Zero-hours Contracts in a Frictional Labor Market*

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Abstract

We develop a model to evaluate the pros and cons of zero-hours contracts, i.e. a contract between an employer and a worker where the former is not obliged to provide any minimum working hours, and the latter is not obliged to accept any work offered. Our model emphasizes three channels through which zero-hours contracts affect the equilibrium of the labor market. First, a job-creation effect, as firms endowed with more volatile technologies can enter the market and/or are able to post more vacancies using these flexible contracts. Second, a substitution effect, whereby jobs that are otherwise viable under a regular employment contract become advertized as zero-hours contracts. Third, a participation effect, as workers who prefer a flexible work schedule enter the labor market to take advantage of zero-hours contracts. We calibrate our model to U.K. data and policies to assess the impact of zero-hours contracts on equilibrium allocation and welfare through each of these channels.

Keywords: Zero-Hours Contracts; Working hours; Gig Economy

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1 Introduction

The past few years have seen growing concern about the incidence of the so-called *gig economy* across both sides of the Atlantic (see Krueger [2018]). Yet, so far there is little research on why these new labor relationships have emerged, or how they affect workers's welfare and firms' profits. Besides, data on these contracts has so far been scarce (an exception is Katz and Krueger [2019]). This paper aims to fill this gap. We provide stylized facts relating to the UK and a theoretical framework within which we analyze the welfare effects on employers and workers of ZHC. The distinguishing features of our framework are that both workers and firms are heterogeneous –firms face more or less volatile demand and workers are more or less attached to the labor market– all jobs pay the minimum wage and employed workers may quit to other jobs. In these context tradeoffs will arise between contract types for different agents and give rise to sorting patterns and welfare comparisons of interest to the policy maker.

Zero-hour contracts (ZHC hereafter) are a specific atypical work arrangement which has attracted growing attention, particularly in the United Kingdom (UK). They have been the subject of a heated controversy in the British media and political arena (see Adams et al. [2015]). The debate is centered around two contrasting views: while employers (and some workers) point to the benefits of having flexible labor contracts in the face of fluctuating demand conditions, trade unions have expressed strong concerns that they may involve exploitation of workers because of the significant monopsony power in online labor market platforms (see Dube et al. [2018]).

The main rationale for ZHC is to provide a flexible workforce to meet a temporary or changeable need for staff. From the viewpoint of the employer, ZHCs facilitate flexible access to a pool of staff when demand changes unexpectedly with no requirement to provide guaranteed levels of work. For this reason, they can be cheaper than paying agency fees for agency workers or recruiting workers under fixed-term contracts, typically part time. As

regards workers, ZHC provides flexibility of employment on top of releasing the requirement to accept all offers of work.

ZHCs may provide a flexible transition from full-time work to retirement, allow to get some earnings while in education, or play the role of stepping stones towards more stable jobs. In effect, according to Datta et al. [2019], 40% of workers under these contracts were satisfied with the number of hours they work, while 44% would rather work more hours, and the remaining 16% would rather prefer to work less hours.[1]

ZHCs have become prominent in low-wage segments of the UK labor market after the financial crisis but these labor market practices are far from being new. They date back to the 19th century where workers hired under piece-rate contracts were not guaranteed any amount of fixed work on a daily or weekly basis, e.g. in industries involving dock labor. Likewise, ZHCs are not an exclusive feature of the UK labor market. Similar contracts can be found in Australia, Canada, Finland and Ireland, though they differ in legal status and levels of regulation.[2]

We analyze the way in which ZHCs interact with more conventional jobs (which offer a minimum number of paid hours, irrespectively of the level of demand) in a low-wage labor market. We assume that all jobs pay the minimum wage level. We set up an equilibrium search and matching model with heterogenous workers who search for heterogenous vacancies. Workers differ in their non-labor income, while vacant jobs differ with respect to the volatility of match productivity shocks. Job seekers may be unemployed or employed. Upon meeting a worker, the firm decides whether to offer a ZHC or a regular contract, depending

[1] A nice illustration of this phenomenon has been the offer made by McDonald in 2016 to 115,000 of its UK employees to move to regular fixed contracts, with a minimum number of guaranteed hours every week. This move has taken place after staff in its restaurants complained they were struggling to get loans and mortgages because they were not guaranteed employment each week. However, the company reported that about 80% of these workers chose to remain on flexible ZHCs. https://www.theguardian.com/business/2017/apr/25/mcdonalds-contracts-uk-zero-hours-workers

[2] Similar on-call contracts exist in European countries like the Scandinavian ones, Cyprus, and Malta. Furthermore, they are also used, albeit subject to a much heavier regulations in Germany, Italy and the Netherlands. They are either explicitly forbidden or not used in the remaining EU countries.

on the worker type (and its own profitability under each contract type). Workers are allowed to exert on-the-job search, and quit when better opportunities become available. We will see that this implies higher worker turnover in ZHCs, which harms employer's profitability.

Our model emphasizes three channels through which ZHCs affect the equilibrium of the labor market. First, we identify a *job-creation* effect, as firms in more volatile technologies can enter the labor market and/or post more ZHC vacancies than when these contracts do not exist. Second, there is a *substitution* effect, whereby jobs that would be viable under conventional contracts are advertised as ZHCs. Finally, there is a *participation* effect, as an increasing number of workers preferring flexible work schedules enter the labor market to take advantage of ZHCs.

We calibrate our model to UK data and policies to assess the impact of ZHCs on equilibrium allocations and welfare through each of these channels. In particular, we evaluate how the model outcomes respond to changes in labor market institutions, namely statutory minimum wages, unemployment benefits, minimum hours thresholds, and regulation of overtime work. Since this is still work in progress, this section merely illustrates what the predicted welfare impact of the presence of ZHC is, in terms of unemployment rate and employment composition along both firm and worker heterogeneity.

Related Literature

A recent body of literature examines the consequences of flexibility in work arrangements on consumption and labor supply. For example, Koustas [2018] focuses on the large rise in rideshare employment during 2012-2016 in the US, where the number of active rideshare drivers now exceeds taxi drivers and chauffeurs. He finds that rideshare drivers tend to be more borrowing constrained than taxi drivers before starting as drivers. However, after a household begins ridesharing, total spending (net of auto expenses) rises by 3-5% and the excess sensitivity of spending to main payroll income falls by over 80%. Thus, flexible labor

supply acts as an insurance device. His estimates suggest that households are willing to pay around $ 1,800 per year for flexible work.

This figure is in line with the experimental results for a US national call centre reported by Mas and Pallais [2017] where the average worker is willing to give up 8% of wages for the option to work from home. Besides, workers are also prepared to pay 20% to avoid a schedule set by an employer on short notice.

Another paper, this time for the US retail sector, dealing with these issues is Frazier [2017]. This author aims to understand the effect of regulations restricting variation in hours. In his equilibrium directed search model of hours and wages, a job offer is a combination of a wage and a distribution of hours from one of two sectors. In the first sector the employer is allowed to adjust hours in response to a productivity shock, while in the other sector hours are fixed. Search frictions in the economy generate imperfect sorting between workers and firms. Here the key trade-off between the two contract types are the wage level and the hours flexibility, whereby wage differences act as a compensating differential for unwanted hours flexibility.

As regards ZHC in the UK, to the best of our knowledge, the only (non descriptive) paper is Datta et al. [2019], which documents how the 2016 rise in the UK minimum wage has resulted in an increase in the use of ZHCs in the UK social care sector, and in low wage sectors in general.

Our specific contribution to this literature is threefold. First, we model incentives in both sides of the labor market to operate with a ZHC, where both firms and workers are heterogeneous in their relative valuation of ZHC compared to regular contracts. Second, contrasting with Frazier [2017], we assume a common hourly wage for all, random search and allow for job-to-job mobility. This type of worker turnover will be key in the firms' choice of contract type since less desirable contracts will experience higher quit rates which will depress profits. Finally, our structural approach will complement Datta et al. [2019]'s

findings on the impact of a rise in minimum wage and propose a mechanism through which all agents in the labor market respond to this raise.

The rest of the paper is structured as follows. Section 2 describes the regulatory framework of ZHCs in the UK. Section 3 provides the main stylized facts about these contracts, using information from the UK LFS. Section 4 lays out the model we use to characterize the evolution of ZHC and regular contracts in a frictional labor-market setup; the model is calibrated to the UK. Section 6 evaluates the labor market effects of ZHCs, and their response to several policy changes. Finally, Section 7 concludes.

2 Regulatory framework

This section reviews the legal status of employees in ZHCs in the UK as well as their entitlement to welfare while employed in these contracts.

Workers' rights As will be explained below, ZHCs typically give staff a 'worker' employment status, which lies between the categories of 'employee' and 'self-employed'. This status will confer such individuals with the following employment rights:

- Right not to be discriminated against under the Equality Act 2010;
- Right to receive pro-rata holiday pay and other working time rights (Working Time Regulations 1998);
- Right to receive Statutory Sick Pay (so long as they have met the Lower Earnings Limit);
- Automatic enrolment for pensions;
- Protection from unlawful deductions from wages;

- Right to receive the hourly National Minimum Wage or National Living Wage.[3]

These rights will also depend on the individual employment contract. Since May 2015 exclusivity clauses in ZHCs, which stop someone from taking on another job, have been banned. Employers cannot enforce the clause, and since January 2016, workers have been able to claim compensation at an employment court if they are punished or dismissed for looking for work elsewhere.

Whereas in the UK workers under ZHCs are not obliged to provide any minimum working hours, in Ireland individuals are contractually obliged to be available for work if called by employers. By contrast, 'self-employed' individuals have no employment rights besides certain discrimination rights. At the other end of the spectrum 'employees' have the whole range of employment rights including unfair dismissal and redundancy and family rights such as paid maternity leave.

The distinction between the status of 'worker' and that of 'employee' has been subject to court litigation recently. A well-known case is whether companies like Uber or Deliveroo should hire under employment contracts or freelance work. To the extent that some of these firms use contractors rather than employees, they do not fall into the above definition of ZHC. The most important difference between the two contracts is that employers must offer 'employees' work in exchange for pay, and 'employees' are required to do the work whereas 'workers' can turn work down, depending on their *availability*.

However, whether an individual is considered to be an employee or a worker will depend not just on what it is the offered contract, but what happens day to day. While a contract might say that there is no obligation to work, if the individual is 'punished' for not accepting all the offered hours offered, or consistently work a set number of hours, then a tribunal might decide that she is actually an employee.

[3]In the UK there are several minimum wages in place. From April 2016 there are three rates for youth (16-17, 18-20, and a special one for apprentices), another one for adults (20-24), and finally the new NLW (25+) which was updated in April 2018 to £7.83 an hour.

Entitlement to welfare Since workers under ZHCs are often low earners, they are entitled to means-tested benefits and tax credits. In the past, the benefits one could claim depended on whether individuals worked more than 16 hours in a week, as in the case of Income Support or Jobseekers' Allowance (JSA). When working 16 hours a week or more, they could also claim the Working Tax Credit, Child Benefit and Housing Benefit if they needed help with the rent and had savings less than £16,000.

However, in 2013 Universal Credit (UC) replaced all of these income support schemes with a taper rate of 65% (63% since 2018) implemented from a typical monthly work allowance of (net of taxes) £490 for single workers. With a current hourly NMW of £7.38 (20-24) and NLW of £7.83 (25 and above), plus an estimated average hours of work under ZHC of 25 hours in a week (see Resolution Foundation), the monthly wage of a ZHC workers would be between £738 and £783. Since the maximum monthly income support under UC are £252 (for workers under 25) and £318 (over 25), someone working 100 hours in a month would receive £898 (=252+490+0.63(738-490)) if aged under 25 and £993 (=318+490+0.63(783-490)) if aged 25 and over.

3 Stylised facts about ZHCs

The number of ZHCs in the UK has surged fivefold since the beginning of the 2010s, although there are signs of having reached a plateau recently. As depicted in Figure 1, in 2017 there were slightly above 900 thousand workers under ZHCs, which represents about 2.8% of all employees in the UK labor force (0.8% in 2012).

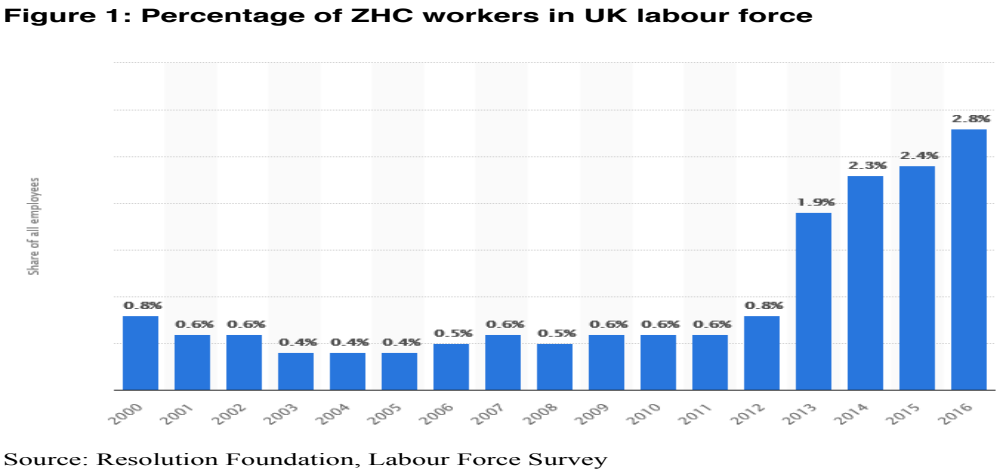

Figure 1. Evolution of the share of ZHCs

We present in this section some stylized facts about ZHC observed in the UK Labour Force Survey. This dataset has the advantage of relating to a large number of individuals. This is important for our purposes since ZHC represent a fairly small share of the labor market. On the other hand, the Labour Force Survey has a modest longitudinal dimension since it only follows individuals over 5 quarters. We will use this longitudinal information in the latter part of this section.

Let us first examine a cross-section dataset. In the Labour Force Survey, ZHCs are defined as employment contracts where a worker is not contracted to work a set number of hours, and is only paid for the number of hours actually worked.[4] We use here the survey carried out in the second quarter of 2018 and restrict our attention to individuals of working age, 18 to 65. This leaves us with 54,544 individuals, of whom 76.2% are in employment, 2.8% are unemployed according to the ILO definition and 21% are inactive.

Every other quarter, the Labour Force Survey includes a question relating to the contractual nature of employment of the respondent. In our sample, 716 individuals declare having a zero-hour contract of employment. This represents 1.3% of our sample and 2.2%

[4]There is a wide range of work arrangements which are akin to ZHCs – e.g., those labelled 'reservist', 'on call', 'min-max', 'key-time', and 'if and when' contracts (see Dickens [1997]).

of employed individuals in our sample. All individuals on zero-hour contracts report being employed. The decomposition of answers across all types of alternative contracts is reported in Table 1. It is clear from these figures that all other types of contracts are included in what we will call regular contracts and we should bear in mind that 23% of these refer to contracts where weekly hours may vary, i.e. "flexitime", "annualised hours contracts" and "term-time working".

Type of agreed working arrangements	Z	R	Total
Does not apply	0.00	0.40	0.39
flexitime	3.49	10.82	10.66
annualised hours cont	0.28	4.91	4.81
term time working	3.21	4.19	4.17
jobsharing	0.14	0.33	0.32
9-day fortnight	0.00	0.27	0.26
4.5-day week	0.00	0.56	0.55
zero hours contract	92.88	0.00	2.02
on-call working	0.00	1.73	1.69
none of these	0.00	76.80	75.13
Total	100.00	100.00	100.00

Table 1. Contract types

The mean age of employees in ZHC is markedly younger than in other contracts: 38.8 years versus 42.9 years old. In order to get a more precise view of the use of ZHC over the lifecyle, we display in Table 2 the fractions of ZHC in employment in 3-year age bands between 18 and 65. This shows an increased prevalence of these contracts at both ends of the working life: 10.6% of employed 18-20 year-olds are in ZHC, as are over 3% those aged under 27 and over 62, while only around 1.5% of prime age workers (from 30 to 55) are employed in these contracts. This pattern mimics (inversely) that of labor force participation over the life cycle, i.e. we observe that a greater share of ZHC contracts in employment coincides with age ranges when participation is low.

age bands	Z	R	Total
1	10.55	89.45	100.00
2	5.29	94.71	100.00
3	3.69	96.31	100.00
4	2.10	97.90	100.00
5	1.62	98.38	100.00
6	1.49	98.51	100.00
7	1.42	98.58	100.00
8	1.25	98.75	100.00
9	1.22	98.78	100.00
10	1.79	98.21	100.00
11	1.52	98.48	100.00
12	1.19	98.81	100.00
13	1.78	98.22	100.00
14	1.93	98.07	100.00
15	2.58	97.42	100.00
16	3.16	96.84	100.00
Total	2.18	97.82	100.00

Table 2. Prevalence of Z over the lifecyle

Female employees are more likely to hold a ZHC than a regular contract as they represent 55.5% of ZHC employment vs 49.4% of regular employment. Table 3 shows the distribution of education across non-employment, regular employment and ZHC. Perhaps unexpectedly these distributions only exhibit modest differences: 25% of ZHC employees hold a degree or equivalent vs 35% of employees in regular contracts, and 17% of ZHC employees hold no or "other" qualifications vs 13% of employees in regular contracts.

Highest qualification	Not employed	Z	R	Total
Degree or equivalent	23.39	24.86	35.21	30.38
Higher education	8.29	10.20	9.38	8.96
GCE A level or equiva	23.57	27.23	22.05	22.72
GCSE grades A*-C or e	21.42	19.55	19.03	19.99
Other qualification	9.60	11.45	7.69	8.50
No qualification	13.72	6.70	6.63	9.45
Total	100.00	100.00	100.00	100.00

Table 3. Distribution of education

Table 4 shows the distribution of tenure with the current employer of employees in either

type of contract. Rather surprisingly, nearly half of ZHC employees report tenures greater than 2 years, contrasting with the image of precarious contracts. Tenures are on average shorter in ZHC contracts than in regular contracts, but probably less so than expected: 22% in employees in ZHC have been with their current employer for more than 5 years vs. 54% or employees in regular contracts; 9.2% of ZHC employees were recruited in the last 3 months vs. 3.4% of employees in regular contracts.

Length of time with current employer	Z	R
Less than 3 months	9.24	3.42
3 months, less that 6	6.16	3.40
6 months, less than 1	14.57	7.24
1 year, less than 2	21.71	10.82
2 years, less than 5	26.05	20.85
5 years, less than 10	10.92	16.47
10 years, less than 2	8.40	23.88
20 years or more	2.94	13.93
Total	100.00	100.00

Table 4. Distribution of tenure

In our dataset, the only measure of hours that does not include a large fraction of missing data is the "total actual hours in the main job". There is no variable indicating whether the survey respondent is on holiday in the relevant week, so we report in Table 5 and Figures 2 and 3 distributions of hours with and without assuming that 10% of respondents are on holiday at any given point in time. Two features of these distributions are as expected: ZHC employees work on average fewer hours and the cross-sectional variance of these hours is greater than in regular contracts. One feature is more surprising: the variance of hours in regular contracts is still substantial. On the other hand, when asked "why pay usually varies", only 0.8% of respondents in regular contracts say that the number of hours and days of work vary, whereas 8.4% of those in ZHC do so.

	mean	std dev	N
All			
Z	21.5	15.9	700
R	32.3	15.7	31,643
Excluding holidays			
Z	23.8	15.0	631
R	35.8	12.2	28,479

Table 5. Mean and variance of actual hours worked

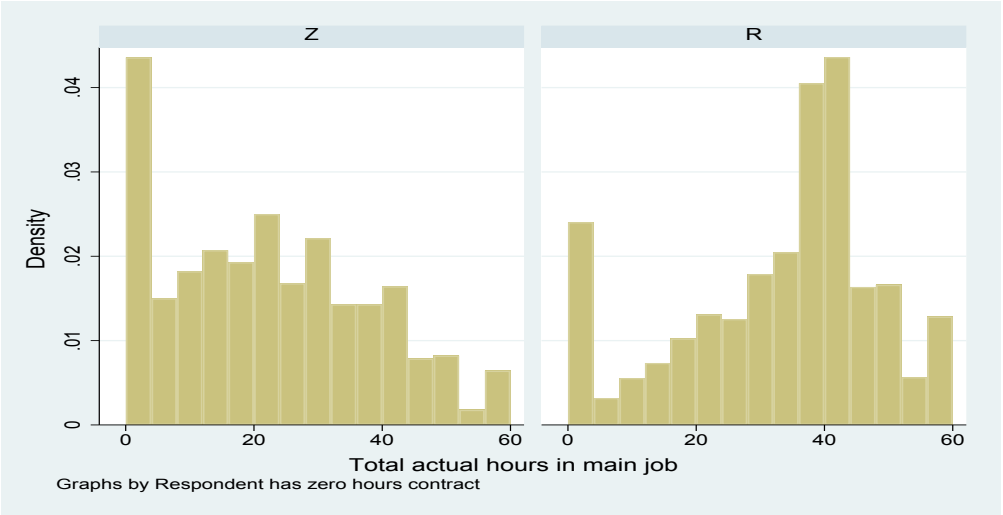

Figure 2. Distribution of actual hours worked

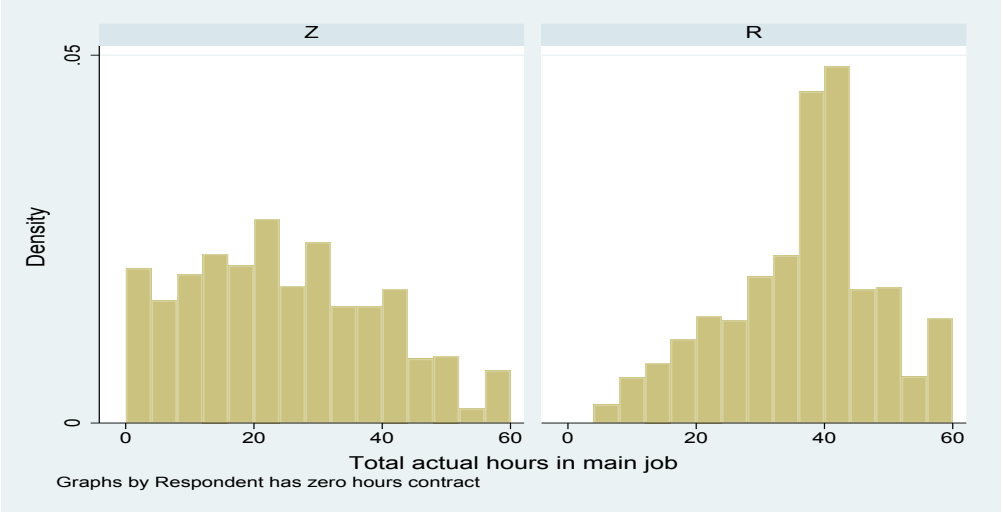

Figure 3. Distribution of actual hours worked - excluding holidays

Turning to the industry breakdown of employment, we observe in Table 6 that industries

where ZHC are the most used are "Arts and Entertainment" (19% of employment), "Accommodation and Food" (14%) and "Admin and Support Services" (7%). The sectors of "Health and Social Work" and of "Wholesale, Retail and Repair of Vehicles" represent large shares of ZHC employment (20% and 13% respectively) even though the use of these contracts within these industries is average (6.8% and 2.8% respectively).

Industry section	Z	R	Total
A Agriculture, fores	0.42	1.02	1.01
B Mining and quarryi	0.14	0.43	0.42
C Manufacturing	4.49	9.32	9.21
D Electricity, gas,	0.00	0.68	0.66
E Water supply, sewe	0.14	0.75	0.73
F Construction	3.09	7.08	6.99
G Wholesale, retail,	9.13	12.89	12.81
H Transport and stor	5.62	5.13	5.14
I Accommodation and	21.35	4.38	4.75
J Information and co	1.12	3.95	3.89
K Financial and insu	0.42	3.97	3.89
L Real estate activi	0.56	1.11	1.10
M Prof, scientific,	2.67	7.57	7.46
N Admin and support	8.85	4.68	4.77
O Public admin and d	1.97	6.97	6.86
P Education	9.69	10.82	10.80
Q Health and social	20.22	13.81	13.95
R Arts, entertainmen	7.44	2.40	2.51
S Other service acti	2.39	2.66	2.65
T Households as empl	0.28	0.23	0.23
U Extraterritorial o	0.00	0.15	0.14
Total	100.00	100.00	100.00

Table 6. Distribution of industry

Table 7 shows the distribution of occupations in both types of contracts. Here the differences are substantial: only 1.8% (resp. 13.5%) of ZHC employees are in higher (resp. lower) managerial and professional occupations, vs 16.9% (resp. 28.2%) of other employees. On the other hand, 57.7% of ZHC employees are in semi-routine or routine occupations or have never worked before (which we will call "lower occupations" hereafter), while the corresponding figure among regular employees is 23.5%. Table 8 shows the distribution of education across

occupations in both types of contracts. This gives limited evidence of over-qualification in routine and semi-routine occupations where 25.6% of ZHC holders have higher education or more vs. only 15.7% in regular contracts.

NS-SEC major group	Z	R	Total
Higher managerial and	1.82	16.91	16.58
Lower managerial and	13.55	28.21	27.89
Intermediate occupati	9.92	13.72	13.64
Small employers and o	8.66	10.47	10.43
Lower supervisory and	8.38	7.08	7.10
Semi-routine occupati	25.00	12.32	12.60
Routine occupations	19.27	8.94	9.16
Never worked, unemplo	13.41	2.35	2.59
Total	100.00	100.00	100.00

Table 7. Distribution of occupation

Z Employment							
NS-SEC major group	Degree	Higher ed	A lev	GCSE	Other	No qual	Total
Higher managerial and	69.23	7.69	15.38	7.69	0.00	0.00	100.00
Lower managerial and	53.61	19.59	16.49	7.22	2.06	1.03	100.00
Intermediate occupati	30.99	14.08	23.94	11.27	16.90	2.82	100.00
Small employers and o	17.74	9.68	20.97	30.65	9.68	11.29	100.00
Lower supervisory and	23.33	5.00	38.33	15.00	6.67	11.67	100.00
Semi-routine occupati	17.32	6.15	24.58	29.61	14.53	7.82	100.00
Routine occupations	18.12	10.14	18.12	18.84	23.19	11.59	100.00
Never worked, unemplo	14.58	9.38	57.29	17.71	0.00	1.04	100.00
Total	24.86	10.20	27.23	19.55	11.45	6.70	100.00
R Employment							
NS-SEC major group	Degree	Higher ed	A lev	GCSE	Other	No qual	Total
Higher managerial and	66.97	8.33	12.61	8.09	2.32	1.67	100.00
Lower managerial and	52.02	12.23	17.00	12.61	3.30	2.84	100.00
Intermediate occupati	26.31	9.88	29.17	25.36	5.17	4.10	100.00
Small employers and o	21.03	9.30	27.87	21.15	10.58	10.07	100.00
Lower supervisory and	11.34	9.76	35.16	23.69	12.13	7.91	100.00
Semi-routine occupati	11.74	7.55	23.67	30.72	13.78	12.54	100.00
Routine occupations	6.27	4.46	20.29	27.98	21.34	19.67	100.00
Never worked, unemplo	25.13	7.41	41.67	19.18	3.70	2.91	100.00
Total	35.21	9.38	22.05	19.03	7.69	6.63	100.00

Table 8. Cross-tabulation of occupation and education

Unfortunately, our dataset does not have enough non-missing observations on pay in ZHC

to derive meaningful descriptive statistics. Since our model focuses on minimum wage labor market and gives no role to wage dispersion, we will use a subset of the data relating to low occupations where the minimum wage tends to prevail. In our theoretical framework as well as our empirical evaluation, we will restrict our attention to the labor market in lower occupations since our focus is on jobs that pay around the minimum wage. Within this sub-labor market, ZHC represent 6.6% of employment. The descriptive statistics reported in this section relating to this sub-market are reported in Appendix A and show a similar qualitative picture.

Among unemployed respondents, 66.8% report a previous occupation belonging to or "lower occupation" sub-market. We examine the distribution of the duration of unemployment for these individuals. As we can see in Table 9, 33% of this group have been unemployed for under 3 months and 19% for over 2 years.

Duration	Percent
Less than 3 months	33.53
3 months,less that 6	16.72
6 months, less than 12	17.31
12 months, less than 18	9.25
18 months, less than 24	4.08
2 years, less than 3	6.57
3 years, less than 4	2.39
4 years, less than 5	1.99
5 years or more	8.16
Total	100.00

Table 9. Distribution of unemployment duration

The Labour Force Survey follows individuals over 5 consecutive quarters and replaces 20% of the sample every quarter. We can use the longitudinal dimension of this data to provide a better understanding of the composition of ZHC employment and its main differences with regular employment and the dynamics of employment in these contracts. Since one wave of the longitudinal dataset relates to 20% of a cross-section and ZHC are a small fraction of employment, we do not have enough observations in a single wave to draw useful

information. We have thus pooled the 8 most recent waves of the longitudinal LFS, from October-December 2015-6 to July-September 2017-8 in order to gather enough data points on ZHC employees. We will assume in the following that the labor market was stable over this period in the dimensions that we describe. We obtain information on 32,117 respondents, of whom 679 report being employed in a ZHC in at least one interview and 250 are observed employed in a ZHC in two consecutive semesters. To be clear, each individual is only asked this question twice over their 5 quarters in the LFS, two quarters apart.

Table 10 shows the transition matrix between three labor market states –non-employed, employed in a ZHC (denoted Z) and employed in a regular contract (denoted R). Several interesting facts emerge from this matrix. First, 10% of exits from non-employment are to ZHC. Second, the rate of loss of employment over two quarters is over twice as large in Z than in R (10.8% vs 4.0%). Third, the rate of continuous employment in the same contract type is nearly twice as large in R than in Z (94.8% vs 49.8%). Fourth, this last figure seems at odds with the distribution of tenure with the same employer that we described above, where 80% of Z employees had been with the same employer for over 6 months.

	NE	Z	R	Total
NE	92.80	0.65	6.55	100.00
Z	10.76	49.80	39.44	100.00
R	4.05	1.18	94.77	100.00
Total	37.29	1.74	60.96	100.00

Table 10. Transitions between contract types and employment status

To gain an insight into the types of individuals in terms of their labor force attachment who are employed in each type of contract, we display in Table 11 the composition in terms of their labor market history over their 5 quarters in the sample of four sub-groups: those reporting Z (resp. R) employment in two consecutive semesters and those switching from Z to R (resp. R to Z) employment in two consecutive semesters. Comparison of the four columns suggest that workers who are at some point employed in a ZHC tend to be less

attached to employment or the labor force as they exhibit higher transition rates to and from these states. Note that the column "NE" refers to individuals who report not being employed in the two interviews when the contract type question is asked. This does not rule out that they could be employed in any of the other three quarters of their presence in the survey.

	NE	ZZ	RR	ZR	RZ	Total
Entrant	3.74	0.40	0.02	0.51	0.00	1.51
EE	2.48	88.00	95.99	90.40	87.45	58.44
EU	1.12	0.80	0.39	1.01	0.87	0.69
EI	4.91	3.60	1.32	2.02	4.33	2.80
UE	1.67	2.40	0.46	2.53	1.73	0.98
UU	1.95	0.00	0.03	0.00	0.00	0.79
UI	1.35	0.00	0.00	0.00	0.00	0.54
IE	5.16	4.00	1.00	2.53	3.03	2.71
IU	2.06	0.40	0.01	0.00	0.00	0.83
II	66.72	0.00	0.07	1.01	0.87	26.73
Retiree	8.85	0.40	0.72	0.00	1.73	3.97
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 11. labor market trajectories

Table 12 shows the distribution of tenure with the current employer for the four sub-groups defined above. As expected, the group of individuals reporting R employment in two consecutive semesters exhibit the longest average tenure and the two groups reporting having switched from R to Z employment or vice-versa exhibit the shortest average tenures. Surprisingly though, over 85% of each of these groups report tenures longer than 6 months, even though they report changing contracts. These "contract switchers" represent over a half of individuals who ever report being in Z employment in this dataset, so this is not a marginal phenomenon. An alternative explanation is intermittent mis-classification in contract type.

	ZZ	RR	ZR	RZ	Total
Less than 3 months	4.22	1.55	6.32	6.45	1.69
3 months, less that 6	2.95	2.07	8.42	6.45	2.20
6 months, less than 1	6.75	4.35	13.68	9.68	4.54
1 year, less than 2	19.41	9.45	21.58	17.05	9.78
2 years, less than 5	39.66	18.89	25.79	23.96	19.28
5 years, less than 10	13.92	17.71	10.00	20.74	17.62
10 years, less than 2	9.28	27.15	8.95	11.06	26.56
20 years or more	3.80	18.82	5.26	4.61	18.33
Total	100.00	100.00	100.00	100.00	100.00

Table 12. Distribution of tenure across contract-stayers and contract-switchers

Desired job mobility varies substantially across groups: 4% of those continuously employed in a regular contract report "looking for a different or additional paid job", whereas 12% or individuals in ZHC do so. Among contract switchers, 14% of those reporting a switch from Z to R report looking for a different job vs only 10% of individuals switching the other way do so.

In a similar vein, 19% of those in continuous Z employment report wishing to "work longer hours at current basic rate of pay", contrasting with only 6.6% of those in continuous R employment.

An advantage of having longitudinal data on individual hours is that we can gauge whether the variability of hours commented above is specific to the average individual history of hours worked or just reflects the variance of constant individual hours sequences. We show in Table 13 the averages of means and standard deviations of individual hours sequences. These sequences each comprise 5 quarterly observations. The mean weekly hours of individuals employed in ZHC continuously is 3.5 hours lower than those of individuals changing contracts either way, which are 4 hours lower than the mean hours of individuals in continuous R employment. The coefficient of variation of individual hours processes is 1.5 larger in the group of employees continuously in ZHC than in the group of employees in continuous R employment.

	mean	std. dev.
ZZ	19.21	7.87
RR	31.00	8.16
ZR	22.55	7.84
RZ	23.21	8.00

Table 13. Distribution of individuals hours processes

Table 14 reports the occupational breakdown for the four groups defined above. This breakdown is quite similar across the three groups who report Z employment in one of the two semesters. They are most represented in "Caring, Leisure And Other Service" "Elementary Occupations", which are also the two occupations with the highest shares in these three groups. The group of individuals continuously employed in R contracts includes greater shares in higher occupations "Managers, Directors And Senior Officials" and "Professional Occupations"

Major occupation group	ZZ	RR	ZR	RZ	Total
Managers, Directors And Senior Officials	0.10	99.05	0.33	0.52	100.00
Professional Occupations	0.76	97.93	0.55	0.76	100.00
Associate Professional And Technical	0.52	98.08	0.59	0.81	100.00
Administrative And Secretarial	0.94	97.80	0.61	0.66	100.00
Skilled Trades Occupations	0.76	97.45	0.70	1.08	100.00
Caring, Leisure And Other Services	3.76	91.62	2.43	2.19	100.00
Sales And Customer Service	0.86	96.90	1.46	0.77	100.00
Process, Plant And Machine Operatives	1.96	94.82	1.16	2.05	100.00
Elementary Occupations	3.27	91.24	2.53	2.96	100.00
Total	1.23	96.65	0.98	1.15	100.00

Table 14. Distribution of occupation across contract-stayers and contract-switchers

As before, we have computed all the above descriptive statistics for a subset of our longitudinal data restricted to lower occupations likely to pay around the minimum wage. These are shown in Appendix A. All results are qualitatively similar to those reported here.

4 Model

4.1 Economic environment

Time t is discrete and runs forever. The economy is populated by heterogeneous workers and firms. All agents use the factor $\beta \in (0,1)$ to discount the future.

Preferences and technology

There is a unit continuum of workers who are indexed by type i. A worker type refers to her non-labor income R_i drawn from a sampling distribution denoted as $\Gamma(\cdot)$. Our preferred interpretation is that R_i captures total household revenues net of the worker's own labor earnings. Workers derive utility from consumption $c_t > 0$ according to a constant relative risk-aversion function

$$u(c_t) = \frac{c_t^{1-\eta} - 1}{1-\eta} \tag{1}$$

with $\eta > 0$. Workers can be either unemployed or employed. In unemployment, workers receive a flow of unemployment benefits b. During employment, they receive a wage in exchange for working h_t hours per period (details follow).

On the other side of the market, there is an endogenous measure of risk-neutral firms. The flow of output per period is $y_t h_t^{\alpha}$ with $0 < \alpha < 1$, where y_t denotes idiosyncratic match productivity and h_t^{α} is a concave function mapping hour worked onto labor services. Firms are indexed by type j, which refers to the firm's own stochastic process for match productivity. To fix ideas, in firm j match productivity evolves according to

$$y_{t+1} = (1-\rho)\,\bar{y} + \rho y_t + \sigma_j \varepsilon_{t+1}, \tag{2}$$

where ε_t is a standard white noise process. The unconditional mean $\bar{y}$ and persistence ρ

are common across firms, whereas σ_j varies by firm type. Hereafter $F_j(\cdot|y)$ denotes the transition function for y_t at firm j, i.e. $F_j(\cdot|y) = \Pr\{y_{t+1} < y'|y_t = y', j\}$.

Z and R contracts

We focus on the segment of the labor market which pays around the minimum wage. We thus assume that the hourly wage is fixed and set to the minimum, w. Firms can offer one of two contracts: a zero-hours contract Z and a hour-regulated contract R. The difference between them is that the hour-regulated contract guarantees a minimum number of hours worked $\underline{h}$ (and thus a minimum level of income). Firms hold the right to set hours worked. Since intra-period profits are $y_t h_t^\alpha - w h_t$, hours worked are given by

$$h(y_t) = \begin{cases} \mathbb{1}\{y_t \geq 0\} \left(\frac{\alpha y_t}{w}\right)^{\frac{1}{1-\alpha}} & \text{in } Z \text{ contracts} \\ \max\left\{\underline{h}, \mathbb{1}\{y_t \geq 0\} \left(\frac{\alpha y_t}{w}\right)^{\frac{1}{1-\alpha}}\right\} & \text{in } R \text{ contracts} \end{cases}. \tag{3}$$

Hereafter, $k \in \{Z, R\}$ denotes the employment contract and $h_k(y_t)$ is the corresponding schedule of hours worked.

Search frictions

Workers and firms come together via random search. We allow for on-the-job search, with a relative search intensity denoted $s_e \in (0, 1)$. The number of contacts per unit of time is given by a standard Cobb-Douglas matching function with constant returns to scale:

$$m(u_t, v_t) = M(u_t + s_e(1 - u_t))^\zeta v_t^{1-\zeta}, \tag{4}$$

where u_t (respectively e_t) is the unemployment (resp. employment) rate, and v_t is the measure of vacancies.

The labor market tightness θ_t and the matching probabilities for vacant jobs ($q(\theta_t)$),

unemployed workers ($\lambda_{u,t}$) and employed workers ($\lambda_{e,t}$) are given by:

$$\begin{aligned} q(\theta_t) &= M\theta_t^{-\zeta} \\ \lambda_{u,t} &= \theta_t q(\theta_t) \\ \lambda_{e,t} &= s_e \theta_t q(\theta_t) \end{aligned} \tag{5}$$

Firms face a convex cost of posting vacancies $\kappa(v_t)$. Since we have *ex ante* firm heterogeneity, we assume that $\kappa(.)$ is convex. Once a vacancy meets a worker, the initial match productivity of the job is $\bar{y}$. Thereafter match productivity evolves according to equation (2). In addition, there is an exogenous job destruction shock that hits jobs with probability δ per period.

4.2 Bellman equations

The behavior of workers and employers who populate the economy can be described by a system of Bellman equations. We focus on a stationary environment, and therefore we omit the time subscript t in the rest of this section.

Let us denote by W the asset value of an employed worker.

$$\begin{aligned} W_k(y;i,j) &= u(R_i + wh_k(y)) + \beta \Bigg((1-\lambda_e) W_k^+(y;i,j) \\ &\quad + \lambda_e \sum_{j'} \max\left\{ \max\left\{ U(i), W_{k'}(\overline{y};i,j') \right\}, W_k^+(y;i,j) \right\} \frac{v_{j'}}{v} \Bigg) \end{aligned} \tag{6}$$

where

$$\begin{aligned} W_k^+(y;i,j) = \int \big(&\delta U(i) + (1-\delta) \left(\ell_k(y';i,j) U(i) \right. \\ &\left. + (1 - \ell_k(y';i,j)) \max\left\{ U(i), W_k(y';i,j) \right\} \right) dF_j(y'|y) . \end{aligned} \tag{7}$$

$\ell_k(y;i,j)$ is the lay-off policy function of the firm, which will be defined momentarily. The worker takes this decision as given to compute the continuation value of employment at the current firm. In equation (7), $v_{j'}$ denotes the number of vacancies of firms type j. Since $v = \sum_j v_j$, v_j/v is the conditional probability of meeting a firm of type j. When a worker is unemployed, her asset value U is given by

$$U(i) = u(R_i + b) + \beta \left((1 - \lambda_u) U(i) + \lambda_u \sum_{j'} \max \{U(i), W_{k'}(\overline{y}; i, j')\} \frac{v_{j'}}{v} \right). \tag{8}$$

We assume that there is free entry of firms. Thus the asset value of holding a filled position, which is denoted by J, solves

$$\begin{aligned} J_k(y;i,j) = {} & y h_k(y)^\alpha - w h_k(y) + \beta (1 - q_k^e(y;i,j)) \\ & \times (1-\delta) \int (1 - q_k^u(y';i,j)) \max \{0, J_k(y';i,j)\} dF_j(y'|y). \end{aligned} \tag{9}$$

In this equation, $q_k^e(y',i,j)$ is the probability that the worker quits on receiving a job offer, and $q_k^u(y',i,j)$ is the policy function that she leaves to unemployment. We have

$$q_k^e(y;i,j) = \lambda_e \sum_{j'} \mathbb{1} \left\{ \max \{U(i), W_{k'}(\overline{y}; i, j')\} \geq W_k^+(y;i,j) \right\} \frac{v_{j'}}{v} \tag{10}$$

and

$$q_k^u(y;i,j) = \mathbb{1} \{ W_k(y';i,j) < U(i) \}. \tag{11}$$

The firm takes these decisions as given to compute the continuation value of employing the worker. Also, at this point we are in a position to define the lay-off policy function of the firm:

$$\ell_k(y;i,j) = \mathbb{1} \{ J_k(y;i,j) < 0 \}. \tag{12}$$

Finally, the contract type is also a policy function. The contract that the firm chooses to offer is

$$k(i,j) = \begin{cases} Z & \text{if } \begin{cases} J_Z(\overline{y};i,j) > J_R(\overline{y};i,j) \geq 0 \text{ and } W_Z(\overline{y};i,j) > U(i) \\ J_R(\overline{y};i,j) \geq J_Z(\overline{y};i,j) > 0 \text{ and } W_Z(\overline{y};i,j) > U(i) > W_R(\overline{y};i,j) \end{cases} \\ R & \text{otherwise} \end{cases}. \tag{13}$$

That is, the firm offers a contract Z if it is acceptable to the worker and yields a value for the firm higher than that of offering a contract R. Alternatively, the firm might choose to offer a contract Z if the contract R would not be accepted by the worker, and the firm is still better off filling its vacancy with a contract Z than remaining unmatched. In other instances (and conditional on the job being profitable under either contract type), the firm chooses to offer the R contract.

4.3 Free entry condition

Free entry into the market implies that employers exhaust the present discounted value of job creation net of the cost of a vacancy. Therefore we have

$$\kappa'(v_j) = \beta q(\theta) \sum_i \max\{0, J_k(\overline{y};i,j)\} a(i,j), \tag{14}$$

where $a(i,j)$ is the probability that firm j forms a match with a type-i worker. We have

$$\begin{aligned} a(i,j) = {} & \frac{u(i)}{u + s_e(1-u)} \mathbb{1}\{W_k(\overline{y};i,j) > U(i)\} \\ & + s_e \sum_{j'} \int \mathbb{1}\left\{W_k(\overline{y};i,j') \geq W_k^+(y';i,j')\right\} dF_{j'}(y'|y) \frac{e(y;i,j')}{u + s_e(1-u)} dy. \end{aligned} \tag{15}$$

In this equation, $u(i)$ and $e(y;i,j)$ denote, respectively, the population measure of type-i unemployed workers and of employed workers in a match y at a firm j. Equation (15) accounts for the fact that an employed worker whose beginning-of-period match productivity is y has match productivity y' by the time of meeting the outside firm.

4.4 Equilibrium

Having described the Bellman equations, policy functions and free entry condition, we are in a position to give the following definition:

Definition. A stationary equilibrium is a list of asset values $W_k(y;i,j)$, $U(i)$, $J_k(y;i,j)$; a list of quit and lay-off policy functions $q_k^e(y;i,j)$, $q_k^u(y;i,j)$, $\ell_k(y;i,j)$ and choice of contract $k(i,j)$; a stationary distribution of workers $e(y;i,j)$, $u(i)$, and vacancies $v(j)$; and labor-market tightness θ such that:

1. (Workers optimize): Given θ, $v(j)$ and the lay-off policy function $\ell_k(y;i,j)$, the asset values $W_k(y;i,j)$, $U(i)$ solve the Bellman equations (6) and (8), and the quit policy functions $q_k^e(y;i,j)$, $q_k^u(y;i,j)$ are given by equations (10) and (11), respectively.

2. (Firms optimize): Given θ, $v(j)$ and the quit policy functions $q_k^e(y;i,j)$, $q_k^u(y;i,j)$, the asset value $J_k(y;i,j)$ solves the Bellman equation (9), the lay-off policy function $\ell_k(y;i,j)$ is given by equation (12), and the choice of contract $k(i,j)$ is given by equation (13)

3. (Free entry condition): Given $e(y;i,j)$, $u(i)$ and $W_k(y;i,j)$, $U(i)$, $J_k(y;i,j)$, the number of vacancies posted by type-j firms $v(j)$ solves equation (14).

4. (Time invariant distribution): Given θ and policy functions $q_k^e(y;i,j)$, $q_k^u(y;i,j)$, $\ell_k(y;i,j)$, $k(i,j)$ the cross-sectional distributions $e(y;i,j)$, $u(i)$, $v(j)$ are time-invariant with respect to the equilibrium stock-flow equations of the economy. In addition, θ equals total vacancies divided by the measure of job seekers.

5 Benchmark equilibrium

WORK IN PROGRESS

In this section, we calibrate our model, evaluate its ability to capture relevant features of the U.K. labor market highlighted in Section 3, and discuss several other model outcomes.

5.1 Calibration

We need a number of preliminary specifications in order to list the parameters of the model. First, we elaborate on the income process of an unemployed worker in order to capture features of real life's labor market institutions. Specifically, we assume that a worker does not lose entirely her unemployment benefit upon working; there is a taper rate τ allowing the worker to receive part of her benefits when working h hours. The income she then receives is given by:

$$\text{inc}\left(h\right) = \max\left\{wh, b + \left(w - \tau\right)h\right\}. \tag{16}$$

Second, as mentioned previously, we assume that the vacancy-posting cost $\kappa\left(.\right)$ is convex. We use the following functional form:

$$\kappa\left(v\right) = \kappa_0 \frac{v^{1+\kappa_1}}{1+\kappa_1}. \tag{17}$$

Third, we have assumed that workers' types i are drawn from a distribution $\Gamma\left(\cdot\right)$. For simplicity, we assume that this distribution is uniform. It is defined over the interval $\left[\underline{R}, \overline{R}\right]$ (recall that R_i denotes a type-i worker's non-labor income), which we discretize using a grid of evenly-spaced points. Fourth, in principle we do not need to specify a distribution and support for firms' types j, which maps into the standard deviation of shocks to firms' match productivity process, σ_j, which could take any positive value. Firms would post vacancies

depending on their type and facing the convex vacancy-posting cost. To keep the model manageable, we will nevertheless restrict σ_j to lie on a discrete grid of evenly-spaced points. We let $\underline{\sigma}$ and $\overline{\sigma}$ denote the lower and upper limit of this grid.

Thus the model parameters are β, η, w, b, τ, $\underline{h}$, ζ, M, s_e, $\bar{y}$, ρ, α, δ, κ_0, κ_1, $\underline{R}$, $\overline{R}$, $\underline{\sigma}$, $\overline{\sigma}$. One model period is set to be two weeks. The discount factor β is 0.9975 to accord with an annual interest rate of 6 percent. We set the coefficient of relative risk aversion η to 2, which is a standard value in the literature. We normalize the hourly wage rate, w, to 1. We choose $b = 0.36$ and $\tau = 0.65$ in agreement with labor market policies in the UK. Specifically, the value of b is equal to 55 percent (the UK replacement ratio of unemployment benefits) times $wh_R(\bar{y})$. For $\underline{h}$, we use $\underline{h} = 0.15$ to accord with a minimum threshold of 15 hours in regular employment contracts. As is standard, the elasticity of the job-filling probability with respect to tightness, ζ, is 0.5. We set M to the value of 0.10 to target a quarterly job-finding rate between 15 and 20 percent. The relative search intensity of employed workers, s_e, is set to 0.35 (Lalé [2018]). We set the unconditional mean of match productivity, $\bar{y}$, at 1.2, given that we have normalized wages to 1. We choose $\rho = 0.983$, which implies a quarterly persistence of match productivity equal to 0.90. For α, we use the value of 0.75 to obtain average hours per worker in R contracts equal to 35 hours. We use $\delta = 0.004$, so that the quarterly job destruction rate (which results from exogenous as well as endogenous job separation) is 2.6 percent. For now, we focus on a partial equilibrium version of the model. Therefore we do not choose values for κ_0 and κ_1 as we do not exploit the free entry condition. We seek to explore a large range of values for worker and firm heterogeneity. Thus, we use $\underline{R} = 0.0$, $\overline{R} = 2.25$, $\underline{\sigma} = 0.04$, $\overline{\sigma} = 0.50$.

5.2 Model outcomes

Table 15 displays a set of model-generated moments. Figure 4 shows the sorting patterns that emerge in the benchmark equilibrium.

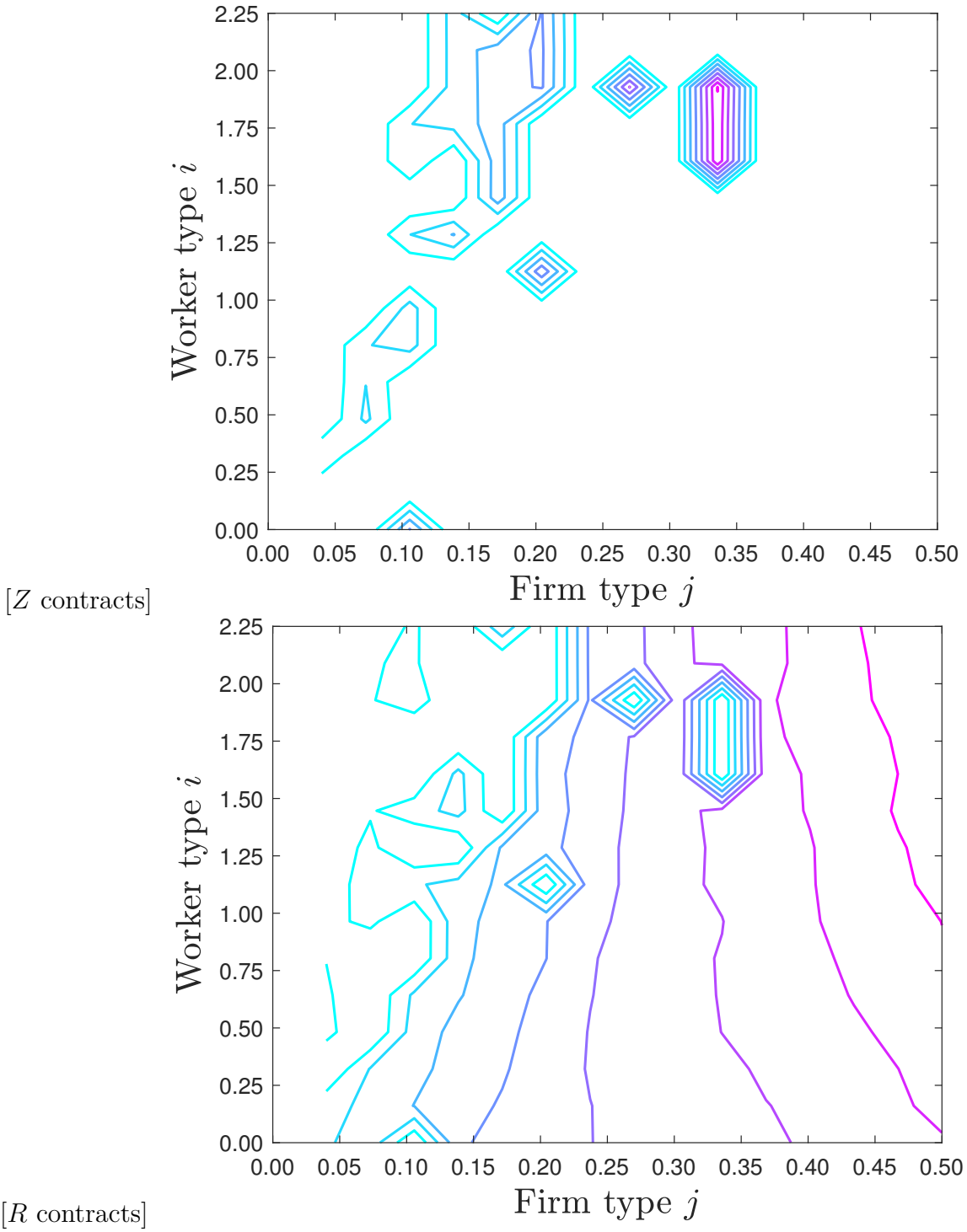

Figure 4. Sorting between workers and firms across contracts

Table 15. Model-generated moments

Description	Value
Employment share of Z contracts	16.9
Average hours per worker	
Hours in Z contracts	9.68
Hours in R contracts	35.5
Quarterly job finding and job destruction	
Job finding to Z contracts	4.46
Job finding to R contracts	14.2
Job finding, overall	18.6
Job destruction in Z contracts	3.36
Job destruction in R contracts	2.45
Job destruction, overall	2.60
Quarterly transition rate	
From Z to R contracts	2.31
From R to Z contracts	0.40

Notes: Job finding, job destruction and transition rates are expressed in percent.

Table 15 displays a set of model-generated moments. As can be observed, the employment share of Z contracts is 16.9% in our economy. Weekly hours are four times lower in Z than in R contracts: 35.5 hours vs. 9.7 hours. Not surprisingly the job finding rate of R contracts is about three timer higher than for Z contracts, since the former are preferred by workers. Conversely, the job destruction rate of Z contracts is almost one percentage point higher than the corresponding rate of R contracts. Given workers' preference for R contracts the quarterly transition rates from Z to R are about four timer higher than from R to Z contracts.

Next, Figure 4 shows the sorting patterns that emerge in the benchmark equilibrium. For each of the two contracts (Z in the upper panel and R in the lower panel), the horizontal axis represents the firm type, so that lower values correspond to firms with lower volatility in its production process while the larger values are those of higher volatility; the vertical axis captures the worker's type, with lower values pertaining to "poorer" workers (in the sense of having lower non-labor income) and larger values corresponding to "richer" workers. The contour plots in each panel puts warmest colors where there is more mass in the probability distribution of employment across (i, j) types.

6 Policy analysis

WORK IN PROGRESS

This section contains our main results: we quantify the impact of ZHCs on equilibrium allocations and on workers' welfare. In doing so, we distinguish between three different mechanisms that we define as follows:

1. Job-creation effect: When ZHCs are allowed for, firms endowed with more volatile technologies can enter the market and/or are able to post more vacancies using these contracts.

2. Substitution effect: When ZHCs are allowed for, part of the jobs that are otherwise viable under a R contract become advertized as Z contracts.

3. Participation effect: When ZHCs are allowed for, workers who demand a flexible work schedule enter the labor market to take advantage of these contracts.

6.1 Equilibrium and welfare effects

6.2 labor market policies

Next, we investigate how labor market policies shape the outcomes of ZHCs. We focus on the role of three policy instruments. The first two are the taper rate τ and statutory minimum wage w, which are already present in the benchmark equilibrium model. The third one is a regulation on hours worked. We introduce an threshold $\bar{h}$ such that hours worked beyond this threshold must be paid at the hourly rate $(1+\varrho)\,w$, where the policy maker chooses both $\bar{h}$ and ϱ.

Table 16 gathers the comparative statics of a 10 percent rise in $(b, \bar{h}, w)$. Probably the most interesting change is the one on the minimum wage, w, which leads to a big increase

Table 16. Effects of changes in labor market policies

Description	Baseline	10-percent change in		
		b	$\underline{h}$	w
Employment share of Z contracts	16.9	22.2	9.60	27.2
Average hours per worker				
Hours in Z contracts	9.68	8.10	8.95	7.93
Hours in R contracts	35.5	37.9	33.6	39.1
Quarterly job finding and job destruction				
Job finding to Z contracts	4.46	5.50	3.37	6.21
Job finding to R contracts	14.2	13.1	15.3	12.4
Job finding, overall	18.6	18.6	18.6	18.6
Job destruction in Z contracts	3.36	3.07	4.26	3.03
Job destruction in R contracts	2.45	2.43	2.39	2.43
Job destruction, overall	2.60	2.57	2.57	2.59
Quarterly transition rate				
From Z to R contracts	2.31	2.17	2.11	1.25
From R to Z contracts	0.40	0.52	0.16	0.40

Notes: Job finding, job destruction and transition rates are expressed in percent.

of the employment share of Z contracts, of about 10 percentage points. This is because the rise in w harms mostly firms with R contracts which them replace these contracts with Z contracts, as illustrated by the increase in the job finding rate for the latter contracts and the decrease for R contracts. These results are in agreement with the evidence reported by Datta et al. (2018) who report that the introduction of the UK NLW in 2016 led to a sizeable rise of the share of ZHCs in the social care sector, and more generally in low-pay sectors.

7 Conclusion

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A Descriptive statistics in low-wage sub-market

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