

# Zero Hours Contracts and Labour Market Policy

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## Abstract

The evolving nature of atypical work arrangements is studied. A particular focus is placed on one such form of work relation: zero hour contracts (ZHCs). The paper uses existing secondary data and new survey data collected for the specific purpose of studying alternative work arrangements to describe the nature of ZHC work in the UK labour market. The interaction with labour market policy is explored, in the context of the 2016 introduction of the UK's National Living Wage. ZHC work is shown to be an important feature of today's work arrangements, and the wage cost shock induced by the new, higher minimum wage resulted in an increased use of ZHCs in the UK social care sector, and in low wage sectors more generally.

Keywords: Atypical work arrangements; Zero hours contracts; Minimum wage.

JEL Codes: J31, J32, J81

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## 1. Introduction

Contemporary labour markets feature the use of “atypical” work arrangements. Some of these – like self-employment and agency work – have emerged in their current format as an evolution of previous work structures. Others – like short hours and zero hours contracts<sup>1</sup> – reflect more the work demands of the modern age, with their introduction driven by technical and social change. The increased incidence of this kind of work has led to discussions of there being a trade-off between additional flexibility and the emergence of low wage, dead end jobs, which function outside the job legislation offered in conventional forms of employment.

From a research perspective, it is important to try to determine which side of this trade-off dominates, and if it differs by work arrangement. In this paper, we consider the case of the UK labour market where the rise of atypical work has been a key feature of the post-financial crisis period. The focus is placed specifically on one kind of alternative work arrangement that has increasingly entered the UK setting, namely zero hours contracts (ZHCs). Almost a million people are on ZHCs at the time of writing, out of a total workforce of 32 million. Many of these ZHC work positions are prominent in the low-wage sectors of employment. Their relevance to labour market policy that affects low wage levels is therefore high.

The principal focus of the paper is placed upon developing a better understanding of ZHCs and labour market policy. More specifically, in doing this, the paper has two main aims. The first is to empirically document the evolution and characterisation of ZHCs in the UK setting. There are two parts to this, the first drawing on data from the Quarterly Labour Force Survey and the second on newly collected survey data on alternative work arrangements. Part of the latter survey is devoted to ZHCs, which are only limitedly surveyed and understood in

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<sup>1</sup> Workers on zero hours contracts agree to be available for work as and when required, with no guaranteed hours or times of work.

existing survey data sources (Abraham and Amaya, 2018) and – consequently – in the literature, and the intention is to fill this gap with new evidence.

The second aim is to explore the extent to which labour market institutions have the scope to be, at least partly, responsible for the increased diffusion of flexible work arrangements, or – conversely – whether the latter are a consequence of factors that have little to do with labour market institutions and rigidities. In this paper, a particular policy focus is placed on minimum wages, where we are interested in understanding whether higher minimum wages have potential to induce a larger utilisation of alternative work arrangements by firms and, consequently, a shift in the composition of their workforce towards more flexible, but also insecure jobs.

In Europe, the rise of alternative work arrangements and gig-economy jobs is often considered an expression of the duality of the labour market, whereby the existence of rigidities in the “primary” market creates the conditions for an expansion of more flexible contractual relationships in the “secondary” market. Alternative work arrangements have also grown in the US, where labour markets are overall less rigid than in Europe, but minimum wages are an important component of labour market policies. By providing direct evidence on the role – or lack thereof – of minimum wage policies on the incidence of flexible work arrangements, this paper contributes to understanding a policy question relevant to both the US and European labour markets.

In the first part of the paper, survey-based evidence is presented to show that ZHCs are a key contract type in some, predominantly low wage, sectors of the UK labour market. They are characterised by the flexibility/dead end jobs trade-off already introduced above. They also feature, in different guises or by different names, in other countries’ employment structures. The second part of the paper analyses minimum wage policy and ZHC utilisation by exploiting a substantial increase in the minimum wage rate for workers aged 25 and over that took place

in the UK in April 2016, when a new minimum wage rate – the National Living Wage (NLW) – was introduced (Bell and Machin, 2017; Giupponi and Machin, 2018). In the UK setting, ZHC usage by employers does seem to have been affected by changes in labour market policy, as the sizable hike of the minimum wage that occurred when the NLW was introduced did shift more workers onto ZHC positions in the adult social care sector (and in low wage sectors more generally). To our knowledge, this is the first study connecting minimum wage changes to employer use of different types of job contracts.

The rest of the paper is structured as follows. In Section 2, a description of the atypical work arrangement under study, ZHCs, is given, together with a discussion of the extent to which other countries have similar job contracts. In Section 3, the relevant literature to the subject matter of the paper is discussed. Section 4 reports the analysis that documents the patterns of ZHC coverage in the UK labour market. Section 5 describes the evidence on minimum wages and ZHC jobs. Section 6 concludes.

## **2. Atypical Work Arrangements: Zero Hours Contracts**

### ***2.1 Zero Hours Contracts in the UK***

ZHCs are an employment contract under which a worker is not guaranteed any hours and is only paid for work carried out. It can be viewed as a form of on-call working, as workers can be offered hours at short notice, as and when an employer needs them. Workers are not obliged to accept work that has been offered to them<sup>2</sup> and, similarly, employers are not obliged to offer any work. Thus, ZHCs offer flexibility to both the employer and the employee, and, as a result, some workers may prefer them to typical fixed hour employment contracts. Conversely, due to the lack of security and guaranteed income, they are unlikely to be suitable

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<sup>2</sup> It is questionable however, whether all ZHC roles afford workers this ability in practice (Wakeling, 2014).

for many workers. Such contracts have become prevalent in particular industries such as retail, health, and hospitality.

ZHCs have, in theory, always been possible to be used by employers in the UK and have no specific legal status, rather being an informal term to refer to a type of contract. Their use has seen an increase over the past decade. Estimates from the Office of National Statistics (ONS) suggest that in 2008 143,000 employees were on ZHCs whereas by 2017 this figure was 883,000. Until 1998, ZHCs were often used to “clock off” workers during quiet periods nonetheless expecting them to stay on site, though this exploitative practice was ended in 1998 with the passing of the Working Time Regulations.

Table 1 presents a breakdown of various legislation coverage for different forms of employment relation in the UK setting. While ZHC workers are covered by some employment legislation, such as minimum wage coverage and holiday pay, legal complications have arisen due to the nature of the contract. One key area of contention has been whether a worker is also considered an “employee”, which would in turn grant them additional rights, such as unfair dismissal protection (Adams et al., 2018).<sup>3</sup> While the contract itself would not classify workers as employees, case law in the UK to date has concentrated more on whether there is a pattern of regular work being accepted, and if so the employee classification would be granted (Pyper and Powell, 2018).

ZHCs have received a fair amount of attention both in the UK media and from the UK Parliament. The Conservative-Liberal Democrat coalition government that was in power from 2010 to 2015 launched a review of the use of ZHCs in 2013. This raised four main areas of concern – exclusivity clauses, transparency of contracts offered to workers, uncertainty of earnings and an imbalance in the employment relationship. Up to now, the only area which has

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<sup>3</sup> Workers are still afforded a number of core employment rights, unlike for example, those gig economy workers who are officially self-employed and thus are not covered.

been legislatively addressed is that concerning exclusivity clauses, i.e. clauses that prevented workers on ZHCs from working for more than one employer. As of March 2015, the *Small Business, Enterprise and Employment Act 2015* came into force and effectively banned exclusivity clauses on ZHCs.

## ***2.2 Zero Hours-Like Contracts: the International Setting***

As stated above there is no legal definition in the UK for ZHCs, and thus international comparisons rely on assessing qualitative similarities. This can often be problematic due to the differences in terminology, legal status and governance. Similar atypical working arrangements however do exist and there is varied diffusion across Europe and other developed economies, though they often operate under different names, and levels of regulation. Caution should nonetheless be taken when drawing parallels as the welfare implications of such arrangements will also rely on factors such as union coverage and domestic economic performance.

Probably the largest proportion of such atypical contracts exists in Australia, where “casual employment” contracts are a legal classification and approximately 25% of employees are on such contracts. Around half of workers on these contracts receive variable earnings from one period to the next, and around a third would like more hours (Gilfillan, 2018). Australia is however an outlier in this case, since most developed economies where zero hours-like contracts are used generally have usage rates in the same region as the UK. In Canada 3.2% of employment is “casual employment” and in the US approximately 2.6% is “on-call”. In Europe, Finland reported 4% of employees on ZHCs, Norway 0.8%, in Netherlands 6.4% are “on-call”, and the Irish Quarterly National Household Survey reports that approximately 5.3% of Irish employees have constant variation in their working hours.<sup>4</sup> Given the varied definition and sometimes lack of a legal classification, equivalent statistics do not necessarily exist for all countries where there is diffusion.

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<sup>4</sup> Figures for Netherlands are from 2016, Finland, Ireland and US from 2015 and Norway 2010.

The attention these types of contracts have received in the media and parliament are not unique to the UK. Following union pressure, New Zealand passed regulation in 2016 which stipulated that firms needed to outline a minimum number of guaranteed hours each week and employee refusal of hours beyond that should not result in any detriment to the worker. Furthermore, it introduced the requirement of compensation to the worker if shifts were cancelled at short notice. In Finland, a Citizen's Initiative gathered 50,000 supporters to ban ZHCs, and though it was rejected by parliament, a number of proposals have been made in order to regulate such employment relationships. The most recent looks to ensure that employers present a valid reason (relating to demand fluctuations) as to why they require to use a ZHC. Extensive regulation was introduced in 2012 and 2013 to "on-call" work in Italy and has severely restricted the use of zero hours-like contracts to only older and younger age groups, and in 2014 further regulation was introduced in both the Netherlands and France.

Table 2 presents a comparative set of descriptions and associated regulations for zero hours-like contracts in Western Europe (where they are present) and for the US. Western Europe generally experiences significant regulation of zero hours-like contracts. For example, while proliferation in the EU is largest in the Netherlands, workers there enjoy regulations that ensure a minimum number of hours of work whenever they are called to work, as well as agreed hour adjustments based on the previous 3 months of work. Conversely, unlike the UK, employees must work when called upon. Such idiosyncrasies exemplify how outwardly similar contractual agreements may have very different implications when in action. What is evident, however, is that the UK, Sweden and the US (aside from some specific cities) appear to have the least regulation of zero hours-like contracts. Union density in Sweden is high (around 70%), but in both the UK and the US rates are much lower (23.2% and 10.7% respectively). Thus, proliferation of zero hours (-like) contracts in the UK and the US, where workers' real wage growth has been weak, are likely to have the most significant welfare implications.

### **3. Related Literature**

#### ***3.1 Atypical Work Arrangements***

Employment relationships such as ZHCs, diverging from the standard full-time, permanent, regular and single employer set-up have been characterised as “atypical” (Eurofound, 2017) and such working arrangements have seen a large amount of growth in the past two decades in a number of developed economies (Eichhorst and Tobsch, 2013; Gielen and Schils, 2014; Katz and Krueger, 2016; LSE Growth Commission, 2017). The concept of “atypical” work arrangements has always been somewhat nebulous, but spans a variety of working practices including part-time, agency, contract, short fixed term, contingent and independent contracting. Studies have demonstrated the large heterogeneity across these types of employment relationships, though part time and temporary work fare relatively badly in terms of wages when compared to their standard counterpart (Kalleberg, 2000).

ZHCs most closely match the definition for contingent work,<sup>5</sup> and early literature suggested that atypical working arrangements, especially in the form of temporary or contingent work, offered workers lower wages, fewer benefits, less security and little scope for human capital development (Rodgers and Rodgers, 1989; Beard and Edwards, 1995; Nollen, 1996; Kalleberg, 2000). Conversely, however, more recent (albeit weak) evidence has suggested that atypical work may serve as a stepping stone to more stable employment in the long run, when faced between an option of continued job search and atypical employment (Addison and Surfield, 2009).

The past few years have seen a growth in the interest in atypical or “alternative” work arrangements with a small portion of the literature presenting descriptive evidence as well as trying to understand the mechanisms driving the shift to such types of work. Factors that have

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<sup>5</sup> “Any job in which an individual does not have an explicit or implicit contract for long-term employment or one in which the minimum hours worked can vary in a non-systematic manner,” (Polivka and Nardone, 1989).



been suggested to be contributors include weak demand conditions, worker's preferences and technological change; where the latter of these may work by reducing transaction costs. Since transaction costs – such as search, monitoring and enforcement costs – are, according to Coase (1937), factors that lead to the creation of the firm, it is likely that technological change would lead to a blurring of the boundaries of the firm.

Katz and Krueger (2019) found that, over the ten year period between 2005 and 2015, the proportion of workers engaged in some form of alternative work arrangement grew by 10-20% in the United States, while analysis of the UK labour market has shown a growth in both the prevalence of ZHCs as well as individuals described as “self-employed with no employees” (LSE Growth Commission, 2017).

Katz and Krueger (2017) report US findings that individuals who suffer periods of unemployment are 7-17% more likely to be employed in alternative work arrangements 1 to 2.5 years later than their observational counterparts who did not experience such unemployment. These results suggest that at least one factor that could be driving the supply side of the atypical labour market is a weakening of market power for workers. Additionally, Mas and Pallais (2017) use a discrete choice experiment to elicit willingness to pay for alternative work arrangements for call centre workers and find that the average worker is willing to give up a fifth of their wages to avoid an employer dictated work schedule. This gives further evidence that low paid workers finding themselves in contingent work arrangements are likely to be engaged in such work out of necessity rather than choice.

To our knowledge there is little recent research concerning the factors driving labour demand for contingent work arrangements. There are obvious benefits to employers, in particular the ability to reduce wage liabilities and cope with seasonal and weekly fluctuating demand conditions. Dube et al. (2018) present evidence demonstrating significant monopsony power on an online labour market platform, though it should be noted such self-employed

“HIT” work does have some key differences to more traditional sectors, which generally offer more on-going work.

### ***3.2 Minimum Wages***

Over its long existence as a key research area in labour economics, the minimum wage literature has evolved along three main lines of research. The primary and most traditional focus has been on the employment and unemployment effects of minimum wages, which have proven elusive to detect in many cases. Early studies based mostly on US time-series work found negative employment effects among teenagers (Brown, Gilroy and Kohen, 1982). However, apart from those, the vast majority of quasi-experimental micro-based work that started in the early 1990s in the US and the UK (Card and Krueger, 1994; Machin, Manning and Rahman, 2003; Stewart, 2004; Giupponi and Machin, 2018), and of more recent analyses based on spatial identification in the US find hardly any evidence of disemployment effects of minimum wages (Dube, Lester and Reich, 2010 and 2016; Baskaya and Rubinstein, 2015; Clemens and Wither, 2014).<sup>6</sup>

Partly in response to this fairly widespread inability to find evidence of disemployment effects, a second strand of research has investigated other margins through which firms can adjust to the wage cost shock induced by the minimum wage increase. Examples of such margins of adjustment are prices (Aaronson, 2001; MaCurdy, 2015; Harasztosi and Lindner, 2017), profits (Draca, Machin and Van Reenen, 2011), firm value (Bell and Machin, 2018) and the quality of services provided (Giupponi and Machin, 2018). A third body of the literature has looked at the impact on wage inequality at the bottom of the distribution, and at wage spillover effects up the wage distribution and onto legally unaffected workers (DiNardo, Fortin

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<sup>6</sup> In a rather different context of union bargained minima, Kreiner et al. (2017) study the effect of a change in the youth minimum wage in Denmark and find an employment elasticity to the wage rate of -0.8.

and Lemieux, 1996; Lee, 1999; Autor, Manning and Smith, 2016; Giupponi and Machin, 2018).

To the best of our knowledge, this is the first paper examining the impact of a minimum wage change on contractual arrangements. We thus contribute to the existing literature by assessing the impact of minimum wages on workers' employment conditions (other than pay) and on the utilisation of flexible contractual forms by firms that can act as buffers against the wage cost shock. We do this by exploiting the introduction of the National Living Wage (NLW) in the UK in April 2016. The NLW is the mandated minimum wage rate for workers aged 25 and over; it was set at £7.20 an hour from April 2016 to March 2017, then uprated to £7.50 in April 2017.<sup>7</sup> As demonstrated by Figure A1 in Appendix A, while the UK has had various national minimum wages (NMW) in place since 1999, the NLW introduction represented a substantial (7.5%) increase in the wage floor for those aged 25 and over.

## **4. Zero Hour Contracts**

### ***4.1 ZHCs in the Labour Force Survey***

The Labour Force Survey (LFS) is a quarterly cross-sectional survey of the UK labour market. Each quarter contains data on approximately 35,000 employees, some of whom could be on a ZHC. Questions relating to flexible work arrangements are asked only in quarters April-June and October-December therefore in each year it is only these two quarters that are analysed.

Table 3 presents summary statistics for both all employees and ZHC employees for 2017. Of all workers in 2017, around 2.7% are recorded as being on ZHCs. ZHC workers are on average more likely to be younger, female, and still in full time education, though still a large proportion (over 80%) have completed their full-time education. It is unsurprising that

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<sup>7</sup> Further details on UK minimum wage policies and the National Living Wage will be provided in Section 5.

female workers experience a higher incidence of ZHCs given they are more prevalent amongst part time employees. Typically, ZHC workers have lower tenure, though it is unclear whether this is due to higher ZHC worker turnover rates or if longer tenured ZHC workers are more likely to be placed on more secure contracts. The mean hourly wage for ZHC workers is around £5 lower than the equivalent for all workers, and they work on average 10 hours less per week than the average employee. Interestingly, the median hourly wage for ZHC workers is very close to the 2017 NLW of £7.50 per hour, within approximately 5%.

Figure 1 and Table 4 exemplify the importance of the NLW for ZHC workers. Figure 1 shows there to be a very sizable spike in the wage distribution for ZHC workers at the 2017 NLW of £7.50 an hour. Table 4 shows that, while the NLW is important for a significant proportion of all employees, with around 6% paid exactly the NLW and 20% likely to be affected by the subsequent minimum wage uprating, the 2016 and 2017 upratings affected a lot more – around half – of all ZHC workers. This latter figure could increase when one considers the possibility of wage spillover effects up the distribution.<sup>8</sup> While the NLW is age specific and mandatory only for those aged 25 and over, there is strong evidence that there are spillovers for workers aged under 25 (Giupponi and Machin, 2018). Indeed, one can see that the proportion paid exactly the NLW is identical for all employees and for those aged 25 and over. This identity is lost, but only marginally, when considering ZHC workers.

The LFS also has a panel version of the survey, albeit with a much smaller sample size. We use this to produce transition Tables 5 and 6, which detail flows into/out of ZHC positions from/to different types of economic activity. As can be seen by the diagonals in both tables, ZHCs have the lowest persistence of all working arrangements presented. Over the period analysed (2015-2018) just over a third of ZHC workers remained in ZHC positions after 5

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<sup>8</sup> For evidence on the existence (or lack thereof) of spillover effects in the UK see Stewart (2012), Low Pay Commission (2009) and Butcher et al. (2012).

quarters and, of ZHC workers, only a quarter were ZHC workers 5 quarters before. ZHC workers are most likely to transition from and to other forms of part time employment, full time employment and inactivity.

These patterns of work dynamics act to confirm the somewhat precarious nature of ZHCs as a form of employment. One issue that emerges is whether workers who move from ZHCs into more secure working arrangements (part time and full time employment) do so by changing employer, or if after a period of time their employer offers a more secure contract. Equally, there is the question of whether those in “regular” work get reclassified by employers onto ZHCs. Sample size issues preclude any systematic and robust probing of this question with the data we have available, but when we investigated the interaction between job changes and changes in ZHC status for non-job changers, we found there to be a roughly half and half mixture of job moves and reclassifications. Clearly both are happening, but this remains suggestive as reaching a firmer conclusion would require more detailed and larger sample size longitudinal data than we are currently able to study.

#### ***4.2 ZHCs in the LSE-CEP Survey of Alternative Work Arrangements***

In order to better understand the role of alternative work arrangements in the UK, between February 5<sup>th</sup> and March 2<sup>nd</sup> 2018, we ran the “LSE-CEP Survey of Alternative Work Arrangements” using an online platform. While the survey was designed to be representative of the UK population aged 18-65, its main goal was to collect information on both the types of jobs and characteristics of workers involved in alternative work arrangements. The survey questionnaire is reproduced in Appendix B. The survey questioned approximately 20,000 individuals, of which just fewer than 19,000 remained in the cleaned sample.<sup>9</sup>

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<sup>9</sup> Respondents were excluded from the cleaned sample if they responded with gibberish to any open questions and/or did not answer the attention questions correctly.

Table A1 in Appendix A presents descriptive statistics for the sample of respondents of the LSE-CEP survey. The survey is equally represented across sex and the age distribution, with a slightly lower participation rate for the ends (18-24 and 55-65) of the surveyed age distribution. Additionally, there is a healthy mixture of qualification attainment as well as regional representativeness across the UK. Around half of our sample are employed by a private company, a further quarter are employed by either a non-profit or government and the remainder are split between some form of self-employment or not working. Sample attrition during cleaning does not appear to fundamentally change any of these statistics.

Table 7 presents descriptive statistics for ZHC workers, for the cleaned sample. ZHCs are spread roughly equally across the sexes of respondents, which is marginally different to the LFS proportion shown earlier in Table 3. ZHC workers in our survey are on average younger than the average worker, though surprisingly share a similar distribution of educational qualifications as all workers in the survey. One may have assumed that workers experiencing more insecure employment contracts would be those with lower skill sets and thus market power, however these summary statistics suggest otherwise. On the whole, a region's share of ZHC workers is roughly the same as their share of workers overall. However, London appears to be anomalous in that its share of ZHC workers is about four fifths higher than its share of workers. Interestingly, a large proportion of ZHC workers (42% in the cleaned sample) hold multiple jobs, and around a third hold a job with a more secure contract. This is suggestive that ZHC jobs may act as a form of "top up" income for some workers, and additionally some ZHC workers may hold multiple ZHC jobs as a form of insurance due to the possibility of lack of hours.

Hourly wages for ZHC workers in our survey are paid an average of £11.63 per hour; this is slightly higher than the same figure produced by the LFS for ZHC workers (£9.77). Figure 2 presents the hourly wage distribution for ZHC workers in our survey. It can be seen

that the modal hourly rate is £8 and that there is a large proportion of individuals paid around the region of the NLW rate of £7.50. Thus, it is likely to be the thicker right tail that is driving up the mean wage in the CEP survey compared to the LFS, rather than the entire distribution being centred higher.

The average number of hours worked is low (around 19 per week) and similar to the figure found in the LFS. This further concretises the fact that many ZHC workers are working less than full time. Figure 3 presents the weekly hours distribution. There is a large spread of the hours performed, with almost 10% of workers not doing any hours the previous week, which may well be reflective of the insecurity related to some ZHC jobs. There does appear to be a selection of workers performing full time (or above full time) hours, whether these hours are regular is however unclear.

What is striking is that around one third of ZHC workers do unpaid work each week, averaging at 7 hours per week. This would imply the average worker is losing out on approximately £80 per week. Such losses may be particularly important for social care workers (who we study in more detail below). As discussed in Rubery et al. (2014) domiciliary carers for example only get paid for face to face time, and time spent driving between clients may result in what they call a ‘fragmented time contract’. Almost two thirds of ZHC workers have been working for over five years. Conversely, over half of those sampled have less than one year experience on a ZHC, suggesting that an abundance of those on ZHCs have previously held non-ZHC working arrangements.

There are a few industries which stand out as having a large share of workers on ZHCs. In particular, retail, education, accommodation and food services, and health and social work. For retail and accommodation and food services this is unsurprising, as these professions are characterised by having a larger proportion of workers on part time contracts and may be subject to seasonal fluctuations. The health and social work sector has the highest proportion

of ZHC workers (15%). The social care sector, which falls under this heading, has not only a large number of low paid staff, but also faces an informal price cap for its output good, as a large proportion of those receiving social care are council funded. It is thus a perfect sector to analyse to assess whether firms facing growing wage bills due to the NLW are likely to use ZHCs to reduce their wage liability.

#### ***4.3 LSE-CEP Survey Representativeness***

Table A2 in Appendix A presents demographic variables (similar to those in Table 7 and Table A1 in Appendix A) for both all respondents and ZHC workers from the LFS, and can be used to check for the representativeness of the CEP survey. In terms of overall representativeness, our survey fares well with respect to age, qualifications and regional distribution. Our survey does however under sample those who did not have a job last week. Furthermore, the survey's representativeness of ZHC workers is generally good, however one can see that the mean hourly wage is just under £2 per hour higher in our survey. The median wages however are more similar (the gap reduces to £0.64), which suggests that the LSE-CEP survey has a slightly fatter right-hand tail of the wage distribution as discussed in section 4.2.

#### ***4.4 LSE-CEP Survey Results***

In this subsection, we report a second set of results that emerged from the survey of employees on ZHCs, with a focus on workers preferences and employment conditions.

An important question is whether workers choose to be on ZHCs for the flexibility that they offer, or would instead like a job with a minimum number of guaranteed hours but could only find employment as ZHC workers. Our survey results suggest an almost even split between workers who are satisfied with their number of hours (40 percent) and workers who would rather work more hours (44 percent), while a remaining 16 percent would like to work fewer hours (Figure 4). Of those wanting to work more hours, when asked about the reason why there are unable to work more hours, 74 percent point to the lack of available work,



followed by another 15 percent who are instead constrained by domestic commitments (Figure 5). As reported in Figure 6, domestic commitments are also the main reason brought about by people who would like to work fewer hours (38 percent), followed by the desire to spend more time on leisure and other unpaid activities (26 percent) or other types of work (14 percent), impediments due to illness or disability (10 percent) and study commitments (7 percent). In addition to the number of hours worked, the pattern of those hours may also be a relevant dimension of workers' satisfaction with their jobs. As with the desired number of hours, there appears to be an almost even split between respondents who would like to have a more regular pattern of hours (45 percent) and those who are satisfied with their current pattern of hours (43 percent), with the remaining 12 percent wanting a less regular schedule (Figure 7).

The survey responses regarding desired hours and work time patterns are suggestive of an almost even dichotomy between workers who are happy with the amount of work that they do, and workers who would like to work more but are unable to. We further investigate this issue by asking ZHC workers what are the reasons for their being on a ZHC (Figure 8). In line with our previous findings, the two main reasons that stand out are the inability to find employment in a job with a guaranteed number of hours (28 percent) and the flexibility to perform other activities (28 percent). Less prominent reasons are – in order of relevance – better remuneration than other available jobs (20 percent), complementing pay from other jobs (14 percent) and earning while studying (7 percent). Overall, 51 percent of respondents state that they are either satisfied or very satisfied with their ZHC job, 28 percent are neither satisfied nor dissatisfied, and the remaining 21 percent are dissatisfied or very dissatisfied (Figure 9).

Finally, we are interested in whether ZHC workers receive training and what type of training they would find most useful. According to our survey results, 55 percent of ZHC workers had received some form of training in the past year. As illustrated in column (1) of Table 8, the most common types of training are – in order of importance – safety training (56

percent), skills training (54 percent), quality training (30 percent), and professional and legal training (22 percent). Training was paid for by employers, contractors, customers or someone else in 72 percent of cases, by the respondent in 16 percent of cases and free for the remainder 12 percent (Table 9). We also asked all ZHC respondents what type of training they would find useful for their future job prospects (column (2) of Table 8): skills training stands out as 50 percent of respondents indicate is as useful, followed by safety training (27 percent) and other types of training (all deemed useful by approximately 23 percent of respondents). It therefore seems that, when offered, training meets individual requirements.

## **5. ZHCs and Minimum Wages**

### ***5.1 Conceptual Framework***

As documented in the previous sections, a large fraction of workers on ZHCs are paid the minimum wage. An interesting question that is relevant for policy is to assess whether labour market policies such as minimum wage upratings are responsible for the increased diffusion of ZHCs, or – conversely – the latter are a consequence of factors that have little to do with labour market institutions. In the first case we should see that a raise of the minimum wage increases the utilisation of ZHCs. In second case, we should see no effect of the minimum wage on ZHC usage. The rationale for a causal effect of minimum wage policies on ZHC utilisation is that ZHCs can help firms buffer the wage cost shock due to the minimum wage increase by allowing them not to commit to a minimum number of hours. At the same time, though, the burden of insecurity would be transferred from firms onto risk-averse employees, potentially worsening the employment conditions of individual workers.

In this section, we exploit a large minimum wage increase recently implemented in the UK – the National Living Wage introduction – to shed light on the causal effect of minimum wage policies on the incidence of ZHCs. We do so in the context of the English adult social

care sector, which previous research has demonstrated to be highly vulnerable to minimum wage increases (Machin, Manning and Rahman, 2003; Machin and Wilson, 2004; Giupponi and Machin, 2018) and which can therefore provide a good testing ground for the effects of minimum wage policies.

Whilst there is a sample selection issue of studying care workers, and associated questions of generalisability for the UK workforce more widely, looking at the adult social care sector allows us to have good quality data on hourly wages and contractual arrangements (which are necessary to answer well the question that we ask). Also, the fact that flexible work arrangements are already largely in use in this sector means that – if the NLW has an impact on ZHC utilisation – this is a sector in which we can see it. Moreover, the estimates are relevant for other low-pay, ZHC-intense sectors, like hospitality and retail, which are those we care about the most when studying the economic effects of minimum wage floors.

## ***5.2 The Introduction of the National Living Wage***

The first UK national minimum wage policy dates back to April 1999, when the National Minimum Wage (NMW) was first introduced. At that time, a minimum hourly wage of £3.60 for workers aged 22 and over, and a lower rate of £3.00 for workers aged between 18 and 21 were established. Additional rates have been introduced in subsequent years, so that as of October 2015 the NMW rates were as follows: an adult minimum rate of £6.70 for workers aged 21 and over, a youth development rate of £5.30 for those aged 18-20, a youth minimum of £3.87 for 16-17 year olds and an apprentice rate of £3.30.

On July 8<sup>th</sup> 2015, the newly elected Conservative Party government called an emergency budget, in which the Chancellor George Osborne announced the introduction of the National Living Wage (NLW). This unexpected intervention changed the structure of minimum wages by introducing a new minimum wage rate of £7.20 an hour for workers aged 25 or above starting from April 1<sup>st</sup> 2016, while leaving the minimum wage rates for younger

workers unchanged.<sup>10</sup> Five minimum wage rates are now in operation in the UK: the NLW for workers aged 25 and over, the NMW for 21-24 year olds, the youth development rate for 18-20 year olds, the young worker rate for 16 and 17 year old, and the apprentice minimum wage.<sup>11</sup>

The NLW introduction was an unexpected and radical policy intervention. Firstly, it came from a political party that had traditionally been hostile to minimum wages, especially at the time of the NMW introduction in April 1999. Secondly, the NLW introduction generated a wage change much larger than recent updates, namely an increase of 10.8 percent at the time of announcement in July 2015 and of 7.5 percent at the time of implementation on April 1<sup>st</sup> 2016. Most importantly for our analysis, the unexpected and sizable wage shock generated by the NLW introduction provides a unique “experiment” to study the consequences of the minimum wage increase and the wage cost shock it induced on employers’ use of ZHCs.

### ***5.3 The Adult Social Care Sector***

The impact of the NLW introduction on ZHC utilisation is studied in the context of workers and firms in the English adult social care sector. Specifically, we will consider adult social care providers operating in the residential care home industry and the domiciliary care industry. Residential care refers to the provision of accommodation and personal care to adults in a communal residential centre, which may or may not provide nursing facilities. Members of staff in residential care homes are predominantly care assistants, who provide 24 hour supervision, meals and help with personal care needs. Domiciliary care – also referred to as home care – is a social care service provided to people who live in their own houses and require assistance with personal care routines, household tasks such as cleaning and cooking, or any other activities they may need to live independently. Domiciliary care assistants typically work

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<sup>10</sup> Additionally, the NLW was set to achieve 60% of median earnings by 2020, which – at the time of the announcement – were forecasted to be £9.00 by the UK Office for Budget Responsibility.

<sup>11</sup> See Giupponi and Machin (2018) for a comprehensive discussion of minimum wages in the UK and for an empirical analysis of the wage and employment consequences of this significant change in the structure of minimum wages.

individually, and are often contracted on flexible working hours or zero hours contracts since domiciliary care work tends to be organised into short and fragmented home visits.

The choice of focussing on the adult social care sector is motivated by various reasons. Firstly, the sector is highly vulnerable to minimum wages changes, as it has many low-paid workers. Of these, the vast majority are older than 25, making the setting especially suited to analysing the NLW introduction. Secondly, the sector is close to what can be considered a competitive labour market, as it consists of a large number of relatively small firms providing a rather homogeneous service, and it is very labour intensive and not unionised. Thirdly, residents' fees are regulated and paid for by local authorities, making it difficult for firms to pass higher costs onto prices. For all these reasons, a minimum wage change is likely to have a substantial impact on total costs and on economic outcomes of workers and firms in this sector, which therefore provides a useful testing ground for analysing the impact of minimum wage policies. In other words, the high vulnerability to minimum wage increases the likelihood of finding large effects from wage shocks. Finally, the incidence of ZHCs is high – particularly in the domiciliary care industry – making this setting especially suited to studying the impact of the NLW on ZHCs.

#### ***5.4 Data Sources***

The main data source that is used to analyse the effect of the NLW introduction on ZHC utilisation is the National Minimum Dataset for Social Care (NMDS-SC).<sup>12</sup> This is an online system administered by Skills for Care and funded by the UK Department of Health that collects information on the adult social care workforce in England. Social care providers can use NMDS-SC to record and manage information about their workers, such as payroll data, training and development, job roles, qualifications and basic demographics. By having an account and regularly updating it, providers are given access to a set of tools to visualise and

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<sup>12</sup> NMDS-SC (2013, 2014).

analyse their data, submit applications for training and development funds, compare their employment and pay structure with those of other providers locally, regionally or nationally, access publications about the social care sector and other e-learning resources for free, and directly share their data and returns with authorities such as the Care Quality Commission and the NHS. No fee is charged to use NMDS-SC. However, in order to benefit of certain facilities, providers must update their account at least once per year.

The dataset is a panel of matched employer-employee data. For each provider, we have information on the industry and main service provided, service capacity and utilisation, number of staff employed, geographic location and system update dates. For workers, we have information on demographics (gender, age and nationality), job characteristics (job role, contract type and qualifications), contracted weekly hours, hourly pay and update date of the hourly pay rate. We have access to the snapshot of the NMDS-SC online system at monthly frequency from March 2015 to March 2017, each snapshot including all providers in the system at that date.

A second data source is the Care Quality Commission (CQC) registry.<sup>13</sup> The registry contains a complete record of all active English care providers regulated by CQC at monthly frequency. It provides information on the activity status of providers and therefore allows us to identify when homes shut down and when new homes enter into the market.

### ***5.5 Sample Design***

Around 22,000 providers are registered with NMDS-SC as of March 2016. Of these, approximately 10,000 are residential care homes with or without nursing, and 3,800 are domiciliary care agencies. We match the sample of residential care homes and domiciliary care agencies with the CQC registry of active locations from March 2015 to March 2017, from

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<sup>13</sup> The CQC is the independent regulator of health and adult social care in England. It is responsible for setting standards of care and for monitoring, inspecting and rating adult social care providers, to make sure that they meet fundamental standards of quality and safety.

which we can obtain information on whether a firm is active or closed in a given month. Our sample comprises care homes that meet the following three criteria: (i) being active from March 2015 through to March 2017 according to the CQC registry, (ii) having a record on NMDS-SC for all those months and (iii) having updated their NMDS-SC account at least once after March 2016.<sup>14</sup> This selection leaves us with a balanced panel of 4,680 firms that are active in March 2016 and remain open until March 2017.<sup>15</sup>

### ***5.6 Descriptive Statistics***

Table 10 reports descriptive statistics for all firms in the balanced sample, and for care homes and domiciliary care agencies separately, as of March 2016. The adult social care sector is characterised by relatively low hourly pay (£7.57 per hour on average) and a large fraction of workers are aged 25 and over (88 percent on average), which are indicative of a high vulnerability to minimum wage increases in general and to the NLW introduction in particular.

The statistics reported in Table 10 also show that the care home sector is characterised by medium-sized establishments employing on average 45 employees. Domiciliary care agencies have a larger pool of employees as compared to care homes (66 vs 39 employees on average), and a remarkably higher proportion of zero hours contract workers (38 vs 5 percent) that translates into lower average weekly hours (16 vs 29 hours). Moreover, the proportion of workers on other flexible work arrangements such as temporary, bank or agency contracts, is almost twice as large in the domiciliary care sector (14 vs 8 percent). These differences most likely stem from the very nature of domiciliary care work, which tends to be organised into

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<sup>14</sup> In order to avoid introducing sample selection driven by unobservable worker and firm characteristics correlated with the timing and frequency of updating, we do not condition our sample on a specific update date and only require that a firm update its records once in the twelve months after April 1st 2016. Approximately 90 percent of NMDS-SC users update within a year.

<sup>15</sup> In our sample we have a total of 3599 care homes and 1081 domiciliary care agencies. According to the 2017 report on the care home market of the Competition & Market Authority (2017), there are approximately 9500 care homes in England. This implies that our sample represents approximately 38 percent of the market for care homes. According to a 2016 report of the United Kingdom Home Care Association (2016), the total number of registered locations providing domiciliary care in England was 8,500 in March 2016. This implies that our sample represents approximately 13 percent of the market of domiciliary care agencies.

short and fragmented home visits to customers, so that domiciliary care assistants are often contracted on flexible working hours.

Apart from substantial differences in the types of working arrangements, the two sectors have an almost identical gender and age composition and similar wage rates. The main occupation in both sectors is care assistant and only a very small share of the workforce holds a nursing qualification. All these characteristics confirm that the adult social care sector is a pertinent context to the studying of the effects of the NLW introduction on wages and contractual arrangements.

### ***5.7 NMDS-SC Representativeness***

We check the representativeness of the NMDS-SC data using data from the ONS's Labour Force Survey (LFS). Table A3 in Appendix A reports the mean and standard deviation for a set of individual-level characteristics for care workers in the LFS.<sup>16</sup> The Table also reports the same characteristics for care workers at the firm level in NMDS-SC. Demographic variables relating to gender, age and region line up very closely. The hourly wage rate and number of weekly hours worked are slightly higher in the LFS data, while the proportion of workers on ZHC is slightly lower. The discrepancy in average weekly hours in LFS and NMDS-SC is most likely due to the fact that the variable in LFS refers to actual hours worked, while in NMDS-SC to contractual hours, which – for ZHC workers – are equal to zero and therefore pull down the mean. The larger fraction of workers on ZHCs in NMDS-SC may be due to the fact that, in this dataset, we cannot account for multiple job holders, which tend to be more frequent in ZHC jobs. All in all, the statistics appear to line up quite satisfactorily, mostly showing a consistent pattern across sources.

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<sup>16</sup> We select employees with standard occupation classification (SOC2010) marked as “care workers” in the LFS. LFS data refer to 2015Q4 and 2016Q1. NMDS-SC data refer to March 2016.



## 5.8 Empirical strategy

This section explores whether the minimum wage increase due to the NLW introduction had an impact on the share of workers on zero hours contracts. By tilting the composition of the workforce towards contracts without a guaranteed number of hours, employers can easily adjust employment at the intensive margin, either on top of or in substitution to adjustments along the extensive margin. Consistent with previous work (Giupponi and Machin, 2018), we will show that the NLW did not have a significant impact on employment, suggesting that any substitution toward contracts with flexible working arrangements is to be interpreted as an adjustment at the intensive margin.

The empirical strategy is based on a difference-in-differences methodology in which we exploit between-firm variation in the pre-NLW proportion of workers that would be affected by the minimum wage increase, in order to identify the effect of the minimum wage hike on ZHC utilisation. The regression specification reads as follows:

$$\Delta^q Y_{j,t} = \alpha_{1,t} + \beta_{1,t} MIN_{j,Mar2016} + X'_{j,Mar2016} \gamma_{1,t} + \xi_{j,t} \quad (1)$$

where  $\Delta^q Y_{j,t}$  is the quarter-on-quarter change in the proportion of workers on a ZHC in firm  $j$  between quarter  $t$  and quarter  $t - 1$ ;  $MIN_{j,Mar2016}$  is the proportion of low-paid workers in firm  $j$  as of March 2016;  $X$  is a vector of pre-NLW firm-level characteristics measured in March 2016, including the proportion of female workers, the average age, the proportion working as care assistants, the proportion with nursing qualification, the occupancy rate and a set of local authority districts fixed effects;  $\xi$  is a disturbance term.<sup>17, 18</sup> The subscript  $t$  indicates the quarter relative to March 2016, which is normalised to take value  $t = 0$ . The variable  $MIN_{j,Mar2016}$  is constructed as the proportion of workers that in March 2016 were paid below the age-specific

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<sup>17</sup> Data on the gender and age composition, and on the occupancy rate is missing for some firms. Such missing information is controlled for via a set of dummy variables.

<sup>18</sup> There is a total of 325 local authority districts in our sample and of 326 local authority districts in England. They split England into 326 areas of local governance.

minimum wage rate that would be in place as of April 2016. In other words, the variable provides a measure of the NLW bite at firm level.

The coefficients  $\beta_{1,t}$  for  $t = -4, \dots, 0$  are treatment leads and provide an easy way to test whether there is any correlation between ZHC utilisation and the proportion of low-paid workers prior to the NLW introduction. In other words, the leads allow to test whether there were divergent trends in ZHC utilisation between firms more and less exposed to the minimum wage increase before the policy change. This is equivalent to testing for the parallel trends assumption in a traditional difference-in-differences setting.

To document the evolution of the relationship between the low-paid proportion and ZHC growth in the post-reform quarters, we measure the outcome variable  $\Delta^q Y_{j,t}$  as the long difference between March 2016 and, respectively, June 2016, September 2016, December 2016 and March 2017. This is equivalent to estimating the cumulative effect of the reform over post-reform quarters, i.e. the sum  $\sum_{t=1}^k \beta_{1t}$  for  $k = 1, \dots, 4$ .

The empirical strategy rests on the assumption that firms with the highest potential to be affected by the NLW introduction were indeed those that experienced larger wage growth in the quarters following the policy change, as a consequence of the NLW introduction. Firstly, we provide evidence that this is indeed the case. Secondly, we show that the between-firm correlation between the proportion of pre-NLW low-paid workers and wage growth is entirely due to the minimum wage change. To this end, we estimate a regression specification similar to model (1), using quarter-on-quarter wage growth as outcome variable. The regression specification reads as follows:

$$\Delta^q \ln W_{j,t} = \alpha_{2,t} + \beta_{2,t} MIN_{j,Mar2016} + X'_{j,Mar2016} \gamma_{2,t} + \eta_{j,t} \quad (2)$$

where  $\Delta^q \ln W_{j,t}$  is the quarter-on-quarter change in the logarithm of the average hourly wage in firm  $j$  between quarter  $t$  and quarter  $t - 1$ ;  $MIN_{j,Mar2016}$  is the proportion of low-paid workers in firm  $j$  in March 2016;  $X$  is the set of above listed covariates and  $\eta$  a disturbance

term. Analogously to what discussed for model (1), the coefficients  $\beta_{2,t}$  for  $t = -4, \dots, 0$  are treatment leads that allow to test the exogeneity of the minimum wage increase. For post-NLW quarters, we measure hourly wage growth ( $\Delta^q \ln W_{j,t}$ ) between March 2016 and, respectively, June 2016, September 2016, December 2016 and March 2017.

### 5.9 Main results

Figure 10 reports the coefficients  $\beta_{2,t}$  for  $t = -4, \dots, 0$  and the cumulated sum  $\sum_{t=1}^k \beta_{2t}$  for  $k = 1, \dots, 4$ , from estimating model (2) on the balanced panel of firms that are active throughout all months between March 2015 and March 2017. The dots indicate the estimated coefficients and the capped vertical bars report 95 percent confidence intervals based on robust standard errors. The specification allows for heterogeneity in the  $\beta_{2,t}$  coefficients between care homes (hollow circles) and domiciliary care agencies (black circles) and includes the full set of controls. The results provide compelling evidence of the causal effect of the minimum wage change on hourly wage growth: whilst no significant correlation between the low-paid proportion and quarter-on-quarter wage growth can be detected prior to the NLW introduction, a statistically significant correlation emerges from the first quarter following the minimum wage increase.

In order to ease the interpretation of the results, Table 11 reports the estimates of the cumulated sum  $\sum_{t=1}^k \beta_{2t}$  for  $k = 4$ . This is equivalent to estimating the following specification:

$$\Delta \ln W_{j,t} = \alpha_3 + \beta_3 \text{MIN}_{j,\text{Mar2016}} + X'_{j,\text{Mar2016}} \gamma_3 + v_{j,t} \quad (3)$$

where  $\Delta \ln W_{j,t}$  is the change in the natural logarithm of the average hourly wage in firm  $j$  between March 2016 and March 2017; all other variables are defined as above and  $v$  is a disturbance term. The parameter  $\beta_3$  captures the relationship between the proportion of low-paid workers and the average hourly wage growth in the 12 months after the NLW introduction.

The specifications in columns (1) and (3) of Table 11 report the estimated coefficient  $\beta_3$  for the pooled sample of care homes and domiciliary care agencies, while those in columns

(2) and (4) allow  $\beta_3$  to vary across the two sectors. The regression models in columns (3) and (4) include the above-listed firm-level controls. In all cases there is significant evidence of larger wage increases in firms with more low-wage workers in the pre-NLW period, as measured by the March 2016 proportion of low-wage workers. According to the estimate in column (3), a one standard deviation increase in the proportion of low-paid workers (corresponding to a 34 percentage point change as reported in Table 10) implies a 1.9 percentage-point faster wage growth on a baseline of 4 percent, indicating a strong and significant relationship between our measure of the NLW bite ( $MIN_{j,Mar2016}$ ) and wage growth after the policy change. According to the estimates in columns (2) and (4), there is no differential relationship between the initial proportion of low-paid workers and wage growth in the domiciliary care and care home sector.

We now consider whether the wage cost shock induced by the NLW introduction had consequences on ZHC utilisation by firms. Figure 11 probes the relationship between the low-paid proportion in March 2016 and growth in ZHC utilisation by reporting the coefficients  $\beta_{1,t}$  for  $t = -4, \dots, 0$  and the cumulated sum  $\sum_{t=1}^k \beta_{1,t}$  for  $k = 1, \dots, 4$ , from estimating model (1) on the balanced panel of firms that are active throughout all months between March 2015 and March 2017. Similar to Figure 10, the dots indicate the estimated coefficients and the capped vertical bars report 95 percent confidence intervals based on robust standard errors. The specification allows for heterogeneity in the  $\beta_{1,t}$  coefficients between care homes (hollow circles) and domiciliary care agencies (black circles) and includes the full set of controls. The graph shows no differential growth in ZHC utilisation prior to the introduction of the NLW across firms more or less exposed to the minimum wage increase. After the policy change, a positive relationship between our measure of the NLW bite and ZHC utilisation emerges in both sectors, with a larger effect size in the domiciliary care one. Starting from the second quarter after March 2016 coefficients are statistically significant and persistent over time. The

overall dynamic of the effect gives strength to a causal interpretation of the impact of the minimum wage hike on ZHC utilisation.

Table 12 reports the regression coefficient  $\beta_3$  from estimating model (3) using the change in the share of ZHC workers between March 2016 and March 2017 ( $\Delta Y_{j,t}$ ) as outcome variable. Estimates in columns (1) and (3) refer to the pooled sample of care homes and domiciliary care agencies, while those in columns (2) and (4) allow  $\beta_3$  to vary across the two sectors. The regression models in columns (3) and (4) include the firm-level controls. The coefficient estimate reported in column (3) indicates that a one standard deviation increase in the proportion of low-paid workers is associated with a statistically significant 0.5 percentage-point faster growth in ZHC utilisation. When  $\beta_3$  is allowed to vary across care home and domiciliary care sectors (columns (2) and (4)), the effect increases by a factor of more than three in the domiciliary care sector. According to the results in column (4), a one standard deviation increase in the proportion of workers paid below the minimum is associated with a 0.4 percentage point larger increase in ZHC utilisation from a baseline of 0.6 in the care home sector, and a 1.5 percentage point larger increase in ZHC utilisation from a baseline of 6 percentage points in the domiciliary care sector. We take this evidence as suggestive of an increase in the share of contracts with no minimum guaranteed hours in response to the minimum wage increase, more so in a context – such as that of domiciliary care agencies – in which work tends to be organised into short and fragmented tasks.<sup>19</sup>

An interesting question to ask is whether the increased share of ZHCs is due to the conversion of previously non-ZHC positions into ZHC ones, the creation of new ZHC jobs or the displacement of workers on non-ZHC positions. For the first option to be true, we would need to observe no employment effects of the NLW introduction, for the second positive

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<sup>19</sup> It is worth noting that, relative to the baseline, the effect size is larger for more exposed care homes, though this is due entirely to the slower baseline growth rate.

employment effects and for the third negative employment effects. We investigate this mechanism in Table A4 in Appendix A, where we report estimates of the coefficient  $\beta_3$  of model (3), using the change in the logarithm of employment headcount between March 2016 and March 2017 as outcome variable. Our results do not point to significant employment effects twelve months after the NLW introduction, thus suggesting that new ZHC jobs replaced non-ZHC positions.

We also investigate whether the NLW introduction had an impact on the utilisation of other flexible contractual arrangements: temporary contracts, bank work and temporary agency contracts.<sup>20</sup> Regression estimates of model (3) are reported in columns (1) to (4) of the various panels of Table A5 in Appendix A. For temporary contracts of all types, estimates are of limited magnitude and statistically insignificant.

### ***5.10 Estimating the Effect of Wages on ZHC Utilisation***

The analysis illustrated in the previous subsection provides reduced-form evidence of the causal effect on the NLW introduction on the increased utilisation of ZHCs. In this section, we are interested in estimating the effect of the wage cost shock induced by the NLW introduction on ZHC utilisation, i.e. a parameter that can potentially be generalised to other policy-relevant settings.

The empirical strategy is based on the estimation of the following structural-form model:

$$\Delta Y_{j,t} = \alpha_4 + \beta_4 \Delta \ln W_{j,t} + X'_{j,Mar2016} \gamma_4 + \theta_{j,t} \quad (4)$$

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<sup>20</sup> We report here the formal definitions of these three contractual arrangements, as defined by NMDS-SC. *Temporary contract*: the worker is employed for a limited duration, normally either on a fixed term contract or for a fixed task, or on a spell of casual or seasonal employment as a “temp”. *Bank worker*: the worker is retained by the organisation as a whole, but deployed on a casual or short term basis. *Temporary agency work*: the worker is supplied by an outside employment agency/bureau; this category includes staff employed by NHS professionals, and workers supplied on contract e.g. by outside catering and cleaning companies.

where  $\Delta Y_{j,t}$  is the change in the share of workers employed with a zero hours contract between March 2016 and March 2017;  $\Delta \ln W_{j,t}$  is the change in the natural logarithm of the average wage in firm  $j$  between March 2016 and March 2017;  $X$  is a vector of above-listed pre-NLW firm-level characteristics and local authority districts fixed effects;  $\theta$  is a disturbance term. The parameter  $\beta_4$  measures the semi-elasticity of ZHC utilisation to the wage rate.

Due to the potential endogeneity of  $\Delta \ln W_{j,t}$ , we estimate equation (4) via a two-stage least squares approach and instrument the change in the logarithm of the average wage  $\Delta \ln W_{j,t}$  with  $MIN_{j,Mar2016}$ . Model (3) can therefore be considered as the first stage of the instrumental variable model. The estimates reported in Table 11 prove the relevance of  $MIN_{j,Mar2016}$  as instrument for  $\Delta \ln W_{j,t}$ . Moreover, the patterns illustrated in Figures 10 and 11 combined provide compelling evidence in favour of the exogeneity of the instrument and of the exclusion restriction.

Estimates of the coefficient  $\beta_4$  are reported in columns (5) and (6) of Table 12, where column (5) is based on the pooled sample, while column (6) allows the coefficient  $\beta_4$  to vary between care homes and domiciliary care agencies. The estimate in column (5) points to a positive and significant wage semi-elasticity of 0.26, whereby a 4.1 percent increase in hourly wages (the average in the sample) leads to a 1.1 percentage point faster growth in ZHC utilisation on a baseline of 1.9 percentage points. Once we allow the parameter to vary across the two industries, the effect becomes significantly larger in the domiciliary care sector, and smaller for the care home sector. According to the estimates in column (6), a 4.1 percent increase in wages (the average in the sample) leads to a 3.3 percentage point faster growth on a baseline of 6.1 percentage points in the domiciliary care sector. In the care home sector, a similar wage increase leads to a 0.9 percentage point faster growth in ZHC utilisation, on a

baseline of 0.6 percentage points.<sup>21</sup> Thus, it seems that one consequence of care sector employers paying higher wages to their staff is a raised likelihood of also placing them on a zero hours contract. This is especially true of domiciliary care employers.

### 5.11 Using LFS to Further Probing the Results for Low Paid Workers

Finally, we test whether a change in the proportion of ZHC utilisation for care workers, and workers in other low paying industries, following the introduction of the NLW is also visible in the national statistics data. Figure 12 presents the evolution of the proportion of care workers on ZHCs around the introduction of the NLW using data from the LFS, for the period from 2014 to 2017. As can be seen, in the quarter following the introduction there is an increase in the proportion of ZHCs. The first two columns of Table 13 present an empirical counterpart to the graph from the following estimating equation:

$$ZHC_{i,t} = \alpha_5 + \beta_5 Post\ NLW_t + X'_{i,t} \gamma_5 + u_{it} \quad (5)$$

where  $ZHC$  is a binary indicator of ZHC status for worker  $i$  in period  $t$ ;  $Post\ NLW$  is a dummy taking value one after March 2016;  $X$  is a vector of individual-level controls including age, education, and dummies for gender, white ethnicity, British nationality, working in the public sector and regional location;  $u$  is a disturbance term.<sup>22</sup>

The results shown in the first two columns of Table 13 demonstrate that, following the NLW introduction, the proportion of workers employed on ZHCs in the social care sector increased. In the column (2) specification including controls, it rose by 1 percentage point, or a sizable 24 percent of the pre-NLW mean.<sup>23</sup> Furthermore, this positive association appears generalisable to other low paying industries. Columns (3) and (4) of Table 13 present results

<sup>21</sup> Estimates of model (4) using the share of other forms of flexible contractual arrangements as outcome variable are reported in the various panels of Table A5 in Appendix A.

<sup>22</sup> Twelve region dummies were included in total.

<sup>23</sup> A regression using only care workers (i.e. based on occupation rather than industry) yields a similar result, with a coefficient of 0.018 and a standard error of 0.007, representing a 17 percent increase on the pre-NLW mean.



for estimates of equation (5) using a sample of all workers employed in low paying industries.<sup>24</sup> As can be seen, the results are almost identical to those for the social care industry. Table A6 in Appendix A breaks down the results into all 13 low paying industries and as can be seen all industries (aside from security) have a positive  $\beta_5$  coefficient (albeit with varying magnitudes and degrees of significance). Given the evidence outlined earlier in this section using the NMDS-SC data, we feel there is substantive evidence to suggest that the increase in ZHC utilisation in the social care industry and in low paying industries in general in the national statistics is due to the NLW introduction.

## 6. Conclusion

This paper offers new evidence on the rise and nature of alternative work arrangements, with a specific focus on ZHCs in the context of the UK labour market. Combining both secondary and newly collected survey data, we provide a comprehensive assessment of the nature of ZHCs, which had been so far only very limitedly studied. The survey data allow us to empirically document the characteristics of workers engaged in ZHCs and to better understand the trade-off between flexibility and insecure, low pay that is inherent in this type of work arrangement.

Furthermore, we investigate whether minimum wage policies have a role in the increased utilisation of ZHCs by firms. We do so by leveraging a novel matched employer employee dataset of English adult social care providers and credible identifying variation stemming from the NLW introduction in the UK labour market.

The analysis finds that many workers on ZHCs are relatively low paid, with a large proportion being paid at or slightly above the minimum wage. Such relatively low pay, coupled with limited and fragmented hours, implies high levels of earnings insecurity for workers

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<sup>24</sup> The low paying industries used are those in the UK's Low Pay Commission list, which can be found in LPC (2017), and are listed in Table A6 in Appendix A.

whose only option is to work on this type of arrangement. Indeed, a stark dichotomy emerges between workers who value the flexibility provided by ZHC jobs, and workers who would rather work more and more regular hours and therefore appear to be engaged in ZHCs out of necessity rather than choice.

The analysis reveals that minimum wage policies appear to have had some bearing on the increased utilisation of ZHCs. Specifically, in the context of the English adult social care sector, we find that the NLW introduction led to a larger incidence of ZHCs. The increase is more highly pronounced in the domiciliary care sector, a sector in which work has traditionally been organised around fragmented hours. This suggests that firms exploit the flexibility of ZHCs in order to buffer the wage cost shock induced by the minimum wage increase. It remains to be understood whether these effects will stabilise or grow larger in the longer run – an issue we intend to study in due course. Similarly, the issue of whether there should be a higher minimum wage for ZHC workers (as suggested in the Taylor, 2017, review of modern work practices) is a research question that needs economic evidence to better inform its viability as a future option for labour market policy. In particular, our evidence suggests that a domiciliary worker paid the NMW experienced both an increase of 7.5% in their wages and 6.1% in their probability of being on a ZHC as a result of the NLW introduction, and such a trade-off may have important welfare implications for workers, both in their current employment and for their future career trajectories.

## References

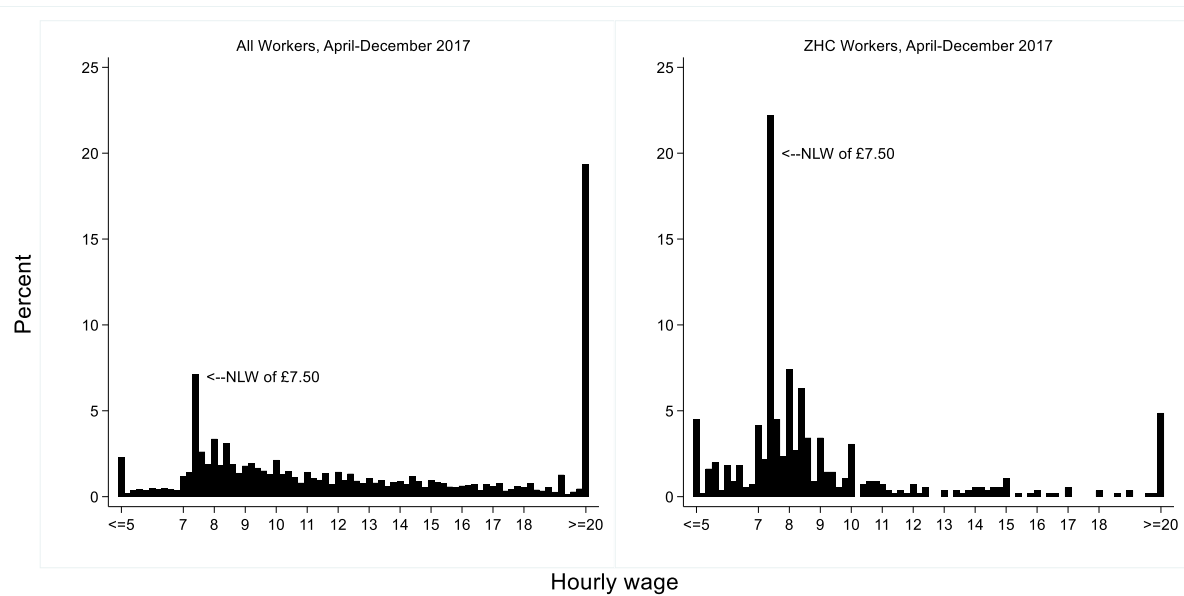
- Aaronson, D. (2001) "Price Pass-Through and the Minimum Wage", Review of Economics and Statistics, 83, 158-69.
- Abraham, K. G. and A. Amaya (2018) "Probing for Informal Work Activity," NBER Working Paper Number 24880.
- Adams, A., J. Freedman and J. Prassl (2018) "Rethinking Legal Taxonomies for the Gig Economy", Oxford Review of Economic Policy, 34(3), 475-494.
- Addison, J. and C. Surfield (2009) "Atypical Work and Employment Continuity", Industrial Relations: A Journal of Economy and Society, 48(4), 655-683.
- Autor, D., A. Manning and C. Smith (2016) "The Contribution of the Minimum Wage to US Wage Inequality Over Three Decades: A Reassessment", American Economic Journal: Applied, 8, 58-99.
- Baskaya, Y. S. and Y. Rubinstein (2015) "Using Federal Minimum Wages to Identify the Impact of Minimum Wages on Employment and Earnings Across the US States", Working Paper.
- Beard, K and J. Edwards (1995) "Employees at Risk: Contingent Work and the Psychological Experience of Contingent Workers", Journal of Organizational Behaviour (1986-1998), 109.
- Bell, B. and S. Machin (2018) "Minimum Wages and Firm Value", Journal of Labor Economics, 36, 159-95
- Brown, C., C. Gilroy and A. Kohen (1982) "The Effect of the Minimum Wage on Employment and Unemployment", Journal of Economic Literature, 20, 487-528.
- Butcher, T., R. Dickens and A. Manning (2012) "Minimum Wages and Wage Inequality: Some Theory and an Application to the UK", CEP Discussion Paper no. 1177. Centre for Economic Performance, LSE.
- Card, D. and A. Krueger (1994) "Minimum Wages and Employment: A Case Study of the Fast-food Industry in New Jersey", American Economic Review, 84, 772-93.
- Clemens, J, and M. Wither (2014) "The Minimum Wage and the Great Recession: Evidence of Effects on the Employment and Income Trajectories of Low-Skilled Workers", Working Paper no. 20724, National Bureau of Economic Research, Cambridge, MA.
- Coase, R. (1937) "The nature of the firm", Economica, 4(16), 388-405.
- Competition & Markets Authority (2017) "Care Homes Market Study. Final Report", <https://assets.publishing.service.gov.uk/media/5a1fdf30e5274a750b82533a/care-homes-market-study-final-report.pdf>

- DiNardo, J., N. Fortin and T. Lemieux (1996) “Labor Market Institutions and the Distribution of Wages, 1973-92: A Semi-Parametric Approach”, Econometrica, 64, 1001-44.
- Draca, M., S. Machin and J. Van Reenen (2011) “Minimum Wages and Firm Profitability”, American Economic Journal: Applied, 3, 129-51.
- Dube, A., T. W. Lester and M. Reich (2010) “Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties”, Review of Economics and Statistics, 92, 945-64.
- Dube, A., T. W. Lester and M. Reich (2016) “Minimum Wage Shocks, Employment Flows, and Labor Market Frictions”, Journal of Labor Economics, 34, 663-704.
- Dube, A., J. Jacobs, S. Naidu and S. Suri (2018) “Monopsony in Online Labour Markets,” NBER Working Paper No. 24416.
- Eichhorst, E. and V. Tobsch (2013) “Has Atypical Work Become Typical in Germany?”, IZA Discussion Paper No, 7609.
- Eurofound (2015) “New forms of employment”, Publications Office of the European Union, Luxembourg.
- Eurofound (2017) “Atypical Work”, European Industrial Relations Dictionary.
- Gielen, A. and T. Schils (2014) “Non-Standard Employment Patterns in the Netherlands”, IZA Policy Paper No.77.
- Gilfillan, G. (2018) “Characteristics and use of casual employees in Australia”, Research Paper Series 2017-2018, Parliament of Australia.
- Giupponi, G. and S. Machin (2018) “Changing the Structure of Minimum Wages: Firm Adjustment and Wage Spillovers”, CEP Discussion Paper no. 1533, Centre for Economic Performance, LSE.
- Harasztosi, P. and A. Lindner (2017) “Who Pays for the Minimum Wage?”, Working Paper.
- Kalleberg, A. (2000) “Nonstandard Employment Relations: Part-time, Temporary and Contract Work”, Annual Review of Sociology, 26(1), 341-365.
- Katz, L. and A. Krueger (2016) “The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015”, NBER Working Paper No. 22667.
- Katz, L. and A. Krueger (2019) “Understanding Trends in Alternative Work Arrangements in the United States”, NBER Working Paper No. 25425.
- Katz, L. and A. Krueger (2017) “The Role of Unemployment in the Rise in Alternative Work Arrangements”, American Economic Review, 107(5), 388-392.
- Kreiner, C., D. Reck and P. Skov (2017) “Do Lower Minimum Wages for Young Workers Raise their Employment? Evidence from a Danish Discontinuity”, Working paper.

- Lee, D. (1999) “Wage Inequality in the United States during the 1980s: Rising Dispersion or Falling Minimum Wage?”, Quarterly Journal of Economics, 114, 977-1023.
- LSE Growth Commission (2017) “UK Growth, A New Chapter”, Centre for Economic Performance, LSE.
- Low Pay Commission (2009), “National Minimum Wage”, LPC Report.
- Low Pay Commission (2017), “National Minimum Wage”, LPC Report.
- Machin, S., A. Manning and L. Rahman (2003) “Where the Minimum Wage Bites Hard: The Introduction of the UK National Minimum Wage to a Low Wage Sector”, Journal of the European Economic Association, 1, 154-80.
- Machin, S. and J. Wilson (2004) “Minimum Wages in a Low Wage Labour Market: Care Homes in the UK”, Economic Journal, 114, 102-109.
- MaCurdy, T. (2016) “How Effective Is the Minimum Wage at Supporting the Poor?”, Journal of Political Economy, 123, 497-545.
- Mas, A. and A. Pallais (2017) “Valuing Alternative Work Arrangements”, American Economic Review, 107(12), 3722-3759.
- McCrane, E. (2018) “Unstable and on-call work schedules in the United States and Canada”, No. 994978592602676. International Labour Organization, 2018.
- NMDS-SC (2013) “NMDS-SC Trend Briefing 1 – Care Worker Pay”, Skills for Care.
- NMDS-SC (2014) “NMDS-SC Trend Briefing 2 – Recruitment and Retentions”, Skills for Care.
- Nollen, S. (1996) “Negative Aspects of Temporary Employment”, Journal of Labour Research, 17(4), 567-582
- Polivka, A. and T. Nardone (1989) “On the Definition of Contingent Work”, Monthly Lab. Rev., 112,9
- Pyper, D. and A. Powell (2018) “Zero-hours contracts”, House of Commons Briefing Paper no. 06553
- O’Sullivan, M., Turner, T., McMahon, J., Ryan, L., Lavelle, J., Murphy, C., & P. Gunnigle (2015) “A study on the prevalence of zero hours contracts among Irish Employers and their Impact on Employees.” Kemmy Business School, Limerick, University of Limerick.
- Rodgers, G. and J. Rodgers (Eds.) (1989) “Precarious Jobs in Labour Market Regulation: the Growth of Atypical Employment in Western Europe”, International Labour Organisation.

- Rubery, J., D. Grimshaw and G. Hebson, G. (2014) “Zero Hours Contracts in Social Care”, FairWRC Research Briefing No. 3.
- Stewart, M. (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, 67-97.
- Stewart, M. (2012) “Wage Inequality, Minimum Wage Effects, and Spillovers”, Oxford Economic Papers, 64(4), 616–634.
- Taylor, M. (2017) “Good Work: The Taylor Review of Modern Working Practices”, Department of Business, Energy and Industrial Strategy, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/627671/good-work-taylor-review-modern-working-practices-rg.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/627671/good-work-taylor-review-modern-working-practices-rg.pdf)
- United Kingdom Home Care Association (2016) “An Overview of the Domiciliary Care Market in the United Kingdom”, <https://www.ukhca.co.uk/pdfs/DomiciliaryCareMarketOverview2015.pdf>
- Wakeling, A. (2014) “Give and take? Unravelling the true nature of zero hour contracts”, ACAS Policy Discussion Papers.

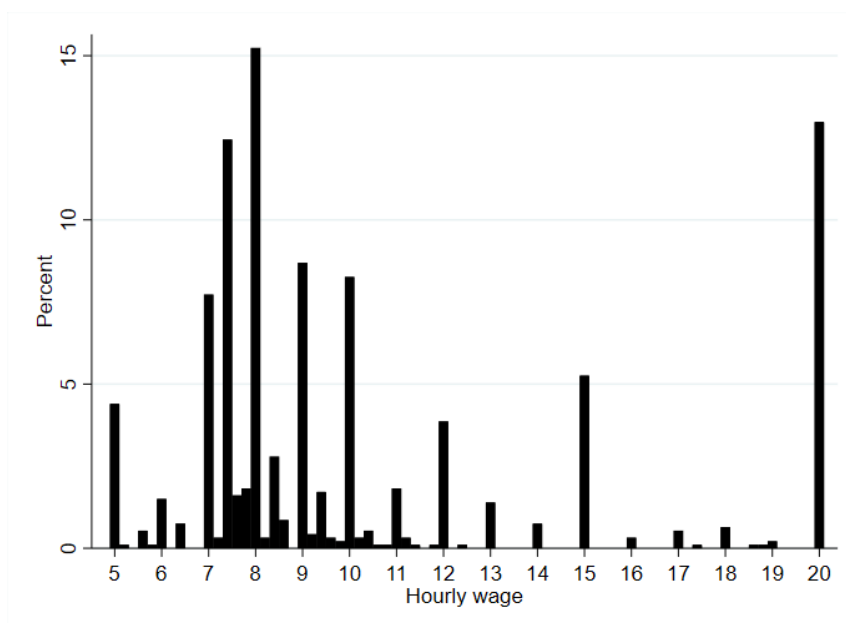
**Figure 1 – Hourly Wage Distribution for all Workers and Workers on ZHC**



*Note:* The graphs show the distribution of hourly wages for all workers and workers who declare to be on a ZHC. The distribution is censored at £5 and £20.00. The data are binned into £0.20 bins. NLW denotes the level of the National Living Wage.

*Source:* LFS.

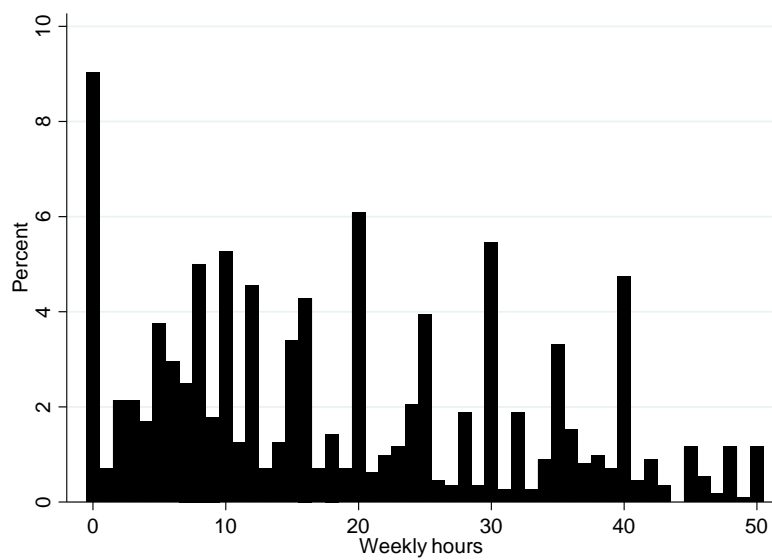
**Figure 2 – Hourly Wage Distribution for Workers on ZHC**



*Note:* The graph shows the distribution of hourly wages for respondents who declare to be on a ZHC. The distribution is censored at £5.00 and £20.00. The data are binned into £0.20 bins.

*Source:* LSE-CEP survey.

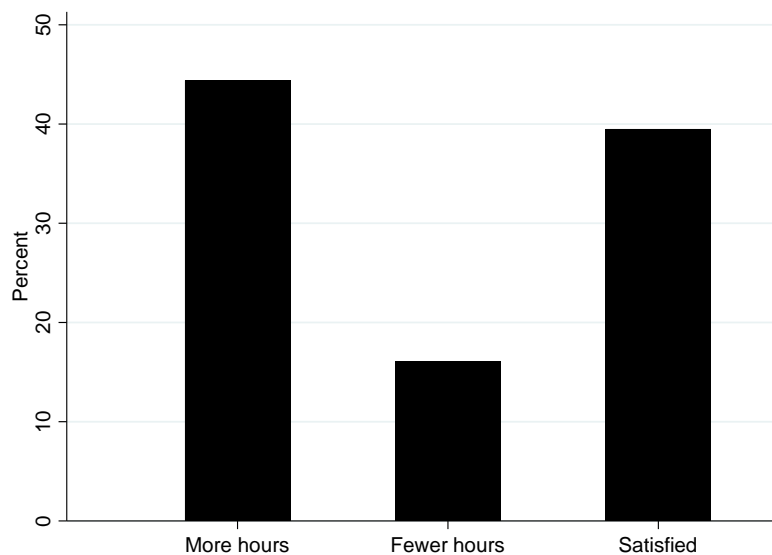
**Figure 3 – Weekly Hours Distribution for Workers on ZHC**



*Note:* The graph shows the distribution of weekly hours of work for respondents who declare to be on a ZHC. The distribution is trimmed at the 95<sup>th</sup> percentile.

*Source:* LSE-CEP survey.

**Figure 4 – Desired Hours of Workers on ZHC**

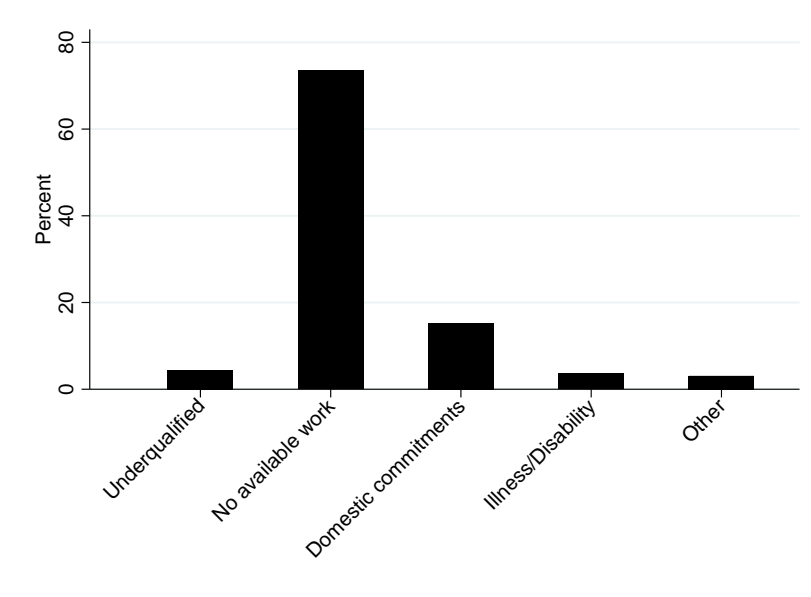


*Note:* The graph shows the distribution of responses to the question "Would you have preferred to work more or fewer hours last week in your zero hours contract or on-call job at that wage rate? Or were you satisfied with the number of hours you worked?".

*Source:* LSE-CEP survey.



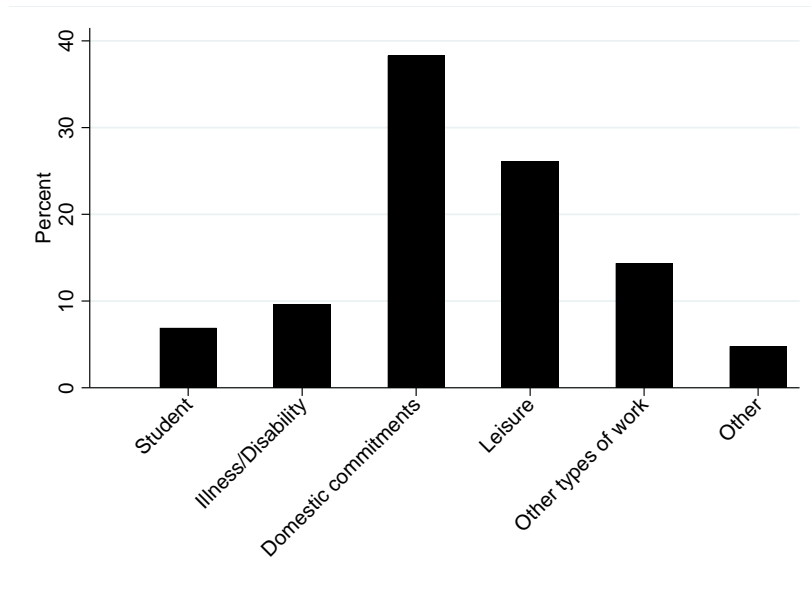
**Figure 5 – Reason for not Working More Hours (Workers on ZHC)**



*Note:* The graph shows the distribution of responses to the question “Why were you NOT able to work more last week?”.

*Source:* LSE-CEP survey.

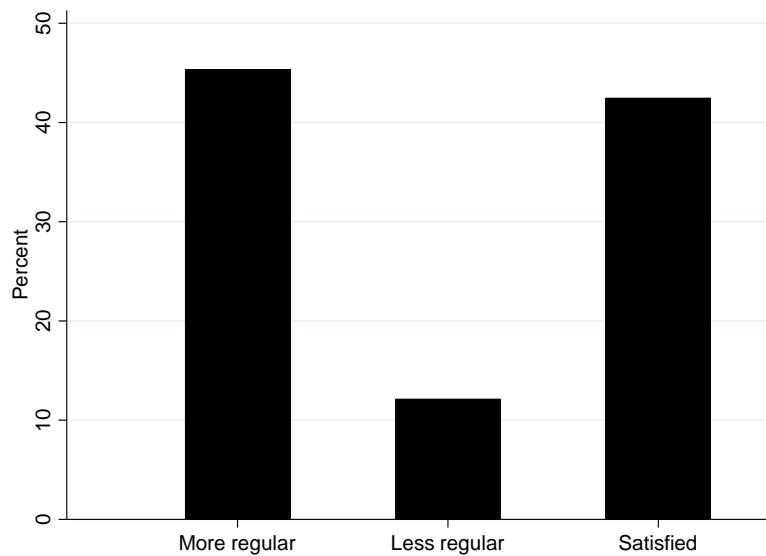
**Figure 6 – Reason for Wanting Fewer Hours (Workers on ZHC)**



*Note:* The graph shows the distribution of responses to the question “Why would you want to work fewer hours?”.

*Source:* LSE-CEP survey.

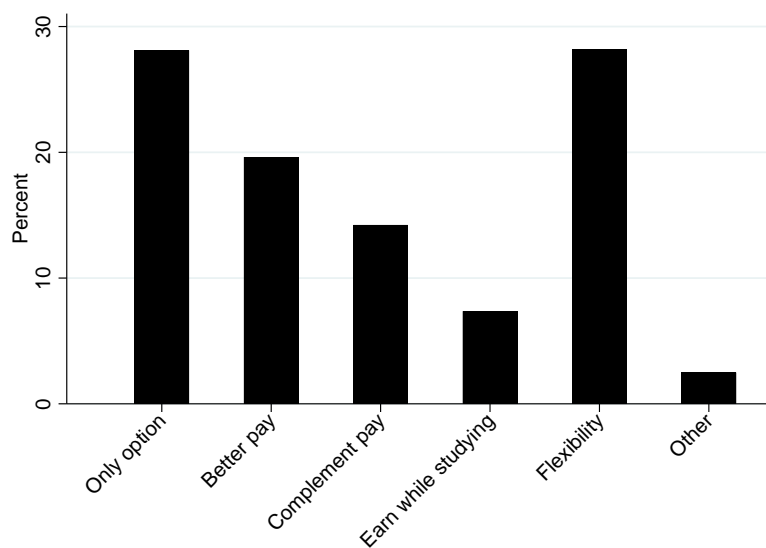
**Figure 7 – Desired Pattern of Hours for Workers on ZHC**



*Note:* The graph shows the distribution of responses to the question “Would you have preferred to work a pattern of more regular hours last week on your zero hours contract or on-call job at that wage rate? Or were you satisfied with the pattern of hours you worked?”.

*Source:* LSE-CEP survey.

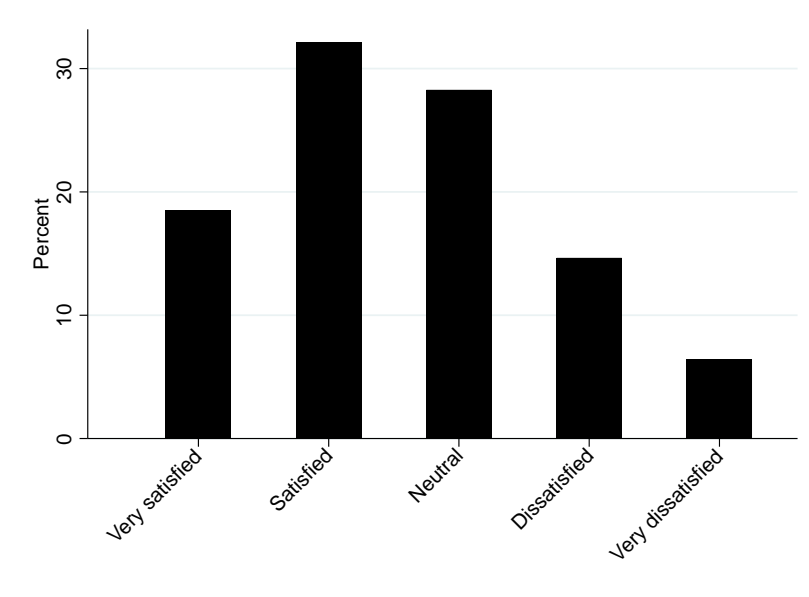
**Figure 8 – Main Reason for Being on ZHC**



*Note:* The graph shows the distribution of responses to the question “Which is the most important reason why you work on a zero hours contract or on-call job?”.

*Source:* LSE-CEP survey.

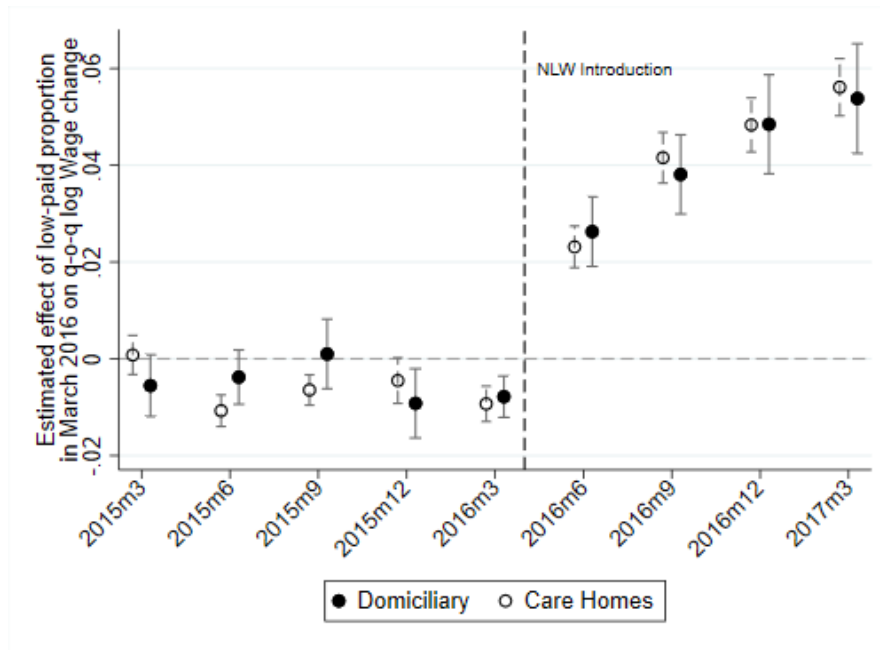
**Figure 9 – Job Satisfaction of Workers on ZHC**



*Note:* The graph shows the distribution of responses to the question “How satisfied are you with working on a zero hours contract or on-call job?”.

*Source:* LSE-CEP survey.

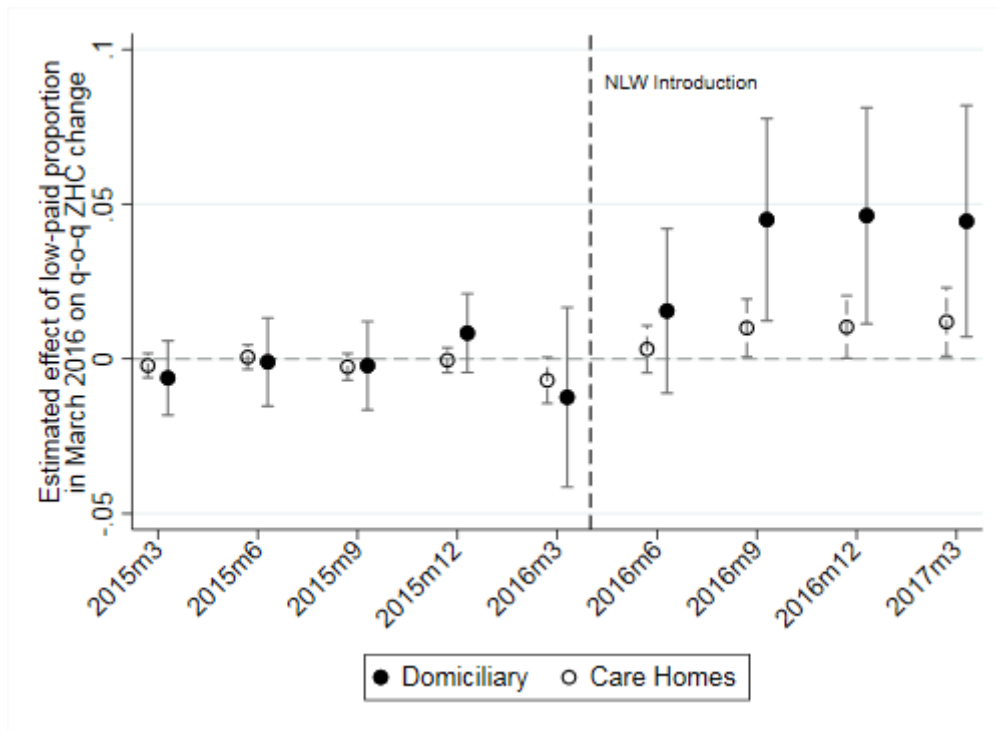
**Figure 10 – Effect of Initial Low-paid Proportion on Wage Growth by Sector**



*Notes:* For the quarters before the NLW introduction, the graph reports the estimated coefficients  $\hat{\beta}_{2,t}$  from model (2) for care homes and domiciliary care agencies. After the NLW introduction, the graph reports the estimated sum  $\sum_{t=1}^k \hat{\beta}_{2,t}$  for  $k = 1, \dots, 4$ . The sample is a balanced panel of adult social care providers active between March 2015 and March 2017. The vertical bars indicate 95% confidence intervals based on robust standard errors. Control variables included in the underlying regression are the initial proportion female, proportion with nursing qualification, proportion of care assistants, average age (all workers), occupancy rate and local authority district dummies. When data on firm-level covariates is missing, such missing information is controlled for via a set of dummy variables.

*Source:* NMDS-SC.

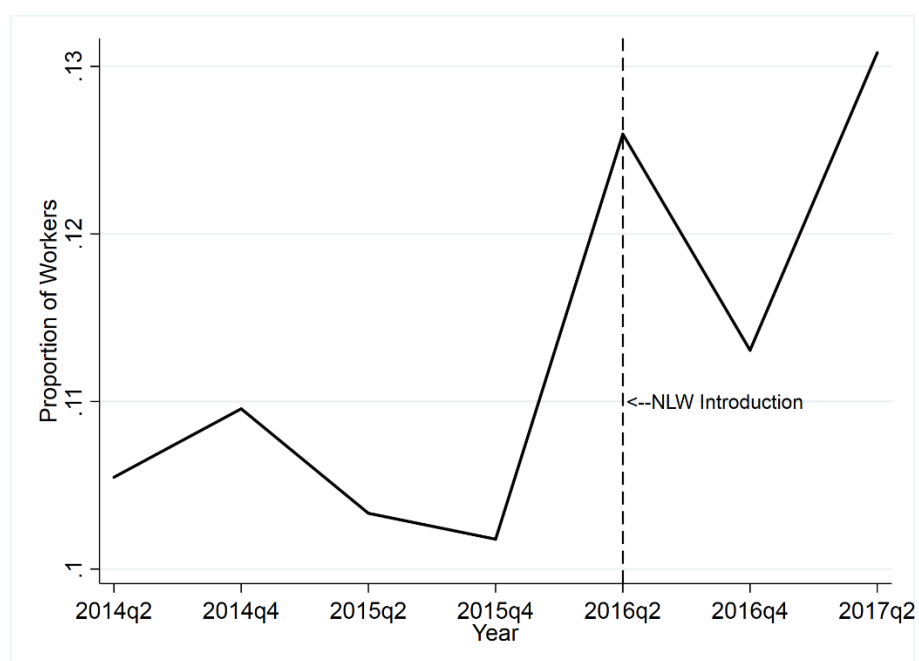
**Figure 11 – Effect of Initial Low-paid Proportion on Proportion of Employees on ZHC by Sector**



*Notes:* For the quarters before the NLW introduction, the graph reports the estimated coefficients  $\hat{\beta}_{1,t}$  from model (1) for care homes and domiciliary care agencies. After the NLW introduction, the graph reports the estimated sum  $\sum_{t=1}^k \hat{\beta}_{1,t}$  for  $k = 1, \dots, 4$ . The sample is a balanced panel of adult social care providers active between March 2015 and March 2017. The vertical bars indicate 95% confidence intervals based on robust standard errors. Control variables included in the underlying regression are the initial proportion female, proportion with nursing qualification, proportion of care assistants, average age (all workers), occupancy rate and local authority district dummies. When data on firm-level covariates is missing, such missing information is controlled for via a set of dummy variables.

*Source:* NMDS-SC.

**Figure 12 – Proportion of Care workers on ZHCs (LFS)**



*Notes:* The graph presents the evolution of the proportion of care workers on ZHCs from April 2014 to April 2017. The dashed line marks the introduction of the NLW at the start of 2<sup>nd</sup> quarter in 2016.

*Source:* LFS.

**Table 1 – Forms of Employment in the UK Institutional Setting**

	Permanent Employment	Zero-Hour Contract	Self-Employment
National Insurance Contributions <sup>25</sup>	Employers pay NI contributions on their employee's earnings and benefits, above the threshold of £162 a week, at a rate of 13.8%.  Employees pay NI on their earnings and benefits above the threshold of £162 a week at a rate of 12%. Above the earnings threshold of £892 a week this drops to 2%.	Employers pay NI contributions on their employee's earnings and benefits, above the threshold of £162 a week, at a rate of 13.8%.  Employees pay NI on their earnings and benefits above the threshold of £162 a week at a rate of 12%. Above the earnings threshold of £892 a week this drops to 2%.	Contributions are only made by the worker. Above the yearly profit threshold of £6,205 there is a flat rate of £2.95 per week. Between £8,424 and £46,350 there is a rate of 9% and above £46,350 the rate drops to 2%.
Minimum Wage Coverage	Employees are covered by Minimum Wage legislation.	ZHC workers are covered by Minimum Wage legislation.	Self-Employed workers are not covered by Minimum Wage legislation.
Holiday Pay coverage	Full-time employees are entitled to 28 days paid holiday leave per year, and part time employees the pro-rata equivalent.	ZHC workers are entitled to the same degree of holiday pay as permanent employees. Due to the nature of ZHC work, many firms include holiday pay in the workers hourly wage rate.	Self-Employed workers are not entitled to holiday pay.
Sick Pay coverage	Permanent employees are entitled to statutory sick pay, assuming they earn at least £116 per week.	ZHC workers are entitled to statutory sick pay, only if they earn at least £116 on average from one employer. <sup>26</sup>	Self-Employed workers are not entitled sick pay.
Unfair Dismissal Protection, Minimum Notice Periods and	Permanent employees have protection against unfair dismissal, are covered	As ZHC workers' hours can be changed at the discretion of the employer, the	Self-Employed workers are not covered by unfair dismissal protection,

<sup>25</sup> NI contributions build up your state pension, whilst also helping to pay for the NHS and other welfare services.

<sup>26</sup> Reports from the UK's Citizens Advice Bureau suggests some employers attempt to avoid paying out sick pay to ZHC workers, and stop hours for those workers who do try to claim.

Statutory Redundancy pay	by statutory minimum notice periods, and entitled to statutory redundancy pay.	<p>employer is in their right to offer zero hours in perpetuity, effectively ending the employment relationship. Thus, there is no protection against unfair dismissal, no minimum notice period, nor a requirement to pay redundancy pay.</p> <p>Some instances of case law in the UK has tried to establish that ZHC workers who work regular hours may be eligible for aspects of dismissal protection.</p>	minimum notice periods or statutory redundancy pay.
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*Source:* UK Government Website



**Table 2 – Examples of Zero Hour-Like Contracts in Europe and the United States**

Country	Name	Description and/or Regulation
France	NA	ZHCs are outlawed in most cases. All part-time contracts must include the number and distribution of hours. Collective bargaining agreements require a minimum of 24 hours per week but can be reduced at the request of the employee. Exceptions for youth in education and temporary agency workers.
Germany	On-call work	Generally, contracts must specify weekly and daily working hours. If agreed by the employer and employee (or employee representative) a contract could avoid specifying weekly working hours, in which case 10 weekly working hours are deemed to be agreed. If the daily working hours are not specified, the employer is bound to call the employee for at least 3 consecutive hours per day.
Italy	On-call work	Contracts exist but are heavily regulated. Contracts must be justified by reference to production cycles and organisation needs, and companies who use them must notify the ministry of labour. Banned from public administration, weekend work and bank holiday work. Only workers under 25 and over 55 can be placed on them. Limits to 400 working days over 3 years and then automatic conversion into full-time permanent contract.
Sweden	On-call contracts	These contracts give no fixed hours and the employer can vary the working hours. No known regulation.
Norway	Zero Hour Contracts	Till recently such contracts made up around 0.8% of the workforce. Case law from 2005 and 2017 has deemed the use of permanent contracts where employees were to work only on-call as illegal and evading temporary employment law (which has strict usage and limitations). New regulation has been proposed by government to explicitly prohibit ZHCs.
Netherlands	Zero-hour Contract	Unlike the UK, there is an obligation on behalf of the employee to work when called upon. Each time an employee is called to worker, they must be paid a minimum of 3 hours wages (even if there is less than 3 hours work for them). Following 3 months of continuous employment on a ZHC, the agreed number of hours adjusts to the average number of hours during the previous 3 months.
	Min.-max. contract	Employees are given a guaranteed number of hours- weekly, monthly or annually. These are always paid even if the employer is unable to provide work. If the guaranteed number of hours per week is 15 hours or less, then similar regulation to the ZHCs is enforceable. During periods of high demand, employers and employees can agree upon extra hours.
United States	On-call / “Just-in-time” schedules	Diffusion of on-call working arrangements have increased from 1.6% in 1995 to 2.6% in 2015 (Katz and Krueger, 2016). There is no federal regulation, however eight states operate “show-up pay” laws, where employers are required to pay workers for a minimum number of hours (no matter how long they work), if they have been called to work. Coverage however varies across these eight states, and a number of exemptions exist. A few cities (e.g. San Francisco, Seattle, New York) operate fair scheduling ordinances, though the content of these may vary by city. As an example, the San Francisco ordinance requires new employees to receive a written estimate of their expected days and hours of shifts. Schedules must be posted at least two weeks in advance, changes with less than a weeks’ notice results in compensation entitlement for the employee, and employees required to be on call but not working are also entitled to some compensation. Additionally, if

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employers have available hours, these must be offered to existing part-time employees before hiring additional part-time workers.

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*Source:* Eurofound (2015), O’Sullivan et al. (2015), McCrate (2018).

**Table 3 – LFS Descriptive Statistics**

	All Employees		Zero Hour Contract Employees	
	2017		2017	
	Mean	S.D.	Mean	S.D.
Age	43.43	13.39	38.22	16.67
Prop. Female	0.49	0.50	0.59	0.49
Prop. In FT Education	0.03	0.17	0.17	0.38
Age When Completed FT (Conditional on Completed)	18.63	3.10	18.32	3.05
Median Tenure (Categorical)	5-10 Years		1-2 Years	
Prop. Part Time	0.29	0.45	0.67	0.47
Prop. Under 25	0.09	0.29	0.31	0.46
Hourly Wage	14.73	11.78	9.77	7.46
Hourly Wage (25+)	15.42	12.13	10.76	7.96
Hourly Wage (Under 25)	8.24	3.63	7.47	5.50
Median Hourly Wage	11.50		7.90	
Hours Worked In Reference Week	31.40	17.38	21.33	16.98
Like To Work More Hours	0.08	0.27	0.25	0.43
Sample Size	71,604		1,907	

*Note:* The table reports the mean and standard deviation of a set of individual characteristics for the employees from the LFS, for both all employees and ZHC workers, in 2017. The ZHC indicator only appears in April-June and October-December quarters of the LFS. Thus the above statistics use only those two quarters for each year. Wage data only appears in two waves of the survey, thus wage stats are based off approximately one third of the number of observations.

*Source:* LFS.

**Table 4 – The Bite of the National Living Wage**

	All Employees				Zero Hour Contract Employees			
	2016		2017		2016		2017	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Proportion paid less than next NLW	0.20	0.40	0.20	0.40	0.54	0.50	0.49	0.50
Proportion paid less than next NLW (25+)	0.16	0.37	0.16	0.36	0.41	0.49	0.39	0.49
Proportion paid exactly NLW	0.06	0.23	0.06	0.24	0.18	0.38	0.20	0.40
Proportion paid exactly NLW (25+)	0.05	0.23	0.06	0.24	0.21	0.41	0.22	0.42
Sample Size	20,638		21,102		606		554	

*Note:* The table reports the mean and standard deviation of proportions of employees impacted by the NLW, for both all employees and ZHC workers, for the years 2016 and 2017.

*Source:* LFS.

**Table 5 – Transitions Out of ZHC Work (Between Quarter T and T+5)**

	Status in period T+5							Total
	Inactive	Unemployed	FT – Emp.	PT- Emp.	FT- Self Emp.	PT- Self Emp.	ZHC	
<b>Status in period T</b>								
Inactive	84.89	3.79	2.23	5.68	0.38	1.82	1.21	100.00 (2,641)
Unemployed	21.20	36.71	19.94	15.19	0.63	1.90	4.43	100.00 (316)
Full Time - Employed	2.47	1.13	88.91	4.41	1.79	0.49	0.81	100.00 (4,697)
Part Time - Employed	7.20	1.55	9.50	76.22	0.75	1.55	3.22	100.00 (1,737)
Full Time - Self Employed	2.58	0.49	8.11	0.86	79.85	6.88	1.23	100.00 (814)
Part Time - Self Employed	11.50	1.47	2.95	6.19	10.03	66.08	1.77	100.00 (339)
ZHC	15.17	4.83	16.55	20.00	4.14	2.76	36.55	100.00 (145)
Total	24.62 (2,632)	2.92 (312)	42.69 (4,563)	16.71 (1,786)	7.47 (799)	3.63 (388)	1.96 (209)	100.00 (10,689)

*Note:* For each type of economic activity today, the table reports the percentage of respondents working arrangements in 5 quarters time. The data is pooled from the LFS panel survey, from January 2015 to March 2018. For all those in some form of employment, their primary job is reported. Sample sizes reported in parentheses.

*Source:* LFS.

**Table 6 – Transitions Into ZHC Work (Between Quarter T and T+5)**

	Status in period T+5							Total
	Inactive	Unemployed	FT – Emp.	PT- Emp.	FT- Self Emp.	PT- Self Emp.	ZHC	
<b>Status in period T</b>								
Inactive	85.18	32.05	1.29	8.40	1.25	12.37	15.31	24.71 (2,641)
Unemployed	2.55	37.18	1.38	2.69	0.25	1.55	6.70	2.96 (316)
Full Time - Employed	4.41	16.99	91.52	11.59	10.51	5.93	18.18	43.94 (4,697)
Part Time - Employed	4.75	8.65	3.62	74.13	1.63	6.96	26.79	16.25 (1,737)
Full Time - Self Empl	0.80	1.28	1.45	0.39	81.35	14.43	4.78	7.62 (814)
Part Time - Self Empl	1.48	1.60	0.22	1.18	4.26	57.73	2.87	3.17 (339)
ZHC	0.84	2.24	0.53	1.62	0.75	1.03	25.36	1.36 (145)
Total	100.00 (2,632)	100.00 (312)	100.00 (4,563)	100.00 (1,786)	100.00 (799)	100.00 (388)	100.00 (209)	100.00 (10,689)

*Note:* For each type of economic activity today, the table reports the percentage of respondents working arrangements 5 quarters before. The data is pooled from the LFS panel survey, from January 2015 to March 2018. For all those in some form of employment, their primary job is reported. Sample sizes reported in parentheses.

*Source:* LFS.

**Table 7 – Sample of ZHC Workers in LSE-CEP Survey**

Variables	Mean	S.D.
Female	0.53	0.50
Age	36.28	13.21
Age 18-24	0.26	0.44
Age 25-34	0.25	0.43
Age 35-44	0.19	0.39
Age 45-54	0.18	0.38
Age 55-65	0.13	0.33
No qualifications	0.02	0.13
Some GCSE/O levels	0.10	0.30
5 or more GCSE/O levels	0.13	0.34
Trade/technical/vocational training	0.11	0.31
A levels	0.23	0.42
Bachelor's degree	0.27	0.45
Master's degree	0.11	0.31
Doctorate degree	0.03	0.16
North East	0.05	0.22
North West	0.12	0.32
Yorkshire and Humberside	0.06	0.23
East Midlands	0.08	0.27
West Midlands	0.09	0.29
Eastern England	0.08	0.26
London	0.19	0.40
South East	0.12	0.33
South West	0.08	0.27
Wales	0.04	0.20
Scotland	0.07	0.26
Northern Ireland	0.02	0.15
Married/Cohabiting	0.44	0.50
Widow/Separated/Divorced	0.10	0.30
Never married	0.45	0.50
Children	0.55	0.50
White	0.84	0.37
Mixed/Multiple ethnic group	0.04	0.20
Asian/Asian British	0.06	0.23
Black/African/Caribbean/Black British	0.06	0.23
Arab	0.00	0.06
Sample Size	1,167	

**Table 7 – Sample of ZHC Workers in LSE-CEP Survey (Cont.)**

Variables	Mean	S.D.
Multiple employers (ZHC jobs)	0.42	0.49
Non-ZHC job holder	0.34	0.47
Agriculture, forestry and fishing	0.01	0.08
Mining and quarrying	0.01	0.08
Manufacturing	0.07	0.25
Electricity, gas, steam and air conditioning supply	0.02	0.15
Water supply, sewerage, waste management	0.01	0.10
Construction	0.06	0.24
Wholesale and retail trade, repair of motor vehicles	0.09	0.29
Transportation and storage	0.06	0.24
Accommodation and food service activities	0.11	0.32
Information and communication	0.05	0.22
Financial and insurance activities	0.03	0.18
Real estate activities	0.01	0.07
Professional, scientific and technical activities	0.03	0.16
Administrative and support service activities	0.05	0.23
Public administration and defence	0.01	0.10
Education	0.09	0.29
Human health and social work activities	0.15	0.36
Arts, entertainment and recreation	0.06	0.24
Other service activities	0.06	0.23
Activities of households as employers of domestic personnel	0.01	0.12
Activities of extraterritorial organizations	0.00	0.07
Other	0.01	0.07
Hourly wage	11.63	8.16
Hourly Wage (median)	8.64	
Hours worked in previous week	18.62	13.67
Different days worked per week	4.06	1.71
Proportion doing unpaid hours	0.32	0.47
Average weekly unpaid hours	7.08	9.02
Less than one year of working experience	0.05	0.23
1-3 years of working experience	0.17	0.38
3-5 years of working experience	0.15	0.36
More than 5 years of experience	0.62	0.48
Less than one year of working experience in ZHC	0.52	0.50
1-3 years of working experience in ZHC	0.21	0.41
3-5 years of working experience in ZHC	0.14	0.35
More than 5 years of experience in ZHC	0.13	0.34
Received work-related training in the last year	0.55	0.50
Sample Size	1,167	

*Note:* The table reports the mean and standard deviation of a set of individual characteristics for the sample of respondents who declared to be on a ZHC in the week prior to taking the survey.

*Source:* LSE-CEP survey.

**Table 8 – Training of Workers on ZHC**

Variables	Received in last year (1)	Most useful to improve job prospects (2)
Technical or technology training	0.18	0.23
Quality training	0.30	0.24
Skills training	0.54	0.50
Continuing education	0.13	0.20
Professional training and legal training	0.22	0.24
Managerial training	0.15	0.23
Safety training	0.56	0.27
Other	0.01	0.02
Sample Size	644	1,167

*Note:* The table reports answers to the question “What type of training [did you receive last year]?” in column (1) and to the question “What type of training would you find most useful to improve your job prospects?” in column (2). The table reports the proportion of respondents who ticked each of the preset options.

*Source:* LSE-CEP survey.

**Table 9 – Who Pays for the Training of Workers on ZHC**

Variables	(1)
Me or a family member	0.16
A contractor or customer	0.11
My employer	0.59
Someone else	0.02
No one, it was free	0.12
Sample Size	644

*Note:* The table reports answers to the question “Who paid for the cost of the training?”. The table reports the proportion of respondents who ticked each of the preset options.

*Source:* LSE-CEP survey.



**Table 10 – NMDS-SC Summary Statistics**

	All firms		Care homes		Domiciliary care agencies	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
<i>Firm level variables</i>						
Number of employees	45.22	46.26	38.99	31.16	65.97	74.00
Proportion under 25	0.12	0.09	0.12	0.09	0.12	0.09
Hourly wage	7.57	1.09	7.53	1.11	7.67	1.01
Weekly hours	25.61	8.90	28.56	5.17	15.75	11.31
Weekly earnings	189.42	79.01	212.80	54.35	111.59	96.54
Hourly wage carer	7.10	0.93	7.01	0.97	7.43	0.68
Weekly hours carer	24.49	10.30	27.98	6.25	12.41	12.25
Proportion on ZHC	0.12	0.23	0.05	0.10	0.38	0.33
Proportion on permanent contract	0.88	0.17	0.90	0.11	0.82	0.27
Proportion on temporary contract	0.02	0.08	0.02	0.04	0.05	0.15
Proportion on bank contract	0.06	0.10	0.06	0.08	0.05	0.13
Proportion on agency contract	0.01	0.08	0.00	0.02	0.04	0.16
Female	0.85	0.13	0.84	0.13	0.87	0.11
Age	42.60	4.63	42.71	4.53	42.21	4.92
Proportion carer	0.61	0.19	0.56	0.16	0.75	0.23
Proportion with nursing qualification	0.03	0.06	0.04	0.07	0.00	0.01
Occupancy rate	0.77	0.33	0.92	0.14	0.27	0.30
Proportion paid below NLW	0.48	0.34	0.52	0.32	0.34	0.36
Number of firms	4,680		3,599		1,081	

*Note:* The table reports the mean and standard deviation of a set of firm-level variables for the balanced sample of firms used in the analysis. The statistics refer to March 2016, and are shown for the full sample, and for the sample of care homes and domiciliary care agencies separately.

*Source:* NMDS-SC.

**Table 11 – Wage Equations**

Dep. Var.: Change in log average hourly wage

*March 2016 to March 2017*

	(1)	(2)	(3)	(4)
Initial low-paid proportion	0.053*** (0.002)	0.054*** (0.003)	0.056*** (0.003)	0.056*** (0.003)
Initial low-paid proportion x Domiciliary		-0.001 (0.006)		-0.001 (0.006)
Observations	4,680	4,680	4,680	4,680
Controls	No	No	Yes	Yes
F-stat	519.52	280.43	410.41	203.22
Mean of dep. var.:				
All firms	0.041			
Care homes	0.043			
Domiciliary care	0.036			

*Notes:* The table reports the estimated coefficient  $\hat{\beta}_3$  from model (3). The sample is a balanced panel of adult social care providers active between March 2015 and March 2017. Robust standard errors are reported in parentheses. P-value: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Control variables are the initial proportion female, proportion with nursing qualification, proportion of care assistants, average age (all workers), occupancy rate and local authority district dummies. When data on firm-level covariates is missing, such missing information is controlled for via a set of dummy variables.

*Source:* NMDS-SC.

**Table 12 – Zero Hour Contracts Equations**

Dep. Var.: Change in proportion of employees on zero hour contracts

*March 2016 to March 2017*

	(1)	(2)	(3)	(4)	(5)	(6)
Initial low-paid proportion	0.001 (0.006)	0.006* (0.004)	0.014** (0.007)	0.012** (0.006)		
Initial low-paid proportion x Domiciliary		0.039** (0.019)		0.033* (0.019)		
Change in log average wage					0.257** (0.126)	0.219** (0.101)
Change in log average wage x Domiciliary						0.596* (0.350)
Observations	4,680	4,680	4,680	4,680	4,680	4,680
Controls	No	No	Yes	Yes	Yes	Yes
Mean of dep. var.:						
All firms	0.019					
Care homes	0.006					
Domiciliary care	0.061					

*Notes:* The table reports the estimated reduced-form coefficient  $\hat{\beta}_3$  from model (3) in columns (1)-(4), and the estimated IV coefficient  $\hat{\beta}_4$  from model (4) in columns (5)-(6), using the change in the share of workers on ZHC as outcome variable. The sample is a balanced panel of adult social care providers active between March 2015 and March 2017. Robust standard errors are reported in parentheses. P-value: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Control variables are the initial proportion female, proportion with nursing qualification, proportion of care assistants, average age (all workers), occupancy rate and local authority district dummies. When data on firm-level covariates is missing, such missing information is controlled for via a set of dummy variables.

*Source:* NMDS-SC.

**Table 13 – Zero Hour Contracts Equation (LFS Sample)**

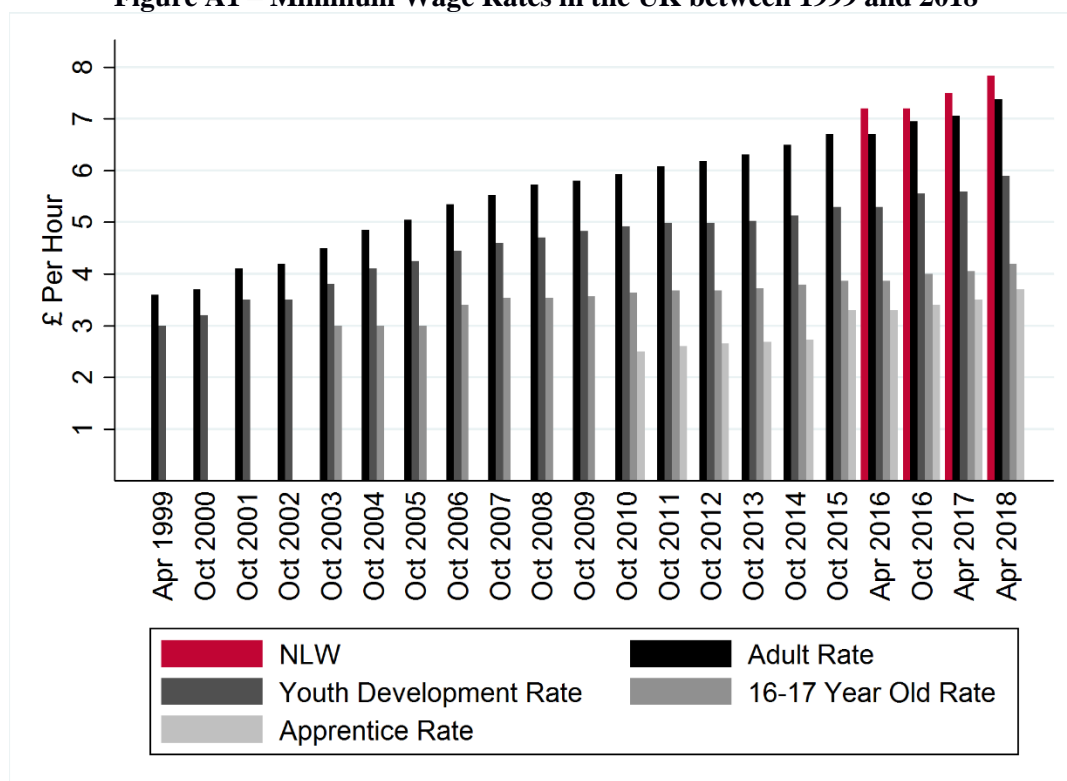
	Social Care Industry		Pooled Low Wage Industries	
	(1)	(2)	(3)	(4)
Post NLW	0.011*** (0.003)	0.010*** (0.003)	0.008*** (0.001)	0.010*** (0.001)
Controls	No	Yes	No	Yes
Observations	25,191	25,191	91,362	91,362
Pre-NLW mean of dep. var.	0.042	0.042	0.041	0.041

*Notes:* The table reports the estimated coefficient  $\hat{\beta}_5$  from the estimating equation (5). The sample for the first two columns is workers employed in the Social Care Industry, and for the second pair of columns is workers employed in Low Paying Industries (defined in LPC (2017)). The samples contain 4 pre-NLW quarters (2014-2015 quarter 2 and quarter 4) and 3 post-NLW quarters (2016 quarter 2 and quarter 4, and 2017 quarter 2). Controls include age, education, gender, a dummy for white ethnicity, a dummy for British nationality, a dummy for working in the public sector and twelve regional dummies

*Source:* LFS.

## Appendix A

**Figure A1 – Minimum Wage Rates in the UK between 1999 and 2018**



*Notes:* The graph reports the various minimum wage rates in the UK between 1999 and 2018. The apprentice rate applies to apprentices. The 16-17 year-old rate to workers aged 16 and 17. The youth development rate to workers aged 18-20. The adult rate applied to workers aged 21 and over until March 2016. From April 2016, the adult rate applies to workers aged 21-24 and the NLW to those aged 25 and over.

*Source:* Low Pay Commission.

**Table A1 – Sample of Survey Respondents of LSE-CEP Survey**

Variables	Mean	S.D.
Female	0.53	0.50
Age	40.93	13.04
Age 18-24	0.14	0.35
Age 25-34	0.21	0.41
Age 35-44	0.22	0.41
Age 45-54	0.25	0.43
Age 55-65	0.19	0.39
No qualifications	0.04	0.19
Some GCSE/O levels	0.12	0.32
5 or more GCSE/O levels	0.13	0.34
Trade/technical/vocational training	0.12	0.33
A levels	0.22	0.41
Bachelor's degree	0.26	0.44
Master's degree	0.09	0.28
Doctorate degree	0.02	0.12
North East	0.05	0.22
North West	0.11	0.32
Yorkshire and Humberside	0.09	0.29
East Midlands	0.08	0.27
West Midlands	0.09	0.29
Eastern England	0.07	0.26
London	0.12	0.33
South East	0.15	0.35
South West	0.08	0.27
Wales	0.05	0.22
Scotland	0.08	0.27
Northern Ireland	0.02	0.14
Employed by government	0.17	0.38
Employed by private company	0.49	0.50
Employed by non-profit organization	0.07	0.26
Self-employed, with or without employees	0.11	0.32
Working in the family business	0.01	0.11
Only work last week was filling out surveys	0.03	0.17
Did not have a job last week	0.12	0.32
Sample Size	18,831	

*Note:* The table reports the mean and standard deviation of a set of individual characteristics for the full sample of respondents to the LSE-CEP Survey of Self-Employment and Alternative Work Arrangements.

*Source:* LSE-CEP survey.

**Table A2 – CEP-LSE Survey Representativeness Based on LFS 2017**

Variables	All 18-65		ZHC 18-65	
	Mean	S.D.	Mean	S.D.
Female	0.52	0.50	0.60	0.49
Age	42.78	13.34	37.85	14.91
Age 18-24	0.11	0.32	0.28	0.45
Age 25-34	0.19	0.40	0.19	0.39
Age 35-44	0.22	0.41	0.16	0.37
Age 45-54	0.24	0.43	0.18	0.38
Age 55-65	0.24	0.43	0.19	0.39
No Qualifications	0.08	0.26	0.06	0.24
GCSE/O levels	0.20	0.40	0.22	0.41
Trade/Technical/Other	0.09	0.28	0.10	0.30
A Levels	0.23	0.42	0.28	0.45
Bachelor's Degree	0.30	0.46	0.23	0.42
Master's Degree	0.05	0.21	0.03	0.17
Doctorate Degree	0.01	0.10	0.00	0.06
North East	0.04	0.20	0.05	0.22
North West	0.11	0.31	0.09	0.29
Yorkshire & The Humber	0.09	0.28	0.08	0.28
East Midlands	0.07	0.26	0.08	0.27
West Midlands	0.09	0.28	0.08	0.26
East of England	0.09	0.29	0.09	0.29
London	0.11	0.32	0.12	0.32
South East	0.13	0.34	0.15	0.35
South West	0.09	0.29	0.11	0.32
Wales	0.04	0.21	0.01	0.11
Scotland	0.08	0.27	0.08	0.27
Northern Ireland	0.05	0.21	0.05	0.23
Employed by Public Sector	0.17	0.38	0.16	0.36
Employed by Private Sector	0.58	0.49	0.84	0.37
Self-employed, with or without employees	0.11	0.31	0.09	0.29
Does not have a job	0.24	0.43	0.00	0.00
Hourly Wage	14.82	11.42	9.70	7.12
Hourly Wage (median)	11.55		8.0	
Sample Size	108,983		1,686	

*Note:* The table reports summary statistics of individual level characteristics for all working age respondents and ZHC workers. Wage data only appears in two waves of the LFS, thus wage statistics are based off approximately one third of the number of observations.

*Source:* LFS

**Table A3 – NMDS-SC Survey Representativeness (Care Workers)**

	LFS		NMDS-SC	
	Mean (1)	S.D. (2)	Mean (3)	S.D. (4)
Prop. female	0.85	0.36	0.85	0.13
Age	42.62	13.58	42.60	4.63
Hourly rate	7.91	1.50	7.10	0.93
Weekly hours	28.38	16.14	24.49	10.30
Proportion on ZHC	0.11	0.31	0.12	0.23
North East	0.07	0.25	0.05	0.23
North West	0.13	0.34	0.13	0.34
Yorkshire & Humberside	0.12	0.32	0.10	0.31
East Midlands	0.08	0.28	0.09	0.28
West Midlands	0.11	0.31	0.12	0.33
East England	0.12	0.32	0.13	0.34
London	0.09	0.28	0.06	0.24
South East	0.15	0.36	0.15	0.36
South West	0.13	0.34	0.15	0.36
Sample Size	2,025		4,680	

*Note:* The table reports the mean and standard deviation for a set of individual-level characteristics for care workers in the LFS (columns (1) and (2)). The table also reports the mean and standard deviation for the same set of characteristics at the firm level in NMDS-SC (columns (3) and (4)). The LFS data refer to 2015Q4 and 2016Q1, and the NMDS-SC data to March 2016. The ZHC indicator only appears in April-June and October-December quarters of the LFS. Thus the proportion of ZHC reported in column (1) is based on 2015Q4 data only. Wage data only appears in two waves of the LFS, thus wage statistics in columns (1) and (2) are based off approximately one fifth of the number of observations.

*Source:* LFS and NMDS-SC.



**Table A4 – Employment Equations**

Dep. Var.: Change in log number of employees

*March 2016 to March 2017*

	(1)	(2)	(3)	(4)
Initial low-paid proportion	-0.000 (0.011)	-0.010 (0.011)	-0.001 (0.014)	-0.009 (0.013)
Initial low-paid proportion x Domiciliary		0.036 (0.032)		0.024 (0.033)
Observations	4,680	4,680	4,680	4,680
Controls	No	No	Yes	Yes
Mean of dep. var.:				
All firms	0.013			
Care homes	0.013			
Domiciliary care	0.012			

*Notes:* The table reports the estimated reduced-form coefficient  $\hat{\beta}_3$  from model (3), using the change in log headcount employment as outcome variable. The sample is a balanced panel of adult social care providers active between March 2015 and March 2017. Robust standard errors are reported in parentheses. P-value: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Control variables are the initial proportion female, proportion with nursing qualification, proportion of care assistants, average age (all workers), occupancy rate and local authority district dummies. When data on firm-level covariates is missing, such missing information is controlled for via a set of dummy variables.

*Source:* NMDS-SC.

**Table A5 – Employment Contract Equations**

Dep. Var.: Change in proportion of employees by contract type between March 2016 and March 2017

*Panel A – Temporary contract*

	(1)	(2)	(3)	(4)	(5)	(6)
Initial low-paid proportion	-0.002 (0.003)	-0.003 (0.002)	-0.002 (0.003)	-0.000 (0.002)		
Initial low-paid proportion x Domiciliary		-0.003 (0.010)		-0.001 (0.010)		
Change in log average wage					-0.038 (0.060)	-0.008 (0.046)
Change in log average wage x Domiciliary						-0.129 (0.167)
Observations	4,680	4,680	4,680	4,680	4,680	4,680
Controls	No	No	Yes	Yes	Yes	Yes
Mean of dep. var.:						
All firms	-0.002					
Care homes	-0.001					
Domiciliary care	-0.005					

*Panel B – Bank*

	(1)	(2)	(3)	(4)	(5)	(6)
Initial low-paid proportion	0.002 (0.003)	-0.001 (0.003)	0.002 (0.003)	-0.001 (0.003)		
Initial low-paid proportion x Domiciliary		0.008 (0.006)		0.011 (0.007)		
Change in log average wage					0.037 (0.056)	-0.024 (0.063)
Change in log average wage x Domiciliary						0.193 (0.118)
Observations	4,680	4,680	4,680	4,680	4,680	4,680
Controls	No	No	Yes	Yes	Yes	Yes
Mean of dep. var.:						
All firms	-0.004					
Care homes	-0.004					
Domiciliary care	-0.005					

Panel C – Agency contract

	(1)	(2)	(3)	(4)	(5)	(6)
Initial low-paid proportion	0.001 (0.002)	-0.001* (0.001)	0.001 (0.002)	0.000 (0.002)		
Initial low-paid proportion x Domiciliary		0.000 (0.007)		0.001 (0.008)		
Change in log average wage					0.017 (0.040)	0.001 (0.027)
Change in log average wage x Domiciliary						0.023 (0.137)
Observations	4,680	4,680	4,680	4,680	4,680	4,680
Controls	No	No	Yes	Yes	Yes	Yes
Mean of dep. var.:						
All firms	-0.002					
Care homes	-0.000					
Domiciliary care	-0.009					

*Notes:* The table reports the estimated reduced-form coefficient  $\hat{\beta}_3$  from model (3) in columns (1)-(4), and the estimated IV coefficient  $\hat{\beta}_4$  from model (4) in columns (5)-(6), using the change in the share of workers on a given contract as outcome variable. The sample is a balanced panel of adult social care providers active between March 2015 and March 2017. Robust standard errors are reported in parentheses. P-value: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Control variables are the initial proportion female, proportion with nursing qualification, proportion of care assistants, average age (all workers), occupancy rate and local authority district dummies. When data on firm-level covariates is missing, such missing information is controlled for via a set of dummy variables. *Temporary contract*: the worker is employed for a limited duration, normally either on a fixed term contract or for a fixed task, or on a spell of casual or seasonal employment as a “temp”. *Bank worker*: the worker is retained by the organisation as a whole, but deployed on a casual or short term basis. *Temporary agency work*: the worker is supplied by an outside employment agency/bureau; this category includes staff employed by NHS professionals, and workers supplied on contract e.g. by outside catering and cleaning companies. *Source*: NMDS-SC.

**Table A6 –Zero Hour Contracts Equation, all Low Pay Industries (LFS Sample)**

	(1) Retail	(2) Retail	(3) Hospitality	(4) Hospitality	(5) Social Care	(6) Social Care	(7) Employment Agencies	(8) Employment Agencies
Post NLW	0.001 (0.002)	0.002 (0.002)	0.0118** (0.006)	0.014** (0.006)	0.011*** (0.003)	0.010*** (0.003)	0.013 (0.013)	0.013 (0.013)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	27,058	27,058	12,446	12,446	25,191	25,191	1,701	1,701
Pre-NLW mean of dep. var.	0.017	0.017	0.102	0.102	0.042	0.042	0.072	0.072
	(9) Cleaning & Maintenance	(10) Cleaning & Maintenance	(11) Leisure, Travel & Sport	(12) Leisure, Travel & Sport	(13) Food Processing	(14) Food Processing	(15) Wholesale of Food	(16) Wholesale of Food
Post NLW	0.013*** (0.004)	0.014*** (0.004)	0.024** (0.011)	0.025** (0.010)	0.011* (0.006)	0.013** (0.006)	0.003 (0.005)	0.004 (0.005)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	5,729	5,729	3,541	3,541	2,885	2,885	1,915	1,915
Pre-NLW mean of dep. var.	0.019	0.019	0.099	0.099	0.025	0.025	0.010	0.010
	(17) Child Care	(18) Child Care	(19) Agriculture	(20) Agriculture	(21) Security	(22) Security	(23) Textiles	(24) Textiles
Post NLW	0.006 (0.006)	0.006 (0.006)	0.001 (0.003)	0.001 (0.004)	-0.024 (0.019)	-0.019 (0.019)	0.018** (0.008)	0.019** (0.008)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,246	3,246	3,084	3,084	1,057	1,057	996	996
Pre-NLW mean of dep. var.	0.031	0.031	0.010	0.010	0.115	0.115	0.009	0.009
	(25) Hairdressing	(26) Hairdressing	(27) Pooled	(28) Pooled				
Post NLW	0.010* (0.005)	0.010** (0.005)	0.008*** (0.001)	0.010*** (0.001)				
Controls	No	Yes	No	Yes				
Observations	2,513	2,513	91,362	91,362				
Pre-NLW mean of dep. var.	0.013	0.013	0.041	0.041				

*Notes:* The table reports the estimated coefficient  $\hat{\beta}_5$  from the estimating equation (5) using different Low Paying Industry samples, as defined in LPC (2017). The samples contain 4 pre-NLW quarters (2014-2015 quarter 2 and quarter 4) and 3 post-NLW quarters (2016 quarter 2 and quarter 4, and 2017 quarter 2). Controls include age, education, gender, a dummy for white ethnicity, a dummy for British nationality, a dummy for working in the public sector and twelve regional dummies

*Source:* LFS.

## Appendix B

### LSE-CEP Survey of Self-employment and Alternative Work Arrangements

R1

What is the highest degree or level of school you have completed?

- ☐ No qualifications
- ☐ Some GCSE/O levels.
- ☐ 5 or more GCSE/O levels
- ☐ Trade/technical/vocational training
- ☐ A levels
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate degree

R2

Are you?

- ☐ Male
- ☐ Female

R3

What is your age? [ALLOW INTEGER NUMBERS BETWEEN 15 and 99]

\_\_\_\_\_

R4

Which region do you usually live in?

- ☐ North East
- ☐ North West
- ☐ Yorkshire and Humberside
- ☐ East Midlands
- ☐ West Midlands
- ☐ Eastern England
- ☐ London
- ☐ South East
- ☐ South West
- ☐ Wales
- ☐ Scotland
- ☐ Northern Ireland

S1. On your main job last week, were you employed by government, by a private company, a nonprofit organization, or were you self-employed or working in the family business? Or were you not working at all last week?

- ☐ Employed by government → GO TO S2
- ☐ Employed by private for-profit company → GO TO S2
- ☐ Employed by nonprofit organization including tax exempt and charitable organizations → GO TO S2
- ☐ Self-employed, with or without employees → GO TO S3
- ☐ Working in the family business → GO TO S3
- ☐ Only work last week was filling out surveys → SCREENS OUT
- ☐ Did not have a job last week → SCREENS OUT

S2. Many people work in self-employment, on either a part-time or full-time basis, doing things such as working on construction jobs, selling goods or services in their businesses, or working through a digital platform or intermediary, such as Uber, Upwork, Deliveroo or Avon. **Last week**, were you working or self-employed as an independent contractor, an independent consultant, or freelance worker? That is, someone who obtains customers on their own to provide a product or service.

- ☐ Yes
- ☐ No

S3. Last week, were you on a zero hours contract? Zero hours contracts are also known as casual contracts or ‘on call’ work. Under such contracts, people agree to be available for work as and when required, but have no guaranteed hours or times of work.

- ☐ Yes → GO TO QUESTION Q1
- ☐ No → GO TO QUESTION D1

Q1 In your employment as a zero hours contract or on-call worker last week, did you have more than one employer or contract? Please consider only jobs on zero hours contracts or on-call jobs when answering this question.

- ☐ Yes
- ☐ No

Q2 Last week, did you do any paid work as self-employed or on employment contracts other than zero hours contracts or on-call jobs?

- ☐ Yes
- ☐ No

Q3 In your zero hours contract or on-call job, how many hours did you work last week? Please, consider only hours you are paid for.

Please enter: \_\_\_\_\_ hours last week

Q4 In your zero hours contract or on-call job, how many hours on average in a week? Please, consider only hours you are paid for.

Please enter: \_\_\_\_\_ hours on average in a week

Q5 On how many (different) days per week do you usually work?  
Please enter: \_\_\_\_\_ days per week

Q6 How much did you earn per hour in your zero hours contract or on-call job last week? Please, consider only hours you are paid for.  
Please enter earnings: £\_\_\_\_\_ per hour

Q7 Did you do any hours of unpaid work in your zero hours contract or on-call job last week? E.g. travel time from one customer to another.

- ☐ Yes
- ☐ No

IF Q7 = YES

Q7a How many hours of unpaid work did you do in your zero hours contract or on-call job last week?  
Please enter: \_\_\_\_\_ hours of unpaid work last week

Q8 Would you have preferred to work more or fewer hours last week in your zero hours contract or on-call job at that wage rate? Or were you satisfied with the number of hours you worked?

- ☐ More hours last week
- ☐ Fewer hours last week
- ☐ Satisfied with number of hours

IF Q8 = More hours last week

Q8a Why were you NOT able to work more last week?

- ☐ I am not qualified for the available work
- ☐ There isn't enough available work
- ☐ I have domestic commitments that prevent me from working more
- ☐ I am ill or disabled
- ☐ Other

IF Q8 = Fewer hours last week

Q8b Why would you want to work fewer hours?

- ☐ I am a student
- ☐ I am ill or disabled and do not feel I can take on more hours
- ☐ I have domestic commitments that prevent me from working more
- ☐ I want to spend more time on leisure or other unpaid activities
- ☐ I want to do other types of work
- ☐ Other

Q9 Would you have preferred to work a pattern of more regular hours last week on your zero hours contract or on-call job at that wage rate? Or were you satisfied with the pattern of hours you worked?

- ☐ More regular hours last week
- ☐ Less regular hours last week
- ☐ Satisfied with pattern of hours

Q10 How satisfied are you with working on a zero hours contract or on-call job?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neither satisfied not dissatisfied
- ☐ Dissatisfied
- ☐ Very dissatisfied

Q11 Which of the following are reasons why you work on a zero hours contract or on-call job? Tick all that apply

- ☐ Could not find employment in a job with a guaranteed number of hours
- ☐ Pay is better than other available jobs
- ☐ To complement pay from other jobs
- ☐ To earn money while going to school
- ☐ Gives me flexibility to perform other activities
- ☐ Other

Q11a Which is the most important reason why you work on a zero hours contract or on-call job?

- ☐ Could not find employment in a job with a guaranteed number of hours
- ☐ Pay is better than other available jobs
- ☐ To complement pay from other jobs
- ☐ To earn money while going to school
- ☐ Gives me flexibility to perform other activities
- ☐ Other

IF Q11a = Could not find employment in a job with a guaranteed number of hours

Q11b Please indicate which of the following reasons contributed to you not finding employment in a job with a guaranteed number of hours:

- ☐ Lack of jobs near where I live
- ☐ I faced discrimination
- ☐ I am overqualified for the available jobs
- ☐ I am underqualified for the available jobs
- ☐ Other

Q12 For how long have you been working on a zero hours contract or on-call job?

- ☐ Less than one month
- ☐ 1 – 6 months
- ☐ 7 – 12 months
- ☐ 1 – 2 years
- ☐ 3 – 4 years
- ☐ 5 years or more



Q13 How much longer do you expect to remain in your zero hours contract or on-call job?

- ☐ Less than one month
- ☐ 1 – 6 months
- ☐ 7 – 12 months
- ☐ One year or more

Q14 Have you received any work-related training in the last year?

- ☐ Yes      SKIP TO Q14a
- ☐ No      SKIP TO Q14c

Q14a What type of training? (Mark all that apply)

[LIST IN RANDOM ORDER, BUT OTHER IS LAST]

- ☐ Technical or technology training
- ☐ Quality training
- ☐ Skills training
- ☐ Continuing education
- ☐ Professional training and legal training
- ☐ Managerial training
- ☐ Safety training
- ☐ Other (please specify: \_\_\_\_\_)

Q14b Who paid for the cost of the training?

- ☐ Me or a family member
- ☐ A contractor or customer
- ☐ My employer
- ☐ Someone else
- ☐ No one, it was free

Q14c What type of training would you find most useful to improve your job prospects? (Mark all that apply)

[LIST IN RANDOM ORDER, BUT OTHER IS LAST]

- ☐ Technical or technology training
- ☐ Quality training
- ☐ Skills training
- ☐ Continuing education
- ☐ Professional training and legal training
- ☐ Managerial training
- ☐ Safety training
- ☐ Other (please specify: \_\_\_\_\_)

Q15 In your job on a zero hours contract or on-call job, what kind of work do you do, that is, what is your occupation? (For example: plumber, typist, farmer)

Please enter your occupation: \_\_\_\_\_

Q15a What are your usual activities or duties at this job? (For example: typing, keeping account books, filing, selling cars, operating printing press, laying brick)

Please enter your usual activities or duties: \_\_\_\_\_

Q15b What kind of business or industry are you in at this job?

- ☐ (A) Agriculture, Forestry and Fishing
- ☐ (B) Mining and Quarrying
- ☐ (C) Manufacturing
- ☐ (D) Electricity, Gas, Steam and Air Conditioning Supply
- ☐ (E) Water Supply, Sewerage, Waste Management and Remediation Activities
- ☐ (F) Construction
- ☐ (G) Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles
- ☐ (H) Transportation and Storage
- ☐ (I) Accommodation and Food Service Activities
- ☐ (J) Information and Communication
- ☐ (K) Financial and Insurance Activities
- ☐ (L) Real Estate Activities
- ☐ (M) Professional, Scientific and Technical Activities
- ☐ (N) Administrative and Support Service Activities
- ☐ (O) Public Administration and Defence, Compulsory Social Security
- ☐ (P) Education
- ☐ (Q) Human Health and Social Work Activities
- ☐ (R) Arts, Entertainment and Recreation
- ☐ (S) Other Service Activities
- ☐ (T) Activities of Households as Employers of Domestic Personnel, Undifferentiated Goods and Services Producing Activities of Households for Own Use
- ☐ (U) Activities of Extraterritorial Organisations and Bodies
- ☐ Other (please specify \_\_\_\_\_)

Q15c In your zero hours contract or on-call job, what is the main company you work for?

Please specify name: \_\_\_\_\_

D1 Which country were you born in?

Please specify: \_\_\_\_\_

D2 What is your nationality?

Please specify: \_\_\_\_\_

D3 Which category or categories below best describe your ethnic group? (Mark all that apply)

- ☐ White
- ☐ Mixed / Multiple ethnic group
- ☐ Asian / Asian British
- ☐ Black / African / Caribbean / Black British
- ☐ Chinese
- ☐ Arab
- ☐ Other (please specify: \_\_\_\_\_)

D4 How many years of working experience have you got?

- ☐ Less than one year
- ☐ 1 – 3 years
- ☐ 3 – 5 years
- ☐ 5 years or more

D5 Are you now married, widowed, divorced, separated or never married?

- ☐ Married
- ☐ Widowed
- ☐ Divorced
- ☐ Separated
- ☐ Never Married
- ☐ Other (please specify: \_\_\_\_\_)

D6 How many children do you have?

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3 or more

D7 Which category represents your total individual income (before taxes) during the past 12 months? This should include money from all jobs, net income from a business or farm, and any rent, pensions, dividends, interest, social security payments or other money income you received.

- ☐ Less than £5,000
- ☐ £5,000 to 9,999
- ☐ £10,000 to 19,999
- ☐ £20,000 to 39,999
- ☐ £40,000 to 69,999
- ☐ £70,000 or more

D8 Which category represents total income (before taxes) of your household during the past 12 months? This should include money from all jobs, net income from a business or farm, and any rent, pensions, dividends, interest, social security payments or other money income that all members of your household received, including you.

- ☐ Less than £5,000
- ☐ £5,000 to 9,999
- ☐ £10,000 to 19,999
- ☐ £20,000 to 39,999
- ☐ £40,000 to 69,999
- ☐ £70,000 or more

D9 Do you use services such as Uber, TaskRabbit, Airbnb or Deliveroo?

- ☐ Yes
- ☐ No

D10 Could you tell us how interesting or uninteresting you found the questions in this survey?

- ☐ Very interesting
- ☐ Interesting
- ☐ Neither interesting nor uninteresting
- ☐ Uninteresting
- ☐ Very uninteresting