# DISCUSSION PAPER SERIES

# Zero Hours Contracts and Their Growth

Egidio Farina
Colin Green
Duncan McVicar

# I Z A Institute
## of Labor Economics

Initiated by Deutsche Post Foundation

# Zero Hours Contracts and Their Growth

**Egidio Farina**
*Queen's University Belfast*

**Colin Green**
*Norwegian University of Science and Technology*

**Duncan McVicar**
*Queen's University Belfast and IZA*

# ABSTRACT

# Zero Hours Contracts and Their Growth*

This paper studies the prevalence and nature of zero-hours contracts (ZHCs) in the UK labour market. The headline count of ZHC workers based on the Labour Force Survey has long underestimated and continues to underestimate the number of workers in ZHC or ZHC-like jobs. ZHC jobs and workers are heterogeneous, but ZHC jobs have become increasingly concentrated among young workers, full-time students, migrants, black and minority ethnic workers, in personal service and elementary occupations, and in the distribution, accommodation and restaurant sector over time. Compared to other forms of employment, median wages in ZHC jobs have also fallen over time. The most common prior labour market state for ZHC workers is non-ZHC employment, particularly part-time employment, and we cannot reject that part of the reported growth in ZHCs has been driven by reclassification of existing employment relationships. Similarly, we cannot reject that growth in public awareness of ZHCs contributed substantially to recent growth in reported ZHCs, particularly over the period 2013/14.

**Corresponding author:**
Duncan McVicar
Queen's Management School
Queen's University Belfast
Riddel Hall
185 Stranmillis Road
Belfast BT9 5EE
United Kingdom

E-mail: d.mcvicar@qub.ac.uk

# 1. Introduction

There is growing concern internationally about the increasing share of contingent jobs (often described as *precarious jobs*) in overall employment (e.g. Katz and Krueger, 2016; Prosser, 2016). In the UK a particular concern has been the dramatic increase in the prevalence of employment contracts that do not guarantee any hours of work at all, known as zero hours contracts (ZHCs). These types of arrangements can be attractive for employers facing erratic and unpredictable demand, and because they enable employers to designate individuals as workers, with fewer entitlements and employment protection rights, rather than employees (Brinkley 2013). ZHCs can also be attractive for workers who want flexibility regarding when and where they work. The use of these contracts, however, raises serious questions about job insecurity, lack of access to work-related benefits and entitlements, lack of opportunity for career development, and unpredictability of hours and income, particularly if employers expect flexibility from workers but offer little flexibility in return (for evidence on this last point see CIPD, 2015). This has made them highly controversial, even as other forms of contingent employment and self-employment have also grown.

ZHCs have been used in the UK and elsewhere – although they sometimes go by other names in other countries, e.g. 'If and When' contracts in Ireland (O'Sullivan et al., 2015) – for many years.[1] Adams and Prassl (2018) suggests their use in the UK goes back to at least the 1970s, and point to examples of the use of ZHC-like contracts as far back as the 19th Century. More recently, the ONS reports figures from the Quarterly Labour Force Survey (QLFS) suggesting that over two hundred thousand workers were employed on ZHCs in their main job in the UK in the year 2000, the earliest available data point (ONS, 2018). Their use appears to have grown rapidly over the last few years, however, even as the labour market has tightened following the Great Recession. ONS estimates of the proportion of people in employment employed under a ZHC in their main job in the UK grew from 0.5% in 2006 to 2.8% (or 901,000 workers) in 2017 (ONS, 2018). The ONS (e.g. ONS, 2014a) notes that these statistics are likely to underestimate the actual prevalence of ZHCs because, among other things, they are based on

---

[1] Even within the UK there is no universally accepted single definition of a ZHC (Adams and Prassl, 2018). ZHCs have been defined by the UK government as *employment contracts where the employer does not guarantee the individual any work and the individual is not obliged to accept any work offered* (DBIS 2013). The (seemingly) preferred definition of the Office for National Statistics (ONS) is a little broader and omits the no worker obligation clause: *contracts that do not guarantee a minimum number of hours* (ONS 2016).

self-reports from the QLFS and not all ZHC workers may realise they are employed under a ZHC, as opposed to, say, a casual contract (for which there is also no universally accepted single definition). Employer based surveys tend to suggest higher – possibly double – ZHC (or ZHC-like contract) prevalence (e.g. ONS, 2018), as do sectoral data (e.g. Bessa et al., 2013; Jacques, 2013; also Adams and Prassl, 2018). On the other hand, the QLFS may exaggerate the *growth* in ZHC prevalence because, as awareness of ZHCs has increased, under-reporting of ZHCs has likely decreased. Indeed the QLFS suggests that growth in the prevalence of ZHCs has levelled off since 2016, even turning negative in 2018. What is not in doubt is that ZHCs now constitute a significant segment of the UK labour market. They are also highly concentrated among particular demographic groups (notably young people), in particular industrial sectors (notably accommodation and food), and in particular occupations (notably caring and leisure) (ONS, 2018).

Despite this, and despite growing interest among researchers in the changing nature of work and contingent employment more generally, uncertainty persists about the prevalence, distribution and nature of ZHCs, and particularly about their growth over time. As a consequence our understanding of the contemporary labour market in the UK is incomplete, and the current debate about ZHCs is taking place against the backdrop of this incomplete understanding. This paper seeks to fill these gaps in our understanding by exploiting data from the QLFS and the longitudinal LFS (LLFS). Specifically, we address the following research questions. How many workers are employed on ZHCs or ZHC-like contracts? What do ZHC jobs and ZHC workers look like? How has this changed over time?  Where in (or out of) the labour market do ZHC workers come from? To what extent has the growth in reported ZHC prevalence been driven by increased awareness of ZHCs?

Our results suggest that the headline ZHC count from the QLFS continues to underestimate the number of workers whose main job is a ZHC or other no-guaranteed-hours-contract (NGHC) job. In contrast, NGHC figures reported by ONS Business Surveys (which count jobs not workers) are likely to over-estimate this number. Whilst recognising that there is no perfect way to measure the number of workers on NGHCs, we argue that the two can reasonably be interpreted as lower and upper bounds on the actual number of workers in NGHCs in their main job. This would put the number of workers in the UK on a ZHC (NGHC) in their main job somewhere between 0.9 million and 1.8 million (between 1.1 million and 1.8 million) in 2017Q4. We show that ZHC (and more broadly NGHC) workers and jobs differ in numerous

characteristics compared to workers in other types of jobs. We also show that ZHC jobs have become increasingly concentrated over time at younger ages, among full-time students, among migrants, among black and minority ethnic workers, in the private sector, in personal service and elementary occupations, and in the distribution, accommodation and restaurant sector. Median real wages for ZHC jobs have also fallen over time relative to those for other jobs. The most common prior labour market state for ZHC workers is non-ZHC employment, particularly other forms of part-time employment, and we cannot reject that part of the reported growth in ZHCs was driven by reclassification of existing employment relationships. Finally – and this may in part explain the reclassification finding – we cannot reject that growth in public awareness of ZHCs contributed substantially to recent growth in reported ZHCs, particularly over the period 2013/14.

## 2. Existing Estimates of the Prevalence of ZHCs

ZHCs began to attract attention in the literature from the mid-late 1990s (e.g. Lucas, 1997), and the ONS first included a question on ZHCs in the QLFS in 2000, since which time the relevant ZHC question in the QLFS has remained broadly unchanged. Although the QLFS is a quarterly survey, information on ZHCs is collected only every other quarter, specifically in the spring and autumn quarters (up to and including 2005) or Q2 and Q4 (from 2006 onwards). The ONS also advise against using Q2/spring quarter data on ZHCs between 2004 and 2013 (at least naively), because survey respondents reporting that they were engaged in shift work were not allowed to answer the question on special working-hours contracts, leading to non-trivial undercounting relative to the Q4/autumn quarter (see ONS, 2014a). Consequently, ONS estimates of the number of people who are on a ZHC in their main job focus on Q4 of each year until 2013, after which both Q2 and Q4 estimates are comparable. Other sources of survey data on ZHCs (or NGHCs) with national or near-national coverage include biannual ONS business surveys from 2014-2017 (see ONS, 2018), *ad hoc* additions to Chartered Institute of Personnel and Development (CIPD) Labour Market Outlook and Employee Outlook surveys in 2013 and 2015 (see CIPD, 2013; CIPD, 2015), the 2018 LSE-CEP Survey of Alternative Work Arrangements (see Datta et al., 2018) and a question in the British Household Panel Survey (BHPS) from wave 9-18 (1999-2008) but not beyond 2008 (see Koumenta and Williams, 2015). There are some limited additional data available for specific sectors and occupations (e.g. see Bessa et al, 2013; Jacques, 2013). The QLFS, however, remains the most widely reported data source on ZHCs in the UK.

The ONS has published regular reports on the number and nature of ZHCs, some based entirely on the QLFS (e.g. ONS, 2017), and some combining data from the QLFS and Business Survey (e.g. ONS, 2018), since 2013. As an example of QLFS-based content, Figure 1 plots the estimated number of people whose main job is a ZHC job derived from the QLFS following the ONS method, as reported in ONS (2018). Note the particularly rapid growth during 2013, continuing at a slower rate until 2016, from which point the reported number of ZHC workers has been essentially flat.

INSERT FIGURE 1 HERE

As frequently noted by the ONS (e.g. ONS, 2014a) and others (e.g. Pennycook et al., 2013), these figures are likely to underestimate the total number of people whose main job is a ZHC job, particularly earlier in the period, and as a result overestimate ZHC growth. This reflects the growing awareness of ZHCs in the media and the broader social discourse. Despite the apparent widespread acceptance of this argument, however, no existing study has attempted to quantify the underestimation from this source or even to test the hypothesis formally. Having said that, two alternative descriptive avenues have been tentatively explored. First, ONS (2014a) explores the extent to which reported ZHC workers have been with their current employer for more or less than one year, concluding that at least some of the reported growth in ZHCs over 2013 – the period of most rapid apparent growth – comes from workers who were with their current employer in the previous year. Such reclassification of existing employment relationships could be driven by QLFS respondents relabelling their contract type despite there being no change in actual contract type, from employers moving existing workers to ZHCs from other contract types, or both. Second, CIPD (2015) and McVicar (2017) plot ZHC numbers from the QLFS alongside Google Trends data on searches for 'zero hours contracts', suggesting some co-movement, but with no formal modelling. In this paper we take this approach further in order to formally test the public awareness hypothesis, and as far as possible, to quantify the magnitude of any public awareness effect.

An additional reason to suspect that the QLFS figures reported by the ONS underestimate the number of ZHCs in the period up to 2013 is that the previously mentioned shift work restriction leading to undercounting in Q2 between 2004 and 2013 is also present over this period for wave 1 respondents in Q4.[2] Although this is acknowledged by ONS (2014a), it is never acted

---

[2] The rolling five-wave panel structure of the LFS means that roughly one fifth of each QLFS sample is a first-time respondent, i.e. is in wave 1 of 5.

upon in terms of publishing revised estimates. The QLFS may also undercount ZHCs (over the whole period) because the relevant question (FLEX10) is only asked of people in employment in the reference period (i.e. the previous week) which may omit *some* ZHC workers who worked no hours in the reference period (Adams and Prassl, 2018). A further reason to suspect that the QLFS may underestimate the number of ZHCs (again over the whole period) is because the precise wording of the relevant question targets individuals whose working hours vary from week to week. CIPD (2015) show this is not the case for all ZHC workers, some of whom work mostly regular hours and regular shifts, suggesting some of those on ZHCs in their main jobs may not respond to FLEX10 or could respond by answering 'none of the above'.

The ONS began to collect information on more broadly-defined *NGHCs* by surveying businesses in January 2014. There have been eight further surveys spaced roughly every six months. In all cases the statistics reported from these surveys are labelled 'experimental' by the ONS, and this data collection exercise has now been discontinued. Nevertheless these data are potentially informative for NGHC prevalence and in contrast to the QLFS, these business survey-based estimates suggest no clear trend increase over the period 2014-2017 (see ONS 2018). At each point in time, however, the count is far higher than the closest QLFS estimate. The following reasons are suggested for this: (i) the business survey counts the number of *contracts* whereas the QLFS counts the number of *people* on a ZHC in their main job (some people may hold more than one job and for some NGHCs may not be the main job); (ii) employers are more likely to be aware of their employees' contractual arrangements, so are less likely to under-report NGHCs; (iii) employers are likely to interpret 'NGHCs' more broadly than ZHCs, to include other contractual arrangements without guaranteed hours (such as casual or some on call contracts). The ONS has not yet attempted to replicate the NGHCs definition using QLFS data (or vice versa the ZHCs definition using business survey data), however, which again makes it difficult to quantify the role of these potential explanations.

The CIPD (2013, 2015) reports estimates of the number of people employed on ZHCs drawing on questions included in the summer/autumn 2013 and spring/summer 2015 Labour Market Outlook surveys of employers (with a sample size of around 1000 in each case). The estimates are derived from the (employment-weighted) proportion of employers who report using ZHCs, multiplied by the proportion of workers employed on a ZHC in those employers, multiplied by the number in employment (taken from the QLFS). In summer/autumn 2013 the resulting estimate was one million, considerably higher than the nearest-in-time QLFS estimate (585,000). In spring/summer 2015 the resulting estimate was 1.3 million, again considerably

higher than the nearest-in-time QLFS estimate (747,000). Two of the arguments set out above for why the ONS business survey estimates are higher than the corresponding QLFS estimates are also relevant here: (i) some workers may hold more than one job; and (ii) employers are more likely to be aware of their employees' contractual arrangements than the workers themselves. The third argument above (that employers likely interpret NGHCs as a broader category than ZHCs) does not obviously hold in the CIPD case. One implication is that the difference between the spring/summer 2015 CIPD estimate of the number of ZHCs held by workers (1.3 million) and the nearest-in-time corresponding ONS business survey estimate of the number of ZHC contracts (1.7 million) might be interpretable as a rough estimate of the number of NGHCs that employers do not think of explicitly as ZHCs. Also note that the growth rate in the number of ZHCs between summer/autumn 2013 and spring/summer 2015 implied by the CIPD data (30%) is very close to that implied by the QLFS (28%). We would not expect this if a disproportionately growing awareness of ZHCs among survey respondents was an important driver of the growth in reported ZHCs captured by the QLFS.

Moving beyond estimates based on nationally representative survey data is also potentially informative. In particular, two sectoral studies (Bessa et al. (2013) and Jacques (2013)), drawing on returns from domiciliary care worker employers and NHS Trusts respectively, again suggest considerably higher numbers of ZHC contracts than the QLFS at the time (see also Pennycook et al., 2013; Adams and Prassl, 2018). Using data from the National Minimum Data Set for Social Care, Bessa et al. (2013) estimate that, on average, 56% of domiciliary care workers in England employed each year over the period 2008-12 were employed on a ZHC (although there is reason to believe this may be an overestimate given apparently contradictory evidence on contracted hours in some cases). They cite a figure of 675,000 total workers in the sector in England in 2009, which suggests 376,000 ZHC workers in this sector alone. Note this is prior to the rapid growth in ZHCs reported by the QLFS. Indeed, averaging over the 2008-2012 period, the QLFS suggests just 189,000 ZHC workers (albeit in their main job) in the overall UK labour market. (Drawing on the same data source, Adams and Prassl (2018) cite a figure of 315,000 ZHC workers in March 2016 for broadly the same sector.) Similarly (if not quite as dramatically), Jacques (2013) reports data obtained from 159 of 164 NHS Trusts in England to suggest almost 100,000 NHS workers were employed on ZHCs in early 2013, again prior to much of the growth in ZHCs reported by the QLFS. More recent ONS reports (e.g. ONS 2016) suggest around 20% of ZHC workers, as reported by the QLFS, are to be found in the whole (1-digit) health and social work sector. This corresponds to around 50,000 in 2012

or just over 100,000 in 2013. In contrast, combining the estimates from Bessa et al. (2013) and Jacques (2013), the suggestion is that domiciliary care workers and NHS workers – both groups which are covered by but do not exhaust the one-digit health and social work sector – between them account for close to 500,000 ZHC workers.

International comparisons of the prevalence of ZHCs or ZHC-like contracts are complicated by institutional differences, terminology differences and differences in data collection. Some countries prevent or heavily restrict ZHCs via either regulation or collective bargaining (e.g. Germany, Netherlands); the UK is something of a permissive outlier in this respect, at least within Europe. Other labels for ZHCs or ZHC-like contracts used elsewhere include on-call (although on-call contracts may also describe regular permanent contracts with an on-call element), casual, and standby contracts. Further, not all countries collect comparable data on ZHCs or ZHC-like contracts, although there are some exceptions (e.g. Finland collects LFS data on ZHC workers, who accounted for 4% of those in employment in 2014). For further detail on these points see O'Sullivan et al. (2015) and Datta et al. (2018). For the US, Katz and Krueger (2016) show that the proportion of those in employment who have on-call contracts grew from 1.7% in 2005 to 2.8% in 2015. The world leader in ZHC-like employment is likely Australia, where casual workers – with contractual terms very similar to UK ZHCs – account for almost one quarter of all employees (Buddelmeyer and Wooden, 2011).

### 3. Data and Approach

We examine QLFS data over the period 2001-2018. QLFS respondents are asked a specific question on whether they work on a special working-hours contract. The structure of the question is such that respondents can choose up to three options among the following alternatives: flexitime, annualised hours contract, term time work, job-sharing, nine-day fortnight, four-and-a-half day week, zero hours contract, on-call working (only added as an option from 2011) or none of the previous options. Note that none of these options, other than ZHCs, can be unambiguously (or even predominantly) categorised as NGHCs. Also note that casual employment, which we argue below *is* interpretable as NGHC employment, is not one of the options under this question. Instead, respondents are asked if they are in casual employment as part of a series of questions on whether their employment is temporary or permanent. When we pool these data to analyse the characteristics of ZHC jobs and workers, the final sample includes approximately 3.8 million respondents, of whom approximately 1.8

million report to be in employment. To analyse how characteristics of ZHC workers and jobs have changed over time, we pool earlier waves and later waves of the QLFS separately.

In using the QLFS to study the prevalence of ZHCs in the UK labour market, a series of factors need to be considered. First, estimates of workers on ZHCs before 2006 need to be rescaled by an adjustment factor that takes into account the change from seasonal quarters to calendar quarters. Second, the LFS data collection process is such that if respondents from one quarter are non-respondents (and no proxy response is available) in a subsequent quarter, data are carried forward from previous quarters. However, for questions not asked in the previous quarter, like the ZHC question, no data can be brought forward. In this case, the response to the question is coded as "Does Not Apply". In order to obtain an estimate of the number of ZHC workers, which takes into account these cases, an additional adjustment factor must be applied. We follow the suggestion of the ONS, which assumes that non-respondents are randomly distributed across contract types in proportion to respondents, in this. Third, the figures on ZHC workers over the period 2004-2013 are affected by under-reporting due to the presence of the check in the LFS questionnaire which did not allow respondents to say that they worked shift work and then go on to say that they also worked on a ZHC. This applies to people interviewed in the quarter April-June, and to a lesser extent to other quarters, if people were interviewed in Wave 1. This problem is acknowledged by the ONS but a possible solution (e.g. an adjustment factor) has not been suggested as of yet. Our own analysis of this point suggests that the Q2 check makes a small but non-trivial difference to pre-2014 second quarter estimates (see Figure A1 in the appendix). By undercounting ZHCs in 2012Q4 but not 2013Q4, the wave 1 check also implies that Figure 1 slightly exaggerates the growth of ZHCs over this one year period, regardless of whether the data support the 'growing awareness' hypothesis. Fourth, as noted by Adams and Prassl (2018), seasonal workers in Q1 or Q3, who may be disproportionately employed on ZHCs, are not counted as such given the ZHC question is asked only every other quarter. Finally, given the nature of the relevant questions in the LFS, broadening analysis from reported ZHCs to analysis of NGHCs more generally is not possible, although some pooling of ZHC and casual workers to this end *is* possible.

To examine where in (or out of) the labour market ZHC workers come from, we exploit the rotating panel design of the LFS to construct a longitudinal dataset from multiple cohorts of the LLFS in which each individual is interviewed for five consecutive quarters before exiting the survey. (Note that the LLFS data made available to researchers by ONS is for the balanced panel only for each cohort, thus no explicit analysis of attrition is possible.) Specifically, we

pool LLFS cohorts over the period 2001-2018 who enter the sample in Q2 or Q4, exploiting observations from the first and fifth waves in each case (i.e. observations that include the ZHC question and are one year apart). The final sample includes 243,396 individuals. We also exploit information on the tenure of ZHC workers to explore the extent to which those entering ZHC status are doing so with the same employer (reclassification of existing employment relationships) as opposed to with a new employer. As we will see, however, limitations in the LLFS data currently made available, in particular with respect to types of employment contract other than ZHCs, constrain what we can learn about flows into ZHCs from these data.

Finally, following a growing literature in economics focusing on how the media can influence public awareness or guide individuals' socio-economic decisions (see Carroll, 2003; Lamla and Lein, 2008; van der Wiel, 2009; Murphy, 2017), we link the QLFS data on ZHCs described above to data on UK national newspaper articles discussing ZHCs, which we interpret as a proxy for public awareness of ZHCs. We obtain the number of UK national newspaper articles on ZHCs for the period 2001-2018 using LexisNexis, a full text online news and business information index. To complement this approach we also proxy for public awareness using Google Trends data (see Edelman (2012) for a review of studies using internet data for economic research). Specifically, we aggregate the number of Google Searches in the UK on "zero hours contracts" over the period 2004-2018 at the semester level.

## 4. The Prevalence and Nature of Zero Hours Contracts

### 4.1. How many workers are employed on ZHCs and other NGHCs?

Table 1 presents a set of alternative estimates of the number of ZHC or NGHC workers in the UK as of 2017Q4 (or as close as possible to that date). These are: the number of ZHC workers in 2017Q4 taken from the QLFS as reported by ONS (2018); the number of ZHC workers in spring/summer 2015, the last available estimate from the CIPD Labour Market Outlook Survey, as reported by CIPD (2015); and the number of NGHCs in November 2017 from the ONS Business Survey, as reported by ONS (2018). We also report an estimate generated from the 2017Q4 QLFS which sums ZHC workers with casual workers who do not report to be on a ZHC. We do this on the basis that casual contracts share the key ZHC feature of not guaranteeing any hours and, like ZHCs, can in practice be severed at any time with no notice period. We are not the first to make this point (see ONS (2014b) for the UK and Lass and Wooden (2019) internationally). One difference in perception if not in legal status is, however,

worth noting. That is that ZHC jobs appear less likely to be perceived as temporary compared to casual jobs. For the UK, we show below that 65% of those reporting to be on a ZHC in their main job report being in permanent employment. That no equivalent figure for casual employment is available from the LFS because the questionnaire only asks about casual employment as a follow up question for those in temporary employment is itself revealing. As we show in Section 4.2 casual and ZHC jobs are also very similar in terms of job and worker characteristics.

INSERT TABLE 1

That the CIPD estimate is larger than the QLFS estimate reported by ONS (2018) is likely to reflect, at least in part, double counting where workers hold more than one job, and greater awareness of contractual arrangements among employers than among workers. The ONS (2018) estimate of NGHCs, which is higher still, is plausibly also capturing the number of NGHCs that employers do not think of as ZHCs, e.g. casual contracts with no guaranteed hours that are not formally ZHCs. It therefore seems reasonable to interpret the ONS estimate of ZHCs based on the QLFS as a lower bound on the number of workers on a ZHC or other NGHC contract in their main job, while the ONS estimate of NGHCs based on the business survey provides a plausible upper bound on the number of workers in a ZHC or NGHC in their main job. The fact that the CIPD estimate and our own NGHC estimate based on the QLFS fall within the range implied by these two ONS estimates supports this interpretation.

### 4.2. What do ZHC jobs and workers look like?

Table A1 in the Appendix compares selected descriptive statistics for ZHC jobs/workers (column 1), casual workers (column 2), those in permanent positions not on special working-hours contracts (column 3), and all other flexible hours jobs/workers (columns 4-10), pooling QLFS data from 2017Q4 and 2018Q4. These estimates confirm the presence of marked differences between ZHC jobs and workers and jobs and workers under different contractual forms, with the notable exception of casual workers. ZHC workers report fewer hours worked compared to the other categories (24.1 hours) and the lowest hourly pay (£9.81) among the categories presented, with the exception in both cases of casuals (and job share for hours). Compared to other categories, ZHCs (and casuals) are concentrated in the youngest age group (16-24), among students, single workers, migrants, black and other ethnic minority workers, among those with secondary education and those with low job tenure. ZHC (and casual) jobs

are mostly part-time. Although the majority of ZHCs are reported by their holders as permanent positions (not the case for casual workers), there is still a much higher proportion of ZHC jobs reported as temporary compared to other special working-hours contracts. Approximately 50% of ZHC jobs (52% of casual jobs) are in personal service or elementary occupations (compared to 22% of permanent non-flexible jobs), with 43% (52% for casual contracts) found in two macro-sectors, namely Distributions, Hotels and Restaurants and Other Services, compared to 27% for permanent non-flexible jobs.

To quantify the strength of the association of each of these characteristics with ZHCs, other (observable) things being equal, we turn to multivariate regression. Specifically, for all those in employment in the pooled 2017Q4 and 2018Q4 QLFS, we regress the probability of being on a ZHC on observable job and worker characteristics. The following linear probability model is estimated:

$$Y_i = \beta_0 + \beta_1 X_i + \tau_q + \varepsilon_i \qquad (1)$$

where $Y_i$ is a binary indicator taking value 1 if workers report to be on a ZHC and 0 otherwise, $X_i$ denotes the set of individuals and job characteristics observed for worker *i,* including age groups, gender, marital status, ethnic group, migrant status, education level and study status, region of residence, indicators for the presence of children in the household, length of employment in months with the same employer, part-time, temporary job and private sector indicators, occupation and industry groups dummy variables and number of weekly hours (excluding overtime), and $\tau_q$ is a dummy variable taking value 1 if workers were interviewed in 2018Q4 and 0 otherwise. Selected estimates are presented in Table 2. In unreported estimates we also re-estimate (1) using a probit model with conclusions unchanged.

INSERT TABLE 2

These estimates, when compared to an average prevalence of 2.8%, highlight the concentration of ZHCs among particular worker groups. Workers in the 16-24 years age group are 2.9pp more likely to work on a ZHC compared to those in the 35-49 years old age group, with full-time students 5.9pp more likely than others. Consistent with Koumenta and Williams (2015), but in contrast to the raw associations in the data, employed women are *less* likely than employed men to hold a ZHC once other observable factors are held constant, by 0.7pp. The probability to be on a ZHC is 2.3pp higher for black workers compared to whites. Workers

with no educational qualifications are less likely to have a ZHC compared to all other education levels. Part-time, temporary and private sector status all increase the probability of a ZHC, by 2.4pp, 12.1pp and 1.7pp respectively. Elementary occupation jobs (the excluded category) are more likely to be ZHCs compared to the other groups. There are further patterns by broad industry group, tenure and region, unreported here for conciseness, but available from the authors on request. Finally, within hours categories (part time / full time), higher hours per week net of overtime are associated with a lower probability of being on a ZHC by approximately 0.08pp per hour.

### 4.3. How have ZHC jobs and ZHC workers changed over time?

Because ONS reports on ZHCs only date back to 2013, with little in the way of detailed description of ZHC jobs and workers prior to that point, we know very little about whether, and if so how, the nature of ZHC jobs and ZHC workers have changed over time in the UK. In particular one might expect the characteristics of ZHC jobs and workers to be somewhat different now, following the apparently rapid growth in 2013 and subsequently, compared to the period before the rapid growth. Table 3 assesses the extent to which this is the case. Specifically, we restrict our analysis to ZHC workers only and compare how their demographic and job characteristics have changed over time. Columns (1) and (2) present averages/proportions and standard deviations for selected worker and job characteristics for autumn/Q4 2001-2011 and 2017-2018. Column (3) shows the p-value for t-tests on equality of means between the two periods. Columns (4) – (6) repeat this for non-ZHC jobs for comparative purposes. The conclusions are essentially unchanged if we group ZHC and casual workers together, and whether estimates are weighted or not.

INSERT TABLE 3

This exercise highlights several important compositional changes in ZHC jobs and workers. In particular, relative to non-ZHC workers, we see that ZHC jobs have become increasingly concentrated in the younger (16-24 years) age group, among full-time students, singles, migrants, black and minority ethnic workers, in the private sector, in personal service and elementary occupations, and in the distribution, accommodation and restaurant sector over time. Further, Table 3 shows that hours and pay in ZHC jobs have fallen over time, with the average real hourly wage of ZHC workers substantially lower in 2017-2018 than in 2001-2011. The comparison with other forms of employment, for which real wages show a slight increase

between the two periods, is stark. Note, however, that estimating a simple wage regression for these two periods pooled suggests that this relative decline is driven predominantly by the compositional changes presented elsewhere in Table 3, e.g. increased concentration at younger ages.

Figure 2 examines the evolution of median wages for ZHC and non-ZHC jobs in more detail. Both types of jobs saw real median wages fall following the recession. The decline in median wages among ZHC jobs, however, was more pronounced and longer lasting than that for other types of employment, thus generating an increasing gap over time. Real wages would have recovered closer to their pre-crash peak – the gap as of 2017Q4 would have been roughly halved – were it not for slower wage growth in ZHC jobs. Haldane (2017) makes a similar point on the wage implications of a growing UK non-standard employment share more generally.

<div align="center">INSERT TABLE 3 & FIGURE 2</div>

## 5.  Where have the ZHC workers come from?

To explore this fourth research question we first exploit the LLFS over the period 2001-2018 to produce transition matrices for within-individual movements, over the course of one year, between labour market states and in particular into ZHCs. Given sample size constraints we pool all cohorts over the 2001-2018 period who enter the sample in Q2 or Q4 and, as casual employment is not available in the LLFS throughout the whole period, we focus on ZHCs alone.[3]

The transition matrix presented in Table 4, similar to that presented by Datta et al. (2018), distinguishes flows from the following mutually exclusive labour market states: inactive; unemployed; employed with a full-time (non-ZHC) job; employed with a part-time (non-ZHC) job; self-employed; and ZHC status. The last column of Table 4 shows where ZHC workers come from in terms of prior labour market state (one year previously). (For inflows the raw counts rather than proportions are most informative.) The largest source of ZHC workers at time t+4 is part-time non-ZHC workers at time t, followed by full-time workers at time t. That is not to say that ZHCs do not act as entry-level (or re-entry) jobs, but taken together, just over

---

[3] Figure A2 in the Appendix uses the QLFS to show proportions of those in employment who report different flexible contract types alongside ZHCs over time. Although some categories appear to fall as ZHCs rise, there is no clear 'smoking gun'.

half of those on a ZHC in any given year were in either full-time or part-time non-ZHC employment one year earlier. Datta et al. (2018) also note this pattern in the data. In the Appendix (Table A2) we repeat this exercise separately for those with tenure with their current employer of less than / more than one year. We see flows from non-ZHC full-time and part-time employment into ZHCs both within and between employers. Perhaps surprising, however, is that three quarters of these flows are within employer. Most workers who report moving from a non-ZHC job to a ZHC job, are doing so with their existing employer.

INSERT TABLE 4

Whether this reclassification, particularly within job, reflects genuine change in employment contracts as opposed to changes in reporting of employment contracts driven by growing public awareness of ZHCs is, however, uncertain. We return to this question in Section 6. But before doing so we briefly consider *who* reclassifies into ZHC status by estimating an LPM (similar to Equation (1)) for switching to ZHC status between time *t* and *t+4* on the same LLFS sample as above, but in this case excluding those on ZHCs at time *t*. Results are presented in Appendix Table A3. The biggest single predictor of transitioning into ZHC status at time *t+4*, for both those remaining with the same employer and those changing employers, is being on a temporary contract at time *t*. One might imagine that such workers have lower bargaining power and would therefore be less able to reject being moved onto a ZHC. One might also imagine, however, that workers reporting being on a temporary contract at time *t* are among those most likely to become aware that their existing contract of employment is, in fact, a ZHC.

## 6. The Growth in Reported ZHC Prevalence

Our final research question concerns the extent to which the growth in reported ZHC prevalence has been driven by increased awareness of ZHCs, which we proxy by national newspaper articles on and Google searches for ZHCs. Figure 3 presents the number of articles on ZHCs from UK national newspapers aggregated to the quarterly level over the period 2001-2018. Figure 4 presents the number of Google searches for the term 'zero hours contracts', in quarterly index form, for the period 2004-2018 (search data are only available from 2004 onwards). Both figures suggest little public awareness of ZHCs prior to 2013, then dramatic jumps in awareness around the time that the number of reported ZHCs in the QLFS itself jumped. These correlations could reflect growing awareness / interest in ZHCs as a result of their growing prevalence. But they could also reflect growing reporting of ZHCs as a result of

growing awareness of ZHCs among survey respondents and also potentially among employers.[4]

INSERT FIGURES 3 & 4

To test this latter hypothesis we extend our earlier model (Equation 1) of workers' individual-level propensity to report ZHC contract status in the QLFS (now over the whole period 2001-2018, at semester frequency, including semester 1 (Q2), to include first the number of newspaper articles on ZHCs, and second the number of Google searches for 'zero hours contracts', recorded in the preceding semesters.

The following LPM is estimated:

$$ZHC_{i,s} = \beta_0 + \beta_1 NEWS_{i,s-1} + \tau X_{i,s} + u_{i,s} \qquad (2)$$

$ZHC_{i,s}$ is a binary indicator taking value 1 if worker $i$ surveyed in semester $s$ reports a ZHC and 0 otherwise. $NEWS_{i,s-1}$ represents the number of newspaper articles scaled by 100 (or Google searches, in semester index form with the peak semester = 100) on ZHCs for the preceding semesters. As before $X_{i,s}$ includes demographic (gender, age group, marital status, ethnic group, highest educational qualification achieved), job (permanent job, types of temporary job, occupation and industry controls), regional dummies, and now also a quadratic semester time trend. The assumption here is that lagging by one semester and conditioning on $X_{i,s}$ means we can treat $NEWS_{i,s-1}$ as exogenous. The trade-off is that lagging by one semester, given the relatively low persistence of ZHCs at the individual level, means we may not pick up behavioural responses to growing coverage of ZHCs over shorter time periods. The key estimates are presented in Table 5.

INSERT TABLE 5

The results presented in column 1, row 1 of Table 5 show that the number of newspaper articles on ZHCs has a positive and statistically significant effect on the probability of reporting being on a ZHC in the following semester over the period 2001-2018. We draw a similar conclusion from the estimated effect of Google searches on reported ZHCs (column 2, row 1). In other words we cannot reject the hypothesis that growing awareness of ZHCs contributed to the

---

[4] In this case, an obvious follow-up question is what prompted the huge spikes in newspaper articles and Google searches in the second half of 2013. One conjecture, put forward by CIPD (2015), is that their own earlier (2013) report, which suggested considerably higher numbers of ZHCs than was previously thought to be the case, was the trigger.

growth in reported ZHCs. Further, the magnitude of these coefficients is sufficiently large that, *if* we are prepared to interpret these estimates as something approaching causal, we can explain *most* of the rapid growth in reported ZHCs over 2013 and into 2014 as a response – either a reporting response or a real response on the part of employers – to growing awareness of ZHCs. Specifically, the estimated coefficient on newspaper articles (Google searches) suggests around 0.8pp (1.1pp) of the 1.2pp growth over this period can be explained by increased awareness of ZHCs. Further rows of Table 5 disaggregate this effect by time, showing no evidence of a positive awareness effect prior to 2013, but evidence of a large and statistically significant positive effect from 2013-2017 (2013-2015 for Google searches), largest in 2013. Note that the awareness effect becomes statistically insignificant – we can reject the awareness hypothesis – in the final 1-3 years of this period, depending on which awareness measure is considered.

As a further test of the awareness hypothesis we explicitly model both reported ZHCs and newspaper articles on (Google searches for) ZHCs as outcomes, allowing for dynamic effects running in both directions. Because newspaper articles and Google searches are only specified at the aggregate (i.e. national) level this necessitates also aggregating reported ZHCs to the national level. In other words we treat reported ZHCs and our awareness measures as time series, estimating the following Vector Autoregressive (VAR) model, which we follow with a Granger Causality test to determine whether one time series has the power to forecast the other:

$$\begin{cases} \text{ZHC}_s = \beta_0 + \beta_1 \text{ZHC}_{s-1} + \gamma_1 \text{NEWS}_{s-1} + \tau X_s + u_s \\ \text{NEWS}_s = \pi_0 + \pi_1 \text{NEWS}_{s-1} + \delta_1 \text{ZHC}_{s-1} + \rho X_s + \varepsilon_s \end{cases} \quad (3)$$

We restrict to a single lag given the number of available data points, but even so we are pushing at the limits of the data here, and as in the LPM, because we have to lag by a full semester we may not pick up shorter run behavioural responses.

The estimation of the VAR requires that the time series do not have a unit root. Table A4 in the Appendix presents results from augmented Dickey-Fuller (ADF) tests that suggest we cannot reject unit roots for log ZHCs, newspaper articles and Google searches over this period, but that we can reject unit roots for all in first differences.[5] In (3), $\text{ZHC}_s$ and $\text{NEWS}_s$ are therefore respectively the growth rate of ZHCs and the change in newspaper articles (Google

---

[5] In unreported estimates non-stationarity in levels and stationarity in first differences for log ZHCs and newspaper articles (but stationarity in levels for Google searches) is also suggested by the Zivot-Andrews test which allows for an (endogenously determined) structural break.

searches) in semester *s* and X$_s$ includes the following controls: a binary indicator taking value 1 in semester 2 to capture seasonality effects, a quadratic time trend and a shift-work check dummy for taking value 1 if the number of ZHCs refers to semester 1 for the period 2004-2013. Results are presented in Table 6.

TABLE 6 HERE

In contrast to Table 5, Table 6 Model 1 (see also Table A5 in the Appendix for an extended VAR allowing for a structural break) presents no evidence of a relationship between lagged newspaper articles and reported ZHCs; the sign on lagged articles is positive but the Granger Causality test clearly rejects the existence of a dynamic relationship between the two time series. Table 6 Model 2, however, does tentatively suggest a relationship from Google searches to ZHCs which borders on statistical significance at the 90% level. Taken together with Table 5 we cannot confidently reject that growth in public awareness of ZHCs contributed (and contributed substantially) to growth in reported ZHCs, at least in 2013 and over the subsequent few years. To the extent that this reflects an awareness-induced reporting change rather than an awareness-induced contracting change on the part of employers, one implication is that the QLFS may indeed have substantially under-estimated the prevalence of ZHCs prior to 2013, as suggested (but not quantified) by the ONS (2014a) and others, and as suggested by the sectoral administrative data reported by Bessa et al. (2013) and Jacques (2013).

## 7. Conclusions

ZHCs generate intense debate, reflecting among other things the view that their use has risen dramatically in recent years, that they are concentrated among particular demographic groups, and that they are associated with disproportionately negative conditions for workers. Despite this, uncertainty has persisted about the prevalence, distribution and nature of ZHCs (and NGHCs more generally), and particularly about their growth over time. This paper addresses several important aspects of this uncertainty.

First, we argue that the headline ZHC count from the QLFS continues to underestimate the number of workers whose main job is a ZHC or other type of NGHC job; rather than 900,000 ZHC workers in 2017, we suggest that the number of workers in the UK on a ZHC (NGHC) in their main job at that time was somewhere between 0.9 million and 1.8 million (1.1 million and 1.8 million). Second, we show that ZHC jobs have become increasingly concentrated over time at younger ages, among students, migrants, black and minority ethnic workers, in the private

sector, in personal service and elementary occupations, and in the distribution, accommodation and restaurant sector. Median real wages for ZHC jobs have also fallen over time relative to those for other jobs, although this mostly appears to reflect changes in the composition of ZHC jobs and workers.

Third, we show that many ZHC workers were previously employed in non-ZHC (particularly part-time) jobs, in many cases with the same employer, rather than being new or re-entrants to employment. This reclassification within job matches could be 'real' (i.e. it could genuinely reflect changing contractual arrangements, suggesting growing insecurity at the individual as well as the aggregate level in this part of the labour market), it could reflect increased *reporting* of ZHCs driven by increased awareness of ZHCs among LFS respondents, or it could reflect some combination of the two. Finally, although data constraints currently prevent us from distinguishing between these two explanations, we do show that the hypothesis that growth in public awareness contributed to the growth in reported ZHCs over this period cannot be rejected, and may even explain most of the observed growth in ZHCs over the period 2013/14.

Efforts to improve our understanding of ZHCs are particularly timely given the range of policy interventions, from banning ZHCs to imposing a wage premium on non-guaranteed hours to imposing a right-to-convert for workers, currently being proposed in the mainstream of the UK debate (e.g. see Taylor et al., 2018). We do not directly address these policy proposals here, but the similarity between ZHCs and casual jobs raises the question as to whether banning ZHCs might simply displace workers into other forms of NGHC jobs. Similarly, would banning NGHC jobs more broadly displace workers onto (potentially very) short-hours contracts or even destroy some jobs concentrated among disadvantaged groups of workers? Imposing a minimum wage premium on non-guaranteed hours could avoid such 'change in name only' displacement effects, but perhaps with uncertain employment effects again concentrated among disadvantaged groups. Indeed, if minimum wage increases more generally have been leading to increased use of ZHCs, as suggested by Datta et al. (2018), then would making this employer response option more costly increase the likelihood of negative employment or hours impacts of future minimum wage increases? Finally, a right to convert could improve worker options, and could potentially help to change expectations on both sides of the labour market, even if lack of employment protection for ZHC workers mean such rights could perhaps be circumvented by some employers in practice.

# References

Adams, A. and Prassl, J. (2018). Zero-Hours Work in the United Kingdom. Geneva: International Labour Organization.

Bessa, I., Forde, C., Moore, S., & Stuart, M. (2013). The National Minimum Wage, earnings and hours in the domiciliary care sector. *University of Leeds and Low Pay Commission, London*.

Brinkley, I. (2013). Flexibility or insecurity? Exploring the rise in zero hours contracts. The Work Foundation, Lancaster University.

Buddelmeyer, H. and Wooden, M. (2011). Transitions out of casual employment: the Australian experience. *Industrial Relations*, **50**, 109–130.

Carroll, CD. (2003). Macroeconomic Expectations of Households and Professional Forecasters. *Quarterly Journal of Economics*, **118**(1), 269-298.

CIPD (2013). *Zero-hours contracts: Myth and reality*. London: Chartered Institute of Personnel and Development.

CIPD (2015). *Zero hours and short hours contracts in the UK: employer and employee perspectives*. London: Chartered Institute of Personnel and Development.

Datta, N., Giupponi. G. and Machin, S. (2018). Zero Hours Contracts and Labour Market Policy. Paper for Economic Policy 68th Panel Meeting, 4-5 October 2018, Vienna.

DBIS (2013). *Zero hours contracts: consultation*. London: Department for Business, Innovation and Skills.

Haldane, AG. (2017). *Work, Wages and Monetary Policy*. Speech given by Chief Economist, Bank of England, National Science and Media Museum, Bradford, 20 June 2017.

Jacques, H. (2013). What do zero hours contracts mean for doctors? *British Medical Journal* BMJ 2013; 346:f3610.

Katz, LF. and Krueger, AB. (2016). The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015.NBER Working Paper No. 22667.

Koumenta, M. and Williams, M. (2015). An anatomy of zero hours contracts in the United Kingdom. CIPD Applied Research Conference 2015.

Lamla, M. and Lein, S. (2008), The Role of Media for Consumers' Inflation Expectation Formation, KOF Working Papers 201, KOF Swiss Economic Institute.

Lass, I. and Wooden, M. (2019). The Structure of the Wage Gap for Temporary Workers: Evidence from Australian Panel Data. *British Journal of Industrial Relations* (forthcoming).

Lucas, R. (1997). Youth, gender and part-time work – students in the labour process. *Work, Employment & Society* 11(4): 595-614.

McVicar, D. (2017). Zero Hours Contracts, Job Quality and Impacts on Workers. NI Assembly KESS Briefing 25/01/2017.

Murphy, R. (2017). Call My Rep! How Unions Overcame the Free-Rider Problem. CESifo Working Paper Series No. 6362.

Nelson, CR. and Plosser, CI. (1982). Trends and random walks In Macroeconomic Time Series. *Journal of Monetary Economics* **10**, 139-162.

ONS (2014a). *Labour Force Survey estimates of people in employment reporting a zero hours contract, methodological note, August 2014.*

ONS (2014b). *Guidance Note: Contracts that do not guarantee a minimum number of hours, 24 June 2014.*

ONS (2016). *Contracts that do not guarantee a minimum number of hours: September 2016.*

ONS (2017). *Labour Force Survey: zero-hours contracts data tables: March 2017*.

ONS (2018). *Contracts that do not guarantee a minimum number of hours: April 2018.*

O'Sullivan M., Turner T., McMahon J., Ryan L., Lavelle J., Murphy C., O'Brien M. and Gunnigle, P. (2015). *A Study on the Prevalence of Zero Hours Contracts among Irish Employers and their Impact on Employees*. University of Limerick.

Pennycook, M., Cory, G. and Alakeson, V. (2013). *A matter of time: the rise of zero-hours contracts*. London: Resolution Foundation.

Prosser, T. (2016). Dualization or liberalization? Investigating precarious work in eight European countries. *Work, Employment & Society*, **30**, 949–965.

Taylor, M., Marsh, G., Nicole, D. and Broadbent, P. (2017). *Good Work: The Taylor Review of Modern Working Practices*. Available at: https://www.gov.uk/government/publications/good-work-the-taylor-review-of-modern-working-practices (last accessed 7 March 2019).

van der Wiel, K. (2009). Have You Heard the News? How Real-Life Expectations React to Publicity, IZA Discussion Papers, 4064, Institute for the Study of Labor.

Zivot, E. and Andrews, K. (1992). Further Evidence On The Great Crash, The Oil Price Shock, and The Unit Root Hypothesis. *Journal of Business and Economic Statistics* **10**(10), 251–70.

**Figure 1: People (Thousands) in Employment on ZHCs (in Their Main Job)**
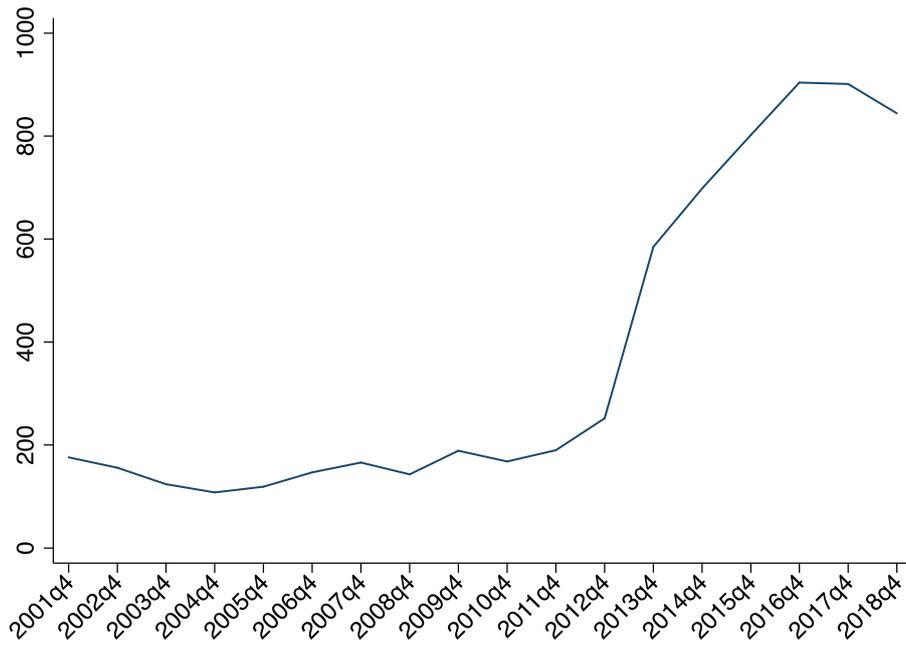


Source: QLFS 2001-2018, Q4 data only.

**Figure 2: Evolution of real median hourly wages – ZHC vs Non-ZHC workers (2001-2018)**
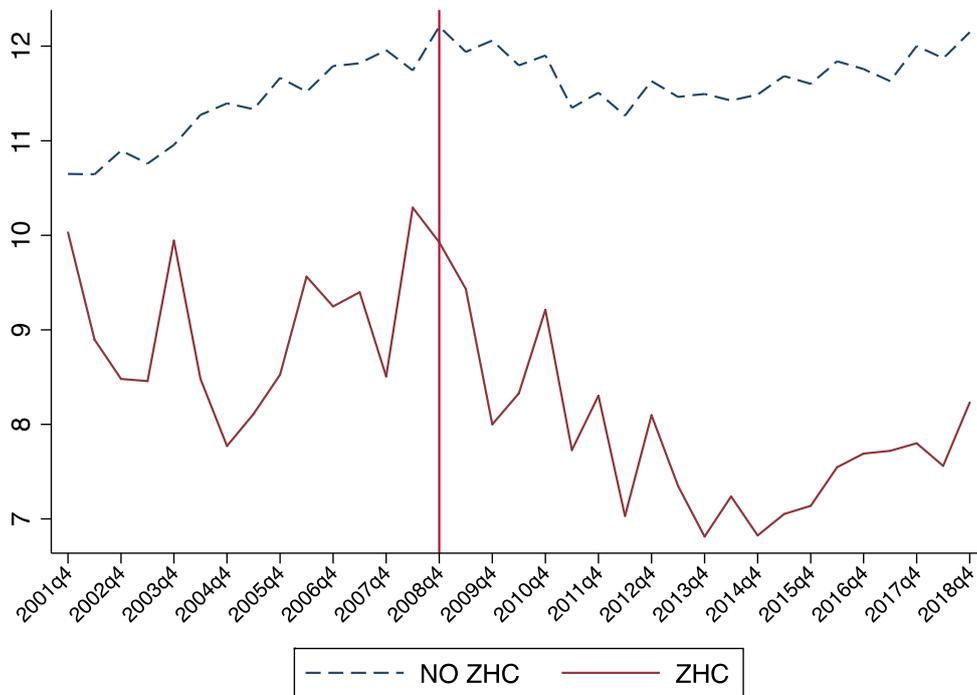


Note: Authors' calculations using QLFS April-June and October-December 2001-2018 (Hourpay). Wages are expressed in £2017.

**Figure 3: UK National Newspaper Articles on ZHCs**
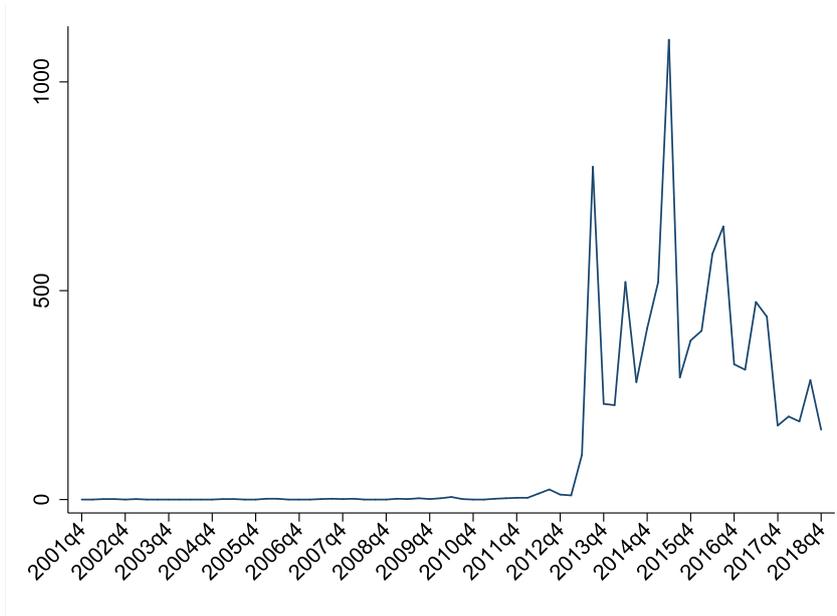


Source: Authors' calculations using Lexis-Nexis.

**Figure 4: Google Searches on ZHCs**



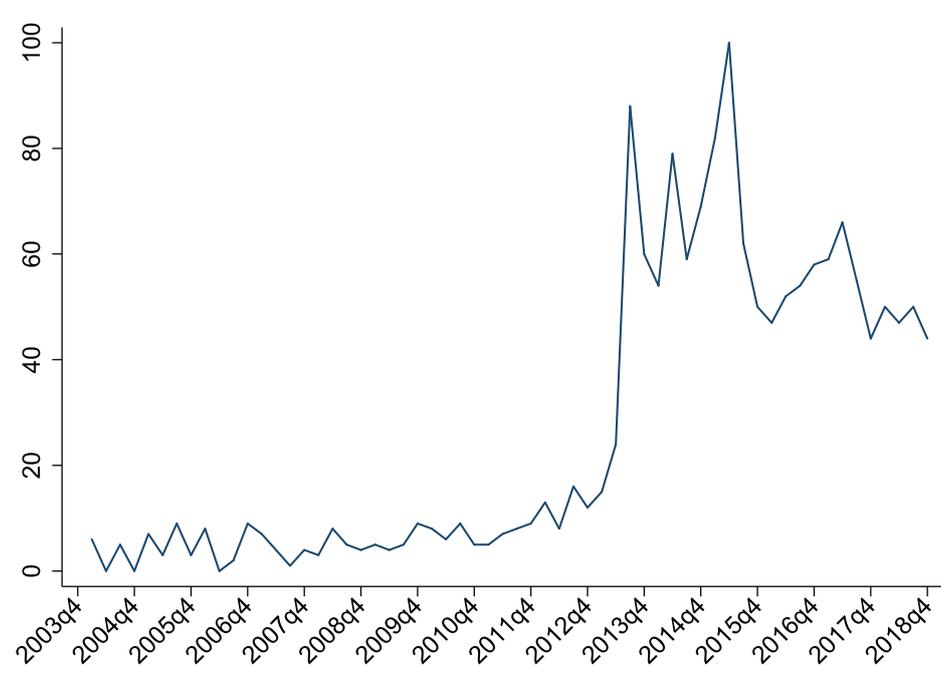Source: Authors' calculations using Google Trends.

**Table 1: Number of workers (in thousands) on ZHCs or NGHCs, 2017Q4**

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
|  | **ONS-QLFS** | **ONS-NGHC** | **CIPD-ZHC** | **ALTERN. DEF.** |
| Number of workers | 901 | 1,800 | 1,340 | 1,081 |

Notes: Column (1) presents the ONS figures of the number of ZHC workers using the QLFS for 2017Q4. Column (2) reports the number of NGHCs estimated by the ONS using the Business Survey for November 2017. Column (3) reports the number of workers on ZHCs estimated by CIPD for spring/ summer 2015. Column (4) reports the authors' estimates of the number of workers on ZHCs plus those on casual contracts who do not also report being on a ZHC, using the 2017Q4 QLFS. This latter estimate is likely a lower bound on the actual sum of ZHC and casual workers because, to avoid possible double counting, we do not count casual workers whose answer to the ZHC is "does not apply". For these cases it is impossible to use imputation to establish if they were on a ZHC or not. The estimate reported above therefore assumes all casual workers reporting DNA for the ZHC contract are ZHC workers. If instead we assume none were on a ZHC we would end up with 1,148,000 workers on a ZHC or casual contract.

**Table 2: Linear Probability Model Estimates - Predictors of ZHCs**

| | Coefficient (st. error) | | Coefficient (st. error) |
|---|---|---|---|
| Age (16-24) | **0.0180***** | Other Education | **0.0113***** |
| | **(0.0036)** | | **(0.0036)** |
| Age (25-34) | -0.0012 | Full-Time Student | **0.0584***** |
| | (0.0017) | | **(0.0085)** |
| Age (50-64) | 0.0022 | Part-Time | **0.0232***** |
| | (0.0016) | | **(0.0030)** |
| Age (65+) | **0.0103**** | Temporary Job | **0.1198***** |
| | **(0.0051)** | | **(0.0068)** |
| Female | **-0.0056***** | Private Sector Employment | **0.0173***** |
| | **(0.0016)** | | **(0.0021)** |
| Single | **0.0035**** | Occ: Managers & Senior Off. | **-0.0374***** |
| | **(0.0015)** | | **(0.0036)** |
| Other Marital Status | 0.0020 | Occ: Professional | **-0.0386***** |
| | (0.0020) | | **(0.0036)** |
| Children (0-4) | -0.0022 | Occ.: Associate Prof. & Tech. | **-0.0393***** |
| | (0.0017) | | **(0.0036)** |
| Children (5-15) | **-0.0028*** | Occ: Admin. & Secretarial | **-0.0421***** |
| | **(0.0016)** | | **(0.0036)** |
| Non UK/British Citizen | 0.0009 | Occ: Skilled Trades | **-0.0309***** |
| | (0.0021) | | **(0.0038)** |
| Asian | -0.0021 | Occ: Personal Service | **-0.0088*** |
| | (0.0030) | | **(0.0045)** |
| Black | **0.0207***** | Occ: Sales & Customer Serv. | **-0.0524***** |
| | **(0.0060)** | | **(0.0043)** |
| Other Ethnic Groups | **0.0106**** | Occ: Process, Plant & Machine Op. | **-0.0077*** |
| | **(0.0050)** | | **(0.0045)** |
| Degree or equivalent | **0.0171***** | Total Usual Hours (No Overtime) | **-0.0006***** |
| | **(0.0031)** | | **(0.0001)** |
| Higher Education | **0.0238***** | D.2018Q4 (=1) | -0.0016 |
| | **(0.0035)** | | (0.0013) |
| GCE A Level | **0.0160***** | Constant | **0.0262***** |
| | **(0.0031)** | | **(0.0101)** |
| GCSE grades A-C | **0.0144***** | | |
| | **(0.0030)** | | |
| N | | | 57,650 |
| $R^2$ | | | 0.0898 |

Notes: Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***. Each entry reports the coefficients and robust standard errors (in parentheses) obtained regressing a binary indicator taking value 1 if individual i reports to work on a ZHC and 0 otherwise on worker and job characteristics, pooling those in employment in the QLFS for 2017Q4 and 2018Q4. Tenure categories and regional and sectoral dummies are included in the model but not reported here for conciseness. For each set of binary indicators the excluded categories are as follows: age group 35-49, male, married, families with no children in the age group 0-4 or 5-15, UK/British Citizenship, white, no qualifications, no full-time student, full-time work, permanent job, public sector employment, and elementary occupations.

### Table 3: Descriptive Statistics – ZHC Job and Worker Characteristics Over Time

| | ZHC | | | Non ZHC | | |
|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| | **2001q4-2011q4** | **2017q4-2018q4** | **p-value** | **2001q4-2011q4** | **2017q4-2018q4** | **p-value** |
| Age (16-24) | **0.252** | **0.305** | **0.000*** | **0.118** | **0.085** | **0.000*** |
| Age (25-34) | 0.163 | 0.158 | 0.698 | **0.198** | **0.193** | **0.001*** |
| Age (35-49) | **0.278** | **0.216** | **0.000*** | **0.389** | **0.355** | **0.000*** |
| Age (50-64) | 0.251 | 0.248 | 0.801 | **0.268** | **0.319** | **0.000*** |
| Age (65+) | **0.056** | **0.073** | **0.025**** | **0.027** | **0.049** | **0.000*** |
| Female | **0.531** | **0.566** | **0.023**** | **0.480** | **0.488** | **0.000*** |
| Married | **0.477** | **0.357** | **0.000*** | **0.566** | **0.547** | **0.000*** |
| Single | **0.402** | **0.526** | **0.000*** | **0.309** | **0.329** | **0.000*** |
| Other Marital Status | 0.121 | 0.117 | 0.697 | 0.125 | 0.124 | 0.326 |
| Children (0-4) | 0.118 | 0.109 | 0.355 | **0.137** | **0.144** | **0.000*** |
| Children (5-15) | 0.262 | 0.269 | 0.592 | **0.293** | **0.287** | **0.001*** |
| Non UK/British Citizen | **0.083** | **0.156** | **0.000*** | **0.088** | **0.129** | **0.000*** |
| Asian | **0.036** | **0.050** | **0.030**** | **0.034** | **0.049** | **0.000*** |
| Black | **0.015** | **0.058** | **0.000*** | **0.016** | **0.022** | **0.000*** |
| Other Ethnic Group | **0.021** | **0.043** | **0.000*** | **0.019** | **0.026** | **0.000*** |
| White | **0.928** | **0.849** | **0.000*** | **0.932** | **0.902** | **0.000*** |
| Degree or equivalent | **0.202** | **0.241** | **0.002*** | **0.223** | **0.344** | **0.000*** |
| Higher Education | 0.113 | 0.101 | 0.201 | **0.101** | **0.097** | **0.000*** |
| GCE A Level | 0.268 | 0.262 | 0.659 | **0.241** | **0.224** | **0.000*** |
| GCSE grades A-C | 0.234 | 0.245 | 0.397 | **0.220** | **0.193** | **0.000*** |
| Other Education Lv. | **0.113** | **0.094** | **0.049**** | **0.118** | **0.077** | **0.000*** |
| No qualification | **0.069** | **0.056** | **0.084*** | **0.098** | **0.066** | **0.000*** |
| Full-Time Student | **0.146** | **0.177** | **0.006*** | **0.036** | **0.026** | **0.000*** |
| Part-Time | **0.605** | **0.679** | **0.000*** | 0.271 | 0.273 | 0.478 |
| Temporary Job | **0.306** | **0.352** | **0.003*** | **0.058** | **0.046** | **0.000*** |
| Private Sector | **0.802** | **0.854** | **0.000*** | **0.749** | **0.770** | **0.000*** |
| Occup.: Managers & Senior Officials | **0.081** | **0.027** | **0.000*** | **0.145** | **0.113** | **0.000*** |
| Occup.: 'Professional | 0.099 | 0.097 | 0.865 | **0.135** | **0.212** | **0.000*** |
| Occup.: 'Associate Prof. & Tech. | **0.111** | **0.071** | **0.000*** | 0.140 | 0.142 | 0.240 |
| Occup.: Admin. & Secretarial | **0.088** | **0.072** | **0.049**** | **0.124** | **0.108** | **0.000*** |
| Occup.: Skilled Trades | **0.082** | **0.054** | **0.000*** | **0.111** | **0.103** | **0.000*** |
| Occup.: Personal Service | **0.163** | **0.208** | **0.000*** | **0.082** | **0.090** | **0.000*** |
| Occup.: Sales & Customer Serv. | **0.109** | **0.087** | **0.015**** | **0.076** | **0.074** | **0.023**** |
| Occup.: Process, Plant & Mach Op. | **0.069** | **0.099** | **0.000*** | **0.073** | **0.063** | **0.000*** |
| Occup.: Elementary | **0.198** | **0.287** | **0.000*** | **0.114** | **0.095** | **0.000*** |
| Industry: Distrib., Hotels & Rest. | **0.259** | **0.303** | **0.002*** | **0.189** | **0.173** | **0.000*** |
| Total Usual Hours (No Overtime) | **25.533** | **23.663** | **0.000*** | 34.086 | 34.108 | 0.675 |
| | **(15.63)** | **(14.24)** | | (12.62) | (12.17) | |
| Hourly Pay (2017£) | **12.02** | **9.95** | **0.001*** | **14.26** | **14.81** | **0.000*** |
| | **(10.94)** | **(8.20)** | | (9.51) | (9.42) | |
| N | 2,451 | 1,831 | | 464,570 | 68,797 | |

Notes: Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***. Each entry in Column (1) reports the (unweighted) means and standard deviations (in parentheses) for ZHC job and worker characteristics averaged over the period 2001Q4-2011Q4. Each entry in Column (2) reports the equivalent statistics for 2017Q4-2018Q4. Column (3) presents the p-values for t-tests on equality of means. Columns (4), (5) and (6) present the equivalent statistics for non-ZHC jobs and workers.

# Table 4: Transition Matrix – 2001-2018

| Status at t | Status at t+4 | | | | | |
|---|---|---|---|---|---|---|
| | **Inactive** | **Unemp.** | **Full-time** | **Part-time** | **Self-employed** | **ZHC** |
| Inactive | 88.54 | 2.95 | 1.81 | 5.23 | 1.26 | 0.21 |
| | (62,730) | (2,089) | (1,281) | (3,709) | (893) | (150) |
| Unemployed | 22.78 | 33.41 | 21.61 | 16.11 | 4.88 | 1.21 |
| | (1,411) | (2,069) | (1,338) | (998) | (302) | (75) |
| Full-time | 2.79 | 1.48 | 89.44 | 4.44 | 1.59 | 0.26 |
| | (2,434) | (1,294) | (78,115) | (3,877) | (1,391) | (225) |
| Part-time | 8.56 | 1.65 | 9.11 | 77.95 | 1.72 | 1.02 |
| | (2,980) | (575) | (3,170) | (27,137) | (599) | (354) |
| Self-employed | 5.07 | 0.91 | 6.01 | 2.75 | 84.65 | 0.63 |
| | (976) | (175) | (1,157) | (529) | (16,309) | (121) |
| ZHC | 11.44 | 2.93 | 21.94 | 26.86 | 11.30 | 25.53 |
| | (86) | (22) | (165) | (202) | (85) | (192) |

Notes: Each entry reports the percentage (number) of workers at time t distributed according to their economic activity status at time $t+4$ (four quarters / one year later). The figures were obtained using the LLFS cohorts starting in spring/Q2 and autumn/Q4 of each year over the period 2001-2018

## Table 5: The Impact of Public Awareness on ZHCs

| | Newspapers' Articles | Google Search Index |
|---|---|---|
| | (1) | (2) |
| **Model 1** | | |
| *Public Awareness* $_{i,h-1}$ | 0.000845*** | 0.000164*** |
| | (0.000211) | (0.000025) |
| N | 1,197,796 | 994,039 |
| $R^2$ | 0.0367 | 0.0413 |
| **Model 2** | | |
| *Public Awareness* $_{i,h-1} * D_{x-2012}$ | -0.018444** | -0.000547*** |
| | (0.008693) | (0.000143) |
| *Public Awareness* $_{i,h-1} * D_{2013}$ | 0.004869*** | 0.000072** |
| | (0.001586) | (0.000027) |
| *Public Awareness* $_{i,h-1} * D_{2014}$ | 0.000795*** | 0.000067* |
| | (0.000269) | (0.000035) |
| *Public Awareness* $_{i,h-1} * D_{2015}$ | 0.000636*** | 0.000069* |
| | (0.000152) | (0.000036) |
| *Public Awareness* $_{i,h-1} * D_{2016}$ | 0.001104*** | 0.000067 |
| | (0.000328) | (0.000063) |
| *Public Awareness* $_{i,h-1} * D_{2017}$ | 0.000716** | -0.000023 |
| | (0.000323) | (0.000072) |
| *Public Awareness* $_{i,h-1} * D_{2018}$ | -0.000003 | -0.000086 |
| | (0.000624) | (0.000090) |
| N | 1,197,796 | 994,039 |
| $R^2$ | 0.0370 | 0.0416 |
| Demo Charac. | Yes | Yes |
| Occup. Charac. | Yes | Yes |
| Industry Charac. | Yes | Yes |
| Seasonal Dummy | Yes | Yes |
| Semester Trend | Yes | Yes |
| Shift-Work Block | Yes | Yes |

Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***. Each entry reports the coefficient and standard error (in parentheses) for the variable of interest. The dependent variable takes value 1 if workers report to be on ZHC and 0 otherwise. Controls include demographic indicators (gender, age group, marital and migrant and study status, ethnic group, highest educational qualification achieved, and indicators for the presence of children in the household), job characteristics (temporary job, part-time job, public sector job, occupation and industry indicators), a quadratic semester trend, regional dummies and the shift-work block dummy. Results in Column 1 are obtained using the number of UK newspapers' articles (/100) on ZHC as a measure of public awareness. Column 2 uses the Google Search Index as a measure for public awareness. Standard errors are clustered at the semester level.

**Table 6: VAR - UK National Newspapers / Google Searches and ZHC Employment**

| | Model 1: Newspaper articles on ZHCs | | Model 2: Google searches for ZHCs | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | % $\Delta ZHC_t$ | $\Delta Articles_t$ | % $\Delta ZHC_t$ | $\Delta$ Google Searches Index |
| % $\Delta ZHC_{t-1}$ | **-0.419\*\*\*** | -0.645 | **-0.409\*** | -23.798 |
| | **(0.158)** | (2.211) | **(0.234)** | (16.834) |
| $\Delta$ Articles$_{t-1}$ | 0.007 | **-0.476\*\*\*** | . | . |
| | (0.012) | **(0.172)** | . | . |
| $\Delta$ Google Searches Index$_{t-1}$ | . | . | 0.005 | -0.094 |
| | . | . | (0.003) | (0.230) |
| Constant | **-0.306\*\*** | -0.718 | -0.039 | -16.310 |
| | **(0.139)** | (1.957) | (0.213) | (15.271) |
| N | 33 | 33 | 28 | 28 |
| Granger Test | 0.561 | 0.771 | 0.104 | 0.157 |
| Controls | Yes | Yes | Yes | Yes |

Notes: Significance at the 10% level is represented by [\*], at the 5% level by [\*\*], and at the 1% level by [\*\*\*]. Columns (1) and (2) report the estimates obtained from a VAR model where the dependent variables are respectively the growth rate of ZHCs and the number of national newspapers articles on ZHCs (divided by 100). Columns (3) and (4) report the estimates obtained from a VAR model where the dependent variables are respectively the growth rate of ZHCs and the change in the Google Search Index. Each entry reports the coefficient and standard errors in parentheses for the (lagged) variables of interest. Controls include a linear and quadratic semester trend, the shift work binary indicator and a dummy indicator for semester 2. QLFS data are used over the period 2001-2018.

# Table A1: Descriptive Statistics by Employment Contract Type.

| | (1) Zero Hours | (2) Casual | (3) Perm. | (4) Flexi Hours | (5) Annual Hours | (6) Term Time | (7) Job Share | (8) 9/14 | (9) 4.5/7 | (10) On Call |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Usual Hours (No Overtime) | 24.067 | 16.784 | 34.895 | 33.523 | 34.634 | 27.862 | 22.764 | 36.687 | 36.899 | 37.590 |
| | (14.14) | (12.14) | (10.52) | (10.39) | (9.90) | (11.59) | (10.62) | (7.01) | (5.58) | (13.90) |
| Hourly Pay (2017£) | 9.81 | 8.703 | 12.685 | 17.093 | 15.013 | 12.501 | 13.707 | 20.130 | 15.894 | 18.260 |
| | (7.84) | (7.47) | (1.34) | (9.56) | (9.14) | (6.74) | (9.14) | (13.38) | (7.47) | (10.43) |
| Age (16-24) | 0.351 | 0.567 | 0.148 | 0.066 | 0.108 | 0.066 | 0.039 | 0.042 | 0.067 | 0.069 |
| Age (25-34) | 0.173 | 0.117 | 0.288 | 0.222 | 0.222 | 0.181 | 0.162 | 0.173 | 0.200 | 0.213 |
| Age (35-49) | 0.198 | 0.094 | 0.335 | 0.373 | 0.336 | 0.405 | 0.385 | 0.392 | 0.376 | 0.374 |
| Age (50-64) | 0.222 | 0.136 | 0.216 | 0.294 | 0.308 | 0.320 | 0.341 | 0.367 | 0.323 | 0.294 |
| Age (65+) | 0.056 | 0.087 | 0.012 | 0.045 | 0.026 | 0.028 | 0.073 | 0.025 | 0.033 | 0.050 |
| Female | 0.546 | 0.527 | 0.492 | 0.502 | 0.487 | 0.810 | 0.804 | 0.451 | 0.361 | 0.350 |
| Married | 0.321 | 0.238 | 0.442 | 0.541 | 0.499 | 0.591 | 0.692 | 0.603 | 0.581 | 0.564 |
| Single | 0.577 | 0.712 | 0.461 | 0.337 | 0.375 | 0.267 | 0.192 | 0.301 | 0.303 | 0.324 |
| Other Marital Status | 0.102 | 0.050 | 0.097 | 0.122 | 0.126 | 0.142 | 0.116 | 0.096 | 0.116 | 0.112 |
| Children (0-4) | 0.109 | 0.074 | 0.168 | 0.155 | 0.131 | 0.131 | 0.219 | 0.114 | 0.140 | 0.150 |
| Children (5-15) | 0.259 | 0.265 | 0.274 | 0.286 | 0.276 | 0.402 | 0.378 | 0.259 | 0.251 | 0.279 |
| Non UK/British Citizen | 0.164 | 0.175 | 0.134 | 0.130 | 0.136 | 0.077 | 0.080 | 0.060 | 0.099 | 0.134 |
| Asian | 0.059 | 0.057 | 0.064 | 0.063 | 0.061 | 0.033 | 0.042 | 0.032 | 0.040 | 0.063 |
| Black | 0.065 | 0.046 | 0.034 | 0.032 | 0.030 | 0.019 | 0.024 | 0.013 | 0.020 | 0.035 |
| Other Ethnic Group | 0.048 | 0.062 | 0.034 | 0.035 | 0.025 | 0.021 | 0.023 | 0.015 | 0.026 | 0.028 |
| White | 0.829 | 0.835 | 0.869 | 0.870 | 0.883 | 0.927 | 0.912 | 0.940 | 0.914 | 0.873 |
| Region: East Midlands | 0.073 | 0.056 | 0.071 | 0.069 | 0.052 | 0.075 | 0.077 | 0.046 | 0.054 | 0.067 |
| Region: Eastern | 0.092 | 0.091 | 0.096 | 0.076 | 0.107 | 0.107 | 0.114 | 0.064 | 0.072 | 0.082 |
| Region: London | 0.136 | 0.140 | 0.150 | 0.157 | 0.117 | 0.124 | 0.098 | 0.129 | 0.099 | 0.139 |
| Region: North East | 0.040 | 0.032 | 0.040 | 0.035 | 0.064 | 0.033 | 0.031 | 0.043 | 0.035 | 0.036 |
| Region: North West | 0.096 | 0.111 | 0.117 | 0.105 | 0.120 | 0.100 | 0.086 | 0.067 | 0.096 | 0.105 |
| Region: Northern Ireland | 0.011 | 0.044 | 0.007 | 0.033 | 0.051 | 0.019 | 0.020 | 0.008 | 0.019 | 0.032 |
| Region: Scotland | 0.082 | 0.082 | 0.082 | 0.083 | 0.092 | 0.058 | 0.111 | 0.126 | 0.122 | 0.074 |
| Region: South East | 0.167 | 0.127 | 0.135 | 0.154 | 0.115 | 0.178 | 0.187 | 0.187 | 0.159 | 0.161 |
| Region: South West | 0.093 | 0.097 | 0.079 | 0.090 | 0.043 | 0.101 | 0.093 | 0.113 | 0.136 | 0.102 |
| Region: Wales | 0.050 | 0.043 | 0.051 | 0.051 | 0.037 | 0.035 | 0.041 | 0.075 | 0.037 | 0.048 |
| Region: West Midlands | 0.082 | 0.095 | 0.086 | 0.072 | 0.140 | 0.085 | 0.074 | 0.056 | 0.084 | 0.076 |
| Region: Yorkshire & Humberside | 0.078 | 0.083 | 0.087 | 0.074 | 0.061 | 0.086 | 0.068 | 0.085 | 0.086 | 0.078 |
| Degree or equivalent | 0.239 | 0.241 | 0.325 | 0.469 | 0.342 | 0.497 | 0.417 | 0.467 | 0.375 | 0.429 |
| Higher Education | 0.100 | 0.064 | 0.081 | 0.111 | 0.101 | 0.105 | 0.111 | 0.148 | 0.110 | 0.111 |
| GCE A Level | 0.280 | 0.311 | 0.237 | 0.198 | 0.221 | 0.182 | 0.199 | 0.213 | 0.254 | 0.231 |
| GCSE grades A-C | 0.236 | 0.257 | 0.208 | 0.137 | 0.194 | 0.146 | 0.161 | 0.091 | 0.139 | 0.140 |
| Other Education Lv. | 0.092 | 0.067 | 0.078 | 0.052 | 0.076 | 0.045 | 0.064 | 0.039 | 0.083 | 0.062 |
| No qualification | 0.053 | 0.060 | 0.071 | 0.033 | 0.066 | 0.025 | 0.047 | 0.042 | 0.038 | 0.028 |
| Full-Time Student | 0.191 | 0.400 | 0.034 | 0.020 | 0.018 | 0.026 | 0.034 | 0.005 | 0.006 | 0.021 |
| Tenure: 0-11 months | 0.344 | 0.498 | 0.128 | 0.129 | 0.140 | 0.150 | 0.138 | 0.095 | 0.106 | 0.141 |
| Tenure: 12-23 months | 0.187 | 0.184 | 0.140 | 0.102 | 0.111 | 0.104 | 0.061 | 0.059 | 0.102 | 0.105 |
| Tenure: 24-35 months | 0.115 | 0.106 | 0.105 | 0.081 | 0.094 | 0.088 | 0.068 | 0.056 | 0.078 | 0.069 |
| Tenure: 36-47 months | 0.075 | 0.065 | 0.087 | 0.064 | 0.074 | 0.079 | 0.063 | 0.056 | 0.073 | 0.068 |
| Tenure: 48-59 months | 0.060 | 0.027 | 0.065 | 0.048 | 0.059 | 0.061 | 0.058 | 0.085 | 0.062 | 0.054 |
| Tenure: 60+ months | 0.219 | 0.120 | 0.473 | 0.576 | 0.521 | 0.519 | 0.612 | 0.649 | 0.580 | 0.562 |
| Part-Time | 0.665 | 0.876 | 0.226 | 0.259 | 0.224 | 0.477 | 0.818 | 0.069 | 0.078 | 0.182 |
| Temporary Job | 0.354 | 1.000 | - | 0.055 | 0.028 | 0.096 | 0.052 | 0.022 | 0.041 | 0.075 |
| Private Sector Employment | 0.867 | 0.789 | 0.774 | 0.653 | 0.715 | 0.289 | 0.515 | 0.576 | 0.825 | 0.681 |
| Public Sector Employment | 0.133 | 0.211 | 0.226 | 0.347 | 0.285 | 0.711 | 0.485 | 0.424 | 0.175 | 0.319 |
| Occup.: Managers & Senior Off. | 0.028 | 0.009 | 0.098 | 0.116 | 0.081 | 0.016 | 0.050 | 0.148 | 0.104 | 0.141 |
| Occup.: Professional | 0.089 | 0.079 | 0.192 | 0.285 | 0.226 | 0.415 | 0.309 | 0.400 | 0.271 | 0.335 |
| Occup.: Assoc. Prof. & Tech. | 0.072 | 0.080 | 0.141 | 0.198 | 0.146 | 0.059 | 0.106 | 0.127 | 0.157 | 0.115 |
| Occup.: Admin. & Secretarial | 0.067 | 0.072 | 0.108 | 0.167 | 0.099 | 0.081 | 0.202 | 0.061 | 0.057 | 0.026 |
| Occup.: Skilled Trades | 0.056 | 0.028 | 0.084 | 0.060 | 0.091 | 0.022 | 0.035 | 0.089 | 0.142 | 0.155 |
| Occup.: Personal Service | 0.199 | 0.141 | 0.098 | 0.052 | 0.103 | 0.288 | 0.146 | 0.050 | 0.054 | 0.088 |
| Occup.: Sales & Customer Serv. | 0.092 | 0.162 | 0.095 | 0.049 | 0.094 | 0.007 | 0.057 | 0.030 | 0.028 | 0.026 |
| Occup.: Process, Plant & Mach Op. | 0.092 | 0.052 | 0.063 | 0.030 | 0.069 | 0.012 | 0.036 | 0.044 | 0.104 | 0.068 |
| Occupation: Elementary | 0.304 | 0.376 | 0.120 | 0.045 | 0.091 | 0.099 | 0.059 | 0.052 | 0.083 | 0.046 |
| Industry: Agriculture & Fishing | 0.004 | 0.001 | 0.005 | 0.008 | 0.003 | 0.000 | 0.012 | 0.020 | 0.013 | 0.013 |
| Industry: Banking, Fin & Insur. | 0.109 | 0.100 | 0.170 | 0.195 | 0.149 | 0.031 | 0.118 | 0.161 | 0.143 | 0.138 |
| Industry: Construction | 0.032 | 0.021 | 0.052 | 0.057 | 0.051 | 0.003 | 0.035 | 0.030 | 0.052 | 0.088 |
| Industry: Distrib., Hotels & Rest. | 0.326 | 0.385 | 0.220 | 0.099 | 0.178 | 0.037 | 0.100 | 0.050 | 0.091 | 0.084 |
| Industry: Energy & Water | 0.004 | 0.001 | 0.021 | 0.019 | 0.021 | 0.002 | 0.009 | 0.033 | 0.018 | 0.041 |
| Industry: Manufacturing | 0.047 | 0.031 | 0.099 | 0.082 | 0.095 | 0.003 | 0.043 | 0.125 | 0.323 | 0.064 |
| Industry: Other Services | 0.103 | 0.139 | 0.045 | 0.061 | 0.045 | 0.014 | 0.046 | 0.034 | 0.039 | 0.066 |
| Industry: Pub. Ad., Educ. & Health | 0.304 | 0.264 | 0.307 | 0.386 | 0.374 | 0.889 | 0.571 | 0.448 | 0.227 | 0.394 |
| Industry: Transport & Comm. | 0.072 | 0.058 | 0.081 | 0.091 | 0.085 | 0.020 | 0.065 | 0.098 | 0.094 | 0.111 |
| N | 1,830 | 852 | 12,413 | 7,919 | 3,737 | 3,301 | 370 | 249 | 484 | 1,560 |

Note: Entries report weighted means / proportions (standard deviations in parentheses) for workers in ZHC jobs (column 1), casual jobs (column 2), permanent job workers not on any special working-hours arrangements (column 3) and other special working arrangement types (columns 4-10), averaged over the period 2017-2018, using QLFSQ4 data. All categories are permitted to overlap except 'permanent'.

## Table A2: Transition Matrix, 2001-2018

### (A) Tenure > 12 months

|  | Status at time t+4 | | | |
| --- | --- | --- | --- | --- |
| Status at t | Full-time | Part-time | Self-employed | ZHC |
| Full-time | 95.04 | 4.03 | 0.73 | 0.20 |
|  | (72,030) | (3,053) | (551) | (155) |
| Part-time | 7.63 | 90.22 | 1.16 | 0.99 |
|  | (2,129) | (25,170) | (325) | (275) |
| Self-employed | 3.88 | 1.93 | 93.56 | 0.63 |
|  | (669) | (333) | (16,132) | (108) |
| ZHC | 21.90 | 29.65 | 14.53 | 33.91 |
|  | (113) | (153) | (75) | (175) |

### (B) Tenure < 12 months

|  | Status at t+4 | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| Status at t | Inactive | Unemp. | Full-time | Part-time | Self-employed | ZHC |
| Inactive | 90.98 | 3.03 | 1.60 | 3.68 | 0.57 | 0.15 |
|  | (62,729) | (2,089) | (1,101) | (2,534) | (392) | (104) |
| Unemployed | 24.32 | 35.67 | 20.74 | 14.88 | 3.26 | 1.14 |
|  | (1,411) | (2,069) | (1,203) | (863) | (189) | (66) |
| Full-time | 21.22 | 11.28 | 52.62 | 7.10 | 7.17 | 0.61 |
|  | (2,434) | (1,294) | (6,035) | (814) | (822) | (70) |
| Part-time | 43.24 | 8.34 | 15.08 | 28.29 | 3.92 | 1.13 |
|  | (2,980) | (575) | (1,039) | (1,950) | (270) | (78) |
| Self-employed | 49.49 | 8.87 | 24.65 | 9.58 | 6.74 | 0.66 |
|  | (976) | (175) | (486) | (189) | (133) | (13) |
| ZHC | 36.91 | 9.44 | 22.32 | 20.17 | 4.29 | 6.87 |
|  | (86) | (22) | (52) | (47) | (10) | (16) |

Notes: Entries report the percentage (number) of workers at time t distributed according to their economic activity status at time t+4 (four quarters / one year later). The figures were obtained using the LLFS cohorts starting in spring/Q2 and autumn/Q4 of each year over the period 2001-2018. Panel (A) excludes respondents who at time $t+4$ reported to work for more than 12 months for the same firm while they declared to be inactive or unemployed at time $t$.

## Table A3: LPM for Transitioning into ZHC Status, by Tenure

| | Total Sample | Tenure<12 months | Tenure>=12 months |
|---|---|---|---|
| | ZHC$_{t+4}$ (=1) | ZHC$_{t+4}$ (=1) | ZHC$_{t+4}$ (=1) |
| Proxy$_{t+4}$ | -0.0024*** | -0.0067*** | -0.0017*** |
| | (0.0006) | (0.0023) | (0.0006) |
| Part-time (No ZHC) | 0.0053*** | 0.0052* | 0.0050*** |
| | (0.0009) | (0.0031) | (0.0010) |
| Self-Employed (No ZHC) | 0.0026*** | 0.0074* | 0.0022** |
| | (0.0009) | (0.0041) | (0.0009) |
| Temporary Contract (No ZHC) | 0.0561*** | 0.0422*** | 0.0650*** |
| | (0.0040) | (0.0054) | (0.0055) |
| Age (16-24) | 0.0053*** | 0.0083** | 0.0045** |
| | (0.0018) | (0.0041) | (0.0021) |
| Age (25-34) | 0.0002 | 0.0042 | -0.0004 |
| | (0.0008) | (0.0030) | (0.0008) |
| Age (50-64) | 0.0034*** | 0.0111*** | 0.0025*** |
| | (0.0007) | (0.0035) | (0.0007) |
| Age (65+) | 0.0108*** | 0.0344* | 0.0092*** |
| | (0.0033) | (0.0208) | (0.0033) |
| Public Employment | -0.0068*** | -0.0061 | -0.0070*** |
| | (0.0011) | (0.0044) | (0.0011) |
| Asian | 0.0033 | 0.0088 | 0.0024 |
| | (0.0024) | (0.0081) | (0.0024) |
| Black | 0.0011 | 0.0127 | -0.0012 |
| | (0.0033) | (0.0134) | (0.0028) |
| Other Ethnic Groups | 0.0003 | 0.0013 | -0.0004 |
| | (0.0030) | (0.0104) | (0.0029) |
| Education: No Qualification | -0.0019** | -0.0063* | -0.0013 |
| | (0.0010) | (0.0036) | (0.0010) |
| Single | -0.0001 | 0.0029 | -0.0004 |
| | (0.0008) | (0.0032) | (0.0008) |
| Other Marital Status | 0.0005 | 0.0030 | 0.0003 |
| | (0.0010) | (0.0040) | (0.0010) |
| Female | -0.0018** | -0.0017 | -0.0017** |
| | (0.0008) | (0.0029) | (0.0008) |
| Children (0-4) | 0.0011 | 0.0056* | 0.0003 |
| | (0.0008) | (0.0034) | (0.0008) |
| Children (5-15) | -0.0001 | 0.0053** | -0.0011 |
| | (0.0007) | (0.0025) | (0.0006) |
| Constant | -0.0008 | -0.0145** | -0.0014 |
| | (0.0022) | (0.0063) | (0.0020) |
| N | 92,556 | 12,096 | 80,460 |
| R$^2$ | 0.0287 | 0.0444 | 0.0269 |
| Regional Dummies | Yes | Yes | Yes |
| Occup. Dummies | Yes | Yes | Yes |
| Industry Dummies | Yes | Yes | Yes |
| Tenure Dummies | Yes | Yes | Yes |
| Seasonal Dummy | Yes | Yes | Yes |
| Semester Trends | Yes | Yes | Yes |
| Shift-Work Block | Yes | Yes | Yes |

Notes: Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***. The dependent variable takes value 1 if workers interviewed in wave 5 report to be on ZHC and 0 otherwise. Each entry reports the coefficient and robust standard errors (in parentheses) for variables defined as in Table A3 – the exception is education which here is captured solely by a binary dummy – measured at wave 1, but with the following additional variables of interest: a dummy indicator taking value 1 for proxy responses, and dummy indicators for workers not on ZHCs who were part-time, self-employed or on temporary contracts (the excluded category is represented by full-time workers not on ZHCs). The sample is all those in employment at time t (wave 1) but not on a ZHC.

## Table A4: ADF Test – Stationarity Tests

### (a) Articles

|  | ADF |
|---|---|
| Articles | 0.623 |
| *ZHC* | 0.974 |
| Δ Articles | **0.000*** |
| % Δ ZHC | **0.042**** |

### (b) Google Search Index

|  | ADF |
|---|---|
| Google Search Index | 0.692 |
| *ZHC* | 0.934 |
| Δ Google Search Index | **0.000*** |
| % Δ ZHC | **0.053*** |

Note: Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***. Each entry reports the p-value for the augmented Dickey-Fuller unit root test without trend.

**Table A5: VAR - UK National Newspapers, Google Searches and ZHC Employment, with Structural Break**

| | Newspaper Articles | |
|---|---|---|
| | **(1)** | **(2)** |
| | $\%\,\Delta\,ZHC_t$ | $Articles_t$ |
| $\%\,\Delta\,ZHC_{t-1}$ | **-0.504*** | 0.111 |
| | **(0.155)** | (1.317) |
| Articles$_{t-1}$ | 0.064 | 2.766 |
| | (0.686) | (5.836) |
| $\%\,\Delta\,ZHC_{t-1}$*Break | 0.049 | -0.673 |
| | (0.256) | (2.180) |
| Articles$_{t-1}$*Break | -0.074 | -3.287 |
| | (0.687) | (5.839) |
| Constant | **-0.303** | 0.084 |
| | **(0.157)** | (1.339) |
| N | 33 | 33 |
| Granger Test | 0.869 | 0.946 |
| Controls | Yes | Yes |
| | Google Search Index | |
| | **(1)** | **(2)** |
| | $\%\,\Delta\,ZHC_t$ | $Google\ Search\ Index_t$ |
| $\%\,\Delta\,ZHC_{t-1}$ | -0.305 | 6.108 |
| | (0.208) | (5.617) |
| Google Search Index$_{t-1}$ | -0.016 | 0.417 |
| | (0.019) | (0.522) |
| $\%\,\Delta\,ZHC_{t-1}$*Break | 0.013 | **-36.016*** |
| | (0.268) | **(7.251)** |
| Google Search Index$_{t-1}$*Break | 0.011 | -0.495 |
| | (0.020) | (0.528) |
| Constant | **7.881** | 5.063 |
| | **(3.136)** | (84.704) |
| N | 28 | 28 |
| Granger Test | 0.103 | **0.000*** |
| Controls | Yes | Yes |

Note: Significance at the 10% level is represented by *, at the 5% level by **, and at the 1% level by ***. Columns (1) and (2) report the estimates obtained from a VAR model where the dependent variables are respectively the growth rate of the zero-hours contract rate and the number of national newspapers articles on zero-hours contracts (divided by 100). Each entry reports the coefficient and standard errors in parentheses relative to the (lagged) variables of interest. Controls include a linear and quadratic semester trend, the shift work binary indicator, a dummy indicator for Q4, the structural break estimated by the Zivot-Andrews test and the interaction terms between the break and the remaining regressors. The results presented were obtained using the QLFS April-June and October-December data relative to the period 2001-2018.

**Figure A1: Estimated Impact of the Q2 Shiftwork Check on ZHC Prevalence**
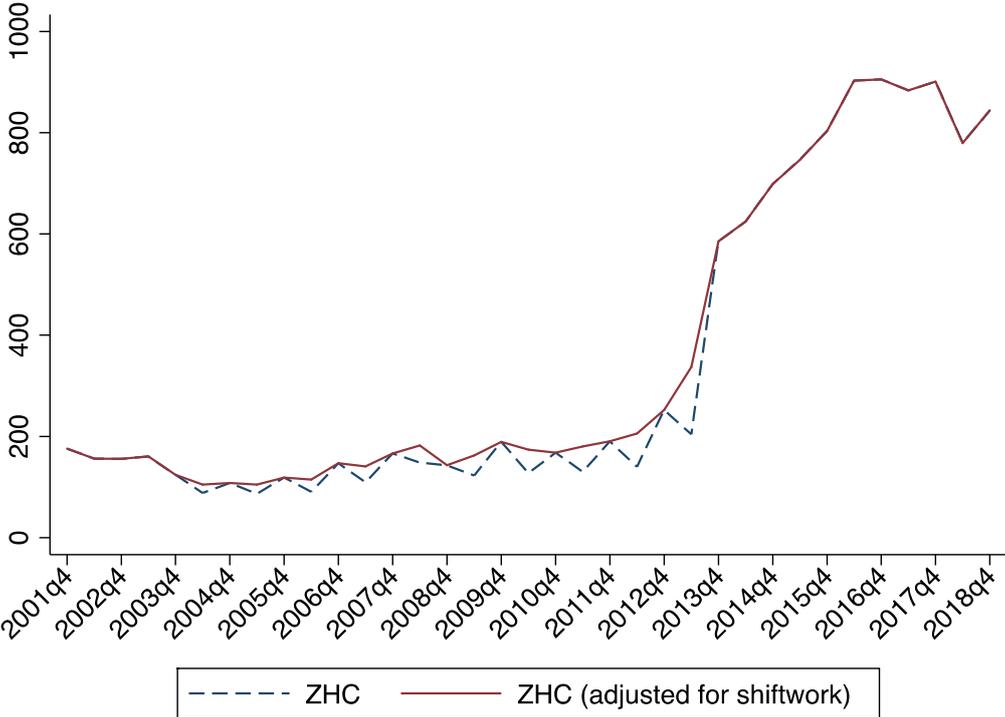


Note: The figure reports the number (in thousands) of people in employment on zero hours contracts (ZHC) for the quarters April-June and October-December relative to the period 2001-2017, obtained using the QLFS. The estimates represented by the blue line reflect the presence of a check in the quarter April-June during the period 2004-2013, which did not allow shift-workers to answer the question on ZHC. The red line presents an adjustment, including an estimate of the number of people on shift-work potentially on ZHCs.

**Figure A2: Flexible Employment Types (% of Those Employed)**
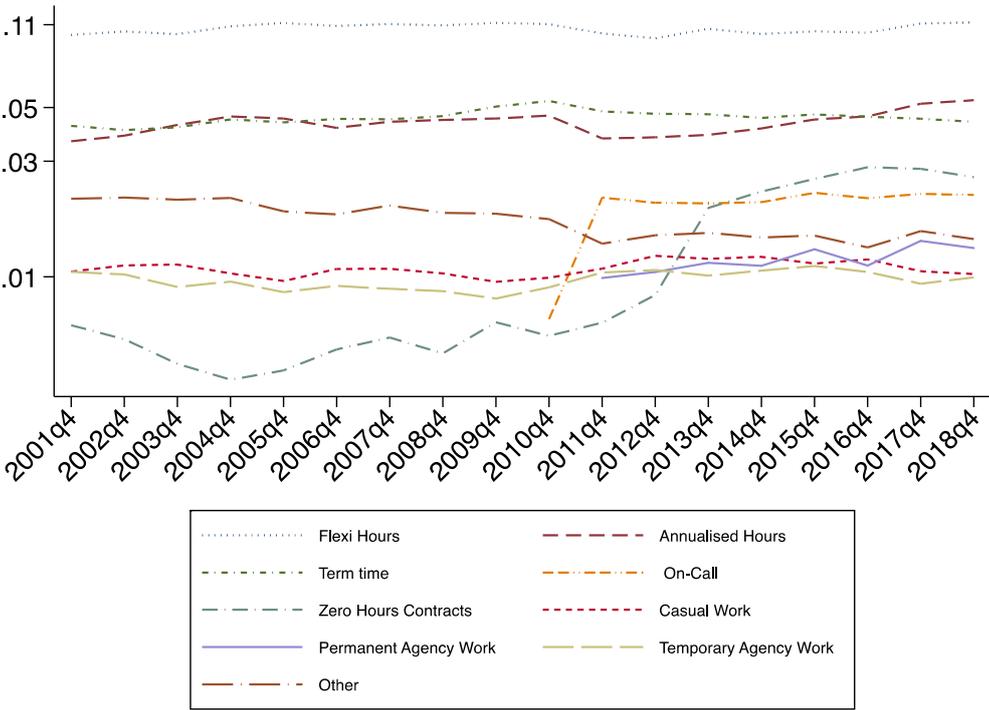


Note: On Call and Permanent Agency were only added as options from 2010 and 2011 respectively.