.33

2017	0.02	0.20	0.93	-0.38	0.42
2018	-0.10	0.21	0.63	-0.52	0.32
Median TTWA wage level	0.04	0.09	0.66	-0.14	0.22
Constant	-12.94	585.67	0.98	-1160.84	1134.95
N=3711					

Source: UKHLS, Waves 1-9

Table A3: Estimated coefficients of a discrete time model of transitions out of minimum wage using the area share of minimum wage workers in 2009 and year specific effects (model corresponding to Figure 12)

	Coefficient	SE	p-values	95% CI	
Transitions to LOW PAY					
Time in min wage job	-0.03	0.01	0.01	-0.06	-0.01
Female	-0.10	0.10	0.27	-0.29	0.08
Age	-0.08	0.04	0.04	-0.15	0.00
Age square	0.00	0.00	0.04	0.00	0.00
Education					
Other higher degree	0.03	0.19	0.87	-0.34	0.41
A-level etc	-0.19	0.17	0.26	-0.52	0.14
GCSE etc	-0.32	0.16	0.05	-0.64	-0.01
Other qualification	-0.36	0.18	0.04	-0.71	-0.01
No qualification	-0.57	0.18	0.00	-0.92	-0.22
Has child under 5	-0.10	0.13	0.46	-0.35	0.16
Number of children					
1	0.21	0.11	0.06	-0.01	0.43
2	0.21	0.12	0.09	-0.03	0.45
3	0.38	0.15	0.01	0.09	0.68
Self-reported health status	-0.12	0.09	0.17	-0.29	0.05
Ethnic Minority (0/1)	-0.11	0.16	0.48	-0.42	0.20
Immigrant (0/1)	0.16	0.16	0.31	-0.15	0.48
Has previous unemployment spell (0/1)	-0.29	0.09	0.00	-0.47	-0.11
Firm size (logged)	0.06	0.02	0.01	0.02	0.09
Public sector	0.56	0.14	0.00	0.28	0.83
Temporary contract	0.17	0.16	0.29	-0.15	0.49
Part-time work	-0.32	0.09	0.00	-0.49	-0.15
Industry					
Manufacturing-food, beverages, textile	-0.65	0.51	0.21	-1.65	0.36
Manufacturing-basic industrial	-0.27	0.54	0.62	-1.32	0.78
Manufacturing-complex industrial	-0.75	0.59	0.20	-1.90	0.40
Construction and gas, electricity and water services	0.16	0.75	0.84	-1.31	1.62
Wholesale and retail trade	-0.28	0.48	0.56	-1.23	0.66
Transportation and storage	-0.44	0.52	0.40	-1.46	0.59
Accommodation and food services	-0.34	0.49	0.48	-1.29	0.61
Information and communication	0.75	1.26	0.55	-1.71	3.21
Finance and insurance and real-estate	0.10	0.72	0.89	-1.31	1.52
Professional, scientific and technical services	-0.73	0.69	0.29	-2.07	0.62
Administrative and support services	-0.31	0.49	0.53	-1.28	0.65
Public administration, education, health and social work	-0.38	0.49	0.43	-1.34	0.57
Arts and other	-0.55	0.50	0.28	-1.53	0.44
Region					
North West	0.02	0.19	0.91	-0.34	0.39

Yorkshire and the Humber	0.36	0.19	0.06	-0.02	0.74
East Midlands	0.06	0.19	0.74	-0.31	0.44
West Midlands	-0.12	0.19	0.55	-0.50	0.26
East of England	0.19	0.21	0.37	-0.23	0.61
London	-0.05	0.29	0.85	-0.62	0.52
South East	0.15	0.23	0.51	-0.29	0.59
South West	-0.09	0.21	0.66	-0.51	0.32
Wales	0.11	0.20	0.57	-0.27	0.50
Scotland	-0.16	0.21	0.45	-0.57	0.25
Year					
2011	-0.56	0.45	0.21	-1.43	0.31
2012	0.01	0.45	0.99	-0.88	0.89
2013	-0.23	0.46	0.61	-1.12	0.66
2014	-0.19	0.44	0.67	-1.04	0.67
2015	0.01	0.44	0.98	-0.85	0.87
2016	-0.35	0.45	0.44	-1.23	0.53
2017	-0.53	0.42	0.21	-1.36	0.30
2018	-0.86	0.50	0.09	-1.85	0.13
Share of minimum wage workers in 2009	-0.01	0.10	0.93	-0.20	0.18
Share of minimum wage workers in 2009 # Year					
2011	0.12	0.12	0.32	-0.11	0.35
2012	-0.03	0.12	0.81	-0.27	0.21
2013	-0.05	0.12	0.67	-0.29	0.19
2014	0.01	0.11	0.91	-0.21	0.24
2015	-0.06	0.12	0.61	-0.28	0.17
2016	-0.10	0.12	0.43	-0.33	0.14
2017	-0.01	0.11	0.94	-0.23	0.21
2018	0.05	0.14	0.71	-0.22	0.32
Median Real TTWA wage level	0.08	0.05	0.11	-0.02	0.17
Constant	1.62	1.15	0.16	-0.64	3.88
Transitions to HIGHER PAY					
Time in min wage job	-0.06	0.03	0.04	-0.11	0.00
female	-0.45	0.14	0.00	-0.73	-0.16
Age	-0.09	0.06	0.12	-0.20	0.02
Age square	0.00	0.00	0.13	0.00	0.00
Education					
Other higher degree	-0.24	0.24	0.31	-0.71	0.23
A-level etc	-0.74	0.21	0.00	-1.16	-0.32
GCSE etc	-1.23	0.21	0.00	-1.64	-0.82
Other qualification	-1.37	0.25	0.00	-1.86	-0.88
No qualification	-2.17	0.29	0.00	-2.75	-1.60
Has child under 5	-0.13	0.20	0.51	-0.51	0.26
Number of children					
1	0.33	0.18	0.06	-0.01	0.68
2	0.35	0.19	0.06	-0.02	0.73
3	0.45	0.24	0.07	-0.03	0.92
Self-reported health status	-0.33	0.14	0.02	-0.60	-0.06
Ethnic Minority (0/1)	-0.04	0.23	0.87	-0.49	0.41
Immigrant (0/1)	-0.54	0.24	0.02	-1.02	-0.07
Has previous unemployment spell (0/1)	-0.41	0.15	0.01	-0.70	-0.12

Firm size (logged)	0.12	0.03	0.00	0.07	0.17
Public sector	0.77	0.20	0.00	0.38	1.16
Temporary contract	0.61	0.21	0.00	0.21	1.02
Part-time work	-0.84	0.13	0.00	-1.11	-0.58
Public sector	-0.33	0.14	0.02	-0.60	-0.06
Industry					
Manufacturing-food, beverages, textile	-0.70	0.90	0.44	-2.45	1.06
Manufacturing-basic industrial	0.34	0.89	0.70	-1.40	2.08
Manufacturing-complex industrial	0.78	0.90	0.39	-0.99	2.54
Construction and gas, electricity and water services	1.61	1.01	0.11	-0.37	3.58
Wholesale and retail trade	-0.38	0.84	0.65	-2.02	1.27
Transportation and storage	0.39	0.87	0.65	-1.31	2.09
Accommodation and food services	-0.57	0.84	0.50	-2.22	1.09
Information and communication	2.62	1.37	0.06	-0.06	5.31
Finance and insurance and real-estate	1.46	1.00	0.14	-0.49	3.42
Professional, scientific and technical services	1.05	0.94	0.26	-0.79	2.89
Administrative and support services	0.05	0.85	0.95	-1.62	1.72
Public administration, education, health and social work	-0.10	0.84	0.90	-1.75	1.55
Arts and other	0.01	0.86	0.99	-1.67	1.69
Region					
North West	-0.06	0.32	0.85	-0.70	0.57
Yorkshire and the Humber	0.40	0.32	0.21	-0.23	1.04
East Midlands	0.28	0.32	0.38	-0.35	0.92
West Midlands	-0.23	0.34	0.50	-0.89	0.43
East of England	0.44	0.35	0.21	-0.24	1.12
London	0.93	0.44	0.04	0.06	1.79
South East	0.71	0.35	0.04	0.02	1.39
South West	0.29	0.34	0.40	-0.38	0.95
Wales	0.15	0.33	0.65	-0.50	0.81
Scotland	0.03	0.35	0.94	-0.65	0.71
Year					
2011	-0.49	0.75	0.51	-1.96	0.98
2012	-0.58	0.74	0.44	-2.02	0.87
2013	0.60	0.74	0.42	-0.85	2.05
2014	-0.11	0.71	0.88	-1.50	1.29
2015	0.25	0.72	0.73	-1.16	1.66
2016	0.02	0.71	0.98	-1.38	1.42
2017	0.13	0.66	0.84	-1.16	1.43
2018	-0.71	0.75	0.34	-2.18	0.75
Share of minimum wage workers in 2009	-0.03	0.17	0.85	-0.37	0.30
Share of minimum wage workers in 2009 # Year					
2011	0.04	0.22	0.87	-0.39	0.47
2012	0.00	0.21	0.99	-0.42	0.42
2013	-0.33	0.23	0.15	-0.78	0.12
2014	-0.07	0.21	0.74	-0.48	0.34

2015	-0.17	0.21	0.44	-0.59	0.25
2016	-0.28	0.22	0.20	-0.71	0.15
2017	-0.17	0.19	0.37	-0.55	0.21
2018	0.09	0.22	0.67	-0.33	0.52
Median Real TTWA wage level	0.06	0.07	0.44	-0.09	0.20
Constant	1.59	1.80	0.38	-1.94	5.13
Transitions to NONEMPLOYMENT					
Time in min wage job	-0.04	0.03	0.22	-0.10	0.02
female	-0.26	0.16	0.11	-0.58	0.06
Age	-0.10	0.07	0.13	-0.24	0.03
Age square	0.00	0.00	0.16	0.00	0.00
Education					
Other higher degree	-0.30	0.32	0.35	-0.93	0.33
A-level etc	-0.40	0.28	0.15	-0.94	0.14
GCSE etc	-0.90	0.27	0.00	-1.43	-0.37
Other qualification	-0.50	0.29	0.08	-1.06	0.06
No qualification	-0.77	0.30	0.01	-1.35	-0.19
Has child under 5	-0.05	0.23	0.81	-0.50	0.39
Number of children					
1	0.51	0.21	0.01	0.11	0.92
2	0.45	0.22	0.05	0.01	0.89
3	0.78	0.27	0.00	0.26	1.30
Self-reported health status	0.31	0.15	0.04	0.02	0.61
Ethnic Minority (0/1)	0.15	0.27	0.59	-0.39	0.68
Immigrant (0/1)	0.12	0.28	0.67	-0.42	0.66
Has previous unemployment spell (0/1)	2.01	0.16	0.00	1.71	2.32
Firm size (logged)	-0.09	0.04	0.02	-0.16	-0.01
Public sector	0.13	0.28	0.65	-0.43	0.68
Temporary contract	0.85	0.22	0.00	0.42	1.27
Part-time work	-0.21	0.16	0.17	-0.52	0.09
Industry					
Manufacturing-food, beverages, textile	13.14	650.86	0.98	-1262.52	1288.79
Manufacturing-basic industrial	13.32	650.86	0.98	-1262.34	1288.97
Manufacturing-complex industrial	12.42	650.86	0.99	-1263.23	1288.08
Construction and gas, electricity and water services	14.10	650.86	0.98	-1261.55	1289.76
Wholesale and retail trade	13.18	650.86	0.98	-1262.48	1288.83
Transportation and storage	14.06	650.86	0.98	-1261.60	1289.71
Accommodation and food services	13.14	650.86	0.98	-1262.51	1288.80
Information and communication	16.30	650.86	0.98	-1259.36	1291.96
Finance and insurance and real-estate	13.34	650.86	0.98	-1262.31	1289.00
Professional, scientific and technical services	13.08	650.86	0.98	-1262.58	1288.74
Administrative and support services	13.27	650.86	0.98	-1262.39	1288.92
Public administration, education, health and social work	12.91	650.86	0.98	-1262.74	1288.57
Arts and other	13.23	650.86	0.98	-1262.42	1288.89
Region					

North West	0.39	0.37	0.29	-0.34	1.12
Yorkshire and the Humber	0.71	0.38	0.06	-0.04	1.46
East Midlands	0.11	0.40	0.79	-0.67	0.88
West Midlands	0.51	0.39	0.19	-0.25	1.27
East of England	0.30	0.42	0.47	-0.52	1.13
London	0.34	0.55	0.54	-0.73	1.41
South East	-0.03	0.47	0.95	-0.95	0.89
South West	0.08	0.42	0.85	-0.74	0.90
Wales	0.13	0.41	0.76	-0.67	0.93
Scotland	0.24	0.41	0.56	-0.57	1.05
Year					
2011	0.90	0.86	0.30	-0.80	2.59
2012	0.17	0.88	0.85	-1.56	1.90
2013	-0.21	0.87	0.81	-1.91	1.49
2014	-0.92	0.89	0.30	-2.66	0.82
2015	0.59	0.95	0.54	-1.28	2.46
2016	-1.40	0.88	0.11	-3.13	0.33
2017	-0.64	0.87	0.47	-2.35	1.07
2018	0.82	0.91	0.36	-0.96	2.60
Share of minimum wage workers in 2009	-0.02	0.21	0.92	-0.42	0.38
Share of minimum wage workers in 2009 # Year					
2011	-0.18	0.24	0.46	-0.66	0.30
2012	-0.08	0.25	0.75	-0.56	0.41
2013	-0.01	0.24	0.96	-0.48	0.46
2014	0.08	0.24	0.74	-0.39	0.56
2015	-0.41	0.28	0.14	-0.97	0.14
2016	0.07	0.24	0.76	-0.40	0.54
2017	-0.13	0.24	0.58	-0.61	0.35
2018	-0.33	0.26	0.20	-0.85	0.18
Median Real TTWA wage level	-0.03	0.09	0.74	-0.21	0.15
Constant	-12.36	650.86	0.99	-1288.02	1263.30
N=3711					

Source: UKHLS, Waves 1-9

Table A4: Estimated coefficients of a discrete time model of transitions out of minimum wage using the area share of minimum wage workers in 2009 interacted with the lag of the minimum wage at the national level (model corresponding to Figure 13)

	Coefficient	SE	p-values	95% CI	
Transitions to LOW PAY					
Time in min wage job	-0.03	0.01	0.01	-0.06	-0.01
female	-0.11	0.09	0.26	-0.29	0.08
Age	-0.08	0.04	0.04	-0.15	0.00
Age square	0.00	0.00	0.05	0.00	0.00
Education					
Other higher degree	0.02	0.19	0.90	-0.35	0.40
A-level etc	-0.20	0.17	0.24	-0.53	0.13
GCSE etc	-0.33	0.16	0.04	-0.64	-0.02
Other qualification	-0.37	0.18	0.04	-0.71	-0.02
No qualification	-0.58	0.18	0.00	-0.92	-0.23
Has child under 5	-0.10	0.13	0.42	-0.35	0.15
Number of children					
1.00	0.21	0.11	0.06	-0.01	0.43
2.00	0.21	0.12	0.08	-0.03	0.45
3.00	0.38	0.15	0.01	0.09	0.68
Self-reported health status	-0.12	0.09	0.17	-0.29	0.05
Ethnic Minority (0/1)	-0.09	0.16	0.58	-0.39	0.22
Immigrant (0/1)	0.16	0.16	0.33	-0.16	0.47
Has previous unemployment spell (0/1)	-0.28	0.09	0.00	-0.47	-0.10
Firm size (logged)	0.05	0.02	0.01	0.02	0.09
Public sector	0.55	0.14	0.00	0.28	0.82
Temporary contract	0.16	0.16	0.31	-0.15	0.48
Part-time work	-0.33	0.09	0.00	-0.49	-0.16
Industry					
Manufacturing-food, beverages, textile	-0.62	0.51	0.23	-1.62	0.39
Manufacturing-basic industrial	-0.26	0.54	0.62	-1.32	0.79
Manufacturing-complex industrial	-0.73	0.59	0.22	-1.88	0.43
Construction and gas, electricity and water services	0.19	0.75	0.80	-1.27	1.66
Wholesale and retail trade	-0.25	0.48	0.60	-1.20	0.69
Transportation and storage	-0.41	0.52	0.44	-1.43	0.62
Accommodation and food services	-0.31	0.49	0.53	-1.26	0.65

Information and communication	0.81	1.26	0.52	-1.65	3.27
Finance and insurance and real-estate	0.16	0.72	0.83	-1.26	1.57
Professional, scientific and technical services	-0.70	0.69	0.31	-2.05	0.64
Administrative and support services	-0.28	0.49	0.57	-1.24	0.69
Public administration, education, health and social work	-0.35	0.49	0.47	-1.31	0.60
Arts and other	-0.50	0.50	0.32	-1.49	0.49
Region					
North West	0.02	0.19	0.93	-0.35	0.38
Yorkshire and the Humber	0.34	0.19	0.08	-0.04	0.72
East Midlands	0.06	0.19	0.77	-0.32	0.43
West Midlands	-0.11	0.19	0.58	-0.49	0.27
East of England	0.22	0.21	0.31	-0.20	0.63
London	0.24	0.23	0.30	-0.21	0.68
South East	0.23	0.22	0.30	-0.20	0.66
South West	-0.10	0.21	0.64	-0.51	0.32
Wales	0.11	0.20	0.58	-0.28	0.50
Scotland	-0.14	0.21	0.51	-0.54	0.27
Year					
2011	-0.20	0.20	0.30	-0.59	0.18
2012	-0.16	0.21	0.45	-0.56	0.25
2013	-0.48	0.22	0.03	-0.92	-0.05
2014	-0.22	0.22	0.32	-0.64	0.21
2015	-0.26	0.24	0.28	-0.73	0.21
2016	-0.71	0.26	0.01	-1.23	-0.20
2017	-0.63	0.36	0.08	-1.35	0.08
2018	-0.77	0.42	0.07	-1.59	0.05
Share of minimum wage workers in 2009	0.43	0.55	0.44	-0.65	1.52
Lagged bite of the minimum wage at the national level	0.03	0.06	0.58	-0.08	0.15
Share of min wage workers# Lagged national bite	-0.01	0.01	0.39	-0.03	0.01
Constant	0.81	3.25	0.80	-5.55	7.18
Transitions to HIGHER PAY					
Time in min wage job	0.81	3.25	0.80	-5.55	7.18
female	0.81	3.25	0.80	-5.55	7.18
Age	0.81	3.25	0.80	-5.55	7.18
Age square	0.81	3.25	0.80	-5.55	7.18
Education					
Other higher degree	-0.22	0.24	0.35	-0.69	0.24
A-level etc	-0.74	0.21	0.00	-1.16	-0.32

GCSE etc	-1.22	0.21	0.00	-1.63	-0.81
Other qualification	-1.35	0.25	0.00	-1.84	-0.86
No qualification	-2.15	0.29	0.00	-2.72	-1.58
Has child under 5	-0.12	0.20	0.54	-0.50	0.26
Number of children					
1	0.33	0.18	0.06	-0.01	0.68
2	0.37	0.19	0.05	-0.01	0.74
3	0.44	0.24	0.07	-0.04	0.91
Self-reported health status	-0.33	0.14	0.02	-0.60	-0.06
Ethnic Minority (0/1)	-0.01	0.23	0.95	-0.46	0.43
Immigrant (0/1)	-0.56	0.24	0.02	-1.03	-0.08
Has previous unemployment spell (0/1)	-0.39	0.15	0.01	-0.68	-0.11
Firm size (logged)	0.12	0.03	0.00	0.06	0.17
Public sector	0.77	0.20	0.00	0.39	1.16
Temporary contract	0.61	0.20	0.00	0.20	1.01
Part-time work	-0.85	0.13	0.00	-1.11	-0.59
Industry					
Manufacturing-food, beverages, textile	-0.63	0.90	0.49	-2.38	1.13
Manufacturing-basic industrial	0.36	0.89	0.69	-1.38	2.09
Manufacturing-complex industrial	0.84	0.90	0.35	-0.92	2.61
Construction and gas, electricity and water services	1.64	1.00	0.10	-0.33	3.60
Wholesale and retail trade	-0.32	0.84	0.70	-1.96	1.32
Transportation and storage	0.47	0.87	0.59	-1.23	2.16
Accommodation and food services	-0.50	0.84	0.55	-2.15	1.15
Information and communication	2.68	1.37	0.05	0.00	5.37
Finance and insurance and real-estate	1.51	1.00	0.13	-0.44	3.46
Professional, scientific and technical services	1.16	0.94	0.22	-0.68	2.99
Administrative and support services	0.10	0.85	0.91	-1.57	1.76
Public administration, education, health and social work	-0.05	0.84	0.95	-1.70	1.60
Arts and other	0.07	0.86	0.93	-1.61	1.76
Region					
North West	-0.06	0.32	0.85	-0.70	0.57
Yorkshire and the Humber	0.39	0.32	0.22	-0.24	1.03
East Midlands	0.28	0.32	0.39	-0.36	0.91
West Midlands	-0.21	0.34	0.54	-0.86	0.45
East of England	0.45	0.35	0.19	-0.22	1.13
London	1.14	0.35	0.00	0.45	1.83

South East	0.77	0.34	0.03	0.10	1.44
South West	0.28	0.34	0.42	-0.39	0.94
Wales	0.15	0.33	0.64	-0.50	0.81
Scotland	0.07	0.35	0.84	-0.61	0.75
Year					
2011	-0.39	0.31	0.21	-0.99	0.22
2012	-0.72	0.33	0.03	-1.37	-0.07
2013	-0.56	0.34	0.10	-1.23	0.10
2014	-0.47	0.33	0.16	-1.12	0.18
2015	-0.51	0.37	0.17	-1.23	0.21
2016	-1.09	0.40	0.01	-1.87	-0.30
2017	-0.90	0.55	0.10	-1.99	0.18
2018	-1.01	0.64	0.11	-2.26	0.23
Share of minimum wage workers in 2009	0.25	0.95	0.79	-1.62	2.11
Lagged bite of the minimum wage at the national level	0.10	0.09	0.27	-0.08	0.27
Share of min wage workers# Lagged national bite	-0.01	0.02	0.66	-0.04	0.03
Constant	-2.65	5.02	0.60	-12.48	7.18
Transitions to NONEMPLOYMENT					
Time in min wage job	-0.04	0.03	0.22	-0.10	0.02
female	-0.27	0.16	0.10	-0.59	0.05
Age	-0.10	0.07	0.14	-0.23	0.03
Age square	0.00	0.00	0.16	0.00	0.00
Education					
Other higher degree	-0.27	0.32	0.40	-0.91	0.36
A-level etc	-0.43	0.28	0.12	-0.97	0.11
GCSE etc	-0.91	0.27	0.00	-1.44	-0.38
Other qualification	-0.51	0.29	0.08	-1.07	0.06
No qualification	-0.77	0.30	0.01	-1.35	-0.19
Has child under 5	-0.03	0.23	0.90	-0.47	0.41
Number of children					
1	0.49	0.21	0.02	0.09	0.90
2	0.42	0.22	0.06	-0.02	0.86
3	0.75	0.27	0.01	0.23	1.27
Self-reported health status	0.34	0.15	0.02	0.05	0.64
Ethnic Minority (0/1)	0.12	0.27	0.65	-0.41	0.66
Immigrant (0/1)	0.13	0.28	0.65	-0.42	0.67
Has previous unemployment spell (0/1)	1.99	0.15	0.00	1.69	2.29
Firm size (logged)	-0.09	0.04	0.02	-0.17	-0.02
Public sector	0.18	0.28	0.52	-0.37	0.73
Temporary contract	0.81	0.22	0.00	0.38	1.23
Part-time work	-0.24	0.16	0.13	-0.54	0.07
Industry					
Manufacturing-food, beverages, textile	13.87	939.78	0.99	-1828.07	1855.80

Manufacturing-basic industrial	14.12	939.78	0.99	-1827.82	1856.05
Manufacturing-complex industrial	13.20	939.78	0.99	-1828.74	1855.13
Construction and gas, electricity and water services	14.84	939.78	0.99	-1827.10	1856.78
Wholesale and retail trade	13.90	939.78	0.99	-1828.04	1855.83
Transportation and storage	14.81	939.78	0.99	-1827.12	1856.75
Accommodation and food services	13.89	939.78	0.99	-1828.05	1855.82
Information and communication	17.02	939.78	0.99	-1824.91	1858.96
Finance and insurance and real-estate	13.97	939.78	0.99	-1827.97	1855.90
Professional, scientific and technical services	13.81	939.78	0.99	-1828.13	1855.75
Administrative and support services	14.01	939.78	0.99	-1827.93	1855.95
Public administration, education, health and social work	13.63	939.78	0.99	-1828.31	1855.56
Arts and other	13.99	939.78	0.99	-1827.95	1855.92
Region					
North West	0.38	0.37	0.31	-0.35	1.11
Yorkshire and the Humber	0.72	0.38	0.06	-0.03	1.47
East Midlands	0.09	0.40	0.81	-0.68	0.87
West Midlands	0.51	0.39	0.19	-0.25	1.28
East of England	0.33	0.42	0.43	-0.50	1.16
London	0.22	0.43	0.61	-0.62	1.07
South East	-0.05	0.46	0.91	-0.95	0.85
South West	0.12	0.42	0.77	-0.70	0.94
Wales	0.10	0.41	0.80	-0.70	0.90
Scotland	0.30	0.41	0.47	-0.51	1.10
Year					
2011	0.27	0.34	0.42	-0.39	0.94
2012	-0.47	0.38	0.21	-1.21	0.26
2013	-0.79	0.40	0.05	-1.58	0.00
2014	-1.08	0.40	0.01	-1.87	-0.30
2015	-1.41	0.45	0.00	-2.30	-0.53
2016	-2.10	0.50	0.00	-3.08	-1.12
2017	-2.83	0.73	0.00	-4.25	-1.40
2018	-2.26	0.81	0.01	-3.83	-0.68
Share of minimum wage workers in 2009	1.04	1.08	0.33	-1.07	3.16
Lagged bite of the minimum wage at the national level	0.34	0.11	0.00	0.12	0.57
Share of min wage workers# Lagged national bite	-0.02	0.02	0.28	-0.06	0.02

Constant	-31.31	939.80	0.97	-1873.28	1810.67
N=3711					

Source: UKHLS, Waves 1-9

Table A5: Estimated coefficients of a discrete time model of transitions out of minimum wage using the area share of minimum wage workers in 2009 interacted with the lag of the bite of the minimum wage at the national level and controlling for area wage levels (model corresponding to Figure 14)

Transitions to LOW PAY					
Time in min wage job	-0.03	0.01	0.02	-0.06	-0.01
female	-0.11	0.09	0.26	-0.29	0.08
Age	-0.08	0.04	0.04	-0.15	0.00
Age square	0.00	0.00	0.05	0.00	0.00
Education					
Other higher degree	0.04	0.19	0.84	-0.34	0.41
A-level etc	-0.19	0.17	0.26	-0.52	0.14
GCSE etc	-0.32	0.16	0.05	-0.63	0.00
Other qualification	-0.36	0.18	0.04	-0.71	-0.01
No qualification	-0.57	0.18	0.00	-0.92	-0.22
Has child under 5	-0.09	0.13	0.48	-0.34	0.16
Number of children					
1	0.21	0.11	0.06	-0.01	0.43
2	0.21	0.12	0.09	-0.03	0.45
3	0.38	0.15	0.01	0.08	0.68
Self-reported health status	-0.12	0.09	0.17	-0.29	0.05
Ethnic Minority (0/1)	-0.11	0.16	0.49	-0.42	0.20
Immigrant (0/1)	0.16	0.16	0.32	-0.16	0.48
Has previous unemployment spell (0/1)	-0.29	0.09	0.00	-0.47	-0.11
Firm size (logged)	0.05	0.02	0.01	0.02	0.09
Public sector	0.55	0.14	0.00	0.28	0.82
Temporary contract	0.17	0.16	0.29	-0.15	0.49
Part-time work	-0.32	0.09	0.00	-0.49	-0.15
Industry					
Manufacturing-food, beverages, textile	-0.64	0.51	0.21	-1.64	0.36
Manufacturing-basic industrial	-0.27	0.54	0.62	-1.32	0.78
Manufacturing-complex industrial	-0.73	0.59	0.21	-1.89	0.42
Construction and gas, electricity and water services	0.16	0.75	0.83	-1.30	1.62
Wholesale and retail trade	-0.27	0.48	0.57	-1.22	0.67
Transportation and storage	-0.42	0.52	0.42	-1.44	0.60
Accommodation and food services	-0.33	0.48	0.49	-1.28	0.62
Information and communication	0.79	1.26	0.53	-1.67	3.25
Finance and insurance and real-estate	0.12	0.72	0.87	-1.29	1.54
Professional, scientific and technical services	-0.70	0.69	0.30	-2.05	0.64

Administrative and support services	-0.31	0.49	0.53	-1.27	0.66
Public administration, education, health and social work	-0.38	0.49	0.44	-1.33	0.58
Arts and other	-0.53	0.50	0.29	-1.52	0.46
Region					
North West	0.01	0.19	0.95	-0.35	0.38
Yorkshire and the Humber	0.36	0.19	0.06	-0.02	0.73
East Midlands	0.06	0.19	0.75	-0.32	0.44
West Midlands	-0.12	0.19	0.54	-0.50	0.26
East of England	0.18	0.21	0.39	-0.23	0.60
London	-0.05	0.29	0.85	-0.62	0.52
South East	0.15	0.23	0.50	-0.29	0.59
South West	-0.09	0.21	0.66	-0.51	0.32
Wales	0.11	0.20	0.56	-0.27	0.50
Scotland	-0.16	0.21	0.44	-0.57	0.25
Year					
2011	-0.16	0.20	0.42	-0.55	0.23
2012	-0.10	0.21	0.64	-0.51	0.32
2013	-0.42	0.23	0.06	-0.87	0.02
2014	-0.15	0.22	0.49	-0.58	0.28
2015	-0.21	0.24	0.39	-0.68	0.27
2016	-0.69	0.26	0.01	-1.20	-0.17
2017	-0.60	0.36	0.10	-1.31	0.11
2018	-0.74	0.42	0.08	-1.56	0.08
Median TTWA wage level	0.08	0.05	0.11	-0.02	0.17
Share of minimum wage workers in 2009	0.42	0.55	0.45	-0.66	1.50
Lagged bite of the minimum wage at the national level	0.03	0.06	0.57	-0.08	0.15
Share of min wage workers# Lagged national bite	-0.01	0.01	0.43	-0.03	0.01
Constant	-0.17	3.30	0.96	-6.63	6.30
Transitions to HIGHER PAY					
Time in min wage job	-0.05	0.03	0.05	-0.11	0.00
female	-0.45	0.14	0.00	-0.73	-0.17
Age	-0.09	0.06	0.13	-0.20	0.02
Age square	0.00	0.00	0.13	0.00	0.00
Education					
Other higher degree	-0.21	0.24	0.37	-0.68	0.25
A-level etc	-0.73	0.21	0.00	-1.15	-0.31
GCSE etc	-1.21	0.21	0.00	-1.62	-0.80
Other qualification	-1.35	0.25	0.00	-1.84	-0.86
No qualification	-2.14	0.29	0.00	-2.72	-1.57
Has child under 5	-0.11	0.20	0.57	-0.49	0.27
Number of children					
1	0.33	0.18	0.06	-0.01	0.68
2	0.36	0.19	0.06	-0.01	0.74

3	0.44	0.24	0.07	-0.04	0.91
Self-reported health status	-0.33	0.14	0.02	-0.60	-0.06
Ethnic Minority (0/1)	-0.03	0.23	0.89	-0.48	0.42
Immigrant (0/1)	-0.55	0.24	0.02	-1.03	-0.08
Has previous unemployment spell (0/1)	-0.40	0.15	0.01	-0.68	-0.11
Firm size (logged)	0.11	0.03	0.00	0.06	0.17
Public sector	0.77	0.20	0.00	0.39	1.16
Temporary contract	0.61	0.21	0.00	0.21	1.01
Part-time work	-0.84	0.13	0.00	-1.11	-0.58
Industry					
Manufacturing-food, beverages, textile	-0.65	0.90	0.47	-2.40	1.11
Manufacturing-basic industrial	0.35	0.89	0.69	-1.38	2.09
Manufacturing-complex industrial	0.83	0.90	0.35	-0.93	2.60
Construction and gas, electricity and water services	1.61	1.00	0.11	-0.36	3.57
Wholesale and retail trade	-0.34	0.84	0.69	-1.98	1.30
Transportation and storage	0.45	0.87	0.60	-1.24	2.15
Accommodation and food services	-0.53	0.84	0.53	-2.18	1.13
Information and communication	2.67	1.37	0.05	-0.02	5.35
Finance and insurance and real-estate	1.48	1.00	0.14	-0.47	3.43
Professional, scientific and technical services	1.15	0.94	0.22	-0.69	2.99
Administrative and support services	0.07	0.85	0.93	-1.59	1.74
Public administration, education, health and social work	-0.07	0.84	0.93	-1.72	1.58
Arts and other	0.05	0.86	0.95	-1.63	1.73
Region					
North West	-0.06	0.32	0.84	-0.70	0.57
Yorkshire and the Humber	0.41	0.32	0.21	-0.22	1.04
East Midlands	0.29	0.32	0.38	-0.35	0.92
West Midlands	-0.21	0.34	0.52	-0.87	0.44
East of England	0.43	0.35	0.22	-0.25	1.11
London	0.91	0.44	0.04	0.04	1.77
South East	0.71	0.35	0.04	0.02	1.39
South West	0.28	0.34	0.41	-0.38	0.95
Wales	0.16	0.33	0.63	-0.49	0.81
Scotland	0.06	0.35	0.87	-0.62	0.73
Year					
2011	-0.36	0.31	0.25	-0.96	0.25
2012	-0.67	0.34	0.05	-1.33	-0.01
2013	-0.51	0.34	0.14	-1.19	0.16
2014	-0.42	0.34	0.22	-1.08	0.24

2015	-0.46	0.37	0.22	-1.20	0.27
2016	-1.06	0.40	0.01	-1.85	-0.27
2017	-0.87	0.56	0.12	-1.96	0.22
2018	-0.99	0.64	0.12	-2.24	0.26
Median TTWA wage level	0.06	0.07	0.39	-0.08	0.20
Share of minimum wage workers in 2009	0.25	0.95	0.79	-1.61	2.12
Lagged bite of the minimum wage at the national level	0.10	0.09	0.26	-0.07	0.28
Share of min wage workers# Lagged national bite	-0.01	0.02	0.68	-0.04	0.03
Constant	-3.50	5.12	0.49	-13.54	6.53
Transitions to NONEMPLOYMENT					
Time in min wage job	-0.04	0.03	0.22	-0.10	0.02
female	-0.27	0.16	0.10	-0.59	0.05
Age	-0.10	0.07	0.14	-0.23	0.03
Age square	0.00	0.00	0.17	0.00	0.00
Education					
Other higher degree	-0.28	0.32	0.39	-0.91	0.36
A-level etc	-0.43	0.28	0.12	-0.97	0.11
GCSE etc	-0.91	0.27	0.00	-1.44	-0.38
Other qualification	-0.51	0.29	0.08	-1.07	0.05
No qualification	-0.77	0.30	0.01	-1.35	-0.19
Has child under 5	-0.03	0.23	0.90	-0.47	0.41
Number of children					
1	0.49	0.21	0.02	0.08	0.90
2	0.42	0.22	0.06	-0.02	0.86
3	0.75	0.27	0.01	0.23	1.27
Self-reported health status	0.34	0.15	0.02	0.05	0.64
Ethnic Minority (0/1)	0.13	0.27	0.63	-0.41	0.67
Immigrant (0/1)	0.13	0.28	0.65	-0.42	0.67
Has previous unemployment spell (0/1)	1.99	0.15	0.00	1.69	2.30
Firm size (logged)	-0.09	0.04	0.02	-0.17	-0.02
Public sector	0.18	0.28	0.51	-0.37	0.73
Temporary contract	0.81	0.22	0.00	0.38	1.23
Part-time work	-0.24	0.16	0.13	-0.55	0.07
Industry					
Manufacturing-food, beverages, textile	13.87	940.80	0.99	-1830.07	1857.80
Manufacturing-basic industrial	14.11	940.80	0.99	-1829.82	1858.05
Manufacturing-complex industrial	13.20	940.80	0.99	-1830.74	1857.13
Construction and gas, electricity and water services	14.85	940.80	0.99	-1829.09	1858.78
Wholesale and retail trade	13.90	940.80	0.99	-1830.03	1857.84

Transportation and storage	14.83	940.80	0.99	-1829.11	1858.76
Accommodation and food services	13.90	940.80	0.99	-1830.04	1857.83
Information and communication	17.03	940.80	0.99	-1826.91	1860.96
Finance and insurance and real-estate	13.97	940.80	0.99	-1829.96	1857.91
Professional, scientific and technical services	13.82	940.80	0.99	-1830.12	1857.75
Administrative and support services	14.02	940.80	0.99	-1829.92	1857.95
Public administration, education, health and social work	13.63	940.80	0.99	-1830.30	1857.57
Arts and other	14.00	940.80	0.99	-1829.94	1857.93
Region					
North West	0.37	0.37	0.32	-0.36	1.11
Yorkshire and the Humber	0.71	0.38	0.06	-0.04	1.46
East Midlands	0.09	0.40	0.81	-0.68	0.87
West Midlands	0.52	0.39	0.18	-0.24	1.28
East of England	0.33	0.42	0.43	-0.50	1.16
London	0.29	0.54	0.60	-0.78	1.36
South East	-0.03	0.47	0.95	-0.95	0.89
South West	0.11	0.42	0.79	-0.71	0.93
Wales	0.10	0.41	0.81	-0.70	0.90
Scotland	0.30	0.41	0.47	-0.51	1.11
Year					
2011	0.26	0.35	0.45	-0.42	0.94
2012	-0.50	0.38	0.20	-1.25	0.26
2013	-0.81	0.41	0.05	-1.61	-0.01
2014	-1.11	0.41	0.01	-1.91	-0.31
2015	-1.44	0.46	0.00	-2.33	-0.54
2016	-2.11	0.50	0.00	-3.09	-1.13
2017	-2.84	0.73	0.00	-4.27	-1.41
2018	-2.27	0.81	0.01	-3.84	-0.69
Median TTWA wage level	-0.02	0.09	0.82	-0.20	0.16
Share of minimum wage workers in 2009	1.04	1.08	0.34	-1.09	3.16
Lagged bite of the minimum wage at the national level	0.34	0.11	0.00	0.12	0.57
Share of min wage workers# Lagged national bite	-0.02	0.02	0.28	-0.06	0.02
Constant	-31.04	940.82	0.97	-1875.01	1812.94
N=3711					

Source: UKHLS, Waves 1-9

Table A6: Coefficients from a model of log hourly wage growth using the lagged area share of minimum wage workers and not controlling for area wage level (model corresponding to Model 1 Table 1)

	Coefficient	SE	p-values	95% CI	
Female	-0.03	0.01	0.00	-0.04	-0.01
Age	0.00	0.00	0.27	-0.01	0.00
Age square	0.00	0.00	0.17	0.00	0.00
Education					
Other higher degree	-0.06	0.01	0.00	-0.09	-0.03
A-level etc	-0.08	0.01	0.00	-0.11	-0.05
GCSE etc	-0.10	0.01	0.00	-0.12	-0.07
Other qualification	-0.11	0.01	0.00	-0.14	-0.08
No qualification	-0.12	0.01	0.00	-0.15	-0.09
Has child under 5	-0.01	0.01	0.52	-0.03	0.01
Number of children					
1	0.01	0.01	0.32	-0.01	0.03
2	0.01	0.01	0.28	-0.01	0.03
3	0.02	0.01	0.09	0.00	0.05
Self-reported health status	-0.01	0.01	0.21	-0.02	0.00
Ethnic Minority (0/1)	-0.01	0.01	0.49	-0.03	0.02
Immigrant (0/1)	-0.02	0.01	0.12	-0.05	0.01
Has previous unemployment spell (0/1)	-0.03	0.01	0.00	-0.04	-0.01
Firm size (logged)	0.01	0.00	0.00	0.00	0.01
Public sector	0.05	0.01	0.00	0.03	0.07
Temporary contract	0.03	0.01	0.01	0.01	0.06
Part-time work	-0.04	0.01	0.00	-0.06	-0.03
Industry					
Manufacturing-food, beverages, textile	-0.06	0.04	0.18	-0.14	0.03
Manufacturing-basic industrial	-0.01	0.04	0.81	-0.10	0.08
Manufacturing-complex industrial	0.00	0.05	0.97	-0.09	0.09
Construction and gas, electricity and water services	0.11	0.05	0.05	0.00	0.21
Wholesale and retail trade	-0.03	0.04	0.47	-0.11	0.05
Transportation and storage	-0.02	0.04	0.60	-0.11	0.06
Accommodation and food services	-0.04	0.04	0.31	-0.12	0.04
Information and communication	0.22	0.07	0.00	0.09	0.34
Finance and insurance and real-estate	0.15	0.05	0.00	0.05	0.26
Professional, scientific and technical services	0.14	0.05	0.01	0.04	0.24
Administrative and support services	-0.02	0.04	0.60	-0.10	0.06

Public administration, education, health and social work	-0.03	0.04	0.52	-0.11	0.05
Arts and other	-0.01	0.04	0.79	-0.09	0.07
Region					
North West	0.00	0.02	0.79	-0.03	0.03
Yorkshire and the Humber	0.01	0.02	0.66	-0.02	0.04
East Midlands	0.01	0.02	0.70	-0.03	0.04
West Midlands	-0.01	0.02	0.38	-0.05	0.02
East of England	0.02	0.02	0.31	-0.02	0.05
London	0.08	0.02	0.00	0.04	0.11
South East	0.04	0.02	0.04	0.00	0.07
South West	0.01	0.02	0.69	-0.03	0.04
Wales	-0.01	0.02	0.71	-0.04	0.03
Scotland	-0.01	0.02	0.71	-0.04	0.03
Year					
2011	-0.04	0.03	0.30	-0.10	0.03
2012	-0.06	0.04	0.10	-0.13	0.01
2013	-0.05	0.04	0.16	-0.13	0.02
2014	-0.07	0.03	0.04	-0.14	0.00
2015	-0.03	0.04	0.52	-0.10	0.05
2016	-0.02	0.04	0.56	-0.10	0.05
2017	-0.08	0.03	0.02	-0.15	-0.01
2018	-0.14	0.05	0.00	-0.23	-0.05
Lagged share of min wage workers	-0.01	0.01	0.18	-0.02	0.00
Lagged share of min wage workers# Year					
2011	0.00	0.01	0.67	-0.01	0.02
2012	0.01	0.01	0.49	-0.01	0.03
2013	0.01	0.01	0.45	-0.01	0.03
2014	0.01	0.01	0.46	-0.01	0.02
2015	0.00	0.01	0.94	-0.02	0.02
2016	0.01	0.01	0.52	-0.01	0.02
2017	0.01	0.01	0.20	-0.01	0.02
2018	0.01	0.01	0.19	-0.01	0.03
Constant	0.36	0.08	0.00	0.20	0.51
N= 3442					

Source: UKHLS, Waves 1-9

Table A7: Coefficients from a model of log hourly wage growth using the lagged area share of minimum wage workers and controlling for area wage level (model corresponding to Model 2 Table 1)

	Coefficient	SE	p-values	95% CI	
Female	-0.03	0.01	0.00	-0.04	-0.01
Age	0.00	0.00	0.27	-0.01	0.00
Age square	0.00	0.00	0.17	0.00	0.00
Education					
Other higher degree	-0.06	0.01	0.00	-0.09	-0.03
A-level etc	-0.08	0.01	0.00	-0.10	-0.05
GCSE etc	-0.10	0.01	0.00	-0.12	-0.07
Other qualification	-0.11	0.01	0.00	-0.14	-0.08
No qualification	-0.12	0.01	0.00	-0.15	-0.09
Has child under 5	-0.01	0.01	0.58	-0.03	0.01
Number of children					
1	0.01	0.01	0.33	-0.01	0.03
2	0.01	0.01	0.30	-0.01	0.03
3	0.02	0.01	0.10	0.00	0.05
Self-reported health status	-0.01	0.01	0.20	-0.02	0.00
Ethnic Minority (0/1)	-0.01	0.01	0.41	-0.04	0.01
Immigrant (0/1)	-0.02	0.01	0.13	-0.05	0.01
Has previous unemployment spell (0/1)	-0.03	0.01	0.00	-0.04	-0.02
Firm size (logged)	0.01	0.00	0.00	0.00	0.01
Public sector	0.05	0.01	0.00	0.03	0.07
Temporary contract	0.03	0.01	0.01	0.01	0.06
Part-time work	-0.04	0.01	0.00	-0.06	-0.03
Industry					
Manufacturing-food, beverages, textile	-0.06	0.04	0.17	-0.14	0.02
Manufacturing-basic industrial	-0.01	0.04	0.81	-0.10	0.08
Manufacturing-complex industrial	0.00	0.05	0.99	-0.09	0.09
Construction and gas, electricity and water services	0.11	0.05	0.05	0.00	0.21
Wholesale and retail trade	-0.03	0.04	0.43	-0.11	0.05
Transportation and storage	-0.02	0.04	0.57	-0.11	0.06
Accommodation and food services	-0.04	0.04	0.28	-0.12	0.04
Information and communication	0.22	0.07	0.00	0.09	0.34
Finance and insurance and real-estate	0.15	0.05	0.00	0.05	0.26
Professional, scientific and technical services	0.14	0.05	0.01	0.04	0.24
Administrative and support services	-0.02	0.04	0.55	-0.10	0.06

Public administration, education, health and social work	-0.03	0.04	0.49	-0.11	0.05
Arts and other	-0.52	0.51	0.30	-1.51	0.47
Region					
North West	0.00	0.02	0.82	-0.03	0.03
Yorkshire and the Humber	0.01	0.02	0.63	-0.02	0.04
East Midlands	0.01	0.02	0.72	-0.03	0.04
West Midlands	-0.01	0.02	0.36	-0.05	0.02
East of England	0.02	0.02	0.39	-0.02	0.05
London	0.05	0.02	0.02	0.01	0.10
South East	0.03	0.02	0.09	-0.01	0.07
South West	0.01	0.02	0.65	-0.03	0.04
Wales	-0.01	0.02	0.76	-0.04	0.03
Scotland	-0.01	0.02	0.68	-0.04	0.03
Year					
2011	-0.03	0.03	0.34	-0.10	0.04
2012	-0.05	0.04	0.13	-0.13	0.02
2013	-0.05	0.04	0.19	-0.13	0.03
2014	-0.06	0.03	0.06	-0.13	0.00
2015	-0.02	0.04	0.55	-0.10	0.05
2016	-0.02	0.04	0.53	-0.10	0.05
2017	-0.08	0.03	0.02	-0.15	-0.01
2018	-0.14	0.05	0.00	-0.23	-0.05
Lagged share of min wage workers	-0.01	0.01	0.30	-0.02	0.01
Lagged share of min wage workers# Year					
2011	0.00	0.01	0.66	-0.01	0.02
2012	0.01	0.01	0.48	-0.01	0.03
2013	0.01	0.01	0.43	-0.01	0.03
2014	0.01	0.01	0.50	-0.01	0.02
2015	0.00	0.01	0.96	-0.02	0.02
2016	0.01	0.01	0.50	-0.01	0.02
2017	0.01	0.01	0.22	-0.01	0.02
2018	0.01	0.01	0.21	-0.01	0.03
Median TTWA wage level	0.01	0.00	0.08	0.00	0.01
Constant	0.27	0.09	0.00	0.09	0.45
N= 3442					

Source: UKHLS, Wave 1-9

Table A8: Coefficients from a model of log hourly wage growth using the area share of minimum wage workers in 2009 and year specific effects and controlling for area wage level (model corresponding to Model 3 Table 1)

	Coefficient	SE	p-values	95% CI	
Female	-0.04	0.01	0.00	-0.05	-0.02
Age	0.00	0.00	0.19	-0.01	0.00
Age square	0.00	0.00	0.18	0.00	0.00
Education					
Other higher degree	-0.07	0.02	0.00	-0.11	-0.03
A-level etc	-0.08	0.02	0.00	-0.11	-0.04
GCSE etc	-0.10	0.02	0.00	-0.14	-0.07
Other qualification	-0.11	0.02	0.00	-0.15	-0.08
No qualification	-0.13	0.02	0.00	-0.16	-0.09
Has child under 5	0.00	0.01	0.96	-0.03	0.02
Number of children					
1	0.01	0.01	0.51	-0.01	0.03
2	0.00	0.01	0.84	-0.03	0.02
3	0.02	0.02	0.25	-0.01	0.05
Self-reported health status	-0.01	0.01	0.11	-0.03	0.00
Ethnic Minority (0/1)	0.00	0.02	0.98	-0.04	0.04
Immigrant (0/1)	-0.02	0.02	0.24	-0.06	0.02
Has previous unemployment spell (0/1)	-0.02	0.01	0.01	-0.04	-0.01
Firm size (logged)	0.01	0.00	0.00	0.01	0.01
Public sector	0.08	0.01	0.00	0.05	0.10
Temporary contract	0.02	0.02	0.30	-0.01	0.05
Part-time work	-0.04	0.01	0.00	-0.06	-0.02
Industry					
Manufacturing-food, beverages, textile	-0.07	0.06	0.25	-0.18	0.05
Manufacturing-basic industrial	0.02	0.06	0.77	-0.09	0.13
Manufacturing-complex industrial	0.02	0.06	0.70	-0.09	0.14
Construction and gas, electricity and water services	0.20	0.07	0.00	0.07	0.34
Wholesale and retail trade	-0.03	0.05	0.61	-0.13	0.08
Transportation and storage	-0.02	0.06	0.76	-0.13	0.09
Accommodation and food services	-0.05	0.05	0.37	-0.15	0.06
Information and communication	0.29	0.09	0.00	0.11	0.47
Finance and insurance and real-estate	0.19	0.07	0.01	0.05	0.34
Professional, scientific and technical services	0.19	0.06	0.00	0.07	0.31
Administrative and support services	-0.02	0.05	0.70	-0.12	0.08

Public administration, education, health and social work	-0.02	0.05	0.65	-0.13	0.08
Arts and other	0.00	0.05	0.97	-0.10	0.11
Region					
North West	0.00	0.02	0.97	-0.04	0.04
Yorkshire and the Humber	-0.01	0.02	0.75	-0.04	0.03
East Midlands	0.01	0.02	0.78	-0.03	0.04
West Midlands	-0.02	0.02	0.24	-0.06	0.02
East of England	0.01	0.02	0.72	-0.03	0.05
London	0.09	0.03	0.00	0.03	0.14
South East	0.02	0.02	0.24	-0.02	0.07
South West	-0.01	0.02	0.52	-0.05	0.03
Wales	0.00	0.02	0.91	-0.04	0.04
Scotland	-0.02	0.02	0.30	-0.06	0.02
Year					
2011	-0.03	0.04	0.36	-0.11	0.04
2012	-0.03	0.04	0.49	-0.10	0.05
2013	0.02	0.04	0.65	-0.06	0.10
2014	-0.06	0.04	0.09	-0.13	0.01
2015	-0.02	0.04	0.61	-0.09	0.05
2016	-0.02	0.04	0.59	-0.10	0.06
2017	-0.07	0.04	0.08	-0.14	0.01
2018	-0.12	0.05	0.01	-0.21	-0.03
Share of min wage workers in 2009	-0.01	0.01	0.31	-0.02	0.01
Share of min wage workers in 2009 # Year					
2011	0.00	0.01	0.70	-0.02	0.02
2012	0.00	0.01	0.86	-0.02	0.02
2013	-0.01	0.01	0.34	-0.03	0.01
2014	0.00	0.01	0.70	-0.02	0.02
2015	0.00	0.01	0.76	-0.02	0.02
2016	0.00	0.01	0.73	-0.02	0.02
2017	0.01	0.01	0.52	-0.01	0.03
2018	0.01	0.01	0.56	-0.02	0.03
Median TTWA wage level	0.00	0.00	0.72	-0.01	0.01
Constant	0.38	0.11	0.00	0.16	0.59
N= 2391					

Source: UKHLS, Waves 1-9

Table A9: Coefficients from a model of log hourly wage growth using the area share of minimum wage workers in 2009 interacted with the lag of the minimum wage at the national level (model corresponding to Table 1, Model 4)

	Coefficient	SE	p-values	95% CI	
Female	-0.04	0.01	0.00	-0.05	-0.02
Age	0.00	0.00	0.19	-0.01	0.00
Age square	0.00	0.00	0.19	0.00	0.00
Education					
Other higher degree	-0.07	0.02	0.00	-0.11	-0.03
A-level etc	-0.08	0.02	0.00	-0.11	-0.04
GCSE etc	-0.11	0.02	0.00	-0.14	-0.07
Other qualification	-0.11	0.02	0.00	-0.15	-0.08
No qualification	-0.13	0.02	0.00	-0.16	-0.10
Has child under 5	0.00	0.01	0.86	-0.03	0.02
Number of children					
1.00	0.01	0.01	0.53	-0.01	0.03
2.00	0.00	0.01	0.79	-0.03	0.02
3.00	0.02	0.02	0.30	-0.01	0.05
Self-reported health status	-0.01	0.01	0.09	-0.03	0.00
Ethnic Minority (0/1)	0.00	0.02	0.85	-0.04	0.04
Immigrant (0/1)	-0.02	0.02	0.22	-0.06	0.01
Has previous unemployment spell (0/1)	-0.03	0.01	0.01	-0.04	-0.01
Firm size (logged)	0.01	0.00	0.00	0.01	0.01
Public sector	0.08	0.01	0.00	0.05	0.10
Temporary contract	0.02	0.02	0.26	-0.01	0.05
Part-time work	-0.04	0.01	0.00	-0.06	-0.02
Industry					
Manufacturing-food, beverages, textile	-0.07	0.06	0.24	-0.18	0.04
Manufacturing-basic industrial	0.01	0.06	0.81	-0.10	0.12
Manufacturing-complex industrial	0.02	0.06	0.70	-0.09	0.14
Construction and gas, electricity and water services	0.21	0.07	0.00	0.08	0.35
Wholesale and retail trade	-0.03	0.05	0.61	-0.13	0.08
Transportation and storage	-0.02	0.06	0.69	-0.13	0.09
Accommodation and food services	-0.05	0.05	0.36	-0.15	0.05
Information and communication	0.29	0.09	0.00	0.11	0.48
Finance and insurance and real-estate	0.19	0.07	0.01	0.05	0.34
Professional, scientific and technical services	0.19	0.06	0.00	0.07	0.31
Administrative and support services	-0.02	0.05	0.70	-0.12	0.08

Public administration, education, health and social work	-0.02	0.05	0.65	-0.13	0.08
Arts and other	0.00	0.05	0.99	-0.10	0.11
Region					
North West	0.00	0.02	0.95	-0.04	0.04
Yorkshire and the Humber	-0.01	0.02	0.76	-0.04	0.03
East Midlands	0.01	0.02	0.73	-0.03	0.05
West Midlands	-0.02	0.02	0.22	-0.06	0.01
East of England	0.01	0.02	0.69	-0.03	0.05
London	0.09	0.02	0.00	0.05	0.14
South East	0.03	0.02	0.16	-0.01	0.07
South West	-0.01	0.02	0.60	-0.05	0.03
Wales	0.00	0.02	0.90	-0.04	0.04
Scotland	-0.02	0.02	0.36	-0.06	0.02
Year					
2011	-0.02	0.02	0.27	-0.05	0.01
2012	-0.01	0.02	0.51	-0.05	0.02
2013	0.01	0.02	0.58	-0.03	0.05
2014	-0.03	0.02	0.16	-0.06	0.01
2015	0.01	0.02	0.73	-0.04	0.05
2016	0.04	0.02	0.11	-0.01	0.09
2017	0.04	0.04	0.22	-0.03	0.11
2018	0.01	0.04	0.74	-0.07	0.10
Share of minimum wage workers in 2009	-0.03	0.06	0.59	-0.14	0.08
Lagged bite of the minimum wage at the national level	-0.02	0.01	0.01	-0.03	-0.00
Share of min wage workers# Lagged national bite	0.00	0.00	0.67	0.00	0.00
Constant	1.20	0.33	0.00	0.56	1.84
N=2391					

Source: UKHLS, Waves 1-9

Table A10: Coefficients from a model of log hourly wage growth using the area share of minimum wage workers in 2009 interacted with the lag of the minimum wage at the national level, and controlling for the area median wage level (model corresponding to Table 1, Model 5)

	Coefficient	SE	p-values	95% CI	
Female	-0.04	0.01	0.00	-0.05	-0.02
Age	0.00	0.00	0.19	-0.01	0.00
Age square	0.00	0.00	0.18	0.00	0.00
Education					
Other higher degree	-0.07	0.02	0.00	-0.11	-0.03
A-level etc	-0.08	0.02	0.00	-0.11	-0.04
GCSE etc	-0.10	0.02	0.00	-0.14	-0.07
Other qualification	-0.11	0.02	0.00	-0.15	-0.08
No qualification	-0.13	0.02	0.00	-0.16	-0.10
Has child under 5	0.00	0.01	0.87	-0.03	0.02
Number of children					
1.00	0.01	0.01	0.53	-0.01	0.03
2.00	0.00	0.01	0.79	-0.03	0.02
3.00	0.02	0.02	0.30	-0.01	0.05
Self-reported health status	-0.01	0.01	0.09	-0.03	0.00
Ethnic Minority (0/1)	0.00	0.02	0.86	-0.04	0.04
Immigrant (0/1)	-0.02	0.02	0.22	-0.06	0.01
Has previous unemployment spell (0/1)	-0.03	0.01	0.01	-0.04	-0.01
Firm size (logged)	0.01	0.00	0.00	0.01	0.01
Public sector	0.08	0.01	0.00	0.05	0.10
Temporary contract	0.02	0.02	0.26	-0.01	0.05
Part-time work	-0.04	0.01	0.00	-0.06	-0.02
Industry					
Manufacturing-food, beverages, textile	-0.07	0.06	0.23	-0.18	0.04
Manufacturing-basic industrial	0.01	0.06	0.82	-0.10	0.12
Manufacturing-complex industrial	0.02	0.06	0.71	-0.09	0.14
Construction and gas, electricity and water services	0.21	0.07	0.00	0.08	0.35
Wholesale and retail trade	-0.03	0.05	0.60	-0.13	0.07
Transportation and storage	-0.02	0.06	0.68	-0.13	0.09
Accommodation and food services	-0.05	0.05	0.35	-0.15	0.05
Information and communication	0.29	0.09	0.00	0.11	0.47
Finance and insurance and real-estate	0.19	0.07	0.01	0.05	0.34
Professional, scientific and technical services	0.19	0.06	0.00	0.07	0.31
Administrative and support services	-0.02	0.05	0.69	-0.13	0.08

Public administration, education, health and social work	-0.02	0.05	0.65	-0.13	0.08
Arts and other	0.00	0.05	1.00	-0.11	0.11
Region					
North West	0.00	0.02	0.96	-0.04	0.04
Yorkshire and the Humber	-0.01	0.02	0.77	-0.04	0.03
East Midlands	0.01	0.02	0.73	-0.03	0.05
West Midlands	-0.02	0.02	0.22	-0.06	0.01
East of England	0.01	0.02	0.70	-0.03	0.05
London	0.09	0.03	0.00	0.03	0.14
South East	0.03	0.02	0.18	-0.01	0.07
South West	-0.01	0.02	0.60	-0.05	0.03
Wales	0.00	0.02	0.90	-0.04	0.04
Scotland	-0.02	0.02	0.36	-0.06	0.02
Year					
2011	-0.02	0.02	0.29	-0.05	0.02
2012	-0.01	0.02	0.54	-0.05	0.02
2013	0.01	0.02	0.56	-0.03	0.05
2014	-0.03	0.02	0.18	-0.06	0.01
2015	0.01	0.02	0.71	-0.04	0.05
2016	0.04	0.02	0.11	-0.01	0.09
2017	0.04	0.04	0.22	-0.03	0.11
2018	0.01	0.04	0.73	-0.07	0.10
Median TTWA wage level	0.00	0.00	0.82	-0.01	0.01
Share of minimum wage workers in 2009	-0.03	0.06	0.58	-0.14	0.08
Lagged bite of the minimum wage at the national level	-0.02	0.01	0.01	-0.03	-0.00
Share of min wage workers# Lagged national bite	0.00	0.00	0.66	0.00	0.00
Constant	1.19	0.33	0.00	0.54	1.84
N=2391					

Source: UKHLS, Waves 1-9

Table A11: Coefficients from a model of ihs hourly wage growth using the lagged area share of minimum wage workers and not controlling for area wage level (model corresponding to Model 1 Table 2)

	Coefficient	SE	p-values	95% CI	
Female	0.00	0.03	1.00	-0.06	0.06
Age	0.01	0.01	0.58	-0.02	0.03
Age square	0.00	0.00	0.68	0.00	0.00
Education					
Other higher degree	-0.01	0.05	0.89	-0.11	0.10
A-level etc	-0.04	0.05	0.39	-0.13	0.05
GCSE etc	0.00	0.05	0.92	-0.09	0.08
Other qualification	-0.07	0.05	0.16	-0.17	0.03
No qualification	-0.07	0.05	0.15	-0.17	0.03
Has child under 5	-0.01	0.04	0.89	-0.08	0.07
Number of children					
1	-0.04	0.03	0.19	-0.11	0.02
2	-0.05	0.04	0.17	-0.12	0.02
3	-0.09	0.05	0.06	-0.18	0.00
Self-reported health status	-0.08	0.03	0.00	-0.13	-0.03
Ethnic Minority (0/1)	-0.04	0.05	0.42	-0.13	0.05
Immigrant (0/1)	-0.04	0.05	0.40	-0.13	0.05
Has previous unemployment spell (0/1)	-0.46	0.03	0.00	-0.51	-0.41
Firm size (logged)	0.03	0.01	0.00	0.02	0.04
Public sector	0.07	0.04	0.08	-0.01	0.15
Temporary contract	-0.13	0.04	0.00	-0.21	-0.04
Part-time work	-0.05	0.03	0.07	-0.10	0.00
Industry					
Manufacturing-food, beverages, textile	-0.25	0.16	0.13	-0.57	0.07
Manufacturing-basic industrial	-0.16	0.17	0.36	-0.49	0.18
Manufacturing-complex industrial	-0.05	0.18	0.80	-0.40	0.31
Construction and gas, electricity and water services	-0.07	0.21	0.75	-0.47	0.34
Wholesale and retail trade	-0.17	0.16	0.26	-0.48	0.13
Transportation and storage	-0.32	0.16	0.05	-0.64	0.00
Accommodation and food services	-0.17	0.16	0.27	-0.48	0.13
Information and communication	-0.31	0.24	0.19	-0.78	0.15
Finance and insurance and real-estate	0.05	0.20	0.79	-0.34	0.45
Professional, scientific and technical services	0.01	0.20	0.96	-0.37	0.39
Administrative and support services	-0.17	0.16	0.27	-0.48	0.14

Public administration, education, health and social work	-0.14	0.16	0.37	-0.45	0.17
Arts and other	-0.16	0.16	0.33	-0.47	0.16
Region					
North West	-0.05	0.06	0.35	-0.17	0.06
Yorkshire and the Humber	-0.07	0.06	0.26	-0.18	0.05
East Midlands	0.01	0.06	0.90	-0.11	0.12
West Midlands	-0.10	0.06	0.11	-0.21	0.02
East of England	-0.01	0.06	0.87	-0.14	0.12
London	0.06	0.07	0.41	-0.08	0.19
South East	0.03	0.07	0.61	-0.10	0.17
South West	0.00	0.06	0.94	-0.13	0.12
Wales	0.00	0.06	0.94	-0.12	0.11
Scotland	-0.07	0.06	0.27	-0.20	0.06
Year					
2011	-0.20	0.13	0.12	-0.46	0.05
2012	-0.12	0.14	0.37	-0.39	0.15
2013	0.08	0.14	0.59	-0.21	0.36
2014	0.01	0.13	0.92	-0.24	0.27
2015	-0.03	0.15	0.85	-0.32	0.26
2016	0.05	0.14	0.71	-0.23	0.33
2017	0.05	0.13	0.70	-0.21	0.31
2018	-0.37	0.17	0.03	-0.70	-0.03
Lagged share of min wage workers	-0.01	0.03	0.73	-0.06	0.04
Lagged share of min wage workers# Year					
2011	0.03	0.03	0.43	-0.04	0.10
2012	0.02	0.04	0.65	-0.05	0.09
2013	-0.03	0.04	0.38	-0.10	0.04
2014	0.00	0.03	1.00	-0.06	0.06
2015	0.01	0.04	0.72	-0.06	0.08
2016	0.01	0.03	0.78	-0.06	0.07
2017	0.00	0.03	0.91	-0.05	0.06
2018	0.03	0.03	0.29	-0.03	0.10
Constant	0.16	0.30	0.58	-0.42	0.75
N= 3733					

Source: UKHLS, Waves 1-9

Table A12: Coefficients from a model of ihs hourly wage growth using the lagged area share of minimum wage workers and controlling for area wage level (model corresponding to Model 2 Table 1)

	Coefficient	SE	p-values	95% CI	
Female	0.00	0.03	1.00	-0.05	0.06
Age	0.01	0.01	0.58	-0.02	0.03
Age square	0.00	0.00	0.68	0.00	0.00
Education					
Other higher degree	-0.01	0.05	0.90	-0.11	0.10
A-level etc	-0.04	0.05	0.40	-0.13	0.05
GCSE etc	0.00	0.05	0.93	-0.09	0.08
Other qualification	-0.07	0.05	0.16	-0.17	0.03
No qualification	-0.07	0.05	0.15	-0.17	0.03
Has child under 5	0.00	0.04	0.90	-0.08	0.07
Number of children					
1	-0.04	0.03	0.19	-0.11	0.02
2	-0.05	0.04	0.17	-0.12	0.02
3	-0.09	0.05	0.06	-0.18	0.00
Self-reported health status	-0.08	0.03	0.00	-0.13	-0.03
Ethnic Minority (0/1)	-0.04	0.05	0.41	-0.13	0.05
Immigrant (0/1)	-0.04	0.05	0.40	-0.13	0.05
Has previous unemployment spell (0/1)	-0.46	0.03	0.00	-0.51	-0.41
Firm size (logged)	0.03	0.01	0.00	0.02	0.04
Public sector	0.07	0.04	0.08	-0.01	0.15
Temporary contract	-0.13	0.04	0.00	-0.21	-0.04
Part-time work	-0.05	0.03	0.07	-0.10	0.00
Industry					
Manufacturing-food, beverages, textile	-0.25	0.16	0.13	-0.57	0.07
Manufacturing-basic industrial	-0.16	0.17	0.36	-0.49	0.18
Manufacturing-complex industrial	-0.05	0.18	0.80	-0.40	0.31
Construction and gas, electricity and water services	-0.07	0.21	0.74	-0.47	0.33
Wholesale and retail trade	-0.18	0.16	0.26	-0.48	0.13
Transportation and storage	-0.32	0.16	0.05	-0.65	0.00
Accommodation and food services	-0.17	0.16	0.27	-0.48	0.13
Information and communication	-0.31	0.24	0.19	-0.78	0.15
Finance and insurance and real-estate	0.05	0.20	0.79	-0.34	0.45
Professional, scientific and technical services	0.01	0.20	0.96	-0.37	0.39
Administrative and support services	-0.17	0.16	0.27	-0.48	0.14

Public administration, education, health and social work	-0.14	0.16	0.37	-0.45	0.17
Arts and other	-0.16	0.16	0.33	-0.47	0.16
Region					
North West	-0.05	0.06	0.35	-0.17	0.06
Yorkshire and the Humber	-0.07	0.06	0.27	-0.18	0.05
East Midlands	0.01	0.06	0.90	-0.11	0.12
West Midlands	-0.10	0.06	0.11	-0.21	0.02
East of England	-0.01	0.07	0.85	-0.14	0.12
London	0.04	0.09	0.65	-0.13	0.21
South East	0.03	0.07	0.66	-0.10	0.16
South West	0.00	0.06	0.95	-0.13	0.12
Wales	0.00	0.06	0.94	-0.12	0.12
Scotland	-0.07	0.06	0.27	-0.20	0.05
Year					
2011	-0.20	0.13	0.12	-0.46	0.05
2012	-0.12	0.14	0.39	-0.38	0.15
2013	0.08	0.14	0.59	-0.21	0.36
2014	0.02	0.13	0.89	-0.24	0.28
2015	-0.03	0.15	0.85	-0.32	0.26
2016	0.05	0.14	0.71	-0.23	0.33
2017	0.05	0.13	0.70	-0.21	0.31
2018	-0.37	0.17	0.03	-0.71	-0.03
Lagged share of min wage workers	-0.01	0.03	0.77	-0.06	0.05
Lagged share of min wage workers# Year					
2011	0.03	0.03	0.43	-0.04	0.10
2012	0.02	0.04	0.65	-0.05	0.09
2013	-0.03	0.04	0.38	-0.10	0.04
2014	0.00	0.03	1.00	-0.06	0.06
2015	0.01	0.04	0.72	-0.06	0.08
2016	0.01	0.03	0.77	-0.06	0.07
2017	0.00	0.03	0.92	-0.05	0.06
2018	0.03	0.03	0.29	-0.03	0.10
Median TTWA wage level	0.00	0.01	0.77	-0.02	0.03
Constant	0.11	0.35	0.75	-0.58	0.80
N= 3733					

Source: UKHLS, Wave 1-9

Table A13: Coefficients from a model of ihs hourly wage growth using the area share of minimum wage workers in 2009 and year specific effects and controlling for area wage level (model corresponding to Model 3 Table 2)

	Coefficient	SE	p-values	95% CI	
Female	0.03	0.04	0.34	-0.04	0.11
Age	0.00	0.01	0.73	-0.02	0.03
Age square	0.00	0.00	0.79	0.00	0.00
Education					
Other higher degree	0.02	0.07	0.74	-0.11	0.16
A-level etc	-0.03	0.06	0.65	-0.15	0.10
GCSE etc	0.00	0.06	0.98	-0.12	0.12
Other qualification	-0.02	0.07	0.71	-0.15	0.10
No qualification	-0.05	0.07	0.44	-0.18	0.08
Has child under 5	0.00	0.05	0.94	-0.10	0.09
Number of children					
1	0.02	0.04	0.64	-0.06	0.10
2	0.00	0.05	0.98	-0.09	0.09
3	0.02	0.06	0.73	-0.10	0.14
Self-reported health status	-0.11	0.03	0.00	-0.17	-0.05
Ethnic Minority (0/1)	0.04	0.07	0.57	-0.10	0.19
Immigrant (0/1)	-0.10	0.07	0.18	-0.25	0.05
Has previous unemployment spell (0/1)	-0.47	0.03	0.00	-0.53	-0.41
Firm size (logged)	0.04	0.01	0.00	0.02	0.05
Public sector	0.09	0.05	0.07	-0.01	0.19
Temporary contract	-0.17	0.05	0.00	-0.28	-0.06
Part-time work	-0.06	0.03	0.06	-0.13	0.00
Industry					
Manufacturing-food, beverages, textile	-0.44	0.22	0.05	-0.88	-0.01
Manufacturing-basic industrial	-0.13	0.22	0.56	-0.56	0.30
Manufacturing-complex industrial	-0.09	0.23	0.68	-0.55	0.36
Construction and gas, electricity and water services	-0.20	0.27	0.45	-0.72	0.32
Wholesale and retail trade	-0.22	0.21	0.29	-0.62	0.19
Transportation and storage	-0.41	0.22	0.06	-0.83	0.02
Accommodation and food services	-0.26	0.21	0.21	-0.66	0.15
Information and communication	-0.60	0.32	0.06	-1.23	0.03
Finance and insurance and real-estate	0.14	0.28	0.62	-0.41	0.70
Professional, scientific and technical services	-0.07	0.24	0.77	-0.55	0.41
Administrative and support services	-0.27	0.21	0.19	-0.68	0.14

Public administration, education, health and social work	-0.19	0.21	0.37	-0.59	0.22
Arts and other	-0.22	0.21	0.29	-0.64	0.19
Region					
North West	-0.01	0.07	0.88	-0.15	0.13
Yorkshire and the Humber	-0.11	0.07	0.12	-0.25	0.03
East Midlands	0.02	0.08	0.77	-0.13	0.17
West Midlands	-0.06	0.07	0.40	-0.21	0.08
East of England	0.01	0.08	0.93	-0.15	0.16
London	0.16	0.11	0.13	-0.05	0.38
South East	0.08	0.08	0.30	-0.08	0.24
South West	-0.01	0.08	0.89	-0.16	0.14
Wales	0.13	0.08	0.09	-0.02	0.28
Scotland	-0.04	0.07	0.61	-0.19	0.11
Year					
2011	-0.28	0.14	0.05	-0.56	0.00
2012	-0.16	0.14	0.27	-0.44	0.12
2013	-0.09	0.15	0.55	-0.40	0.21
2014	0.01	0.14	0.93	-0.26	0.29
2015	-0.21	0.14	0.14	-0.49	0.07
2016	0.06	0.15	0.70	-0.23	0.35
2017	-0.06	0.14	0.66	-0.35	0.22
2018	-0.33	0.18	0.06	-0.67	0.02
Share of min wage workers in 2009	-0.02	0.03	0.47	-0.08	0.04
Share of min wage workers in 2009 # Year					
2011	0.05	0.04	0.22	-0.03	0.12
2012	0.02	0.04	0.64	-0.06	0.10
2013	-0.01	0.04	0.81	-0.10	0.07
2014	0.00	0.04	0.98	-0.07	0.07
2015	0.07	0.04	0.09	-0.01	0.14
2016	0.01	0.04	0.88	-0.07	0.09
2017	0.03	0.04	0.42	-0.04	0.11
2018	0.07	0.05	0.18	-0.03	0.16
Median TTWA wage level	-0.01	0.02	0.66	-0.04	0.03
Constant	0.27	0.42	0.52	-0.55	1.09
N= 2607					

Source: UKHLS, Waves 1-9

Table A14: Coefficients from a model of ihs hourly wage growth using the area share of minimum wage workers in 2009 interacted with the lag of the minimum wage at the national level (model corresponding to Table 2, Model 4)

	Coefficient	SE	p-values	95% CI	
Female	0.04	0.04	0.31	-0.03	0.11
Age	0.00	0.01	0.78	-0.02	0.03
Age square	0.00	0.00	0.84	0.00	0.00
Education					
Other higher degree	0.03	0.07	0.68	-0.11	0.16
A-level etc	-0.02	0.06	0.71	-0.15	0.10
GCSE etc	0.00	0.06	0.94	-0.11	0.12
Other qualification	-0.02	0.07	0.78	-0.15	0.11
No qualification	-0.05	0.07	0.45	-0.18	0.08
Has child under 5	-0.01	0.05	0.82	-0.11	0.08
Number of children					
1	0.02	0.04	0.61	-0.06	0.10
2	0.00	0.05	0.92	-0.10	0.09
3	0.02	0.06	0.71	-0.10	0.14
Self-reported health status	-0.11	0.03	0.00	-0.17	-0.05
Ethnic Minority (0/1)	0.05	0.07	0.47	-0.09	0.20
Immigrant (0/1)	-0.11	0.07	0.15	-0.25	0.04
Has previous unemployment spell (0/1)	-0.47	0.03	0.00	-0.54	-0.41
Firm size (logged)	0.04	0.01	0.00	0.02	0.05
Public sector	0.09	0.05	0.08	-0.01	0.19
Temporary contract	-0.16	0.05	0.00	-0.26	-0.05
Part-time work	-0.06	0.03	0.07	-0.12	0.01
Industry					
Manufacturing-food, beverages, textile	-0.46	0.22	0.04	-0.89	-0.02
Manufacturing-basic industrial	-0.14	0.22	0.53	-0.57	0.29
Manufacturing-complex industrial	-0.12	0.23	0.60	-0.57	0.33
Construction and gas, electricity and water services	-0.18	0.26	0.50	-0.70	0.34
Wholesale and retail trade	-0.22	0.21	0.27	-0.63	0.18
Transportation and storage	-0.43	0.22	0.05	-0.85	0.00
Accommodation and food services	-0.27	0.21	0.19	-0.67	0.13
Information and communication	-0.61	0.32	0.06	-1.24	0.03
Finance and insurance and real-estate	0.14	0.28	0.62	-0.41	0.69
Professional, scientific and technical services	-0.08	0.24	0.74	-0.56	0.40
Administrative and support services	-0.28	0.21	0.17	-0.69	0.12

Public administration, education, health and social work	-0.19	0.21	0.35	-0.60	0.21
Arts and other	-0.24	0.21	0.27	-0.65	0.18
Region					
North West	0.00	0.07	0.97	-0.14	0.14
Yorkshire and the Humber	-0.11	0.07	0.14	-0.25	0.03
East Midlands	0.03	0.07	0.73	-0.12	0.17
West Midlands	-0.06	0.07	0.41	-0.21	0.08
East of England	0.01	0.08	0.90	-0.14	0.16
London	0.14	0.09	0.12	-0.04	0.31
South East	0.09	0.08	0.27	-0.07	0.24
South West	-0.01	0.08	0.94	-0.16	0.15
Wales	0.13	0.08	0.08	-0.02	0.29
Scotland	-0.03	0.07	0.67	-0.18	0.11
Year					
2011	-0.11	0.06	0.09	-0.23	0.02
2012	-0.02	0.07	0.82	-0.15	0.12
2013	-0.01	0.07	0.86	-0.16	0.13
2014	0.11	0.07	0.14	-0.04	0.25
2015	0.15	0.08	0.08	-0.01	0.31
2016	0.26	0.09	0.01	0.08	0.44
2017	0.37	0.13	0.01	0.11	0.64
2018	0.29	0.16	0.07	-0.02	0.60
Share of minimum wage workers in 2009	-0.17	0.21	0.44	-0.59	0.25
Lagged bite of the minimum wage at the national level	-0.06	0.02	0.01	-0.11	-0.02
Share of min wage workers# Lagged national bite	0.00	0.00	0.42	0.00	0.01
Constant	3.41	1.24	0.01	0.97	5.84
N=2607					

Source: UKHLS, Waves 1-9

Table A15: Coefficients from a model of ihs hourly wage growth using the area share of minimum wage workers in 2009 interacted with the lag of the minimum wage at the national level, and controlling for the area median wage level (model corresponding to Table 2, Model 5)

	Coefficient	SE	p-values	95% CI	
Female	0.04	0.04	0.31	-0.03	0.11
Age	0.00	0.01	0.77	-0.02	0.03
Age square	0.00	0.00	0.83	0.00	0.00
Education					
Other higher degree	0.03	0.07	0.70	-0.11	0.16
A-level etc	-0.02	0.06	0.70	-0.15	0.10
GCSE etc	0.00	0.06	0.96	-0.11	0.12
Other qualification	-0.02	0.07	0.77	-0.15	0.11
No qualification	-0.05	0.07	0.44	-0.18	0.08
Has child under 5	-0.01	0.05	0.80	-0.11	0.08
Number of children					
1	0.02	0.04	0.61	-0.06	0.10
2	0.00	0.05	0.92	-0.10	0.09
3	0.02	0.06	0.71	-0.10	0.14
Self-reported health status	-0.11	0.03	0.00	-0.17	-0.05
Ethnic Minority (0/1)	0.06	0.07	0.45	-0.09	0.20
Immigrant (0/1)	-0.11	0.07	0.15	-0.26	0.04
Has previous unemployment spell (0/1)	-0.47	0.03	0.00	-0.54	-0.41
Firm size (logged)	0.04	0.01	0.00	0.02	0.05
Public sector	0.09	0.05	0.08	-0.01	0.19
Temporary contract	-0.16	0.05	0.00	-0.26	-0.05
Part-time work	-0.06	0.03	0.07	-0.12	0.01
Industry					
Manufacturing-food, beverages, textile	-0.45	0.22	0.04	-0.89	-0.02
Manufacturing-basic industrial	-0.14	0.22	0.54	-0.57	0.30
Manufacturing-complex industrial	-0.12	0.23	0.62	-0.57	0.34
Construction and gas, electricity and water services	-0.17	0.27	0.51	-0.69	0.35
Wholesale and retail trade	-0.22	0.21	0.28	-0.62	0.18
Transportation and storage	-0.42	0.22	0.05	-0.85	0.00
Accommodation and food services	-0.27	0.21	0.20	-0.67	0.14
Information and communication	-0.60	0.32	0.06	-1.23	0.03
Finance and insurance and real-estate	0.14	0.28	0.61	-0.41	0.70
Professional, scientific and technical services	-0.08	0.24	0.74	-0.56	0.40
Administrative and support services	-0.28	0.21	0.18	-0.69	0.13

Public administration, education, health and social work	-0.19	0.21	0.36	-0.59	0.22
Arts and other	-0.23	0.21	0.28	-0.65	0.19
Region					
North West	0.00	0.07	0.97	-0.14	0.14
Yorkshire and the Humber	-0.11	0.07	0.13	-0.25	0.03
East Midlands	0.03	0.07	0.73	-0.12	0.17
West Midlands	-0.06	0.07	0.41	-0.21	0.08
East of England	0.01	0.08	0.87	-0.14	0.17
London	0.16	0.11	0.13	-0.05	0.38
South East	0.10	0.08	0.24	-0.06	0.26
South West	-0.01	0.08	0.93	-0.16	0.15
Wales	0.13	0.08	0.08	-0.02	0.29
Scotland	-0.03	0.07	0.68	-0.18	0.12
Year					
2011	-0.11	0.06	0.08	-0.24	0.01
2012	-0.02	0.07	0.77	-0.16	0.12
2013	-0.02	0.08	0.80	-0.17	0.13
2014	0.10	0.07	0.17	-0.04	0.24
2015	0.14	0.08	0.09	-0.02	0.31
2016	0.26	0.09	0.01	0.08	0.44
2017	0.37	0.13	0.01	0.11	0.63
2018	0.29	0.16	0.07	-0.02	0.59
Median TTWA wage level	-0.01	0.02	0.66	-0.04	0.03
Share of minimum wage workers in 2009	-0.16	0.22	0.46	-0.58	0.26
Lagged bite of the minimum wage at the national level	-0.06	0.02	0.01	-0.11	-0.02
Share of min wage workers# Lagged national bite	0.00	0.00	0.45	0.00	0.01
Constant	3.48	1.25	0.01	1.02	5.94
N=2607					

Source: UKHLS, Waves 1-9

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