

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

Final report

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Executive Summary

This report presents examines the wage progression of minimum wage job holders between 2009 and 2017. Our aims are i) to examine whether the substantial increases in the minimum wage rate during this period affected progression out of minimum wage jobs and ii) to investigate which individual and job characteristics are associated with progression out of minimum wage jobs.

Between 2008 and 2017, the adult minimum wage rate in the UK increased significantly relative to median hourly pay. In 2017, it was 54% of median full-time hourly pay compared to 48% in 2008. During this period, the proportion of workers covered by the minimum wage also increased from 4% in 2008 to 7% in 2017. 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 18.4% in 2017¹.

A priori, it is not clear if and how minimum wage increases should affect the wage progression of minimum wage job holders. If minimum wages 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 contrary, 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 transitions out of minimum wage employment. At the time of writing, the UKHLS provides an eight year panel covering 2009-2017. 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

¹ ONS, Low and high pay in the UK 2018, <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/lowandhighpayuk/2018>

are only slightly higher. Minimum wage workers are more 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 only limited evidence that minimum wage upratings have depressed the probability to transition to higher paid employment and increased the probability of remaining in a minimum wage job.

Our estimates suggest workers in areas with high shares of minimum wage workers are less likely to transition to higher pay compared to workers in areas with low shares of minimum wage workers when the bite of the minimum wage increases. For example, holding the bite at its median level (54% in our sample), workers at the third quartile of area share of minimum wage workers are 5 percentage points less likely to transition to higher pay compared to workers at the first quartile. This represents a fall of approximately 50%, although our estimates are imprecise due to small sample sizes. There is no difference between transition rates in areas with high and low shares of minimum wage workers when the bite is at 51%.

However, the results are not robust. We do not find any significant effects when we allow the effect of minimum wage upratings to vary flexibly over time. No do we find any effects on the probability of progressing to low-paid employment (above the minimum wage). In this case, estimates (although again imprecise) are not only statistically insignificant but close to zero.

We find that more educated individuals and those working in the public sector or in large firms are more likely to transition to 'high' pay. Women, individuals with a history of unemployment, and part-time workers have lower chances of moving to 'high' paid employment. We also found that time spent in a minimum wage job had a negative effect. This could be due to unobserved lower productivity of those remaining in minimum wage jobs or to 'true' persistence. The latter is consistent with a significant body of literature that finds low pay, in general, to have a scarring effect.

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, rising faster than average earnings, inflation or GDP. From 2016, when the Government introduced the National Living Wage (NLW) and set for it a target for it of 60% of median earnings by 2020 (subject to sustained economic growth), the rate of growth of the minimum wage accelerated further and significant further increases of the minimum wage are expected to continue.

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 nearly 8% in 2017 and is projected to reach 12% in 2020 as the NLW continues to increase (Low Pay Commission, 2017). 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 wages 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 more sparse. 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 (2009-2016). We examine 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. Eight waves are currently available to use, covering the period 2009-2017.

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 years³ (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 and women aged 60 and over. On the one hand, the probability of progressing to higher wages

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.

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 34,735 individuals and 132,202 person-year observations. Out of these, there are 4,711 observations where the person is observed to be in a minimum wage job corresponding to 2,865 individuals. We observe 1,138 transitions to low pay, 269 transitions to ‘high’ pay and 141 transitions to non-employment. In our full specification, we lose some observations due to missing values on the covariates and are left with 1,728 individuals, 1,107 transitions to low pay, 267 transitions to ‘high’ pay and 136 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 20 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.

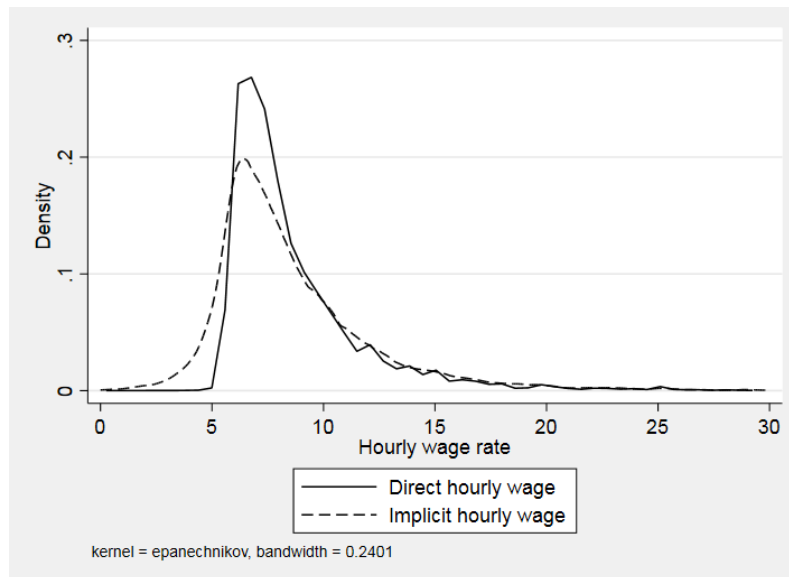


Fig 1: Density the nominal hourly wage distribution using the direct and implicit hourly wage measures, 2009-2017

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).

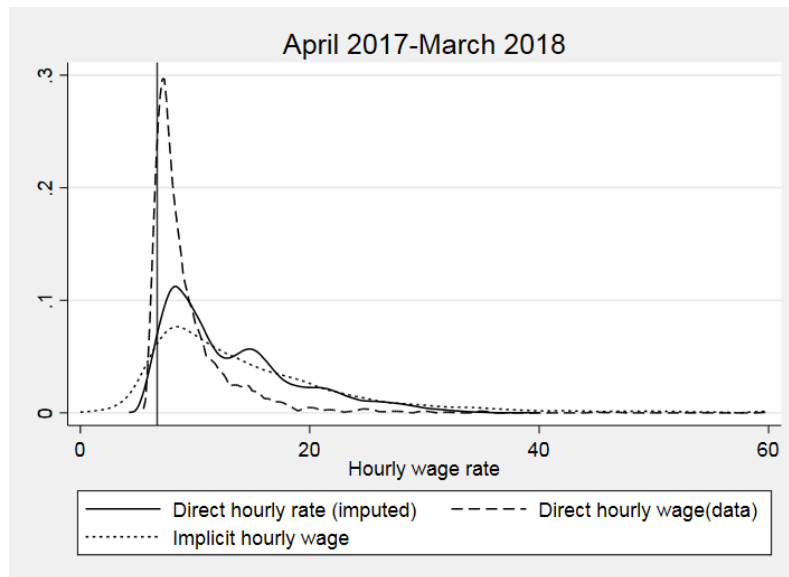


Figure 2: Hourly pay distribution according to three measures: ‘direct’, ‘implicit’, and ‘direct’ + imputed values

Figure 2 shows the distribution of hourly pay according to three measures: direct, implicit and direct plus imputed between October 2015 and March 2016 as well as the value of the minimum wage during this period (the vertical black line). The imputation significantly improves on both the direct and 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. 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 7% in 2017. 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.

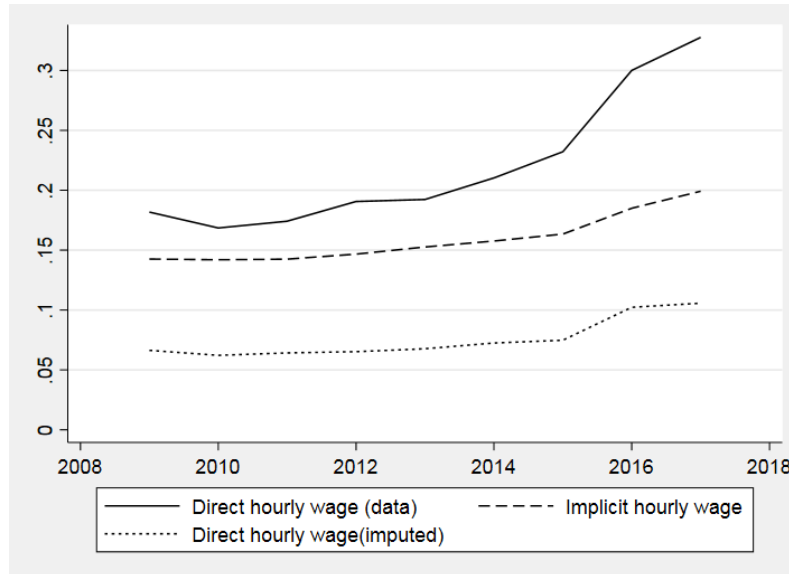


Figure 3: Proportion of workers with an hourly pay below or at the NMW/NLW level

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 drops in the observed wages. 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 (143 cases) experience 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 dataset⁴. 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 Great Britain's workforce (it does not cover Northern Ireland). 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 would expect local labour markets with a higher share of minimum wage workers to be affected more strongly.

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>

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 2014-2017 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 (2009-2017); (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 2017, 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:

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

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.

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

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 to transition 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.

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

$MWBite_{t-1}$ 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 the 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 covariates, 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.

3.1 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. Figure 4 shows that between 2009 and 2016, 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 has climbed from around 4-4.5% 2009/2010 to 7% in 2016. The share of low-paid workers on the other hand fell from around 24% in 2009 to around 20% in 2016. 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. 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 6% in Northern Ireland. Similarly, the share of low-paid workers ranged from less than 10% in London to 29% in Wales. 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 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

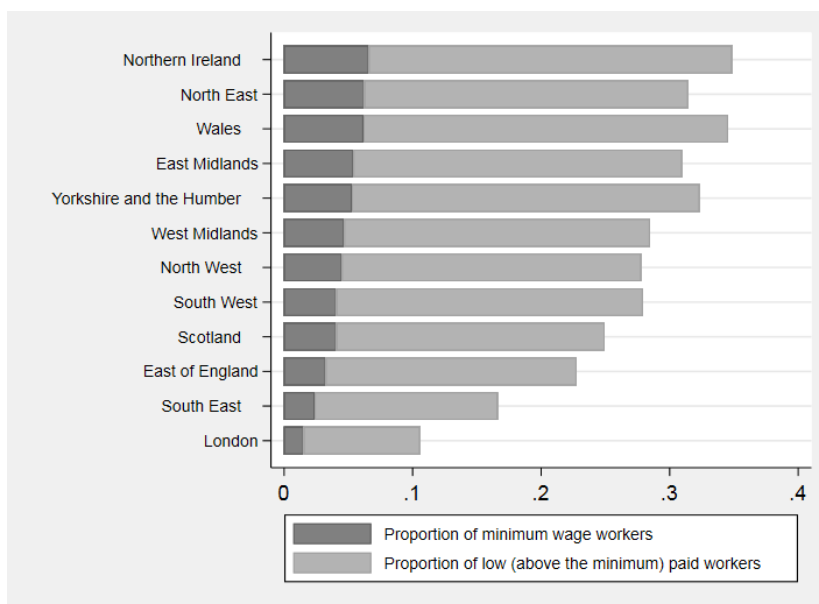


Fig 5: Proportion of workers who are paid at/below the minimum and proportion of workers paid at or below the low paid threshold by region

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 2006. 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.

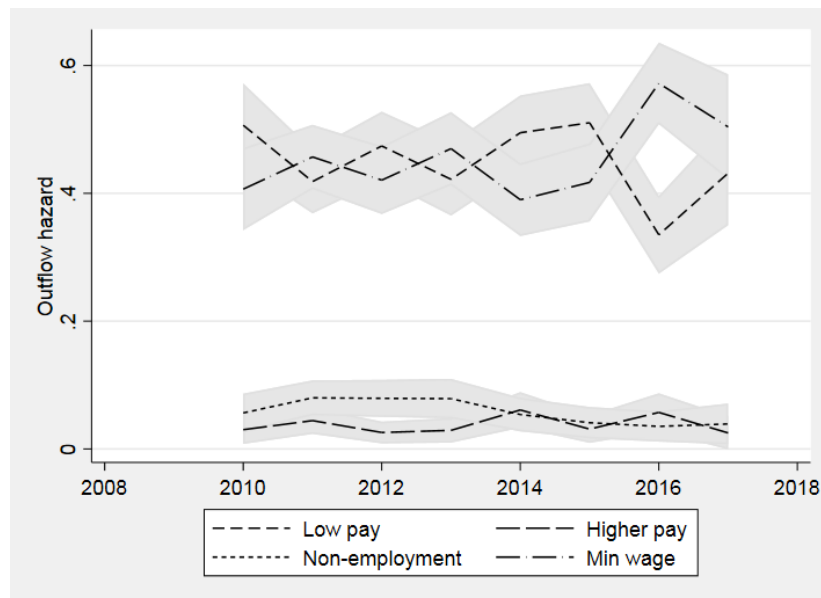


Fig 6: One-year transition probabilities to minimum wage, low paid, ‘high’ paid and non-employment by year

Every year, around half of minimum wage workers transition to a better paid job while between 5% and 10% transition to non-employment. The proportion of workers finding a better paid job after 1 year increased slightly after 2012 but fell again in 2016. The proportion of minimum wage workers moving to non-employment fell during the same period. Both trends are consistent with macro indicators showing economic growth resuming after 2012. 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, and this proportion is relatively stable over time.

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 jobs in any of the previous three years ($t-1$, $t-2$ and $t-3$). Figure 7 plots these three-year transition probabilities. They show a very similar pattern to one-year transitions: a substantial minority of minimum wage workers manage to obtain better pay but the vast majority of transitions are to low paid work. In fact, the proportion of individuals succeeding in securing ‘high’ paid employment are very similar whether we look at one or three-year transition probabilities. This finding suggests that most individuals moving to low pay from a minimum wage job are not successful in moving further up, to ‘high’ pay jobs, in the short-term.



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’ paid and non-employment by region are displayed in Figure 8. Unfortunately, low 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, 25% and 20% respectively. In contrast, Northern Ireland, Wales and the North West have the lowest probabilities, between 4 to 7%. 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 top three deciles. 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 is relatively constant, the probability of transitioning to a ‘high’ paid job increases significantly in areas where wages are higher (in the top three deciles). Conversely, the probability of moving into non-employment falls. This pattern suggests that chances of finding ‘high’ paid employment may be 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.

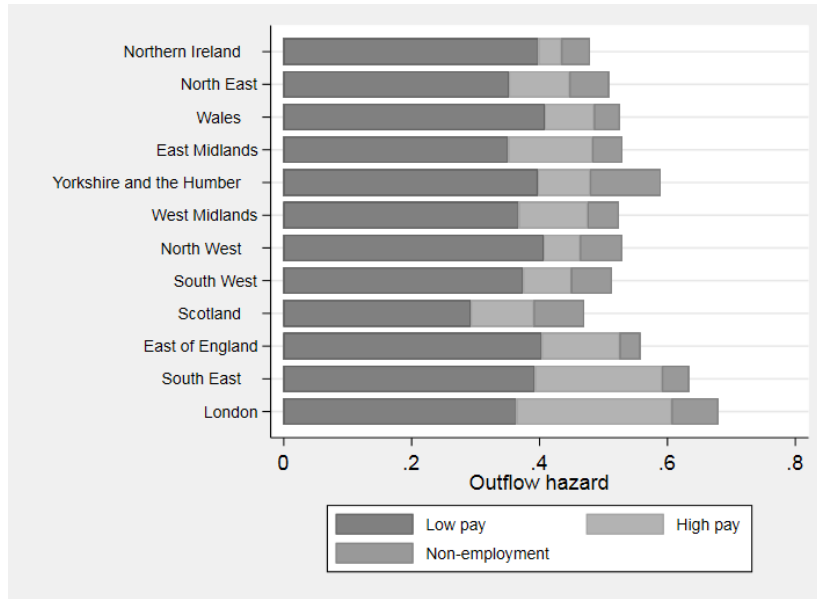


Fig 8: One-year transition probabilities to minimum wage, low paid, ‘high’ paid and non-employment by region

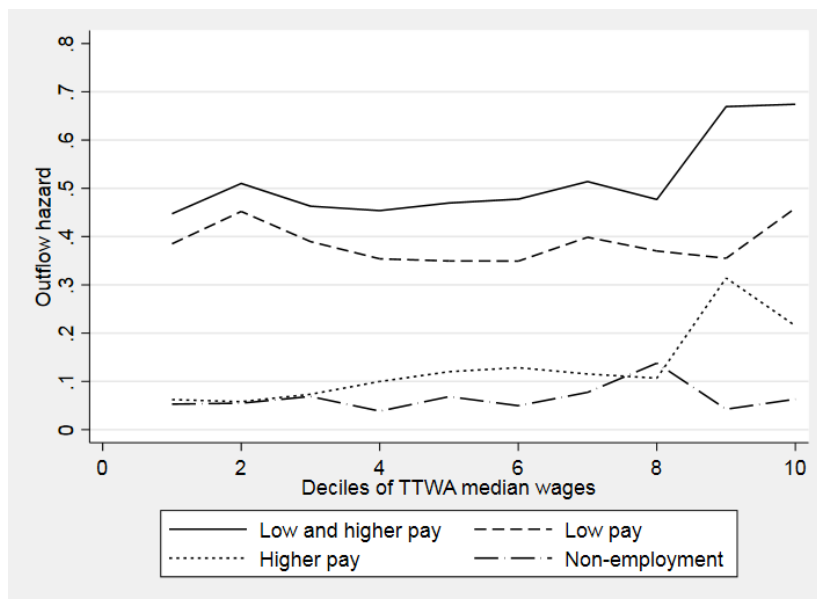


Fig 9: One-year transition probabilities to minimum wage, low paid, ‘high’ paid and non-employment by decile of TTWA median wages

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 the

probability of leaving a minimum wage job for better paid employment to fall as the share of minimum wage workers in one's area 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 top left panel shows 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 very close to zero and generally statistically insignificant. Moreover, with the exception of 2016, we find no consistent pattern over time. However, in 2016 the average marginal effect on the probability of remaining in a minimum wage job was larger and statistically significant. This corresponds with a slightly lower probability to transition to low-paid employment (although this is not statistically significant). There is no sudden corresponding fall in the probability of transitioning to a higher paid job in 2016.

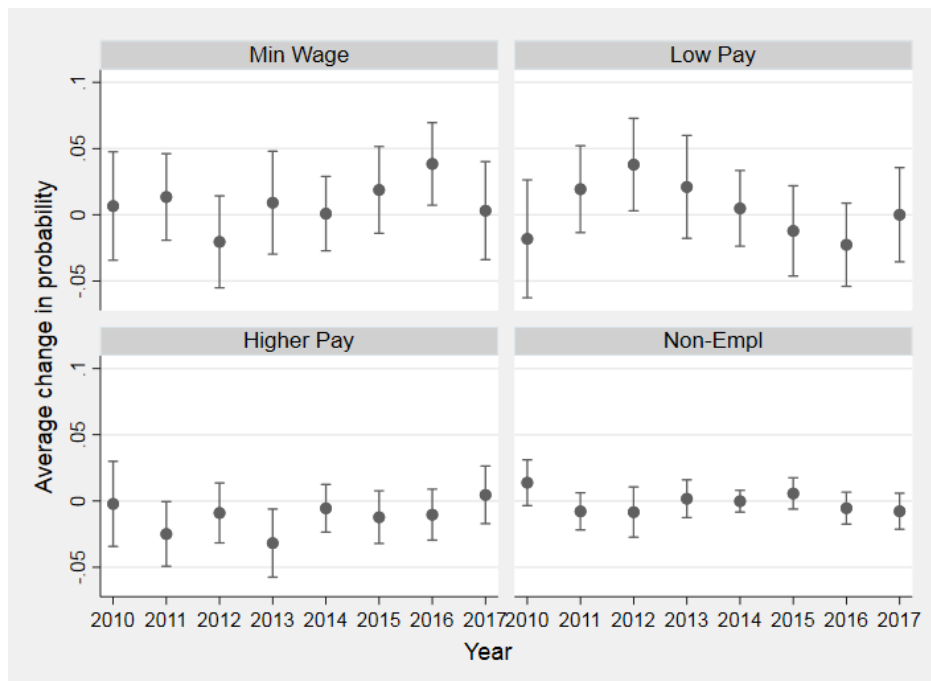


Fig 10 Average marginal effects (and 95% confidence intervals) of area lagged share of minimum wage workers by year

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 by much. The effect of the share of minimum wage workers on the probability

of remaining in a minimum wage job remains significant in 2016. Correspondingly, the effect on the probability to transition to a low paid job is negative and slightly larger than in other years but not statistically different from zero.

Both sets of estimates suggest that the effect of living in an area with a higher share of minimum wage workers on the probability to move to a low paid job are negative only in three out of eight years. The estimated effects on the probability to move to a higher pay job are more consistently negative. However, they are typically close to zero and statistically insignificant.

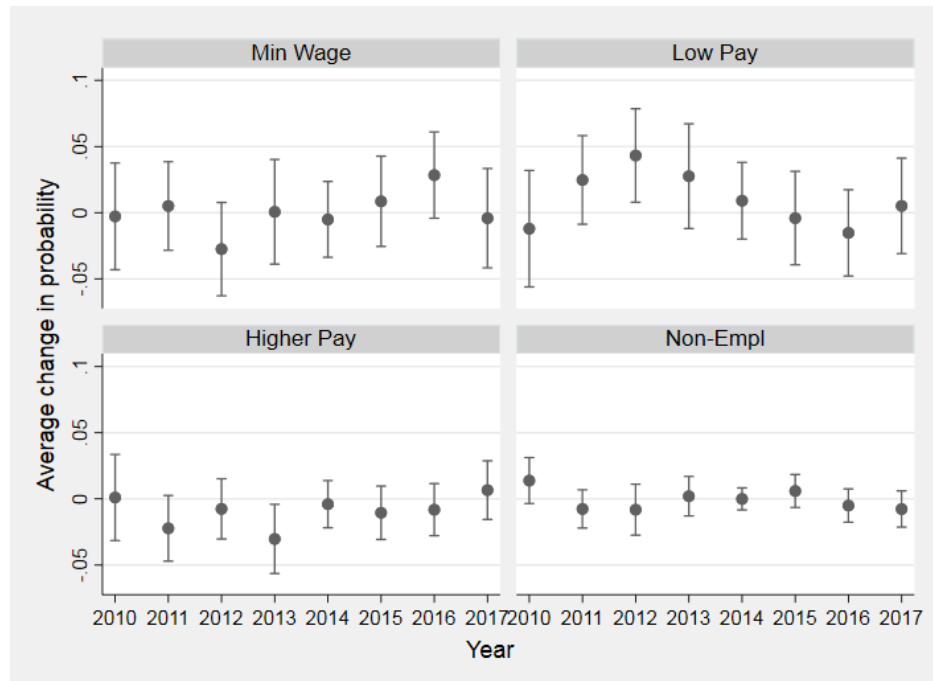


Fig 11: Average marginal effects (and 95% confidence intervals) of the lagged share of minimum wage workers, controlling for area median wages by year

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 the 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 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, the effects are not significant although the standard errors are larger than in the models above with lagged area shares of minimum wage workers. The estimated effects on the probability of transition to low pay are generally

close to zero, with the exception of 2011 and 2017 when they are positive (and statistically significant in the first case). In the case of the probability to transition to higher pay, effects are generally negative but small and insignificant. The effect for 2016 is in line with those for other years.

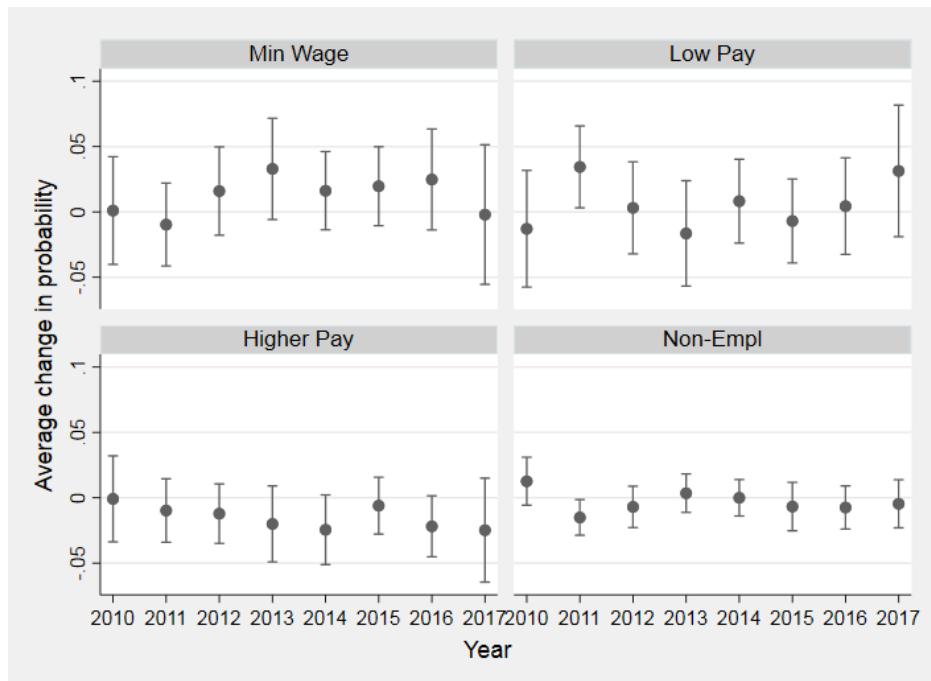


Fig 12: Average marginal effects (and 95% confidence intervals) of area's share of minimum wage workers in 2009, controlling for area median wages, by year

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. While estimated effects on the probability of transitioning to low paid jobs (paid above the minimum) remains very close to zero and insignificant, the estimated effects on the probability of transitioning to high pay are negative and, in some cases, significant. Moreover, as expected, living in an area with a higher share of minimum wage workers in 2009 is more detrimental to minimum wage workers chances of progression in years when the bite of the minimum wage is higher. Our estimates suggest that going from the first to the third quartile of the distribution of area share of minimum wage workers in 2009 decreases the probability of transitioning to a higher pay job when the bite is 54% (the median in our sample) by about 5 percentage points. Given that the probability of transitioning to a higher pay job is only about 10% on average, this is a very large effect. The counterpart to the lower probability of transitioning to higher pay is a larger probability of remaining in a minimum wage job. We find that going from the first to the third quartile of the area's share of minimum wage workers increases the probability of remaining in a minimum wage job when the bite is 54% by about 7 percentage points, or 14%.



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 that 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. The negative effect on the probability of transitioning to higher pay remains unaltered, and the probability of remaining on the minimum wage are only slightly smaller. Moving from the first to the third quartile of the distribution of the area share of minimum wage workers increased the probability of remaining in a minimum wage job by 5 percentage points. Estimated effects on the probability to transition to a low-paid job (above the minimum) remain small and statistically insignificant.

We conclude that for the period we study, 2009-2017, there is no evidence that a higher minimum wage affects the probability of transitioning to low-paid jobs (above the minimum wage) and limited evidence that there is a negative impact on the probability of transitioning to higher pay. When we instrument the level of the minimum wage by the lagged area share of minimum wage workers, we find no evidence that a higher minimum wage affects either the probability of transitioning to low-paid (above the minimum) jobs, or to higher pay. When we instrument by the area share of minimum wage workers in 2009 interacted with the bite of the minimum wage calculated at the national level (and lagged), we find that a higher minimum wage decreases the probability of transitioning to a higher paid job and increases the probability of remaining in a minimum wage job. However, we only obtain statistically significant results when we constrain the effects to vary linearly with the bite of the minimum wage.

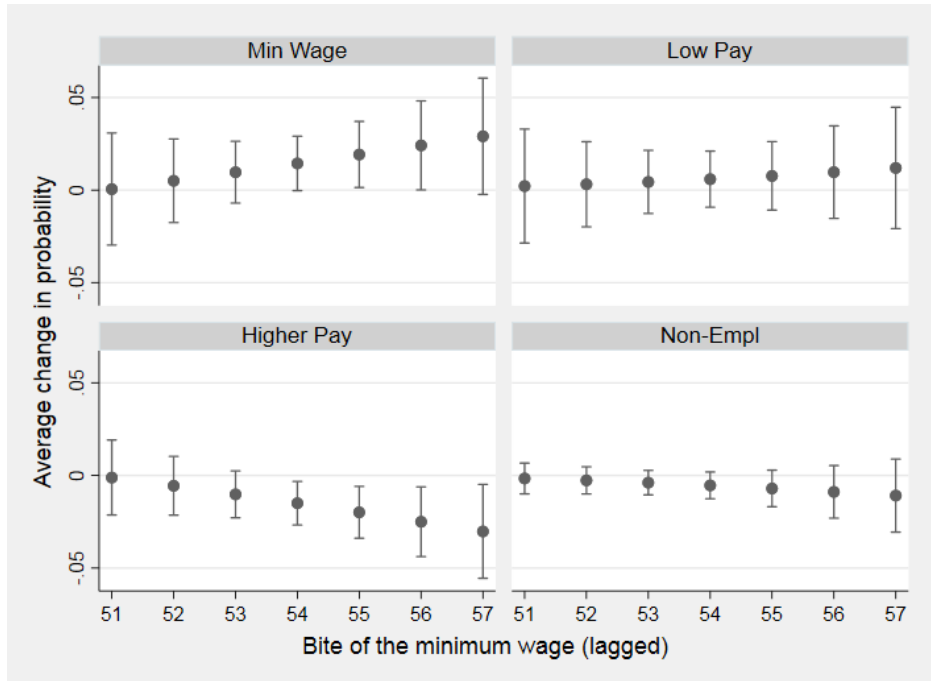


Fig 14: Average marginal effects (and 95% confidence intervals) of area's share of minimum wage workers in 2009, controlling for area median wages, by bite of minimum wage

4.3 Interactions with gender

Since women are more likely to find themselves in a minimum wage job, and are generally lower paid, we check whether effects vary by gender. Since our sample sizes are small, we include only a simple interaction of our instruments with gender. Results are shown in Fig 15 (using the lagged share of minimum wage workers as an instrument) and Fig 16 (using the share of minimum wage workers in 2009 interacted with the bite of the minimum wage). In both cases we control for area wage levels and all our individual and job-related covariates. We do not find that estimated effects differ by gender, although they are more precisely estimated for women. This is not surprising given that we have more women on a minimum wage in our sample. Both specifications indicate that living in an area with a higher share of minimum wage workers depresses the probability to moving to higher pay by around 1-2 percentage points.

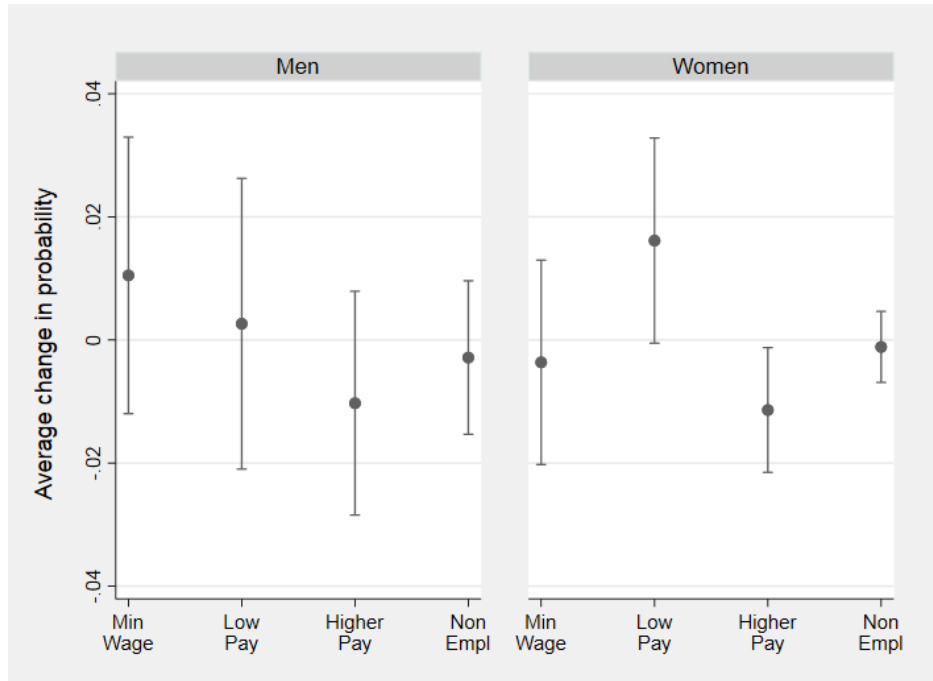


Fig 15: Average marginal effects (and 95% confidence intervals) of area lagged share of minimum wage workers, by gender

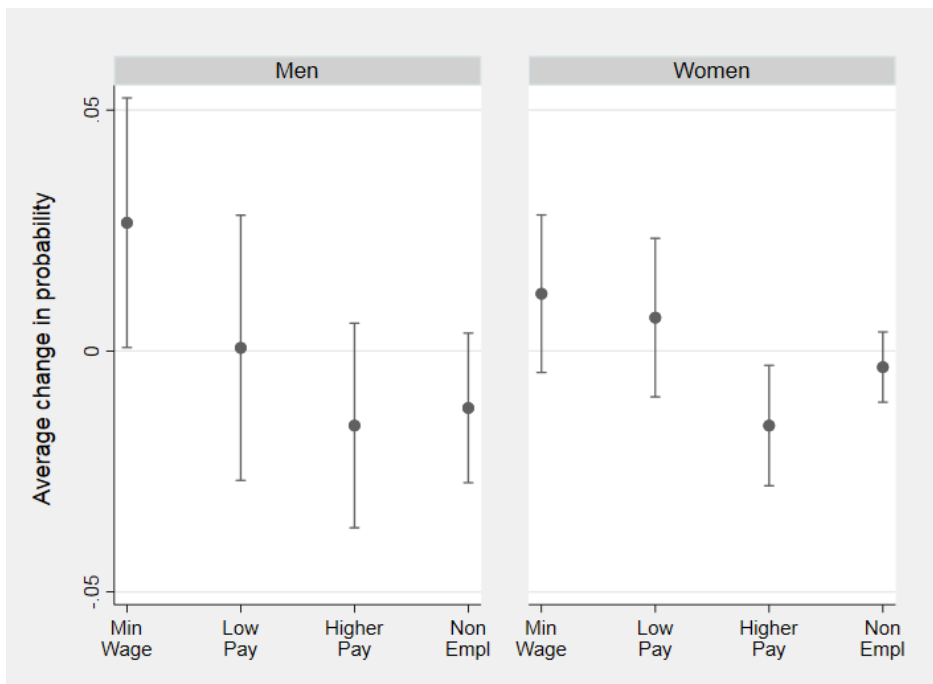


Fig 16: Average marginal effects (and 95% confidence intervals) of area's share of minimum wage workers in 2009, by gender

4.4 Individual and job level determinants of progression out of minimum wage jobs

As part of our estimation strategy, we quantified the effects of several individual and job characteristics on the probability of moving out of a minimum wage job. We focussed on two transitions: to low paid (but above the minimum wage) employment and to ‘high’ paid jobs. The estimates (see Table A1 in the Appendix) indicate that only a few predictors are significantly associated with the probability to transition to low-paid employment: having a previous history of unemployment and being in bad health reduces the probability of moving off the minimum wage and onto low-paid employment. In contrast, working in the public sector or in a large firm increases the likelihood of moving to a low-paid job. Figure 17 shows the magnitude of these effects. They can be interpreted as the average change in the probability of moving from a minimum wage job to low-paid employment as a result of a unit change in the predictor.

Additional predictors turn out to be significantly correlated with the probability of transitioning to ‘high’ pay. Figure 18 shows the magnitude of the effects (calculated as average marginal changes in the probability to transition into ‘high’ pay). Individuals with higher levels of qualification have a greater probability of transitioning off a minimum wage job, with the difference being especially high for degree holders. Working part-time and having a history of unemployment are, on the other hand, associated with a lower probability of moving to a ‘high’ paid job while working in the public sector or in larger firms increases the probability of moving to ‘high’ pay. Women have a lower probability of moving into ‘high’ paid employment from a minimum wage job even after controlling for part-time work and the number of children they have. Having no qualifications has the strongest negative impact while working in the public sector has the strongest positive effect.

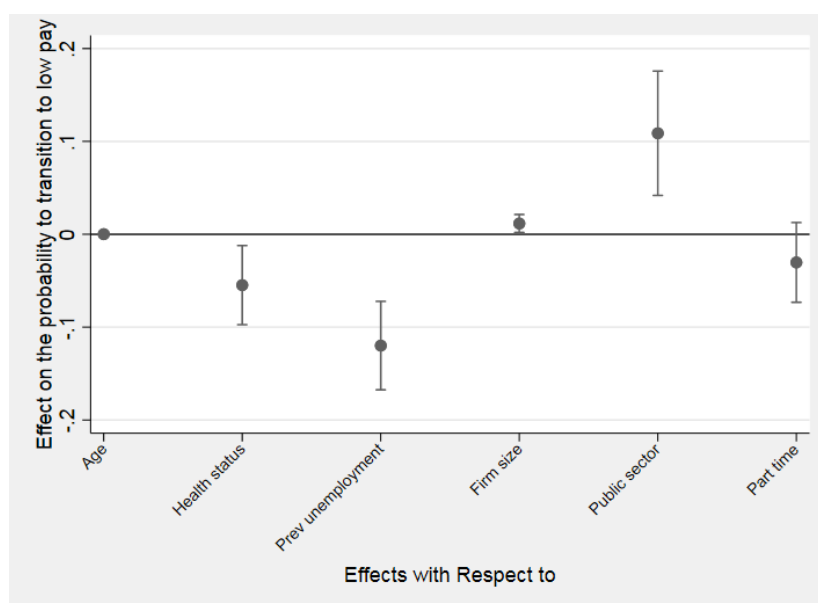


Fig 17: Average marginal effects (and 95% confidence intervals) on the probability to transition to low pay.

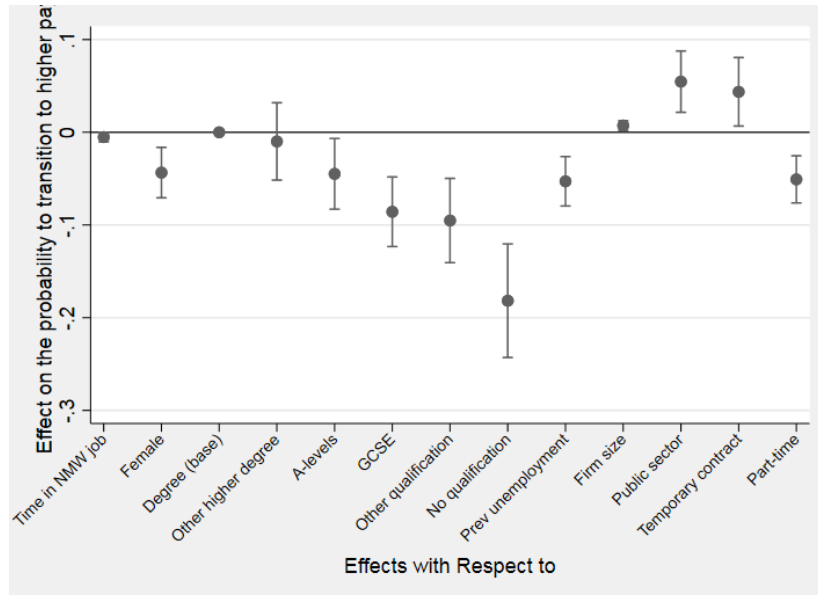


Fig 18: Average marginal effects (and 95% confidence intervals) on the probability to transition to 'high' pay.

5. Conclusions

Using the UKHLS, we examined progression out of minimum wage jobs in the UK between 2009 and 2017. 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 7%. 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 as 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 used 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 examined 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 would expect areas with higher shares of minimum wage workers to be more affected when the minimum wage is high.

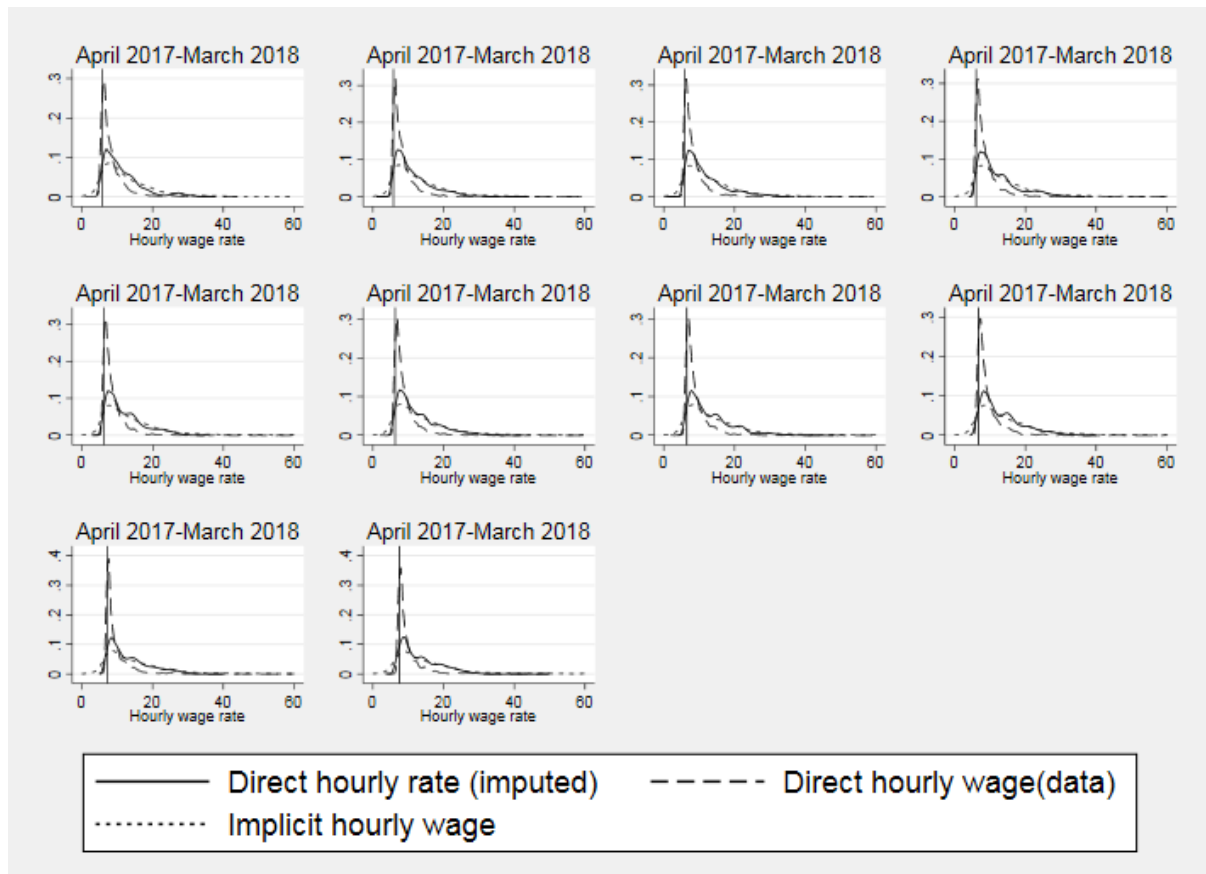
Our results are sensitive to specification. When using the lagged area share of minimum wage workers we find no evidence that transition probabilities, either to low pay or higher pay, are influenced by hikes in the minimum wage. Similarly, when we allow the effects to vary flexibly over time, we do not find significant effects. However, when we impose additional constraints to increase statistical power we find that minimum wage increases (relative to the median) are associated with a lower probability of progressing to higher pay in areas with a high share of minimum wage workers. We find no evidence that the probability of transitioning to low pay is affected.

We are cautious in interpreting our results. On the one hand, our sample sizes are relatively small and so our methods are underpowered. On the other hand, the specifications where we find significant effects assume that the annual minimum wage hikes between 2009 and 2017 affected wage progression in the same way. Note, all the significant effects are on the probability of progressing to higher pay, which is surprising given we expect transitions to low pay to be most affected in the short term. In fact, our estimates for transitioning to low pay are always very close to zero.

Individual and job characteristics are important determinants of the probability of moving out of a minimum wage job. 'High' educational qualifications, working in the public sector, working in larger firms and working on temporary contracts all increase the probability to transitioning to 'high' pay. Working part-time, having a history of unemployment and being female depress the probability to move to 'high' pay. We also found the likelihood of transitioning to 'high' pay decreases the longer one spends in a minimum wage job suggesting that there may be persistence in minimum wage jobs. Again, this finding is consistent with results from a previous study that focuses on the early noughties (Bryan & Taylor, 2006) and with the literature on low pay dynamics more generally (Cappellari & Jenkins, 2008; Stewart, 2007).

Appendix

Fig A1: Hourly pay distributions according to three measures: ‘direct’, ‘implicit’, and ‘direct’ + imputed values between 2009 and 2017



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	-0.01	0.02	0.36	-0.05	0.02
female	-0.09	0.12	0.46	-0.32	0.15

Age		-0.10	0.05	0.03	-0.19	-0.01
Age square		0.00	0.00	0.03	0.00	0.00
Education						
Other higher degree		0.07	0.24	0.76	-0.39	0.54
A-level etc		-0.09	0.21	0.68	-0.50	0.32
GCSE etc		-0.24	0.20	0.22	-0.63	0.14
Other qualification		-0.35	0.22	0.12	-0.78	0.09
No qualification		-0.37	0.22	0.09	-0.80	0.06
Has child under 5		0.06	0.15	0.70	-0.24	0.36
Number of children						
	1	0.12	0.14	0.37	-0.14	0.39
	2	0.26	0.15	0.09	-0.04	0.55
	3	0.05	0.19	0.81	-0.32	0.42
Self-reported health status		-0.30	0.10	0.00	-0.50	-0.10
Ethnic Minority (0/1)		0.13	0.24	0.58	-0.34	0.61
Immigrant (0/1)		-0.39	0.25	0.11	-0.87	0.09
Has previous unemployment spell (0/1)		-0.28	0.11	0.02	-0.50	-0.05
Firm size (logged)		0.07	0.02	0.01	0.02	0.11
Public sector		0.75	0.17	0.00	0.41	1.08
Temporary contract		0.12	0.20	0.54	-0.27	0.51
Part-time work		-0.29	0.10	0.01	-0.50	-0.09
Industry						
Manufacturing-food, beverages, textile		-0.47	0.71	0.51	-1.87	0.93
Manufacturing-basic industrial		0.18	0.73	0.81	-1.25	1.61
Manufacturing-complex industrial		0.01	0.77	0.99	-1.51	1.53
Construction and gas, electricity and water services		1.57	1.03	0.13	-0.46	3.60
Wholesale and retail trade		0.10	0.67	0.88	-1.21	1.42
Transportation and storage		0.07	0.71	0.92	-1.33	1.47
Accommodation and food services		-0.21	0.67	0.75	-1.53	1.11
Information and communication		1.44	1.32	0.27	-1.14	4.02
Finance and insurance and real-estate		0.85	0.98	0.39	-1.08	2.77
Professional, scientific and technical services		-0.35	0.83	0.67	-1.99	1.28
Administrative and support services		0.09	0.68	0.90	-1.26	1.43
Public administration, education, health and social work		0.00	0.68	1.00	-1.32	1.33
Arts and other		-0.14	0.69	0.84	-1.49	1.21
Region						
North West		0.08	0.21	0.71	-0.34	0.49
Yorkshire and the Humber		0.39	0.22	0.07	-0.03	0.82
East Midlands		0.09	0.22	0.67	-0.33	0.52
West Midlands		0.07	0.23	0.77	-0.38	0.51
East of England		0.43	0.24	0.07	-0.03	0.90
London		0.33	0.34	0.34	-0.34	1.00

South East	0.47	0.25	0.06	-0.02	0.97
South West	0.15	0.23	0.53	-0.31	0.60
Wales	0.19	0.22	0.38	-0.23	0.62
Scotland	-0.07	0.23	0.77	-0.52	0.38
Year					
2011	-0.45	0.51	0.38	-1.46	0.56
2012	-0.78	0.52	0.14	-1.81	0.25
2013	-0.59	0.57	0.31	-1.71	0.54
2014	-0.32	0.51	0.53	-1.32	0.69
2015	0.16	0.56	0.78	-0.94	1.25
2016	-0.05	0.58	0.93	-1.18	1.08
2017	-0.85	0.72	0.24	-2.26	0.57
Lagged share of min wage workers	-0.07	0.11	0.50	-0.29	0.14
Lagged share of min wage workers# Year					
2011	0.09	0.13	0.52	-0.18	0.35
2012	0.22	0.14	0.11	-0.05	0.48
2013	0.10	0.14	0.49	-0.18	0.37
2014	0.08	0.13	0.52	-0.17	0.33
2015	-0.01	0.13	0.95	-0.27	0.25
2016	-0.08	0.13	0.56	-0.34	0.18
2017	0.07	0.14	0.61	-0.20	0.34
Constant	2.47	1.22	0.04	0.08	4.86

Transitions to HIGHER PAY

Time in min wage job	-0.06	0.04	0.06	-0.13	0.00
female	-0.60	0.19	0.00	-0.97	-0.23
Age	0.01	0.08	0.94	-0.14	0.16
Age square	0.00	0.00	0.98	0.00	0.00
Education					
Other higher degree	-0.05	0.31	0.87	-0.66	0.55
A-level etc	-0.59	0.28	0.04	-1.14	-0.04
GCSE etc	-1.22	0.27	0.00	-1.76	-0.68
Other qualification	-1.40	0.33	0.00	-2.03	-0.76
No qualification	-2.57	0.43	0.00	-3.40	-1.73
Has child under 5	0.06	0.26	0.80	-0.44	0.57
Number of children					
1	-0.22	0.24	0.36	-0.70	0.25
2	0.21	0.25	0.41	-0.28	0.69
3	-0.05	0.32	0.89	-0.68	0.59
Self-reported health status	-0.36	0.18	0.05	-0.71	-0.01
Ethnic Minority (0/1)	0.13	0.38	0.74	-0.61	0.87
Immigrant (0/1)	-0.43	0.39	0.26	-1.19	0.32
Has previous unemployment spell (0/1)	-0.58	0.21	0.01	-0.98	-0.17
Firm size (logged)	0.12	0.04	0.00	0.05	0.19
Public sector	1.19	0.25	0.00	0.70	1.67
Temporary contract	0.65	0.27	0.02	0.12	1.19
Part-time work	-0.85	0.18	0.00	-1.20	-0.51
Industry					
Manufacturing-food, beverages, textile	0.02	1.27	0.99	-2.47	2.52
Manufacturing-basic industrial	1.24	1.26	0.33	-1.23	3.70
Manufacturing-complex industrial	1.72	1.29	0.18	-0.79	4.24

Construction and gas, electricity and water services	2.94	1.48	0.05	0.03	5.85
Wholesale and retail trade	0.34	1.20	0.78	-2.01	2.70
Transportation and storage	1.08	1.24	0.38	-1.35	3.50
Accommodation and food services	-0.25	1.21	0.83	-2.63	2.12
Information and communication	2.82	1.67	0.09	-0.45	6.09
Finance and insurance and real-estate	2.62	1.42	0.07	-0.16	5.41
Professional, scientific and technical services	1.80	1.30	0.17	-0.75	4.35
Administrative and support services	0.61	1.23	0.62	-1.80	3.01
Public administration, education, health and social work	0.71	1.20	0.56	-1.65	3.06
Arts and other	0.76	1.22	0.53	-1.62	3.15
Region					
North West	-0.02	0.39	0.95	-0.79	0.74
Yorkshire and the Humber	0.19	0.40	0.63	-0.59	0.98
East Midlands	0.52	0.38	0.18	-0.23	1.27
West Midlands	-0.08	0.42	0.85	-0.91	0.74
East of England	0.42	0.43	0.32	-0.41	1.26
London	1.05	0.49	0.03	0.08	2.02
South East	1.16	0.40	0.00	0.37	1.95
South West	-0.24	0.43	0.58	-1.09	0.61
Wales	0.30	0.39	0.44	-0.46	1.07
Scotland	0.20	0.41	0.63	-0.60	1.00
Year					
2011	0.54	0.83	0.51	-1.07	2.16
2012	-0.67	0.87	0.44	-2.38	1.03
2013	0.76	0.92	0.41	-1.04	2.55
2014	-0.47	0.83	0.57	-2.09	1.15
2015	0.09	0.90	0.92	-1.67	1.86
2016	-0.13	0.94	0.89	-1.98	1.72
2017	-1.32	1.10	0.23	-3.47	0.83
Lagged share of min wage workers	-0.05	0.18	0.79	-0.40	0.30
Lagged share of min wage workers#					
Year					
2011	-0.27	0.24	0.26	-0.74	0.20
2012	-0.01	0.25	0.98	-0.49	0.47
2013	-0.34	0.25	0.17	-0.83	0.14
2014	-0.02	0.21	0.94	-0.44	0.40
2015	-0.16	0.23	0.48	-0.61	0.29
2016	-0.18	0.23	0.42	-0.64	0.27
2017	0.10	0.22	0.67	-0.34	0.53
Constant	-0.14	2.04	0.94	-4.14	3.85
Transitions to NONEMPLOYMENT					
Time in min wage job	-0.01	0.09	0.92	-0.18	0.16
female	-0.01	0.29	0.97	-0.58	0.56
Age	-0.19	0.12	0.11	-0.43	0.04
Age square	0.00	0.00	0.16	0.00	0.00
Education					

Other higher degree		-0.02	0.62	0.98	-1.22	1.19
A-level etc		0.21	0.52	0.69	-0.81	1.23
GCSE etc		-0.83	0.51	0.10	-1.83	0.17
Other qualification		-0.73	0.56	0.19	-1.83	0.37
No qualification		-0.45	0.56	0.43	-1.55	0.66
Has child under 5		0.01	0.46	0.99	-0.90	0.91
Number of children						
	1	0.39	0.35	0.27	-0.30	1.08
	2	-0.37	0.46	0.42	-1.28	0.53
	3	0.02	0.49	0.97	-0.94	0.98
Self-reported health status		0.43	0.26	0.10	-0.09	0.95
Ethnic Minority (0/1)		-0.20	0.65	0.76	-1.47	1.07
Immigrant (0/1)		0.11	0.63	0.87	-1.12	1.33
Has previous unemployment spell (0/1)		6.75	1.05	0.00	4.70	8.80
Firm size (logged)		-0.10	0.06	0.11	-0.22	0.02
Public sector		1.10	0.45	0.01	0.22	1.98
Temporary contract		0.85	0.36	0.02	0.15	1.55
Part-time work		-0.29	0.28	0.30	-0.83	0.25
Industry						
Manufacturing-food, beverages, textile		12.17	1316.33	0.99	-2567.79	2592.13
Manufacturing-basic industrial		11.78	1316.33	0.99	-2568.18	2591.74
Manufacturing-complex industrial		11.98	1316.33	0.99	-2567.98	2591.94
Construction and gas, electricity and water services		-0.88	1764.14	1.00	-3458.54	3456.77
Wholesale and retail trade		11.91	1316.33	0.99	-2568.05	2591.86
Transportation and storage		13.56	1316.33	0.99	-2566.40	2593.52
Accommodation and food services		12.17	1316.33	0.99	-2567.79	2592.12
Information and communication		15.00	1316.33	0.99	-2564.96	2594.96
Finance and insurance and real-estate		-2.66	2306.55	1.00	-4523.42	4518.10
Professional, scientific and technical services		-1.94	1630.71	1.00	-3198.07	3194.19
Administrative and support services		12.09	1316.33	0.99	-2567.86	2592.05
Public administration, education, health and social work		11.32	1316.33	0.99	-2568.64	2591.28
Arts and other		12.21	1316.33	0.99	-2567.75	2592.17
Region						
North West		-0.12	0.53	0.82	-1.15	0.92
Yorkshire and the Humber		0.42	0.53	0.43	-0.61	1.45
East Midlands		-0.01	0.58	0.99	-1.14	1.12
West Midlands		0.32	0.60	0.60	-0.86	1.49
East of England		-0.74	0.68	0.28	-2.07	0.59
London		0.18	0.83	0.83	-1.46	1.81
South East		-0.97	0.73	0.19	-2.41	0.47
South West		-1.13	0.63	0.07	-2.36	0.10
Wales		-0.83	0.58	0.15	-1.96	0.31

Scotland	-0.77	0.60	0.20	-1.95	0.41
Year					
2011	2.76	1.23	0.02	0.36	5.16
2012	1.77	1.39	0.20	-0.95	4.49
2013	0.15	1.49	0.92	-2.78	3.08
2014	-0.45	1.23	0.72	-2.87	1.97
2015	-1.31	1.48	0.38	-4.21	1.59
2016	0.50	1.47	0.73	-2.37	3.38
2017	1.16	2.24	0.60	-3.22	5.55
Lagged share of min wage workers	0.32	0.23	0.17	-0.13	0.78
Lagged share of min wage workers# Year					
2011	-0.56	0.31	0.07	-1.17	0.05
2012	-0.50	0.36	0.16	-1.20	0.20
2013	-0.29	0.34	0.39	-0.95	0.37
2014	-0.33	0.28	0.24	-0.87	0.21
2015	-0.18	0.31	0.56	-0.79	0.42
2016	-0.57	0.31	0.07	-1.18	0.04
2017	-0.70	0.41	0.09	-1.50	0.10
Constant	-14.61	1316.33	0.99	-2594.58	2565.35
N=2507					

Source: UKHLS, Waves 1-8

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	-0.01	0.02	0.40	-0.04	0.02
female	-0.08	0.12	0.48	-0.32	0.15
Age	-0.10	0.05	0.03	-0.19	-0.01
Age square	0.00	0.00	0.03	0.00	0.00
Education					
Other higher degree	0.08	0.24	0.74	-0.39	0.55
A-level etc	-0.09	0.21	0.65	-0.51	0.32
GCSE etc	-0.24	0.20	0.23	-0.62	0.15
Other qualification	-0.36	0.22	0.10	-0.80	0.07
No qualification	-0.39	0.22	0.07	-0.82	0.04
Has child under 5	0.08	0.16	0.62	-0.23	0.38
Number of children					
1	0.12	0.14	0.37	-0.15	0.39
2	0.25	0.15	0.10	-0.04	0.55
3	0.04	0.19	0.82	-0.33	0.41
Self-reported health status	-0.30	0.10	0.00	-0.50	-0.10
Ethnic Minority (0/1)	0.10	0.25	0.68	-0.38	0.58
Immigrant (0/1)	-0.38	0.25	0.13	-0.86	0.11
Has previous unemployment spell (0/1)	-0.28	0.11	0.02	-0.50	-0.05
Firm size (logged)	0.07	0.02	0.01	0.02	0.11
Public sector	0.75	0.17	0.00	0.42	1.09
Temporary contract	0.13	0.20	0.51	-0.26	0.52
Part-time work	-0.29	0.10	0.01	-0.49	-0.08

Industry					
Manufacturing-food, beverages, textile	-0.48	0.71	0.50	-1.88	0.92
Manufacturing-basic industrial	0.18	0.73	0.81	-1.26	1.61
Manufacturing-complex industrial	0.00	0.78	1.00	-1.52	1.52
Construction and gas, electricity and water services	1.54	1.03	0.14	-0.49	3.57
Wholesale and retail trade	0.08	0.67	0.91	-1.24	1.40
Transportation and storage	0.06	0.72	0.93	-1.34	1.46
Accommodation and food services	-0.24	0.68	0.73	-1.56	1.09
Information and communication	1.44	1.32	0.27	-1.14	4.02
Finance and insurance and real-estate	0.81	0.98	0.41	-1.12	2.74
Professional, scientific and technical services	-0.38	0.84	0.65	-2.02	1.26
Administrative and support services	0.06	0.69	0.93	-1.29	1.40
Public administration, education, health and social work	-0.03	0.68	0.97	-1.36	1.30
Arts and other	-0.16	0.69	0.81	-1.52	1.19
Region					
North West	0.06	0.21	0.76	-0.35	0.48
Yorkshire and the Humber	0.40	0.22	0.06	-0.02	0.83
East Midlands	0.09	0.22	0.69	-0.34	0.51
West Midlands	0.06	0.23	0.81	-0.39	0.50
East of England	0.40	0.24	0.09	-0.06	0.87
London	-0.15	0.41	0.71	-0.95	0.65
South East	0.37	0.26	0.15	-0.13	0.87
South West	0.17	0.23	0.47	-0.29	0.62
Wales	0.21	0.22	0.34	-0.22	0.63
Scotland	-0.09	0.23	0.71	-0.54	0.36
Year					
2011	-0.36	0.51	0.48	-1.35	0.64
2012	-0.64	0.52	0.22	-1.66	0.38
2013	-0.49	0.57	0.39	-1.60	0.63
2014	-0.16	0.51	0.75	-1.16	0.84
2015	0.19	0.55	0.73	-0.89	1.28
2016	-0.06	0.57	0.92	-1.17	1.06
2017	-0.82	0.72	0.25	-2.23	0.58
Lagged share of min wage workers	-0.03	0.11	0.78	-0.24	0.18
Lagged share of min wage workers#					
Year					
2011	0.08	0.13	0.54	-0.18	0.34
2012	0.21	0.13	0.12	-0.05	0.46
2013	0.09	0.14	0.51	-0.18	0.36
2014	0.06	0.12	0.61	-0.18	0.30
2015	-0.01	0.13	0.96	-0.26	0.25
2016	-0.08	0.13	0.55	-0.33	0.18
2017	0.06	0.14	0.67	-0.21	0.33

Median TTWA wage level		11.89	5.53	0.03	1.06	22.73
Constant		0.92	1.41	0.51	-1.84	3.69
Transitions to HIGHER PAY						
Time in min wage job		-0.06	0.04	0.07	-0.13	0.00
female		-0.59	0.19	0.00	-0.96	-0.22
Age		0.01	0.08	0.94	-0.14	0.16
Age square		0.00	0.00	1.00	0.00	0.00
Education						
Other higher degree		-0.04	0.31	0.90	-0.65	0.57
A-level etc		-0.59	0.28	0.04	-1.14	-0.04
GCSE etc		-1.21	0.27	0.00	-1.75	-0.67
Other qualification		-1.41	0.33	0.00	-2.05	-0.77
No qualification		-2.59	0.43	0.00	-3.42	-1.75
Has child under 5		0.09	0.26	0.74	-0.42	0.59
Number of children						
	1	-0.22	0.24	0.36	-0.70	0.26
	2	0.20	0.25	0.42	-0.29	0.69
	3	-0.04	0.32	0.89	-0.68	0.59
Self-reported health status		-0.35	0.18	0.05	-0.70	0.00
Ethnic Minority (0/1)		0.09	0.38	0.82	-0.66	0.83
Immigrant (0/1)		-0.41	0.39	0.29	-1.16	0.35
Has previous unemployment spell (0/1)		-0.57	0.21	0.01	-0.98	-0.16
Firm size (logged)		0.12	0.04	0.00	0.05	0.19
Public sector		1.20	0.25	0.00	0.71	1.68
Temporary contract		0.65	0.27	0.02	0.12	1.19
Part-time work		-0.84	0.18	0.00	-1.19	-0.50
Industry						
Manufacturing-food, beverages, textile		0.01	1.27	1.00	-2.48	2.50
Manufacturing-basic industrial		1.22	1.25	0.33	-1.24	3.68
Manufacturing-complex industrial		1.71	1.28	0.18	-0.81	4.23
Construction and gas, electricity and water services		2.90	1.48	0.05	-0.01	5.80
Wholesale and retail trade		0.30	1.20	0.80	-2.05	2.66
Transportation and storage		1.05	1.24	0.40	-1.38	3.47
Accommodation and food services		-0.30	1.21	0.80	-2.67	2.07
Information and communication		2.81	1.67	0.09	-0.46	6.08
Finance and insurance and real-estate		2.57	1.42	0.07	-0.22	5.35
Professional, scientific and technical services		1.74	1.30	0.18	-0.81	4.30
Administrative and support services		0.56	1.23	0.65	-1.84	2.96
Public administration, education, health and social work		0.66	1.20	0.59	-1.70	3.01
Arts and other		0.72	1.22	0.55	-1.66	3.10
Region						

North West		-0.05	0.39	0.91	-0.81	0.72
Yorkshire and the Humber		0.20	0.40	0.62	-0.59	0.99
East Midlands		0.51	0.38	0.19	-0.25	1.26
West Midlands		-0.11	0.42	0.80	-0.94	0.72
East of England		0.37	0.43	0.39	-0.47	1.21
London		0.47	0.61	0.44	-0.72	1.66
South East		1.03	0.41	0.01	0.22	1.84
South West		-0.22	0.43	0.62	-1.07	0.64
Wales		0.32	0.39	0.41	-0.44	1.08
Scotland		0.17	0.41	0.68	-0.64	0.97
Year						
	2011	0.64	0.82	0.43	-0.96	2.25
	2012	-0.49	0.87	0.57	-2.20	1.22
	2013	0.92	0.92	0.32	-0.88	2.73
	2014	-0.27	0.82	0.74	-1.89	1.34
	2015	0.19	0.90	0.83	-1.57	1.94
	2016	-0.12	0.94	0.90	-1.96	1.71
	2017	-1.27	1.09	0.24	-3.41	0.87
Lagged share of min wage workers		0.01	0.18	0.95	-0.34	0.36
Lagged share of min wage workers#	Year					
	2011	-0.27	0.24	0.25	-0.74	0.19
	2012	-0.03	0.24	0.92	-0.50	0.45
	2013	-0.36	0.25	0.14	-0.85	0.12
	2014	-0.04	0.21	0.84	-0.45	0.37
	2015	-0.17	0.22	0.45	-0.61	0.27
	2016	-0.19	0.23	0.41	-0.63	0.26
	2017	0.07	0.22	0.74	-0.36	0.51
Median TTWA wage level		14.42	8.78	0.10	-2.80	31.63
Transitions to NONEMPLOYMENT						
Time in min wage job		-0.01	0.09	0.92	-0.18	0.16
female		-0.01	0.29	0.97	-0.58	0.56
Age		-0.19	0.12	0.11	-0.43	0.04
Age square		0.00	0.00	0.16	0.00	0.00
Education						
Other higher degree		-0.01	0.62	0.99	-1.22	1.20
A-level etc		0.20	0.52	0.70	-0.82	1.22
GCSE etc		-0.83	0.51	0.11	-1.82	0.17
Other qualification		-0.75	0.57	0.18	-1.86	0.36
No qualification		-0.46	0.56	0.41	-1.57	0.64
Has child under 5		0.02	0.46	0.97	-0.89	0.92
Number of children						
	1	0.38	0.35	0.28	-0.31	1.08
	2	-0.38	0.46	0.41	-1.28	0.53
	3	0.02	0.49	0.98	-0.95	0.98
Self-reported health status		0.43	0.26	0.11	-0.09	0.94
Ethnic Minority (0/1)		-0.23	0.66	0.72	-1.52	1.05
Immigrant (0/1)		0.12	0.63	0.85	-1.11	1.35
Has previous unemployment spell (0/1)		6.76	1.05	0.00	4.70	8.82
Firm size (logged)		-0.10	0.06	0.11	-0.22	0.02
Public sector		1.10	0.45	0.01	0.22	1.98
Temporary contract		0.86	0.36	0.02	0.16	1.55

Part-time work	-0.28	0.28	0.31	-0.82	0.26
Industry					
Manufacturing-food, beverages, textile	12.19	1314.73	0.99	-2564.64	2589.02
Manufacturing-basic industrial	11.79	1314.73	0.99	-2565.04	2588.62
Manufacturing-complex industrial	11.99	1314.73	0.99	-2564.84	2588.82
Construction and gas, electricity and water services	-0.88	1757.83	1.00	-3446.16	3444.41
Wholesale and retail trade	11.91	1314.73	0.99	-2564.92	2588.74
Transportation and storage	13.57	1314.73	0.99	-2563.26	2590.39
Accommodation and food services	12.17	1314.73	0.99	-2564.66	2589.00
Information and communication	15.04	1314.73	0.99	-2561.79	2591.86
Finance and insurance and real-estate	-2.64	2285.29	1.00	-4481.72	4476.44
Professional, scientific and technical services	-1.94	1628.31	1.00	-3193.37	3189.50
Administrative and support services	12.09	1314.73	0.99	-2564.73	2588.92
Public administration, education, health and social work	11.32	1314.73	0.99	-2565.51	2588.14
Arts and other	12.21	1314.73	0.99	-2564.62	2589.04
Region					
North West	-0.13	0.53	0.81	-1.16	0.91
Yorkshire and the Humber	0.43	0.53	0.42	-0.60	1.46
East Midlands	-0.01	0.58	0.98	-1.15	1.12
West Midlands	0.31	0.60	0.61	-0.87	1.48
East of England	-0.75	0.68	0.27	-2.08	0.58
London	-0.17	1.08	0.88	-2.28	1.94
South East	-1.05	0.76	0.16	-2.54	0.43
South West	-1.12	0.63	0.07	-2.35	0.11
Wales	-0.81	0.58	0.16	-1.95	0.33
Scotland	-0.79	0.61	0.19	-1.98	0.40
Year					
2011	2.81	1.22	0.02	0.43	5.19
2012	1.84	1.39	0.18	-0.88	4.55
2013	0.17	1.49	0.91	-2.75	3.08
2014	-0.37	1.24	0.77	-2.79	2.05
2015	-1.32	1.47	0.37	-4.20	1.56
2016	0.47	1.46	0.75	-2.40	3.33
2017	1.17	2.23	0.60	-3.19	5.53
Lagged share of min wage workers	0.34	0.23	0.14	-0.11	0.80
Lagged share of min wage workers#					
Year					
2011	-0.56	0.31	0.07	-1.16	0.04
2012	-0.50	0.35	0.16	-1.20	0.19
2013	-0.28	0.34	0.40	-0.95	0.38
2014	-0.33	0.27	0.22	-0.87	0.20
2015	-0.17	0.31	0.57	-0.77	0.43
2016	-0.56	0.31	0.07	-1.17	0.04
2017	-0.70	0.41	0.09	-1.50	0.10

	8.54	17.23	0.62	-25.23	42.31	8.54
Constant		-15.72	1314.74	0.99	-2592.56	2561.12
N=2507						

Source: UKHLS, Waves 1-8

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	-0.02	0.02	0.31	-0.05	0.01
Female	-0.08	0.12	0.49	-0.32	0.15
Age	-0.11	0.05	0.02	-0.19	-0.02
Age square	0.00	0.00	0.02	0.00	0.00
Education					
Other higher degree	0.02	0.24	0.92	-0.45	0.50
A-level etc	-0.11	0.21	0.60	-0.52	0.30
GCSE etc	-0.26	0.20	0.18	-0.65	0.12
Other qualification	-0.39	0.22	0.08	-0.82	0.05
No qualification	-0.40	0.22	0.07	-0.83	0.03
Has child under 5	0.07	0.16	0.64	-0.23	0.38
Number of children					
1	0.12	0.14	0.38	-0.15	0.39
2	0.24	0.15	0.11	-0.05	0.54
3	0.05	0.19	0.80	-0.32	0.42
Self-reported health status	-0.30	0.10	0.00	-0.50	-0.10
Ethnic Minority (0/1)	0.10	0.25	0.70	-0.39	0.58
Immigrant (0/1)	-0.38	0.25	0.12	-0.86	0.10
Has previous unemployment spell (0/1)	-0.29	0.11	0.01	-0.51	-0.07
Firm size (logged)	0.07	0.02	0.01	0.02	0.12
Public sector	0.74	0.17	0.00	0.41	1.08
Temporary contract	0.13	0.20	0.50	-0.25	0.52
Part-time work	-0.29	0.10	0.01	-0.49	-0.09
Industry					
Manufacturing-food, beverages, textile	-0.46	0.71	0.52	-1.86	0.93
Manufacturing-basic industrial	0.16	0.73	0.83	-1.27	1.58
Manufacturing-complex industrial	0.00	0.77	1.00	-1.51	1.52
Construction and gas, electricity and water services	1.57	1.04	0.13	-0.46	3.60
Wholesale and retail trade	0.07	0.67	0.92	-1.25	1.39
Transportation and storage	0.04	0.71	0.96	-1.36	1.44
Accommodation and food services	-0.23	0.68	0.73	-1.55	1.09
Information and communication	1.33	1.31	0.31	-1.24	3.91
Finance and insurance and real-estate	0.74	0.98	0.45	-1.19	2.66
Professional, scientific and technical services	-0.40	0.84	0.63	-2.04	1.24
Administrative and support services	0.07	0.69	0.92	-1.28	1.41

Public administration, education, health and social work		-0.02	0.68	0.98	-1.34	1.31
Arts and other		-0.16	0.69	0.81	-1.52	1.19
Region						
North West		0.05	0.21	0.83	-0.37	0.46
Yorkshire and the Humber		0.37	0.22	0.08	-0.05	0.80
East Midlands		0.05	0.22	0.82	-0.38	0.48
West Midlands		0.05	0.23	0.84	-0.40	0.49
East of England		0.38	0.24	0.11	-0.09	0.84
London		-0.12	0.41	0.78	-0.91	0.68
South East		0.32	0.26	0.21	-0.18	0.82
South West		0.13	0.23	0.58	-0.32	0.58
Wales		0.21	0.22	0.34	-0.22	0.63
Scotland		-0.10	0.23	0.65	-0.55	0.34
Year						
	2011	-0.67	0.50	0.18	-1.64	0.30
	2012	0.06	0.51	0.90	-0.93	1.06
	2013	0.12	0.52	0.81	-0.90	1.15
	2014	0.00	0.49	1.00	-0.95	0.96
	2015	0.18	0.49	0.71	-0.78	1.14
	2016	-0.52	0.52	0.32	-1.53	0.50
	2017	-1.01	0.59	0.09	-2.17	0.15
Share of minimum wage workers in 2009		-0.04	0.11	0.69	-0.25	0.17
Share of minimum wage workers in 2009 # Year						
	2011	0.16	0.13	0.20	-0.09	0.42
	2012	0.01	0.13	0.96	-0.25	0.26
	2013	-0.09	0.14	0.54	-0.36	0.19
	2014	0.01	0.12	0.91	-0.23	0.26
	2015	-0.02	0.13	0.85	-0.27	0.22
	2016	0.00	0.14	1.00	-0.27	0.27
	2017	0.14	0.16	0.39	-0.18	0.46
Median Real TTWA wage level		9.25	5.49	0.09	-1.51	20.01
Constant		1.44	1.41	0.31	-1.32	4.20
Transitions to HIGHER PAY						
Time in min wage job		-0.06	0.04	0.07	-0.13	0.01
female		-0.59	0.19	0.00	-0.97	-0.22
Age		0.00	0.08	0.96	-0.15	0.15
Age square		0.00	0.00	0.99	0.00	0.00
Education						
Other higher degree		-0.12	0.31	0.71	-0.72	0.49
A-level etc		-0.58	0.28	0.04	-1.13	-0.03
GCSE etc		-1.25	0.27	0.00	-1.79	-0.72
Other qualification		-1.46	0.33	0.00	-2.10	-0.81
No qualification		-2.58	0.42	0.00	-3.41	-1.75
Has child under 5		0.08	0.26	0.75	-0.43	0.59
Number of children						
	1	-0.26	0.24	0.29	-0.74	0.22
	2	0.17	0.25	0.48	-0.31	0.66
	3	-0.05	0.33	0.87	-0.69	0.58
Self-reported health status		-0.34	0.18	0.06	-0.69	0.01
Ethnic Minority (0/1)		0.17	0.38	0.66	-0.58	0.91
Immigrant (0/1)		-0.45	0.38	0.24	-1.20	0.30
Has previous unemployment spell (0/1)		-0.57	0.21	0.01	-0.97	-0.16
Firm size (logged)		0.12	0.04	0.00	0.05	0.19
Public sector		1.24	0.25	0.00	0.75	1.73
Temporary contract		0.61	0.27	0.02	0.08	1.15
Part-time work		-0.87	0.18	0.00	-1.22	-0.52

Public sector	1.24	0.25	0.00	0.75	1.73
Industry					
Manufacturing-food, beverages, textile	0.02	1.26	0.99	-2.45	2.49
Manufacturing-basic industrial	1.20	1.25	0.34	-1.24	3.64
Manufacturing-complex industrial	1.70	1.28	0.18	-0.80	4.20
Construction and gas, electricity and water services	2.86	1.48	0.05	-0.04	5.77
Wholesale and retail trade	0.31	1.19	0.80	-2.03	2.64
Transportation and storage	0.99	1.23	0.42	-1.42	3.39
Accommodation and food services	-0.31	1.20	0.80	-2.66	2.04
Information and communication	2.82	1.67	0.09	-0.45	6.09
Finance and insurance and real-estate	2.55	1.41	0.07	-0.21	5.32
Professional, scientific and technical services	1.72	1.29	0.18	-0.81	4.25
Administrative and support services	0.57	1.22	0.64	-1.81	2.96
Public administration, education, health and social work	0.65	1.19	0.59	-1.69	2.99
Arts and other	0.73	1.21	0.54	-1.63	3.10
Region					
North West	-0.08	0.39	0.84	-0.85	0.69
Yorkshire and the Humber	0.15	0.40	0.70	-0.64	0.95
East Midlands	0.43	0.39	0.27	-0.33	1.18
West Midlands	-0.09	0.42	0.84	-0.91	0.74
East of England	0.33	0.43	0.45	-0.52	1.17
London	0.57	0.61	0.35	-0.62	1.77
South East	1.02	0.41	0.01	0.21	1.83
South West	-0.24	0.44	0.58	-1.10	0.61
Wales	0.36	0.39	0.36	-0.41	1.12
Scotland	0.17	0.41	0.68	-0.64	0.98
Year					
2011	-0.11	0.81	0.89	-1.70	1.48
2012	-0.01	0.84	0.99	-1.66	1.64
2013	0.45	0.86	0.60	-1.23	2.14
2014	0.50	0.84	0.55	-1.13	2.14
2015	-0.22	0.82	0.79	-1.82	1.39
2016	0.01	0.84	0.99	-1.63	1.65
2017	-0.08	0.99	0.94	-2.02	1.86
Share of minimum wage workers in 2009	-0.02	0.18	0.92	-0.38	0.34
Share of minimum wage workers in 2009 # Year					
2011	-0.05	0.23	0.82	-0.51	0.40
2012	-0.19	0.24	0.44	-0.67	0.29
2013	-0.30	0.25	0.24	-0.79	0.20
2014	-0.31	0.24	0.20	-0.79	0.17
2015	-0.11	0.23	0.63	-0.56	0.34
2016	-0.34	0.25	0.17	-0.83	0.15
2017	-0.25	0.31	0.42	-0.85	0.36
Median Real TTWA wage level	8.88	9.05	0.33	-8.85	26.61
Constant	-1.17	2.39	0.62	-5.85	3.51
Transitions to NONEMPLOYMENT					
Time in min wage job	0.00	0.09	0.99	-0.17	0.17
female	-0.09	0.29	0.76	-0.66	0.48
Age	-0.18	0.12	0.15	-0.41	0.06

Age square		0.00	0.00	0.21	0.00	0.00
Education						
Other higher degree		0.00	0.62	0.99	-1.20	1.21
A-level etc		0.18	0.53	0.73	-0.86	1.22
GCSE etc		-0.88	0.51	0.09	-1.88	0.13
Other qualification		-0.82	0.57	0.15	-1.93	0.29
No qualification		-0.47	0.57	0.41	-1.59	0.65
Has child under 5		-0.01	0.47	0.99	-0.93	0.91
Number of children						
	1	0.33	0.35	0.35	-0.36	1.02
	2	-0.44	0.46	0.34	-1.34	0.46
	3	0.01	0.50	0.99	-0.97	0.98
Self-reported health status		0.39	0.26	0.14	-0.12	0.91
Ethnic Minority (0/1)		-0.34	0.67	0.61	-1.65	0.96
Immigrant (0/1)		0.24	0.63	0.71	-1.01	1.48
Has previous unemployment spell (0/1)		6.82	1.05	0.00	4.77	8.87
Firm size (logged)		-0.10	0.06	0.11	-0.22	0.02
Public sector		1.06	0.45	0.02	0.18	1.94
Temporary contract		0.87	0.36	0.01	0.17	1.57
Part-time work		-0.27	0.28	0.33	-0.82	0.28
Industry						
Manufacturing-food, beverages, textile		12.27	1280.76	0.99	-2497.97	2522.51
Manufacturing-basic industrial		11.86	1280.76	0.99	-2498.38	2522.10
Manufacturing-complex industrial		12.05	1280.76	0.99	-2498.19	2522.30
Construction and gas, electricity and water services		-0.65	1733.63	1.00	-3398.50	3397.21
Wholesale and retail trade		12.03	1280.76	0.99	-2498.21	2522.28
Transportation and storage		13.63	1280.76	0.99	-2496.62	2523.87
Accommodation and food services		12.32	1280.76	0.99	-2497.92	2522.56
Information and communication		15.14	1280.76	0.99	-2495.10	2525.39
Finance and insurance and real-estate		-2.64	2306.66	1.00	-4523.61	4518.33
Professional, scientific and technical services		-2.01	1591.26	1.00	-3120.81	3116.80
Administrative and support services		12.15	1280.76	0.99	-2498.10	2522.39
Public administration, education, health and social work		11.52	1280.76	0.99	-2498.72	2521.77
Arts and other		12.34	1280.76	0.99	-2497.91	2522.58
Region						
North West		-0.25	0.53	0.64	-1.28	0.79
Yorkshire and the Humber		0.35	0.53	0.51	-0.68	1.38
East Midlands		-0.15	0.57	0.79	-1.27	0.97
West Midlands		0.29	0.60	0.63	-0.89	1.47
East of England		-0.86	0.68	0.21	-2.20	0.47
London		0.11	1.08	0.92	-2.01	2.23
South East		-1.13	0.77	0.14	-2.63	0.37
South West		-1.21	0.62	0.05	-2.43	0.01
Wales		-0.80	0.58	0.17	-1.94	0.35
Scotland		-0.92	0.61	0.13	-2.12	0.28
Year						
	2011	3.28	1.26	0.01	0.82	5.75
	2012	1.82	1.26	0.15	-0.65	4.29
	2013	0.10	1.33	0.94	-2.50	2.70
	2014	-0.40	1.36	0.77	-3.07	2.27
	2015	0.25	1.46	0.87	-2.61	3.10

	2016	0.15	1.38	0.91	-2.56	2.86
	2017	-0.51	1.76	0.77	-3.96	2.94
Share of minimum wage workers in 2009		0.30	0.25	0.22	-0.18	0.79
Share of minimum wage workers in 2009 # Year						
	2011	-0.70	0.32	0.03	-1.32	-0.08
	2012	-0.53	0.32	0.10	-1.16	0.10
	2013	-0.27	0.33	0.42	-0.92	0.38
	2014	-0.35	0.34	0.31	-1.01	0.32
	2015	-0.57	0.39	0.14	-1.32	0.19
	2016	-0.60	0.36	0.10	-1.31	0.11
	2017	-0.52	0.50	0.30	-1.50	0.46
Median Real TTWA wage level		-1.33	17.83	0.94	-36.29	33.62
Constant		-14.74	1280.76	0.99	-2525.00	2495.51
N=2507						

Source: UKHLS, Waves 1-8

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	-0.02	0.02	0.34	-0.05	0.02
female	-0.09	0.12	0.45	-0.32	0.14
Age	-0.10	0.05	0.02	-0.19	-0.02
Age square	0.00	0.00	0.02	0.00	0.00
Education					
Other higher degree	0.04	0.24	0.88	-0.43	0.50
A-level etc	-0.09	0.21	0.65	-0.50	0.31
GCSE etc	-0.26	0.20	0.19	-0.64	0.13
Other qualification	-0.36	0.22	0.10	-0.79	0.07
No qualification	-0.38	0.22	0.08	-0.81	0.05
Has child under 5	0.07	0.15	0.67	-0.24	0.37
Number of children					
1.00	0.10	0.14	0.46	-0.17	0.37
2.00	0.24	0.15	0.12	-0.06	0.53
3.00	0.04	0.19	0.84	-0.33	0.41
Self-reported health status					
Ethnic Minority (0/1)	-0.30	0.10	0.00	-0.50	-0.10
Immigrant (0/1)	0.13	0.24	0.61	-0.35	0.60
Has previous unemployment spell (0/1)	-0.38	0.25	0.12	-0.86	0.10
Firm size (logged)	-0.29	0.11	0.01	-0.51	-0.06
Public sector	0.06	0.02	0.01	0.02	0.11
Temporary contract	0.75	0.17	0.00	0.41	1.08
Part-time work	0.13	0.20	0.49	-0.25	0.52
	-0.29	0.10	0.01	-0.50	-0.09

Industry					
Manufacturing-food, beverages, textile	-0.42	0.71	0.55	-1.81	0.97
Manufacturing-basic industrial	0.19	0.72	0.79	-1.23	1.61
Manufacturing-complex industrial	0.05	0.77	0.95	-1.46	1.56
Construction and gas, electricity and water services	1.61	1.03	0.12	-0.41	3.63
Wholesale and retail trade	0.14	0.67	0.84	-1.17	1.44
Transportation and storage	0.09	0.71	0.90	-1.30	1.48
Accommodation and food services	-0.16	0.67	0.81	-1.48	1.15
Information and communication	1.51	1.31	0.25	-1.06	4.09
Finance and insurance and real-estate	0.82	0.98	0.40	-1.10	2.73
Professional, scientific and technical services	-0.34	0.83	0.68	-1.97	1.29
Administrative and support services	0.14	0.68	0.84	-1.20	1.47
Public administration, education, health and social work	0.04	0.67	0.95	-1.27	1.36
Arts and other	-0.10	0.68	0.89	-1.44	1.24
Region					
North West	0.04	0.21	0.87	-0.38	0.45
Yorkshire and the Humber	0.35	0.22	0.11	-0.08	0.77
East Midlands	0.04	0.22	0.84	-0.38	0.47
West Midlands	0.05	0.23	0.84	-0.40	0.49
East of England	0.38	0.24	0.11	-0.08	0.84
London	0.28	0.34	0.41	-0.39	0.95
South East	0.39	0.25	0.12	-0.10	0.88
South West	0.11	0.23	0.63	-0.34	0.56
Wales	0.20	0.22	0.35	-0.22	0.63
Scotland	-0.10	0.23	0.67	-0.54	0.35
Year					
2011	-0.16	0.21	0.46	-0.57	0.26
2012	-0.01	0.23	0.98	-0.47	0.45
2013	-0.26	0.26	0.31	-0.76	0.24
2014	-0.05	0.24	0.83	-0.53	0.43
2015	0.01	0.28	0.98	-0.55	0.56
2016	-0.59	0.31	0.06	-1.21	0.03
2017	-0.65	0.41	0.11	-1.45	0.15
Share of minimum wage workers in 2009	0.52	1.18	0.66	-1.78	2.82
Lagged bite of the minimum wage at the national level	0.04	0.10	0.65	-0.15	0.24
Share of min wage workers# Lagged national bite	-0.01	0.02	0.63	-0.05	0.03

Constant	0.14	5.25	0.98	-10.15	10.44
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**Transitions to
HIGHER PAY**

Time in min wage job	-0.06	0.04	0.08	-0.13	0.01
female	-0.59	0.19	0.00	-0.97	-0.22
Age	0.00	0.08	0.96	-0.15	0.15
Age square	0.00	0.00	0.94	0.00	0.00
Education					
Other higher degree	-0.14	0.31	0.65	-0.75	0.47
A-level etc	-0.57	0.28	0.04	-1.12	-0.02
GCSE etc	-1.25	0.27	0.00	-1.78	-0.71
Other qualification	-1.44	0.33	0.00	-2.08	-0.80
No qualification	-2.56	0.42	0.00	-3.39	-1.73
Has child under 5	0.05	0.26	0.85	-0.46	0.56
Number of children					
1.00	-0.25	0.24	0.29	-0.73	0.22
2.00	0.15	0.25	0.54	-0.33	0.64
3.00	-0.05	0.33	0.89	-0.68	0.59
Self-reported health status	-0.36	0.18	0.04	-0.71	-0.01
Ethnic Minority (0/1)	0.17	0.38	0.64	-0.56	0.91
Immigrant (0/1)	-0.46	0.38	0.23	-1.21	0.29
Has previous unemployment spell (0/1)	-0.55	0.21	0.01	-0.96	-0.15
Firm size (logged)	0.12	0.04	0.00	0.04	0.19
Public sector	1.26	0.25	0.00	0.77	1.74
Temporary contract	0.61	0.27	0.03	0.07	1.14
Part-time work	-0.87	0.18	0.00	-1.21	-0.52
Industry					
Manufacturing-food, beverages, textile	0.03	1.26	0.98	-2.43	2.49
Manufacturing-basic industrial	1.24	1.24	0.32	-1.19	3.67
Manufacturing-complex industrial	1.71	1.27	0.18	-0.78	4.20
Construction and gas, electricity and water services	2.86	1.47	0.05	-0.03	5.74
Wholesale and retail trade	0.35	1.19	0.77	-1.98	2.67
Transportation and storage	1.03	1.22	0.40	-1.36	3.43
Accommodation and food services	-0.26	1.19	0.83	-2.60	2.08
Information and communication	2.96	1.67	0.08	-0.31	6.22
Finance and insurance and real-estate	2.61	1.40	0.06	-0.14	5.36
Professional, scientific and technical services	1.72	1.29	0.18	-0.80	4.24

Administrative and support services	0.60	1.21	0.62	-1.77	2.98
Public administration, education, health and social work	0.67	1.19	0.58	-1.66	2.99
Arts and other	0.76	1.20	0.53	-1.59	3.11
Region					
North West	-0.07	0.39	0.86	-0.84	0.70
Yorkshire and the Humber	0.14	0.40	0.72	-0.65	0.94
East Midlands	0.42	0.39	0.27	-0.33	1.18
West Midlands	-0.08	0.42	0.84	-0.91	0.74
East of England	0.31	0.43	0.47	-0.54	1.16
London	0.97	0.50	0.05	-0.01	1.95
South East	1.09	0.41	0.01	0.29	1.88
South West	-0.25	0.44	0.56	-1.11	0.60
Wales	0.36	0.39	0.36	-0.41	1.12
Scotland	0.19	0.41	0.65	-0.62	0.99
Year					
2011	-0.30	0.33	0.37	-0.95	0.36
2012	-0.73	0.39	0.06	-1.49	0.02
2013	-0.66	0.41	0.11	-1.47	0.15
2014	-0.60	0.40	0.13	-1.38	0.17
2015	-0.80	0.47	0.09	-1.72	0.12
2016	-1.24	0.52	0.02	-2.26	-0.22
2017	-1.16	0.67	0.08	-2.47	0.16
Share of minimum wage workers in 2009	3.41	2.38	0.15	-1.25	8.07
Lagged bite of the minimum wage at the national level	0.27	0.17	0.12	-0.06	0.60
Share of min wage workers# Lagged national bite	-0.07	0.04	0.13	-0.15	0.02
Constant	-13.46	9.09	0.14	-31.28	4.36

Transitions to NONEMPLOYMENT

Time in min wage job	0.03	0.08	0.73	-0.14	0.19
female	-0.08	0.29	0.78	-0.65	0.49
Age	-0.19	0.12	0.11	-0.43	0.04
Age square	0.00	0.00	0.15	0.00	0.00
Education					
Other higher degree	-0.01	0.62	0.98	-1.22	1.20
A-level etc	0.21	0.53	0.69	-0.82	1.24
GCSE etc	-0.79	0.51	0.12	-1.80	0.21
Other qualification	-0.79	0.56	0.16	-1.90	0.31
No qualification	-0.46	0.57	0.42	-1.58	0.65
Has child under 5	-0.01	0.47	0.98	-0.92	0.90
Number of children					
1.00	0.26	0.35	0.46	-0.43	0.94

	2.00	-0.46	0.46	0.31	-1.36	0.43
	3.00	-0.04	0.49	0.94	-1.00	0.93
Self-reported health status		0.46	0.26	0.08	-0.05	0.98
Ethnic Minority (0/1)		-0.24	0.64	0.71	-1.50	1.02
Immigrant (0/1)		0.22	0.62	0.72	-1.00	1.44
Has previous unemployment spell (0/1)		6.79	1.04	0.00	4.75	8.83
Firm size (logged)		-0.10	0.06	0.11	-0.21	0.02
Public sector		1.17	0.44	0.01	0.29	2.04
Temporary contract		0.65	0.36	0.07	-0.05	1.36
Part-time work		-0.26	0.27	0.34	-0.80	0.27
Industry						
Manufacturing-food, beverages, textile		13.01	1599.06	0.99	-3121.08	3147.11
Manufacturing-basic industrial		12.82	1599.06	0.99	-3121.28	3146.91
Manufacturing-complex industrial		13.04	1599.06	0.99	-3121.06	3147.14
Construction and gas, electricity and water services		-0.33	2144.89	1.00	-4204.24	4203.58
Wholesale and retail trade		12.82	1599.06	0.99	-3121.27	3146.92
Transportation and storage		14.43	1599.06	0.99	-3119.66	3148.53
Accommodation and food services		13.11	1599.06	0.99	-3120.98	3147.21
Information and communication		15.80	1599.06	0.99	-3118.30	3149.90
Finance and insurance and real-estate		-2.32	3019.93	1.00	-5921.26	5916.63
Professional, scientific and technical services		-1.25	2041.39	1.00	-4002.30	3999.80
Administrative and support services		13.05	1599.06	0.99	-3121.05	3147.14
Public administration, education, health and social work		12.27	1599.06	0.99	-3121.83	3146.37
Arts and other		13.11	1599.06	0.99	-3120.99	3147.20
Region						
North West		-0.29	0.53	0.59	-1.33	0.75
Yorkshire and the Humber		0.40	0.52	0.45	-0.63	1.42
East Midlands		-0.15	0.57	0.80	-1.27	0.97
West Midlands		0.30	0.60	0.61	-0.87	1.47
East of England		-0.84	0.68	0.21	-2.17	0.49
London		0.15	0.83	0.86	-1.48	1.77
South East		-1.22	0.73	0.10	-2.66	0.22
South West		-1.20	0.62	0.05	-2.41	0.00
Wales		-0.78	0.58	0.18	-1.91	0.35
Scotland		-0.86	0.60	0.15	-2.04	0.31
Year						
	2011	0.71	0.50	0.16	-0.27	1.69
	2012	-0.53	0.57	0.35	-1.64	0.58

2013	-1.54	0.65	0.02	-2.82	-0.27
2014	-2.20	0.63	0.00	-3.43	-0.97
2015	-2.63	0.74	0.00	-4.09	-1.18
2016	-3.04	0.84	0.00	-4.68	-1.40
2017	-3.68	1.07	0.00	-5.77	-1.58
Share of minimum wage workers in 2009	2.03	3.64	0.58	-5.10	9.15
Lagged bite of the minimum wage at the national level	0.45	0.29	0.12	-0.12	1.01
Share of min wage workers# Lagged national bite	-0.04	0.07	0.54	-0.17	0.09
Constant	-37.21	1599.13	0.98	-3171.46	3097.03
N=2502					

Source: UKHLS, Waves 1-8

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	-0.01	0.02	0.35	-0.05	0.02
female	-0.09	0.12	0.47	-0.32	0.15
Age	-0.11	0.05	0.02	-0.19	-0.02
Age square	0.00	0.00	0.02	0.00	0.00
Education					
Other higher degree	0.05	0.24	0.84	-0.42	0.52
A-level etc	-0.10	0.21	0.65	-0.51	0.31
GCSE etc	-0.25	0.20	0.21	-0.63	0.14
Other qualification	-0.37	0.22	0.09	-0.80	0.06
No qualification	-0.39	0.22	0.07	-0.82	0.04
Has child under 5	0.08	0.15	0.61	-0.22	0.38
Number of children					
1	0.10	0.14	0.45	-0.16	0.37
2	0.24	0.15	0.12	-0.06	0.53
3	0.04	0.19	0.85	-0.33	0.41
Self-reported health status	-0.30	0.10	0.00	-0.50	-0.10
Ethnic Minority (0/1)	0.10	0.25	0.70	-0.38	0.58
Immigrant (0/1)	-0.37	0.25	0.13	-0.85	0.11
Has previous unemployment spell (0/1)	-0.28	0.11	0.01	-0.51	-0.06
Firm size (logged)	0.06	0.02	0.01	0.02	0.11
Public sector	0.74	0.17	0.00	0.41	1.08
Temporary contract	0.15	0.20	0.46	-0.24	0.53

Part-time work		-0.28	0.10	0.01	-0.49	-0.08
Industry						
Manufacturing-food, beverages, textile		-0.44	0.71	0.54	-1.83	0.96
Manufacturing-basic industrial		0.18	0.73	0.80	-1.24	1.60
Manufacturing-complex industrial		0.03	0.77	0.97	-1.48	1.54
Construction and gas, electricity and water services		1.58	1.03	0.13	-0.45	3.60
Wholesale and retail trade		0.10	0.67	0.88	-1.21	1.41
Transportation and storage		0.07	0.71	0.93	-1.33	1.46
Accommodation and food services		-0.20	0.67	0.76	-1.52	1.11
Information and communication		1.47	1.31	0.26	-1.10	4.04
Finance and insurance and real-estate		0.78	0.98	0.43	-1.14	2.70
Professional, scientific and technical services		-0.37	0.83	0.66	-2.00	1.27
Administrative and support services		0.10	0.68	0.89	-1.24	1.43
Public administration, education, health and social work		0.00	0.67	0.99	-1.31	1.32
Arts and other		-0.13	0.69	0.85	-1.48	1.21
Region						
North West		0.02	0.21	0.91	-0.39	0.44
Yorkshire and the Humber		0.36	0.22	0.09	-0.06	0.79
East Midlands		0.05	0.22	0.82	-0.38	0.48
West Midlands		0.04	0.23	0.86	-0.41	0.49
East of England		0.35	0.24	0.14	-0.11	0.82
London		-0.09	0.41	0.83	-0.89	0.71
South East		0.31	0.25	0.23	-0.19	0.81
South West		0.12	0.23	0.59	-0.33	0.57
Wales		0.21	0.22	0.34	-0.22	0.63
Scotland		-0.12	0.23	0.59	-0.57	0.32
Year						
	2011	-0.10	0.21	0.63	-0.52	0.32
	2012	0.07	0.24	0.77	-0.40	0.54
	2013	-0.19	0.26	0.47	-0.69	0.32
	2014	0.03	0.25	0.92	-0.46	0.52
	2015	0.07	0.28	0.81	-0.49	0.63
	2016	-0.55	0.32	0.08	-1.17	0.07
	2017	-0.61	0.41	0.14	-1.41	0.20
Median TTWA wage level		9.12	5.43	0.09	-1.53	19.77
Share of minimum wage workers in 2009		0.48	1.17	0.68	-1.81	2.77
Lagged bite of the minimum wage at the national level		0.04	0.10	0.65	-0.15	0.23

Share of min wage workers# Lagged national bite	-0.01	0.02	0.67	-0.05	0.03
Constant	-0.98	5.28	0.85	-11.32	9.37

Transitions to HIGHER PAY

Time in min wage job	-0.06	0.04	0.09	-0.13	0.01
female	-0.59	0.19	0.00	-0.96	-0.21
Age	0.00	0.08	0.96	-0.15	0.15
Age square	0.00	0.00	0.93	0.00	0.00
Education					
Other higher degree	-0.13	0.31	0.68	-0.74	0.48
A-level etc	-0.58	0.28	0.04	-1.13	-0.02
GCSE etc	-1.24	0.27	0.00	-1.78	-0.70
Other qualification	-1.45	0.33	0.00	-2.09	-0.81
No qualification	-2.57	0.42	0.00	-3.40	-1.74
Has child under 5	0.06	0.26	0.81	-0.45	0.57
Number of children					
1	-0.25	0.24	0.30	-0.73	0.22
2	0.15	0.25	0.54	-0.33	0.64
3	-0.05	0.33	0.89	-0.68	0.59
Self-reported health status	-0.36	0.18	0.05	-0.71	-0.01
Ethnic Minority (0/1)	0.14	0.38	0.71	-0.60	0.88
Immigrant (0/1)	-0.44	0.38	0.25	-1.19	0.31
Has previous unemployment spell (0/1)	-0.55	0.21	0.01	-0.96	-0.14
Firm size (logged)	0.12	0.04	0.00	0.04	0.19
Public sector	1.25	0.25	0.00	0.76	1.74
Temporary contract	0.61	0.27	0.02	0.08	1.15
Part-time work	-0.86	0.18	0.00	-1.21	-0.51
Industry					
Manufacturing-food, beverages, textile	0.01	1.26	0.99	-2.45	2.47
Manufacturing-basic industrial	1.22	1.24	0.32	-1.21	3.66
Manufacturing-complex industrial	1.69	1.27	0.18	-0.80	4.18
Construction and gas, electricity and water services	2.82	1.47	0.06	-0.07	5.71
Wholesale and retail trade	0.31	1.19	0.79	-2.01	2.64
Transportation and storage	1.01	1.22	0.41	-1.39	3.41
Accommodation and food services	-0.30	1.20	0.80	-2.64	2.05
Information and communication	2.92	1.66	0.08	-0.34	6.18

Finance and insurance and real-estate	2.57	1.41	0.07	-0.18	5.32
Professional, scientific and technical services	1.69	1.29	0.19	-0.84	4.21
Administrative and support services	0.57	1.21	0.64	-1.81	2.94
Public administration, education, health and social work	0.63	1.19	0.60	-1.70	2.95
Arts and other	0.72	1.20	0.55	-1.63	3.08
Region					
North West	-0.08	0.39	0.84	-0.85	0.69
Yorkshire and the Humber	0.16	0.40	0.69	-0.63	0.95
East Midlands	0.44	0.39	0.26	-0.32	1.19
West Midlands	-0.09	0.42	0.83	-0.92	0.74
East of England	0.29	0.43	0.51	-0.56	1.14
London	0.62	0.61	0.31	-0.57	1.81
South East	1.01	0.41	0.01	0.20	1.82
South West	-0.24	0.44	0.58	-1.10	0.61
Wales	0.36	0.39	0.36	-0.41	1.12
Scotland	0.17	0.41	0.69	-0.64	0.97
Year					
2011	-0.25	0.34	0.47	-0.91	0.42
2012	-0.66	0.40	0.10	-1.43	0.12
2013	-0.59	0.42	0.17	-1.41	0.24
2014	-0.52	0.41	0.20	-1.32	0.27
2015	-0.73	0.48	0.13	-1.67	0.21
2016	-1.21	0.52	0.02	-2.23	-0.18
2017	-1.11	0.67	0.10	-2.43	0.21
Median TTWA wage level	8.94	9.06	0.32	-8.82	26.71
Share of minimum wage workers in 2009	3.40	2.37	0.15	-1.25	8.05
Lagged bite of the minimum wage at the national level	0.27	0.17	0.11	-0.06	0.60
Share of min wage workers# Lagged national bite	-0.07	0.04	0.13	-0.15	0.02
Constant	-14.66	9.18	0.11	-32.66	3.34
Transitions to NONEMPLOYMENT					
Time in min wage job	0.03	0.08	0.73	-0.14	0.19
female	-0.09	0.29	0.75	-0.66	0.48
Age	-0.19	0.12	0.12	-0.43	0.05
Age square	0.00	0.00	0.16	0.00	0.00
Education					
Other higher degree	0.00	0.62	1.00	-1.21	1.21
A-level etc	0.22	0.53	0.68	-0.81	1.25
GCSE etc	-0.78	0.51	0.13	-1.79	0.22
Other qualification	-0.78	0.56	0.17	-1.89	0.33
No qualification	-0.45	0.57	0.43	-1.56	0.67

Has child under 5	0.00	0.47	1.00	-0.91	0.91
Number of children					
1	0.26	0.35	0.46	-0.42	0.94
2	-0.46	0.46	0.31	-1.36	0.43
3	-0.05	0.49	0.92	-1.01	0.92
Self-reported health status	0.46	0.26	0.08	-0.05	0.98
Ethnic Minority (0/1)	-0.21	0.65	0.75	-1.48	1.07
Immigrant (0/1)	0.20	0.63	0.75	-1.03	1.43
Has previous unemployment spell (0/1)	6.79	1.04	0.00	4.75	8.83
Firm size (logged)	-0.10	0.06	0.11	-0.22	0.02
Public sector	1.17	0.44	0.01	0.30	2.04
Temporary contract	0.66	0.36	0.07	-0.05	1.36
Part-time work	-0.27	0.28	0.33	-0.81	0.27
Industry					
Manufacturing-food, beverages, textile	12.99	1603.66	0.99	-3130.14	3156.11
Manufacturing-basic industrial	12.79	1603.66	0.99	-3130.33	3155.91
Manufacturing-complex industrial	13.02	1603.66	0.99	-3130.10	3156.15
Construction and gas, electricity and water services	-0.36	2142.32	1.00	-4199.22	4198.51
Wholesale and retail trade	12.80	1603.66	0.99	-3130.32	3155.93
Transportation and storage	14.43	1603.66	0.99	-3128.69	3157.55
Accommodation and food services	13.10	1603.66	0.99	-3130.02	3156.22
Information and communication	15.77	1603.66	0.99	-3127.35	3158.90
Finance and insurance and real-estate	-2.36	3001.00	1.00	-5884.22	5879.49
Professional, scientific and technical services	-1.27	2043.38	1.00	-4006.22	4003.68
Administrative and support services	13.04	1603.66	0.99	-3130.09	3156.16
Public administration, education, health and social work	12.26	1603.66	0.99	-3130.86	3155.39
Arts and other	13.10	1603.66	0.99	-3130.02	3156.23
Region					
North West	-0.30	0.53	0.58	-1.34	0.74
Yorkshire and the Humber	0.38	0.53	0.47	-0.65	1.41
East Midlands	-0.16	0.57	0.78	-1.28	0.96
West Midlands	0.29	0.60	0.62	-0.87	1.46
East of England	-0.87	0.68	0.20	-2.20	0.46
London	0.29	1.07	0.79	-1.81	2.38
South East	-1.19	0.75	0.11	-2.66	0.28
South West	-1.19	0.61	0.05	-2.40	0.01
Wales	-0.79	0.58	0.17	-1.93	0.34

Scotland		-0.85	0.60	0.16	-2.03	0.32
Year						
	2011	0.70	0.51	0.17	-0.30	1.69
	2012	-0.56	0.58	0.34	-1.70	0.58
	2013	-1.55	0.66	0.02	-2.84	-0.27
	2014	-2.22	0.64	0.00	-3.48	-0.96
	2015	-2.65	0.75	0.00	-4.13	-1.18
	2016	-3.04	0.84	0.00	-4.69	-1.40
	2017	-3.69	1.07	0.00	-5.78	-1.60
Median TTWA wage level		-4.08	17.86	0.82	-39.07	30.92
Share of minimum wage workers in 2009		2.11	3.65	0.56	-5.04	9.26
Lagged bite of the minimum wage at the national level		0.45	0.29	0.12	-0.11	1.01
Share of min wage workers# Lagged national bite		-0.04	0.07	0.53	-0.18	0.09
Constant		-36.88	1603.74	0.98	-3180.15	3106.40
N=2502						

References

- Allison, P. D. (1982). Discrete-Time Methods for the Analysis of Event Histories. *Sociological Methodology*, 13, 61-98.
- Arulampalam, W. (2001). Is Unemployment Really Scarring? Effects of Unemployment Experiences on Wages. *The Economic Journal*, 111(475), F585-F606.
- Bryan, M. L., & Taylor, M. (2006). Identifying and Explaining Pattern of NMW Receipt in Britain, 1999-2004 *Report for the Low Pay Commission*
- Cai, L., Mavromaras, K., & Sloane, P. (2018). Low Paid Employment in Britain: Estimating State-Dependence and Stepping Stone Effects. *Oxford Bulletin of Economics and Statistics*, 80(2), 283-326.
- Cappellari, L. (2002). Do the 'Working Poor' Stay Poor? An Analysis of Low Pay Transitions in Italy. *Oxford Bulletin of Economics and Statistics*, 64(2), 87-110.
- Cappellari, L., & Jenkins, S. P. (2008). Estimating Low Pay Transition Probabilities Accounting for Endogeneous Selection Mechanisms. *Applied Statistics*, 57(2), 165-186.
- D'Arcy, C., & Finch, D. (2017). The Great Escape? Low Pay and Progression in the UK's Labour Market: Resolution Foundation.
- Dickens, R., & Manning, A. (2002). Has the National Minimum Wage Reduced UK Wage Inequality? *Journal of the Royal Statistical Society*, 167(4), 613-626.
- Dickens, R., & Manning, A. (2004). Spikes and Spillovers: The Impact of the National Minimum Wage on the Wage Distribution in a Low-Wage Sector. *The Economic Journal*, 114(494), C95-C101.
- Dolton, P., Bondibene, C. R., & Wadsworth, J. (2012). Employment, Inequality and the UK Minimum Wage over the Medium-Term. *Oxford Bulletin of Economics and Statistics*, 74(1), 78-106.
- Goldsmith-Pinkham, P., Sorkin, I., & Swift, H. (2018). Bartik Instruments: What, When, Why, and How *NBER Working Papers* (Vol. 24408): National Bureau of Economic Research.
- Gregg, P., & Tominey, E. (2005). The Wage Scar from Male Youth Unemployment. *Labour Economics*, 12(4), 487-509.
- Jenkins, S. P. (1995). Easy Estimation Methods for Discrete-Time Duration Models. *Oxford Bulletin of Economics and Statistics*, 57(1), 129-138.
- Jones, M. K., Jones, R. J., Latreille, P. L., Murphy, P. D., & Sloane, P. J. (2013). A regional analysis of flows into and out of the UK National Minimum Wage. *Applied Economics*, 45(21), 03074-03087.
- Jones, M. K., Jones, R. J., Murphy, P. D., & Sloane, P. J. (2004). The Analysis of Flows Into and Out of The National Minimum Wage *Report for the Low Pay Commission*.
- Low Pay Commission. (2017). National Minimum Wage. Low Pay Commission Report 2017: Low Pay Commission.
- Manning, A. (2012). Minimum Wage: Maximum Impact. In R. Foundation (Ed.).
- Metcalf, D. (2008). Why Has the British National Minimum Wage Had Little or No Impact on Employment? *Journal of Industrial Relations*, 50(3), 489-512.
- Neumark, D., & Nizalova, O. (2007). Minimum Wage Effects in the Longer Run. *Journal of Human Resources*, 42(2), 435-452.
- Neumark, D., & Wascher, W. L. (2007). Minimum Wages and Employment. *Foundations and Trends in Microeconomics*, 3(1-2), 1-182.

- Nicoletti, C., & Rondinelli, C. (2010). The (Mis)specification of Discrete Duration Models with Unobserved Heterogeneity: A Monte Carlo Study. *Journal of Econometrics*, 159(1), 1-13.
- Prothero, R. (2016). *Travel to Work Area Analysis in Great Britain: 2016*. London: Office for National Statistics.
- Rinz, K., & Voorheis, J. (2018). The distributional effects of minimum wages: Evidence from linked survey and administrative data. *CARRA Working Paper Series*, 2018-02.
- Skinner, C., Stuttard, N., Beissel-Durrant, G., & Jenkins, J. (2002). The Measurement of Low Pay in the UK Labour Force Survey. *Oxford Bulletin of Economics and Statistics*, 64(Supplement), 653-676.
- Stewart, M. B. (2002a). Estimating the Impact of the Minimum Wage Using Geographical Wage Variation. *Oxford Bulletin of Economics and Statistics*, 64(Supplement), 583-605.
- Stewart, M. B. (2002b). *The National Minimum Wage and Labour Market Transitions Report for the Low Pay Commission*.
- Stewart, M. B. (2004). The Impact of the Introduction of the UK Minimum Wage on the Employment Probabilities of Low Wage Workers. *Journal of the European Economic Association*, 2(1), 67-97.
- Stewart, M. B. (2007). The Interrelated Dynamics of Unemployment and Low Wage Employment. *Journal of Applied Econometrics*, 22(3), 511-531.
- Stewart, M. B. (2012). Wage Inequality, Minimum Wage Effects, and Spillovers. *Oxford Economic Papers*, 64(4), 616-634.
- Stewart, M. B., & Swaffield, J. K. (2002). Using the BHPS Wave 9 Additional Questions to Evaluate the Impact of the National Minimum Wage. *Oxford Bulletin of Economics and Statistics*, 64(Supplement), 633-652.
- Swaffield, J. K. (2014). Minimum Wage Hikes and the Wage Growth of Low-Wage Workers. *Bulletin of Economic Research*, 66(4), 384-405.