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Why do flexible work arrangements exist?

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Abstract
This paper studies flexible work arrangements, with a focus on zero-hours contracts (ZHCs). Leveraging a unique dataset from a large UK firm in the low-pay sector, it provides novel descriptives on ZHC workers, as well as evidence on demand and supply side mechanisms for the use of ZHCs. The results show that ZHC workers experience significantly higher turnover rates and lower wages than permanent employees, and large heterogeneity in hours and earnings volatility. Causal evidence on the firm demand-side demonstrates that ZHCs help firms manage production and demand shocks. On the supply-side, ZHC roles attract 25% more applicants than comparable permanent jobs. ZHC roles are concentrated among specific demographics, and vacancy applicant and firm offer data demonstrates this is supply driven. Few ZHC workers apply for permanent positions and their decision to apply for a permanent position is wage insensitive. In contrast, permanent workers exhibit ZHC-wage elasticities that are an order of magnitude larger than those of their ZHC counterparts.

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1 Introduction

Flexible work arrangements, such as zero-hours contracts and gig work, which offer no guarantee of hours or a work schedule, are a hotly debated topic. Proponents argue that these arrangements offer critical flexibility for both workers and employers, while critics contend they undermine job security, destabilise earnings, and represent an extension of monopsony power, but applied to contracting rather than wages. These discussions have permeated policy forums, court systems, and government legislatures, resulting in numerous attempts—some successful, others unsuccessful, and many ongoing—to regulate such work arrangements across various countries.[1]

Flexible work arrangements are a significant feature of many developed economies, are more prevalent in low-pay jobs (Datta et al., 2019) and attract considerable policy attention. Estimates of ZHC prevalence in the UK range from 3% from in the Labour Force Survey to 14% based on the near-universe of vacancy data (Adams-Prassl et al., 2023). The disparities in these figures suggest a significant lack of awareness among workers, which is concerning for a topic where academic and policy research has often relied on self-reported survey evidence.[2] Despite the importance of schedule-flexible work arrangements, very little is known about the causes and consequences of ZHCs due to data limitations. This paper overcomes these limitations and provides novel descriptives on ZHC workers, as well as evidence on demand and supply-side mechanisms for ZHC use.

This paper explores flexible work arrangements and their role in modern labour markets, with a focus on zero-hours contracts (ZHCs) using firm data.[3] It utilises a novel dataset from a representative firm (The Company) operating in a low-pay industry with over 350 establishments and covering 31,000 employees between 2011 and 2019 in the UK, where 70% of the workforce on ZHCs. The dataset encompasses data on demographics, home addresses, job roles, contractual details, unexpected absences, start and leave dates, progression, full daily timesheet data, and all job vacancy, applicant and selection details. I leverage this data to first provide a comprehensive, descriptive, analysis of ZHCs in equilibrium, followed by isolating firm demand-side mechanisms, and worker supply-side preferences.

The equilibrium descriptives document that ZHCs are most prevalent among young individuals, living in high student population areas, with higher education levels, and that ZHC workers have considerably higher turnover rates than their permanent counterparts. Their median tenure is one third that of permanent workers, and 20% of hired ZHC staff never work a single shift. This latter point is suggestive of the temporary role of the work from the worker's perspective,

[1]Examples include the UK's new Employment Rights Bill and a Supreme Court ruling on Deliveroo riders' eligibility for collective bargaining; a bill in the Netherlands proposing the abolition of ZHCs; the Fair Work Amendment Bill 2020 in Australia; and in the US, California Assembly Bill 5, the Gig Is Up Act, the Gig Worker Equity Compensation Act, and Department of Labor revisions on Employee vs. Independent Contractor Classification.

[2]E.g. see Dolado et al. (2023); Datta et al. (2019); Koumenta and Williams (2019); Wood and Burchell (2014).

[3]Zero-hours contracts are employment contracts with no guaranteed hours. More details are documented in Section 2.

who may be using such positions during further job search. Hours and earnings volatility of flexible work arrangements have received significant attention from policymakers (Taylor et al., 2017; CIPD, 2022) as well as academics (Schneider and Harknett, 2019; Mas and Pallais, 2017, 2020), and the daily timesheet data offer a first detailed look at this for ZHCs.[4] There are important differences between short-run and long-run hours volatility. Many ZHC workers see little week-on-week hours volatility: about 50% of ZHC worker-weeks experience only a ±2-hour change compared to the previous week, but the median worker has an interquartile range (IQR) of 7 hours over all their working weeks. In both these short and long-run measures, however, there is a thick right tail of workers who experience large amounts of volatility. Ten percent of workers have an IQR of £175 ($234) or more in weekly earnings, which is equivalent to 55% of full time earnings for a minimum wage worker during the sample period. It is important to note, however, that it is unclear whether this volatility is demand or supply-driven.

There is relatively little empirical work on the firm demand side of ZHCs. Dickens (1997), an early project studying ZHCs, surveyed 500 firms, and 20% stated they used ZHCs of some form, while 94% of those using them stated the reason was to deal with fluctuations in demand. This paper provides first-of-its-kind causal evidence on the role of ZHCs in weathering three different types of shocks for firms. First, using information on permanent worker absence days (e.g. sickness absences) along with timesheet data, I show that when a permanent worker is absent, firms utilise ZHCs as a form of cover. Cover estimates range from approximately 15% at the specific job-establishment-day level (i.e. using a ZHC burger-flipper to cover a permanent burger-flipper) to 25% at the establishment-day level, which allows substitutability across job roles within establishments for cover (i.e. using a cleaner to cover a permanent burger-flipper). Second, using information on permanent worker quits, I show that establishments increase their use of ZHC workers, with cover rates of a similar magnitude to absences at the peak but slowly decreasing back to zero over approximately 5–6 months. Third, exploiting the fact that some establishments are "al-fresco", I make use of weather shocks to demonstrate that during better weather days, establishments increase ZHC usage while non-exposed establishments make no such adjustment. Furthermore, al-fresco establishments have on average 24 percentage points more of their workforce on ZHCs. Analysis using local labour market unemployment data, suggests there appears to be no obvious role for labour market slackness in adjusting ZHC usage, as suggested by Katz and Krueger (2017).

The paper lastly turns to the labour supply side. I first show that ZHC jobs attract 25% more job applicants than like-for-like permanent jobs with the same job role (e.g. waiter), in the same establishment, in the same year. Analysis of the demographic makeup of applicants, firm selection, and final decisions from applicants suggests that the demographic makeup of ZHC workers is largely supply-driven. Second, I turn to eliciting preferences over contract type for incumbent workers in the firm, in both ZHC and permanent positions. The applicant data include information on whether internal staff apply for posted jobs, which allows me to observe the rates at

[4] Chen et al. (2019) document this for Uber drivers in the US; however, there are some fundamental differences between gig workers and ZHCs, as documented in section 2.

which ZHC workers apply for similar (and in some specifications, identical) permanent positions and vice versa. Exploiting pre-existing wage differentials between ZHCs and permanent contracts in otherwise like-for-like positions, coupled with an exogenous contract-job-establishment wage shifter that generates variation in the wage differential, I estimate incumbent ZHC-to-permanent application-wage differential elasticities, and the same for permanent-to-ZHC. The wage variation comes from involuntary exposure to the Living Wage Foundation's Living Wage due to contracts some establishments of The Company have with local governments.

The analysis shows only 15% of ZHC workers within the firm ever apply for a permanent contract job, roughly the same as the actual transition rate within The Company, and that ZHC workers are very wage insensitive to their contract choice. Incumbent ZHCs have a permanent application-wage differential elasticity of 0.1, while the incumbent permanent employees have a ZHC application-wage differential of more than 10 times that in absolute value. The results indicate incumbent ZHCs have a very strong preference for their ZHC and are willing to forgo some salary for the flexibility their contract offers. Generally fewer permanent contract workers apply for ZHC positions (around 8%), however the estimates suggest some are very wage-sensitive, and would be willing to move to a ZHC position if wages between the two were equalised.

The results suggest an important role for ZHCs and flexible work arrangements in a modern economy. From the firm side, ZHCs offer an important ability to flexibly adjust to both production and demand shocks, and the results give a clear reason why they are more prevalent in volatile industries such as accommodation, food services, and retail. The supply analysis suggests that many workers prefer being on ZHCs *ceteris paribus*, and for those that don't, they may serve as an important stepping stone of short-term flexible work while searching for more secure work. Indeed, this has been echoed by actual company-level interventions, such as when McDonald's offered all their ZHC staff fixed-hour contracts, and there was only a 20% take-up.[5] The analysis, however, suggests that ZHC workers may be liable to see larger wage markdowns than their permanent counterparts due to their lower wage sensitivity, consistent with gig-worker monopsony estimates from online labour market platforms (Dube et al., 2020). ZHC wages are approximately 6% lower than their permanent counterparts in the same occupation-industry in representative national statistics,[6] and while some of this may be due to differences in marginal productivities, such as the risk of a ZHC not coming to work when needed, the lower wage sensitivities for ZHC workers indicate that firms have larger monopsony power over them. These findings imply policymakers should tread carefully when regulating the actual use of ZHCs, but potentially more attention should be paid to the wage differentials between otherwise identical permanent and ZHC positions.

This paper contributes to the growing literature on flexible work arrangements and represents a

[5]See here for more information: https://www.theguardian.com/business/2017/apr/25/mcdonalds-contracts-uk-zero-hours-workers.

[6]This figure comes from estimating the equation $ln(wage_{jiot}) = \beta ZHC_{jiot} + \gamma_{io} + \theta_t + \varepsilon_{jiot}$ for worker j, in industry i and occupation j in year t, on LFS data for the period 2016–2022.

number of important advances. The use of a large firm's dataset allows for careful measurement of a wide array of important descriptive statistics, which are otherwise difficult to obtain using survey data and do not exist in administrative data. Statistics on transitions and turnover are presented from the LFS in Datta et al. (2019) and Dolado et al. (2023); however, those in this paper offer more detailed and precise measures with like-for-like permanent comparisons, while the information on hours and income volatility supplements existing estimates for gig workers based on tax records and banking transaction data, such as those in Collins et al. (2019); Tomlinson (2018), but offers within-job estimates for a large employer. More generally, the paper presents an important contribution to the descriptive measurement of flexible work arrangements, joining work including Datta et al. (2019); Collins et al. (2019); Katz and Krueger (2019); Boeri et al. (2020); Adams-Prassl et al. (2023); Hansen et al. (2023).

The paper also offers the first set of estimates that document both demand- and supply-side estimates on work-schedule flexibility, joining Lewandowski et al. (2023), who provide both employer and employee estimates on demand- and supply-side preferences for work-from-home (WFH). More generally, the paper presents novel results on the firm demand side for flexible work arrangements. The only other paper to the author's knowledge that examines the firm demand side for ZHCs is Datta et al. (2019), which documents the impact of the minimum wage on firms in the social care sector and their propensity to use ZHCs. This paper presents concrete evidence on the role of ZHCs for firms in weathering production and demand shocks. Dolado et al. (2023) examines ZHCs in a frictional labour market, making use of a structural search model, and presents an interesting welfare analysis on their role. Their modelling approach reflects the role of demand and production shocks from the firm's perspective and the importance of business volatility, and this paper presents reduced-form results that lend credibility to their approach.

The lastly adds to the broad literature on measuring worker preferences. A modern, rich literature on the topic exists, where researchers typically aim to measure preferences for different job characteristics using survey modules (Eriksson and Kristensen, 2014; Wiswall and Zafar, 2018; Datta, 2019; Ameriks et al., 2020; Drake et al., 2022; Maestas et al., 2023) or using experiments (Mas and Pallais, 2017; He et al., 2021). This paper uses a natural experiment to elicit preference elasticities over contract types between otherwise identical jobs, using workers already in those positions, and is able to do so for both individuals in schedule-flexible positions with respect to permanent-fixed jobs, and for individuals in permanent-fixed positions with respect to schedule-flexible jobs. This enables the elicitation of preferences for workers who may already be sorted based on their preferences. In doing so, the paper also contributes to the literature on monopsony. Researchers concerned with monopsony often suggest that differences in job characteristics and amenities, and heterogeneous preferences among workers, offer a microfoundation for firm market power over workers (Card et al., 2018; Manning, 2021; Datta, 2024). Adams-Prassl et al. (2023) find a positive relationship between labour market power, as measured by concentration, and the proliferation of 'risky-flexible' jobs. This paper presents a contrasting angle. Workers in ZHC jobs generally prefer ZHCs; however, their strong preferences for ZHCs give rise to wage differentials compared to permanent jobs, which may reflect larger wage markdowns.

The rest of this paper is structured as follows. Section 2 describes ZHCs. Section 3 describes the data and exogenous wage variation utilised. Section 4 documents equilibrium descriptives. Section 5 then turns to the role of ZHCs from the demand side. Section 6 presents information on the supply side, and Section 7 concludes.

2 What is a ZHC?

Atypical work arrangements come in a variety of shapes and sizes, but one particular form that has dominated discussions in the UK and is a feature of many modern labour markets is zero-hours contracts (ZHCs). By definition, ZHCs are employment contracts in which a worker is not guaranteed a minimum number of hours and is only paid for the work they carry out. Workers are also not obligated to work when asked by the employer. This deviates from other forms of flexible working hours, such as shift work with guaranteed, fixed hours. Therefore, in theory, ZHCs offer a work arrangement characterised by two-sided flexibility. Legally, ZHC workers have "worker" status, rather than "employee" status. In terms of regulation and worker protection, they are closer to typical permanent employees than the self-employed, but do not receive the full set of worker protections. ZHC workers are covered by minimum wage legislation, and are entitled to holiday pay,[7] sick pay, and rest breaks (unlike self-employed contractors or gig workers). They are also protected against discrimination. However, given the flexible nature of the contract, ZHC workers are not covered by unfair dismissal protection or notice periods, as the employer has the right to set their hours to zero at will. Similar to regular employees, but unlike self-employed contractors or gig workers, they are subject to payroll taxes (including employer national insurance contributions), and the structure of worker contributions mimics that of regular employees.

Contracts with similar features exist across a wide range of developed economies but often face differing degrees of regulation. These include on-call work in Germany, Italy, Sweden, and the United States; min-max contracts in the Netherlands; zero-hours contracts in Norway, Finland, and the Netherlands; and casual employment in Canada and Australia. The prevalence of such contracts varies across these economies, ranging from 0.8% in Norway to 25% in Australia. For a full discussion of variations in their form and regulation, see Datta et al. (2019).

2.1 Why are ZHCs used?

ZHCs present a variety of potential costs and benefits to both firms and workers compared to traditional work arrangements. For firms, they provide insurance against shocks on both the labour supply and demand sides. British workers are absent from work for an average of 7.8 days per year (mostly due to illness), and over one-third of UK employees leave their employer

[7] This is often added to the base hourly rate as a pro-rated 12.07% top-up.

every year, with many workers only required to give one week's notice during their first two years of employment. Both of these occurrences can be costly for firms, especially when there is a need to meet immediate consumer demand (Grinza and Rycx, 2020). Furthermore, many industries experience both seasonal and short-term stochastic demand. ZHCs provide firms with an on-call workforce they can attempt to utilise in response to such shocks. However, the obvious downside, compared to permanent, fixed-hour staff, is that there is no guarantee ZHC workers will accept the work when requested. This creates a key trade-off for firms when determining the contract composition of their staff, and their optimising strategy will likely depend on both the variance of demand for their output (and permanent labour supply), as well as the likelihood of ZHC staff accepting work when requested.

For workers, ZHCs offer an opportunity for flexibility, which may be suitable and preferred by certain types of workers. For example, existing evidence suggests that, on average, women have a higher willingness to pay for hour flexibility than men (Datta, 2019; Mas and Pallais, 2017). On the other hand, ZHCs provide insecure and volatile income and could be viewed as a way for firms to offload risk onto workers through precarious contracting. Alternatively, ZHCs may serve as a source of temporary flexible work while workers search on-the-job for permanent positions. This latter point may have further implications for firms, as different contract types may lead to varying turnover rates, which can result in significant costs for firms (Bertheau et al., 2022).

Given the above firm demand and worker supply factors, the resulting allocation may depend on the slackness of the local labour market (Katz and Krueger, 2017). In particular, if weak labour markets strengthen the bargaining position of firms and weaken that of workers, workers may be pushed into accepting a ZHC role, thereby reducing their utility. For this to occur, however, two conditions would need to be met. First, firms would need to benefit from workers being on ZHCs rather than fixed-hour contracts, which is a priori unclear. Second, these workers would need to have a strong preference for fixed-hour contracts.

3 Data and Exogenous Wage Variation

I make use of a rich dataset from a services firm (The Company) with over 350 establishments across the UK. Establishments have autonomy over employment and workforce decisions but are centrally operated by the same company using a uniform structure of operations and management. Due to clauses in the data-sharing agreement, I am unable to disclose the name or precise industry of the firm. However, I can disclose that they operate in a low-pay sector as identified by the Low Pay Commission,[8] and they face a similar degree of local private competition as pubs, restaurants, hairdressers, and mechanic's garages.[9]

[8]The Low Pay Commission is an independent, non-departmental public body of the Department for Business and Trade in the UK, responsible for advising the government on the National Minimum Wage.

[9]For more information, see section 3.3 of Datta (2023).

The dataset includes HR data from 2011 to 2019 and job postings, coupled with applicant and precise timesheet data, from 2016 to 2019. The HR data covers approximately 31,000 employees and 70,000 appointments. Employees may have multiple appointments over their time with The Company, for example, if they move up the job ladder. The data includes information on demographics, home postcodes, job roles, pay, contractual details, unexpected absences, start and leave dates, progression within the firm, and full timesheet data. The vacancy data includes all the information contained in a job advert, such as job role, contract type, wage, location, and all the text within the advert. The applicant data contains information on each applicant, including their home postcode, gender, whether they are an internal applicant matched to their existing internal identifier (i.e. already working for The Company), and the outcome of their application (e.g. "Unsuccessful at shortlist", "Formal job offer rejected", "Formal job offer accepted").

Table 1 presents summary statistics for The Company in March 2019 and paints a picture of a typical firm operating in a low-wage labour market, where younger and female workers are overrepresented. Sixty percent of the firm's workforce is female, and the median worker is 33 years old. Almost half of the firm's workers are classified as "Entry-Level." These jobs are bottom of the rung, typically minimum-wage positions, and would be considered "unskilled" in the economics literature. Examples of such entry-level jobs in the wider economy include burger flippers in the fast-food industry, shelf packers and checkout workers in supermarkets, waiting staff in restaurants, and sales assistants in retail. Approximately 70% of the firm's workers were on ZHCs in this snapshot, a proportion that is more typical for the low-pay sector. The average wage in the firm is £12.88, and around half of the workforce is based in establishments located in London.

Table 1: Summary Statistics, March 2019

Variable	Mean	S.D.	Median
Female	0.60		
Age	35.9	14.3	33.0
Entry-Level	0.49		
Zero Hour Contract	0.72		
Hourly Rate (£)	12.88	5.87	10.20
London	0.53		
N			
Job	18,773		
Establishments	362		

Note: *The table presents job-level summary statistics for The Company as of March 2019.*

The firm's dataset lends itself to a detailed analysis of flexible work arrangements, specifically ZHCs. The data enables us to examine equilibrium outcomes, firm demand decision-making, and worker supply preferences. The project incorporates several additional datasets merged into The Company's data, including census data to provide further demographic insights, claimant count (unemployment) data to measure local labour market conditions, and weather data to isolate local service demand shocks. These are discussed in more detail in the relevant sections.

3.1 Living Wage Variation

At various points, the analysis makes use of exogenous wage variation at the establishment and establishment-job level, resulting from the firm's involuntary exposure to a Living Wage. This variation is documented in detail in Datta (2023). Specifically, I utilise a location-specific wage floor that affects a small number of workers in a given area but is binding for The Company in locations where jobs are paid below the Living Wage.

The Living Wage Foundation (LWF) is a charitable organisation in the UK, established in 2011, that campaigns for employers to pay workers a living wage. Organisations can voluntarily sign up to become Living Wage employers and, following appropriate audits by the LWF, can achieve accredited status. As of July 2020, the LWF lists 6,562 accredited employers, including 107 local government units. When public bodies achieve accreditation, they are required to enforce the living wage in their procurement contracts. The Company operates in the service sector, and a significant portion of its business is through procurement contracts with local councils. As the firm operates hundreds of establishments across the UK, different establishments become contractually obliged to pay the LLW and UKLW at different times. This depends on whether, and when, the local government unit has voluntarily signed up to the LWF's Living Wage, as well as idiosyncratic timings of contractual renewal or renegotiation. When an establishment is exposed to the Living Wage, it affects only those workers within the establishment whose pay point is below the mandated Living Wage (i.e. entry-level workers), while the remainder of wages in the local labour market remain unchanged.

Between 2012 and 2019, 107 local government units gained accreditation. For example, of the 32 London Boroughs, 17 received accreditation, with the earliest (Islington) in May 2012 and the most recent (Redbridge) in November 2018[10]. This setting provides significant variation in Living Wage treatment for establishments run by The Company. The Living Wage rates for London (LLW) and the rest of the UK (UKLW) are calculated annually by the LWF and the Resolution Foundation and have typically been considerably higher than the mandatory National Minimum Wage (NMW) and National Living Wage (NLW). The LLW rate has generally been about 30-35% higher than the mandatory minimums, while the UKLW has been about 15-20% higher, as shown in 13 in the appendix .

When a council signs up to the LWF's Living Wage, it only affects council employees and those subcontracted to do work for the council. Council employment constitutes approximately 3% of total employment and typically consists of workers more skilled than those who would be impacted by the wage floor. For example, Table 12 in the appendix provides estimates of employment counts and shares for the London Borough of Hackney, showing that council

[10] Correct as of July 2019.

employment accounts for only 3.3% of total employment in the borough. Furthermore, an examination of the borough's pay scale documentation shows that the lowest pay point is 8% above the binding LLW for 2019. This suggests that the council's adoption of the Living Wage affects only a fraction of workers in the area. Datta (2023) provides causal evidence to support this, specifically showing, using UK social security data, that when a Local Authority governmental unit adopts the Living Wage, the proportion of workers being paid the Living Wage in the area remains unchanged.

4 Equilibrium Descriptives

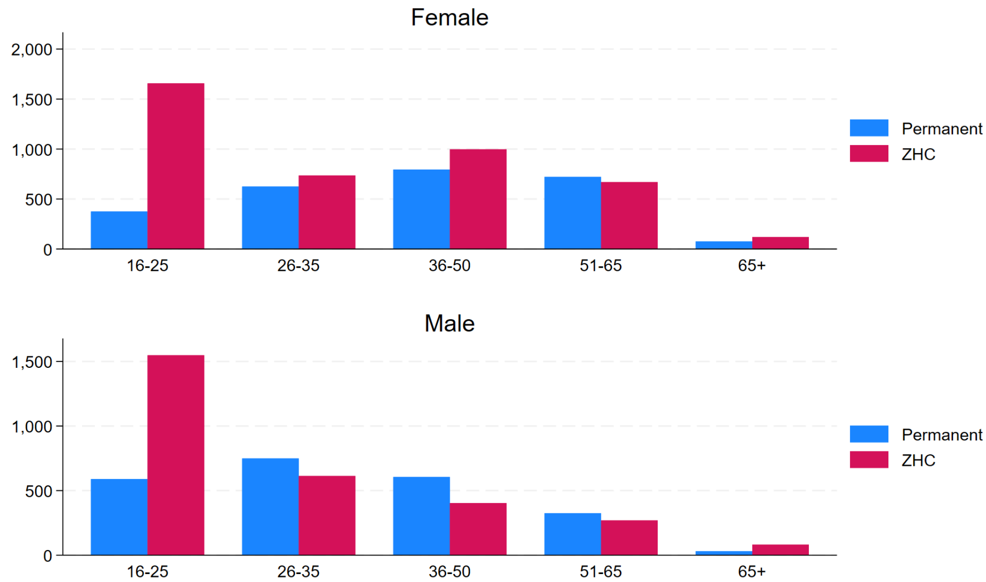
I begin by presenting equilibrium descriptive statistics on ZHCs and comparing them to their permanent counterparts within The Company. I refer to these as equilibrium descriptives, as it is unclear whether the supply side, the demand side, or a combination of both drives these statistics. First, I document demographic differences between ZHC and permanent workers, followed by staff turnover rates. Next, I provide information on the distribution of hours and earnings volatility, commuting times, and finally, transition rates between permanent and ZHC workers within The Company.

4.1 Demographics

Figure 1 presents breakdowns of employee counts by contract type, ZHC and permanent, for age and gender.[11] The figures show that 16-25 year-olds are more represented on ZHCs than in any other age bracket, with approximately 75% of them, both male and female, employed on ZHCs. Across all other age bands, ZHCs and permanent positions are more equally represented, though females are generally more likely to be on ZHCs than males. The stronger representation of women and younger workers aligns with other studies examining ZHCs in the UK (Datta et al., 2019; Dolado et al., 2023). The results also suggest that ZHCs are utilised more by those at or above the retirement age of 65+, consistent with research indicating that older workers would work longer if jobs were flexible (Ameriks et al., 2020).

[11]The author acknowledges the existence of non-binary individuals; however, due to data limitations, the analysis is restricted to a binary definition.

Figure 1: Age and Gender Breakdown



Note: *The figure plots contract types for workers employed at The Company as of March 2019, broken down by gender and age, based off a sample of 11,989*

Table 2 presents estimates from a linear probability model where the dependent variable is a binary indicator for being on a ZHC. The regression includes various demographic characteristics such as age bands and gender, taken from The Company's HR dataset, as well as data based on the Census Output Area (OA) or postcode[12] of the individual's residence. The merged census data includes the average proportion of students, owner-occupied residents, and highest education level[13]. The merged postcode data includes the average residential housing price for that postcode. Column (2) introduces a job-establishment fixed effect, implying it examines variation within the same job role (e.g. "burger flipper") within the same establishment. The results partly reflect those in Figure 1, particularly concerning age, though less so for gender once controlling for job and establishment. The findings suggest that a 16-25 year-old is 15% more likely to be on a ZHC compared to a 26-35 year-old, and this likelihood remains high at 9% when comparing within the same job-establishment. Women are 11% more likely to be on a ZHC, although this reduces to 1.6% within the same job-establishment. Workers on ZHCs are more likely to be students (or at least live in neighbourhoods with more students), live in areas with a higher education level, and live in neighbourhoods with higher house prices. These findings hold even when controlling for job-establishment fixed effects.

4.2 Turnover

Figures 2 and 3 present Kaplan-Meier survival curves at the employee level and the appointment level, respectively. The latter includes only entry-level positions to enable a more like-for-like

[12]Census OAs have a recommended size of 125 households, while a postcode has, on average, 15 addresses.
[13]Education levels range from 1 to 5+. Level 1 includes failure grades at GCSE (16+ national exams), while Level 5 includes higher education diplomas.

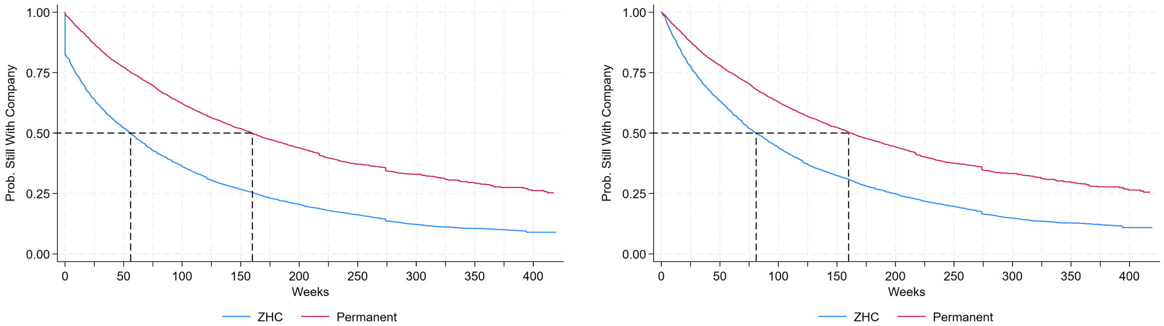
Table 2: Probability of Being on a ZHC- Demographics

	(1) ZHC	(2) ZHC
16-25	0.149***	0.0902***
	(0.00394)	(0.00365)
36-50	0.0293***	-0.0220***
	(0.00433)	(0.00343)
51-65	0.0515***	-0.0431***
	(0.00536)	(0.00429)
66+	0.0436***	-0.0734***
	(0.0129)	(0.00995)
Female	0.107***	0.0156***
	(0.00323)	(0.00266)
Prop. Student (OA)	0.0749**	0.0656**
	(0.0315)	(0.0277)
ln(House Price) (Postcode)	0.0605***	0.0201***
	(0.00366)	(0.00337)
Prop. Owner Occupier (OA)	-0.114***	-0.00214
	(0.00654)	(0.00584)
Highest Education Level (OA)	0.0458***	0.0168***
	(0.00441)	(0.00346)
Constant	0.230***	0.581***
	(0.0201)	(0.0186)
Job-Establishment FE	No	Yes
N	70693	70693

Note: *The table presents appointment-level demographic regressions estimated with a linear probability model of the from:* $ZHC_{iej} = \beta' X_{iej} + \gamma_{ej} + \varepsilon_{iej}$. *The sample include 70,693 appointments in The Company over 2011-2019. Data on age and gender is based off The Company's own HR records, data on proportion of students, proportion of owner occupier and highest education level are based off census data for the output area data where the appoinment-holder lives. Data on house prices is based off the postcode where the appointment-holder lives and is based off data from Her Majesty's Land Registry. Robust standard errors are reported in parentheses.* * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

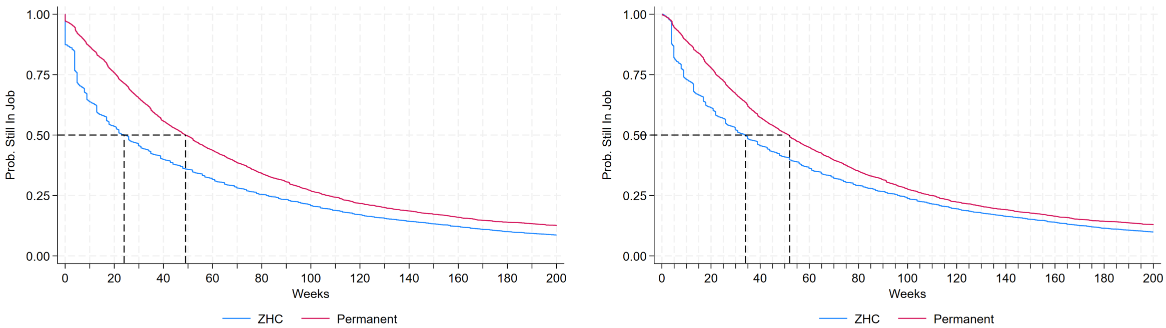
comparison between job roles. In both figures, the left-hand panel shows the unrestricted sample of employees or entry-level appointments. It is evident that ZHC workers have a significantly higher turnover rate. The median ZHC employee remains at the firm for just over one year, while the median permanent worker stays for three times that duration. Similarly, the median ZHC entry-level appointment lasts 6 months, compared to approximately one year for its permanent counterpart. It is also clear that a large proportion of ZHC workers never actually work. Almost 20% of ZHC employees never work a single day, indicating the highly transient nature of this contractual relationship.

Figure 2: Employee Survival Curves by Contract Status



Note: *The figure presents Kaplan-Meier survival curves for employee tenure at The Company by employee contract type. The sample includes all employees whose employment started between 2011-2019. The left hand panel is based off an unrestricted sample of 27,476 employees. The right hand panel includes those workers who worked at least one shift and is based off a sample of 24,226 employees.*

Figure 3: Job Survival Curves by Contract Status - Entry Level



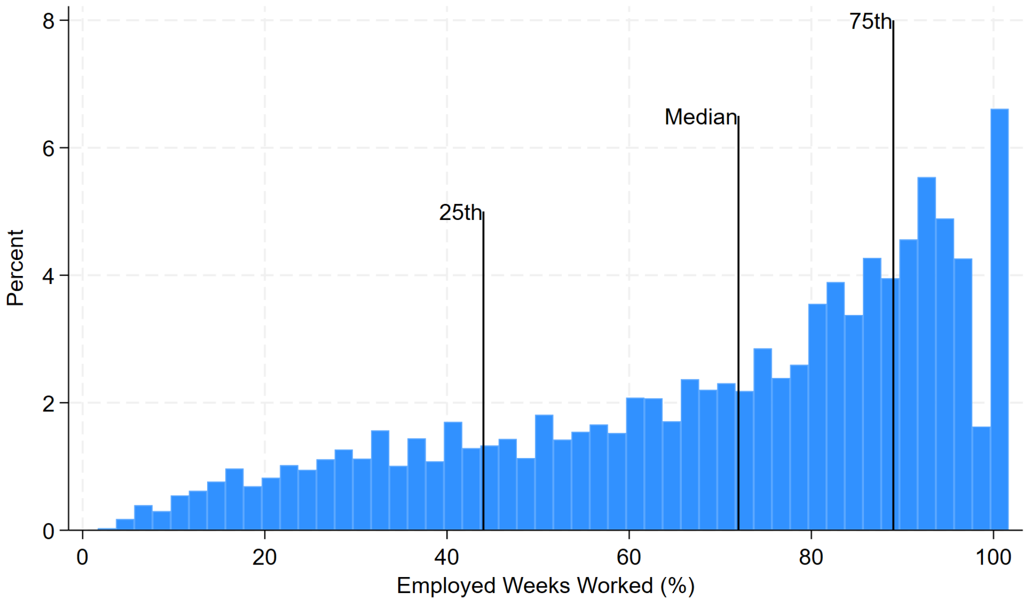
Note: *The figure presents Kaplan-Meier survival curves for appointment tenure at The Company by appointment contract type. The sample includes all entry-level appointments which started between 2011-2019. The left hand panel is based off an unrestricted sample of 41,212 appointments. The right hand panel includes those appointments who worked at least one shift and is based off a sample of 36,811 appointments.*

The right-hand panel is restricted to those who work at least one shift with the firm, thus excluding hires who never work. The survival curves for permanent workers remain unchanged, but the median tenure for ZHC employees increases by approximately 6 months, while the median tenure for ZHC entry-level appointments increases by around 3 to 4 months.

4.3 Hour and Earnings Volatility

A permanent employee would expect to work 89% of employed weeks at a minimum.[14] Figure 4 presents the distribution of weeks worked for ZHC workers based on their timesheet data, with the sample restricted to those employed for a minimum of one month. The median ZHC worker works just over 70% of their employed weeks at The Company, suggesting they work considerably fewer weeks, with more volatility, compared to their permanent counterparts. There is significant heterogeneity across workers. Those at the 25th percentile work less than half of their employed weeks, while those at the 75th percentile work a similar number of weeks as their permanent counterparts.

Figure 4: Percentage of weeks worked



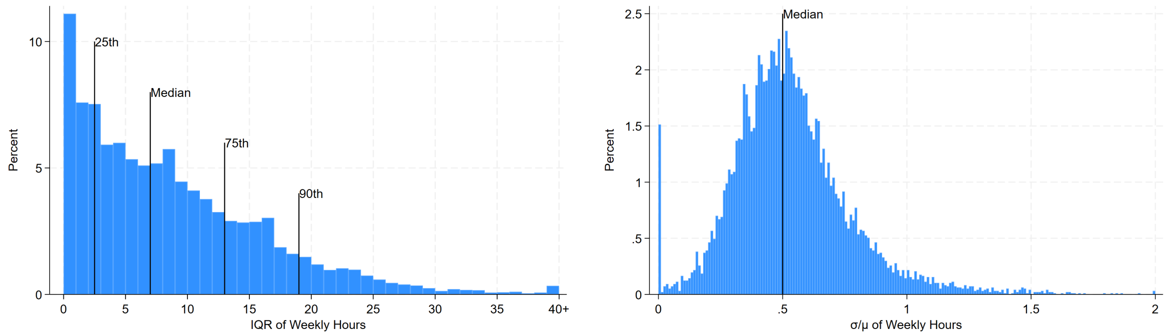
Note: *The figure presents the distribution of the percent of weeks worked by employed ZHC workers at The Company between 2016-2019. The sample includes 610,602 worker-weeks for 10,669 workers ZHC workers whom worked for more than a month with The Company.*

Next, I document information on the intensive margin. The mean hours worked per week for a ZHC worker is 10 hours, which increases to 14 hours when restricting to weeks they actually worked. The mean for permanent workers is 34 hours, with full-time equivalent being 40 hours. Turning to volatility, Figure 5 presents two distributions of measures of dispersion. The first is the distribution of worker-level interquartile ranges (IQR), which provides information on levels. The second is the distribution of the worker-level coefficient of variation (CV)—the standard deviation divided by the mean—which has the advantage of being unitless. Both graphs are based on weeks where the worker has non-zero hours. The figure shows a wide distribution of worker-level hour volatilities. The left-hand panel suggests that over 10% of workers have very little (or no) volatility in their hours, with the difference between their 1st and 3rd quartile of most worked hour weeks being zero. At the 25th percentile, workers still experience relatively

[14] Assuming statutory paid holiday of 28 days is taken in full weeks.

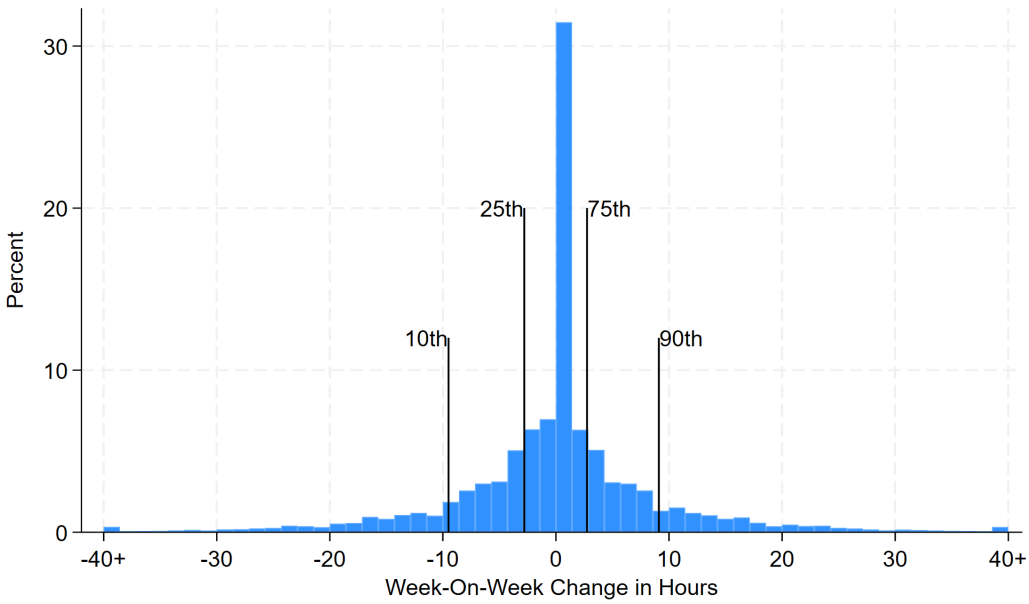
low hour volatility, with an IQR of approximately 2.5 hours. However, a significant proportion of workers do experience high hour volatility. The median worker has an IQR of 7.5 hours, while workers at the 75th percentile have an IQR of 13 hours. The right-hand panel suggests a similar pattern. The distribution has a heavy right skew. The median worker's standard deviation of hours is 50% of their mean hours. However, there is a right tail, with some workers experiencing large variations in their weekly hours.

Figure 5: Distribution of Worker Level IQR and CV of Weekly Hours



Note: *The figure presents the distributions of worker-level IQR (left panel) and CV (right panel) of hours for ZHC workers at The Company between 2016-2019. The sample includes 430,499 worker-weeks with hours greater than 0, for 10,669 workers ZHC workers whom worked for more than a month with The Company.*

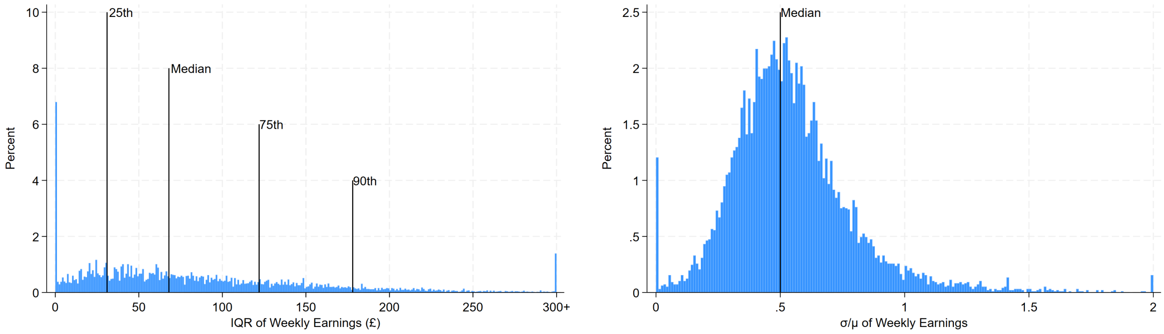
Figure 6: Distribution of Worker Level Week-on-Week Hours Changes



Note: *The figure presents the distributions of week-on-week hour changes for ZHC workers at The Company between 2016-2019. The sample includes 430,499 worker-weeks with hours greater than 0, for 10,669 workers ZHC workers whom worked for more than a month with The Company.*

Both IQR and CV measures capture long-run variation in worker-level hours. While these may be representative of general volatility, they could also be influenced by one-off structural changes in an individual's working pattern (e.g., dropping from 4 days a week to 2 days a week). To examine short-run variation more closely, Figure 6 plots the distribution of week-on-week hour changes at the worker-week level. The distribution suggests a less volatile picture in the short run. One-third of worker-weeks show no change in hours compared to the previous week, while 50% of worker-weeks experience a change of approximately ±2 hours. However, at the tails, we observe much larger swings in hours, with 20% of worker-weeks showing changes of 10 hours or more week-on-week.

Figure 7: Distribution of Worker Level IQR and CV of Weekly Earnings



Note: *The figure presents the distributions of worker-level IQR (left panel) and CV (right panel) of earnings for ZHC workers at The Company between 2016-2019. The sample includes 430,499 worker-weeks with hours greater than 0, for 10,669 workers ZHC workers whom worked for more than a month with The Company.*

Figure 7 presents the earnings counterparts to figure 5, providing an indication of the variability in weekly earnings from work at The Company. Unsurprisingly, the results mirror those for hours worked. The median worker has an interquartile range of weekly income of around £70, or nearly £300 per month. For the top 10th percentile, this figure is approximately £175 per week, or £760 per month. These figures, for low-pay workers in the UK, are significant and may indicate unwanted income volatility at the worker level. However, from these descriptive statistics alone, we cannot determine whether this volatility is driven by worker or firm choice, whether it is undesirable for workers experiencing such high volatility, or whether, all else being equal, these workers would prefer a permanent contract. It is also worth noting that I do not have data on other sources of income, and there is evidence that individuals in alternative work arrangements, such as gig work (Collins et al., 2019) and ZHCs (Datta et al., 2019), often have secondary jobs. However, the proportion of ZHC workers with other sources of income is generally low, with Datta et al. (2019) noting that only 14% of ZHC workers had complementary pay from additional employment.

4.4 Commutes

The HR data contains the address of the establishment as well as the workers' home postcode.[15] I measure commuting times using the Google Maps API, calculated for an arrival time of 9 a.m.

[15] Postcodes in the UK typically represent around 15 housing units, making it nearly equivalent to knowing an individual's street.

to account for traffic. Commuting time is calculated for both car and public transport, with the assumption that workers choose the fastest method of the two options.[16]

Table 3 presents the results from an OLS regression using a sample of appointments active on the last day of the sample. The dependent variable is $ln(Commute_i)$, for worker i, with the independent variable of interest being whether the worker has a ZHC or not. The regression includes an establishment-job fixed effect to ensure comparisons are made within like-for-like job roles and establishments. The estimate suggests that ZHC workers commute approximately 15% farther than their permanent counterparts, and this result holds when controlling for wages as well. Given that the mean commuting time within The Company is approximately 22 minutes, this suggests ZHC workers commute an extra 7 minutes each day. While this may sound small, there is strong evidence that workers in low-pay industries have a pronounced distaste for commuting (Datta, 2024).

Table 3: Commuting Differences

	(1) ln(Commute)	(2) ln(Commute)
ZHC	0.128***	0.154***
	(0.0206)	(0.0224)
Wage Control	No	Yes
Establishment-Job FE	Yes	Yes
N	16384	16384

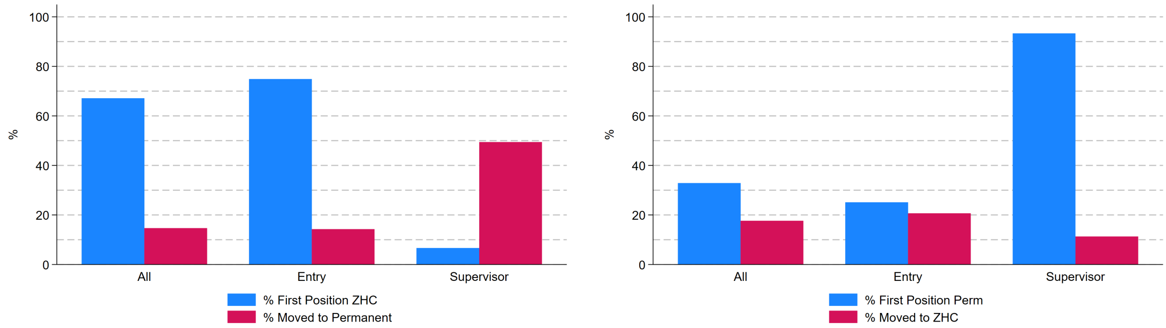
Note: *The table presents coefficient estimates of $\hat{\beta}$ from the OLS regression $ln(Commute_{iej}) = \beta ZHC_{iej} + \gamma_{ej} + \epsilon_{iej}$ for appointment i at establishment e in job-role j. γ_{ej} are establishment-job fixed effects. The regression is based on a sample of active appointments at The Company as of March 2019.*

4.5 Transitions

Exploiting the panel nature of the HR dataset, Figure 8 documents the proportion of workers who start on a particular contract type for entry-level and supervisor/managers, the two main job families in terms of hierarchy, and the percentage who then transition between contract types. Approximately 70% of entry-level workers start on a ZHC, while a much higher proportion of supervisors/managers start on a permanent contract. The propensity to transition from ZHC to permanent, and vice versa, for entry-level workers is almost identical, while a far higher proportion of ZHC supervisors transition to permanent. The former of these results is particularly interesting. If we were to assume ZHCs were universally disliked, we would expect to see a far higher transition rate from ZHC to permanent than vice versa, assuming these transitions are supply-driven.

[16] In practice, this often means that many people working in London are assumed to utilise public transport.

Figure 8: Transitions Between ZHC and Permanent



Note: *The Figure presents percentages for workers who started on a ZHC (left hand) or permanent contract (right panel) for all, entry-level, and supervisor/managerial workers, and the corresponding percentages of those workers who transitioned from ZHC to permanent or vice versa. The sample is 23,805 entry-level and supervisor/managers employed by The Company over 2011-2019.*

4.6 Discussion

Taking stock of the above set of descriptive statistics, the largest predictors for being on a ZHC are being in the 16-25 age bracket, living in a high student population area, being female and having a higher education level. When controlling for job-establishment fixed effects, the 16-25 age bracket still dominates and is a 6-time stronger predictor than being female, which falls to being only marginal, while education level and living in a student area remain large predictors. ZHC workers are far more transient than permanent staff with around 20% of ZHC hires never actually working a shift, and half of them leaving The Company within a year. ZHC workers work less weeks and hours than permanent staff, and while many do not experience large amounts of hours and earnings volatility, the worker level statistics are highly heterogeneous, with a thick right tails experiencing considerable volatility. ZHC workers appear to commute farther than their permanent counterparts, and only about 15% transition to having a permanent contract within The Company, roughly the same proportion of permanent staff transitioning to a ZHC.

5 Demand Side

The following section delves into ZHCs from the perspective of the firm. In particular, it examines the causal use of ZHCs by firms to respond to production (labour) shocks generated by absences and permanent staff turnover, as well as consumer demand shocks. Lastly, it presents descriptive evidence on ZHCs in relation to local labour market slackness, addressing the question of whether high use of ZHCs suggests low worker bargaining power.

5.1 ZHCs and Production Shocks

5.1.1 Worker Absence Shocks

To estimate the use of ZHCs as a response to permanent staff absentee shocks, I exploit the fact that the HR data for 2016-2019 contains absentee data for permanent staff at the daily worker level,[17] as well as daily timesheet data. I estimate two equations of the form:.

$$ZHC\ Hours_{jed} = \beta_1 Perm\ Absence\ Hours_{jed} + \lambda_{je} + \theta_{eyw} + \gamma_{jyw} + \eta_d + \varepsilon_{jed} \tag{1}$$

$$ZHC\ Hours_{ed} = \beta_2 Perm\ Absence\ Hours_{ed} + \theta_{eyw} + \eta_d + \varepsilon_{ed} \tag{2}$$

Equation (1) exploits variation in the number of permanent worker absentee hours at the job-establishment-day (jed) level, while controlling for job-establishment (λ_{je}), establishment-year-week (θ_{eyw}), job-year-week (γ_{jyw}), and exact date (η_d) fixed effects, and examines how ZHC hours respond. The dependent variable and the main regressor of interest are scaled to the same level (daily hours), so β_1 has a like-for-like cover interpretation, similar to a pass-through estimate. Specifically, β_1 indicates how the firm adjusts ZHC usage for every hour a permanent worker is absent. The equation isolates a demand effect under the assumption that permanent absenteeism does not affect ZHC worker supply. An obvious violation of this assumption would occur if permanent worker sickness affects ZHC workers in the same establishment. While this is possible, it is reasonable to assume that such an effect would be negative, and thus a positive value of β_1 would reflect a reduced form demand effect. I argue that this parameter is of key interest, as it is a policy-relevant parameter for firms when choosing contract composition. Specifically, firms will want to know whether ZHC workers can be used to mitigate the effects of permanent absenteeism when optimizing contract decisions.

Equation (2) estimates a similar specification, but isolates variation at the establishment-day level, while controlling for establishment-year-week (θ_{eyw}) and date (η_d) fixed effects. A key difference between the two specifications is that the second allows for substitutability between job roles within the establishment. For example, (1) estimates how ZHC hours of burger flippers respond to permanent burger flipper absenteeism, while (2) estimates how ZHC hours across all job roles (e.g., burger flippers and cleaners) respond to absenteeism among all permanent workers.

Columns (1) and (2) of Table 4 present estimates of $\hat{\beta}_1$ from (1), the first for the full sample of workers, and the second for just entry-level job roles. Column (1) suggests a cover rate of just under 10%, meaning that for every 1 hour of job-specific permanent absenteeism, the counterpart job-specific ZHC worker works an additional 6 minutes. When looking at just entry-level workers, the cover rate increases to 15%. This increase is unsurprising, given that we know there are more ZHC workers in entry-level positions, suggesting that for more skilled workers, there are supply constraints on using ZHC workers to cover permanent absenteeism. Column

[17] There is no equivalent data for ZHC workers due to the nature of their contracts.

Table 4: ZHC as Absence Cover

	Job-Establishment			Establishment	
	(1)	(2)	(3)	(4)	(5)
	ZHC Hours	ZHC Hours	ZHC Hours	ZHC Hours	ZHC Hours
Perm Sick Hours	0.0902***	0.150***	0.138***	0.249***	0.226***
	(0.00629)	(0.0101)	(0.017)	(0.0205)	(0.0418)
Perm Sick Hours X LW			0.016		0.0325
			(0.021)		(0.0475)
Establishment-Job FE	Yes	Yes	Yes	No	No
Establishment-Time FE	Yes	Yes	Yes	Yes	Yes
Job-Time FE	Yes	Yes	Yes	No	No
Date FE	Yes	Yes	Yes	Yes	Yes
N	2554599	912530	912530	232109	232109
Sample	All	Entry-Level	Entry-Level	All	All

Note: *The table presents estimates of* $\hat{\beta}_1$ *from equation (1) in columns (1) and (2), where the latter restricts the sample to Entry-Level workers, estimates of* $\hat{\beta}_2$ *from equation (2) in column (4), estimates of* $\hat{\beta_{3a}}$ *and* $\hat{\beta_{3b}}$ *from equation (3) in column (3) and estimates of* $\hat{\beta_{4a}}$ *and* $\hat{\beta_{4b}}$ *from equation (4) in column (5). Heteroskedastic robust standard errors are reported in parantheses.* * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

(4) presents the estimate of $\hat{\beta}_2$ from (2). The estimate implies a considerably higher cover rate of 25% (or 15 minutes for every hour) at the establishment level, suggesting that there is likely some substitutability between job roles, at least in the very short run when necessary.

It is worth probing whether these cover rates are constrained by supply. The difference between columns (1) and (2) suggests that this is the case, at least for more skilled jobs. Columns (3) and (5) present estimates from the following two equations, respectively:

$$ZHC\ Hours_{jed} = \beta_{3a} Perm\ Absence\ Hours_{jed} + \beta_{3b} Perm\ Absence\ Hours_{jed}\ X\ Living\ Wage_{jed} + \lambda_{je} + \theta_{eyw} + \gamma_{jyw} + \eta_d + \varepsilon_{jed} \tag{3}$$

$$ZHC\ Hours_{ed} = \beta_{4a} Perm\ Absence\ Hours_{ed} + \beta_{4b} Perm\ Absence\ Hours_{ed}\ X\ Living\ Wage_{ed} + \theta_{eyw} + \eta_d + \varepsilon_{ed} \tag{4}$$

where $Living\ Wage_{jed}$ and $Living\ Wage_{ed}$ are binary variables indicating whether the job-establishment-time or establishment-time are covered by the Living Wage, as outlined in Section 3.1. The Living Wage boosts entry-level wages by approximately 6%, as documented in both Datta (2023) and Datta and Machin (2024).[18]

The estimates in columns (3) and (5) for the impact of cover are largely unchanged and suggest that paying entry-level workers higher wages does not increase cover, as the interaction terms

[18] For reference, an event study from Datta and Machin (2024) of log wages on Living Wage treatment, estimated using a Sun and Abraham (2021) staggered difference-in-difference estimator, is included in Figure 14 in the appendix.

are small in magnitude and not statistically different from zero. Datta and Machin (2024) do not find any evidence of negative employment effects from the Living Wage for The Company,[19] and thus it appears that the low but meaningful cover rates of 25% at the establishment level represent the firm's unconstrained optimal cover decision.

5.1.2 Worker Exit Shocks

To estimate the use of ZHCs by firms as a response to permanent staff exit shocks, I exploit a similar framework. First, I estimate event studies of the following form:

$$ZHC\ Hours_{jew} = \sum_{k \neq -1} \beta_5^k Perm\ Leave_{je,w+k} + \lambda_{je} + \theta_{eyw} + \gamma_{jyw} + \varepsilon_{jew} \tag{5}$$

$$ZHC\ Hours_{ew} = \sum_{k \neq -1} \beta_6^k Perm\ Leave_{ew} + \theta_e + \eta_{yw} + \varepsilon_{ew} \tag{6}$$

where the specifications (5) and (6) mirror (1) and (2) from the previous subsection. The key difference is the change in the right-hand side variable of interest, which is now the total number of permanent leavers (measured in hours), and the specifications are now at the job-establishment-week and establishment-week levels, respectively. I estimate the specifications with leads and lags of 4 months (16 weeks) and 6 months (24 weeks), respectively, and aggregate coefficients up to the monthly level according to $\hat{\beta}_x^m = \sum_{k \in m} \frac{1}{4} \hat{\beta_{x,k}}$, which are presented in Figures 9 and 10.

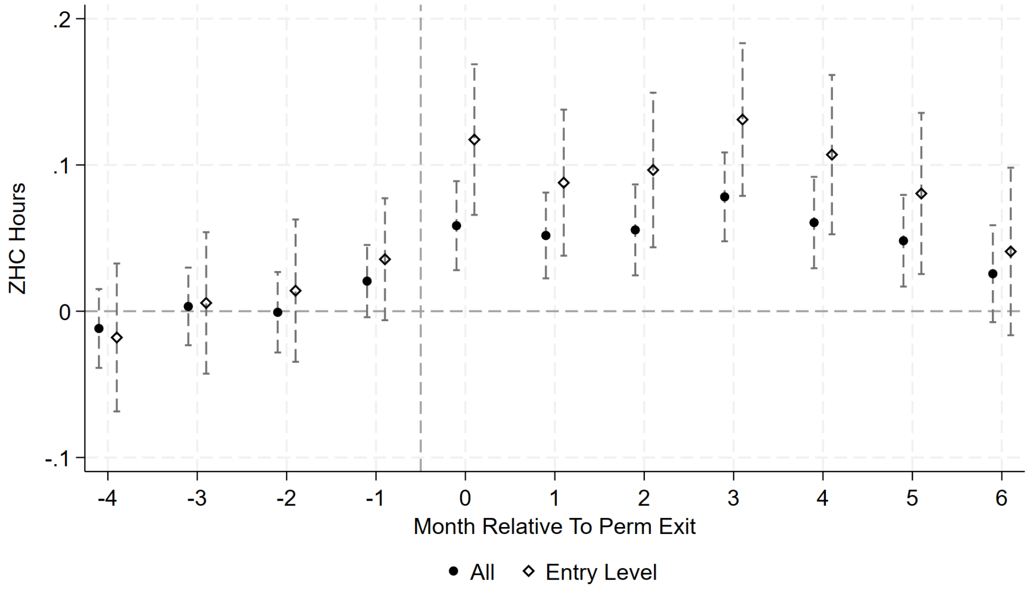
The results present a similar picture to those of permanent worker absentee shocks. Figure 9 suggests a cover rate of around 10-15% at the job-establishment level for entry-level workers, and slightly lower, around 7-8%, for all workers. The cover rates drop back to zero over approximately a 6-month period following the permanent worker's exit. One might note a slight uptick in cover the month preceding a worker's exit (though this is not statistically significant). Workers in the UK are eligible for 28 days of paid mandatory holiday leave and will often take accrued holiday before leaving, which may explain the slight uptick. Figure 10, like the absentee shocks, suggests a higher cover rate at the establishment level, indicating some substitutability across positions, with a cover rate peaking at approximately 20%.

5.2 ZHCs and Firm Demand Shocks

Next, I examine the use of ZHCs as a response to demand shocks. The Company has some establishments that are partially outdoors. While I cannot disclose the precise industry of The Company, a similar example could be cafés, where some have outdoor seating while others are entirely located indoors. I refer to these outdoor-exposed establishments as al-fresco establishments. To examine the use of ZHCs to respond to demand shocks, I exploit weather variation

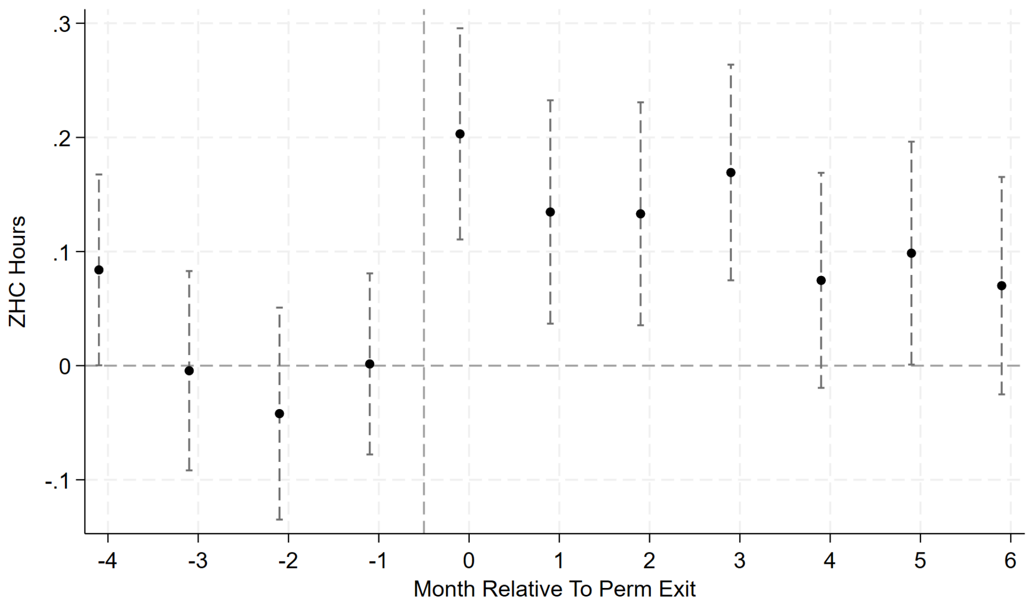
[19] More generally, their results, combined with Datta (2023), suggest employment increases due to the firm's monopsony power.

Figure 9: ZHC as Permanent Leaver Cover, Job-Establishment level - Event Study



Note: *The figure presents estimates of* $\hat{\beta}_5^m = \sum_{k \in m} \frac{1}{4} \hat{\beta_{5,k}}$ *where* $\hat{\beta_{5,k}}$ *is estimated according to equation (5). Bars represent 95% confidence intervals, based on heteroskedastic robust standard errors. The black dots are estimated on a sample of 213,484 establishment-job-weeks operated by The Company over the 2016-2019 period, while the diamonds are based on a sample of 71,540 entry level establishment-job-weeks.*

Figure 10: ZHC as Permanent Leaver Cover, Establishment level - Event Study



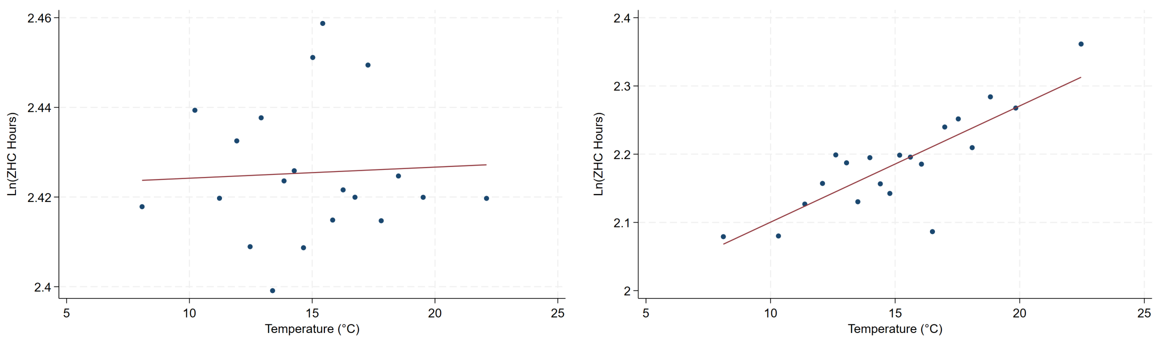
Note: *The figure presents estimates of* $\hat{\beta}_6^m = \sum_{k \in m} \frac{1}{4} \hat{\beta_{6,k}}$ *where* $\hat{\beta_{6,k}}$ *is estimated according to equation (6). Bars represent 95% confidence intervals, based on heteroskedastic robust standard errors. The sample of observations is 18,594 establishment-weeks operated by The Company over the 2016-2019 period.*

at the establishment-day level. As I do not have sales data or any other proxy for demand, I can only examine the reduced form impact of weather on ZHC hour usage, rather than estimating an IV of short-run demand on ZHC usage. Weather data is taken from the Met Office's HadUK-Grid dataset, which provides maximum air temperatures interpolated for every $1km^2$ grid in the UK. These are then merged on a daily level to the precise location of each establishment.

Figure 11 presents bin-scatter plots of log ZHC hours against temperature (°C), residualised against establishment-month fixed effects, for establishments that are not weather-exposed and for those that are al-fresco. The figure demonstrates that al-fresco establishments show a strong positive correlation between within-month temperature fluctuations and ZHC usage, while establishments that are not weather-exposed do not exhibit a similar relationship.

Figure 11: ZHC usage vs Temperature

(a) Standard Establishments (b) Al-fresco Establishments



Note: *The figure presents bin-scatter plots of ln(ZHC Hours) against temperature, measured in degrees Celsius, with both variables residualised against estbalishment-month fixed effects. The left hand side panel plots it for those establishments without outside exposure, while the right hand side presents al-fresco establishments. The sample includes 232,109 establishment-days operated by The Company between 2016-2019.*

To probe this relationship further I estimate the equation

$$ln(ZHC\ Hours_{ed}) = \beta_7 Temp_{ed} + \beta_8 Temp_{ed}\ X\ AlFresco_e + \theta_{eym} + \gamma_d + \varepsilon_{ed} \tag{7}$$

where Al Fresco is a binary indicator, equal to 1 if it is weather exposed. Equation (7) exploits within establishment-year-month variations in the weather, while also controlling for aggregate daily date shocks, and explores the impact of temperature changes on ZHC use for non-exposed establishments and al-fresco establishments.

Table 5 presents the estimates from equation (7). The results mirror those of Figure 11 and suggest that for non-exposed establishments, there is no relationship between weather variation and ZHC usage. However, for weather-exposed establishments, a 1°C increase in temperature results in a 1.7% increase in ZHC hours at the daily level. The results suggest a strong role for ZHCs in managing fluctuating demand. A comparison of ZHC usage between weather-exposed and non-exposed establishments shows that al-fresco establishments have, on average, 24 percentage points more of their workforce on ZHCs.

Table 5: ZHCs and Demand Shocks

	(1)
	ln(ZHC hours)
Temperature	-0.000247
	(0.00157)
Temperature X Al Fresco	0.0167***
	(0.00307)
Establishment-Month FE	Yes
Date FE	Yes
N	232109

Note: *The table presents estimates of $\hat{\beta}_7$ and $\hat{\beta}_8$ from equation (7). The sample is based on 232,109 establishment-days for The Company between 2016-2019. Heteroskedastic robust standard errors are reported in parantheses.* * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.3 Local Labour Market Slackness

On the demand side, I lastly examine the role of labour market slackness and ZHC usage. I utilise claimant count unemployment data, which measures the number of individuals claiming unemployment-related benefits, at the Local Authority (LA)[20] level, provided by the Department for Work and Pensions. The data contains only counts of individuals at the monthly level rather than rates. To convert the data into a rate measure, I divide it by the working-age population in the Local Authority, which is measured annually and sourced from the ONS.

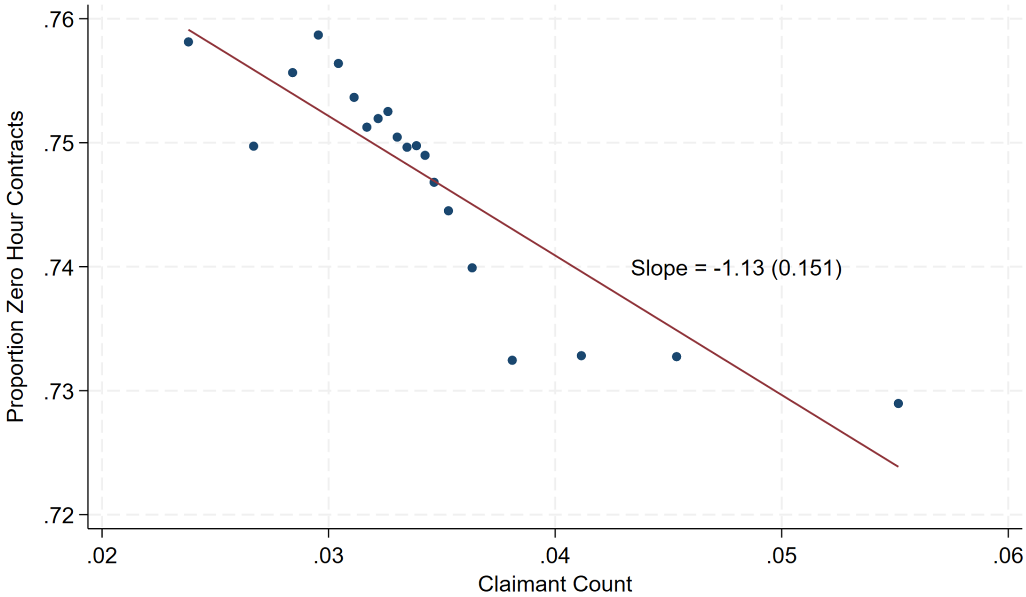
Figure 12 presents a bin-scatter plot of the probability of a worker being on a ZHCs at the year-month level, against the aforementioned claimant count rate, residualised against job-establishment fixed effects. The results are suggestive of a strong negative slope, where a 1pp increase in the claimant count rate is associated with a 1.1 pp drop in the proportion of ZHCs. This is the opposite of what one would expect if slack labour markets were reducing worker bargaining, and allowing firms to place workers on ZHCs.

Figure 12 presents a bin-scatter plot of the probability of a worker being on a ZHC at the year-month level, against the aforementioned claimant count rate, residualised against job-establishment fixed effects. The results suggest a strong negative slope, where a 1 percentage point increase in the claimant count rate is associated with a 1.1 percentage point drop in the proportion of ZHCs. This is the opposite of what one would expect if slack labour markets were reducing worker bargaining power and allowing firms to place more workers on ZHCs.

An obvious explanation is that during periods of labour market slackness, the firm may face

[20] There are 382 LAs in the UK.

Figure 12: Proportion of ZHCs vs Local Unemployment



Note: *The figure presents a bin-scatter plot of monthly probabilities of a workers being on a ZHC at the for The Company against the claimant count divided by the working age population at the Local Authority where the establishment is located. The variables are residualised against job-establishment fixed effects. The sample is based off 911,389 worker-months between 2013-2019. The slope is estimated based off a regression of the form* $ZHC_{ijeym} = \beta CC_{eym} + \gamma_{ej} + \varepsilon_{ijeym}$*, where ZHC is an indicator of being on a ZHC for worker i, in job j, at establishment e in year-month ym,* CC_{eym} *is the claimant count rate, and* γ_{je} *are job-establishment fixed effects. Standard errors clustered at the establishment-year-month.*

lower levels of demand, and therefore the staff easiest to let go of would be ZHC workers, thus reducing their proportion. However, a regression of the form

$$ZHC\ Hours_{eym} = \beta_9 C_{eym} + \gamma_e + \lambda_{ym} + \varepsilon_{eym} \tag{8}$$

where $ZHC\ Hours_{eym}$ denotes total ZHC hour usage at establishment e in year-month ym, elicits a parameter estimate of $\hat{\beta}_9$ of 21.7 (15.0), suggesting that total ZHC hours are not negatively correlated with local unemployment. I therefore find little evidence that firms have lower demand for ZHCs during slack labour market times.

5.4 Discussion

The above set of results implies that ZHCs play an important role in weathering both input supply and consumer demand shocks. ZHCs provide firms with a form of insurance, offering cover when permanent workers are temporarily absent (e.g., due to sickness) and labour inputs during periods of permanent worker turnover. Cover estimates generally range from 10-25%, though this seems to be due to unconstrained firm decision-making rather than supply constraints to ZHC positions. ZHCs are used to respond to varying demand and are more prevalent in establishments subject to larger fluctuations in consumer demand. This helps explain why they are more common in sectors such as retail, security, leisure, and hospitality, as reflected in national statistics Datta et al. (2019). Lastly, I find no evidence that establishments experiencing slacker labour markets, where workers may have less bargaining power, are increasing their use of ZHCs, which is consistent with the findings of Katz and Krueger (2017).

6 Supply Side

I now turn to examine ZHCs from the perspective of the worker. Using the firm's job posting and application data, I document differences in the number of applicants for permanent job contracts versus ZHC contract jobs in the recruitment process, as well as differences in applicant demographics, firm selection, and applicant decisions by job type. I then turn to eliciting preferences over contracts. Exploiting the Living Wage, which exogenously altered the pay differential between ZHC and permanent contracts, I estimate ZHC workers' preferences for a ZHC contract versus a permanent contract, and permanent workers' preferences for a ZHC position.

6.1 Applications, Selection and Decisions by Contract Type

I first estimate the regression

$$ln(Applicants_{aejym}) = \beta_{10} ZHC_{aejym} + \gamma_{ej} + \theta_{ey} + \lambda_{jy} + \xi_{ym} + \varepsilon_{aejym} \tag{9}$$

where $Applicants_{aejym}$ is the number of job applications The Company received for job advert a at establishment e for job-role j in year-month ym. ZHC_{aejym} is an indicator variable for whether the advertised position is for a ZHC or permanent contract, which is differentiated in the advert by describing it as either "permanent" or "flexible." The textual descriptions of the job-role are generally otherwise unchanged. The interpretation of β_{10} is the percentage increase in the number of applicants if the job is advertised as a ZHC, compared to a permanent position in the same establishment-job, controlling for establishment-year, job-year, and year-month fixed effects.

Approximately 10% of jobs receive no applicants, I therefore use a $ln(1 + y)$ adjustment. For robustness, I check the results against a variety of commonly used alternatives, including $ln(Applicants)$ (dropping the zeros), $ln(Applicants + Applicants_{p50})$, $ln\left(\frac{Applicants}{\bar{Applicants}} + 1\right)$, $ihs(Applicants)$ using the transformation of the parameter estimate as suggested in Bellemare and Wichman (2020), and power transformations of the form $Applicants^k$ for $k \in \{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}\}$, with their associated parameter adjustments to elicit the semi-elasticity. For a thorough discussion of the behaviour associated with these transformations, see Bellemare and Wichman (2020) and Thakral and Tô (2023).

Table 6 presents estimates of $\hat{\beta_{10}}$. Column (1) presents the baseline specification, column (2) includes a wage control, and column (3) includes an establishment-job-year FE, implying that the estimate compares the number of applicants in the same establishment, job role, and year. Given that this generates a number of singletons, it results in a lower number of observations. All specifications suggest that ZHC jobs receive approximately 25% more job applicants than

Table 6: Applicants by Job Type

	(1) ln(1+ Applicants)	(2) ln(1 + Applicants)	(3) ln(1 + Applicants)
ZHC	0.253***	0.247***	0.240***
	(0.0300)	(0.0301)	(0.033)
Wage Control	No	Yes	Yes
Establishment-Job FE	Yes	Yes	No
Establihsment-Year FE	Yes	Yes	No
Job-Year FE	Yes	Yes	No
Establishment-Job-Year FE	No	No	Yes
Year-Month FE	Yes	Yes	Yes
N	5707	5707	4397

Note: *The table presents estimates of* $\hat{\beta_{10}}$ *from equation (9) where the dependent variable is ln(1+Applicants). The sample is based on 5,707 job postings for The Company between 2016-2019. Standard errors clustered at the job-establishment are reported in parantheses.* * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

their equivalent permanent counterparts. Table 13 in the appendix presents the equivalent of column (2) for all the aforementioned transformations. Parameter estimates of the semi-elasticity range from 12% to 32%, but are largely concentrated around 25%.

Turning to the demographics of applicants, table 7 presents counterpart estimates of the appointment-level demographic estimates from table 2, but for job applicants. Specifically, it presents estimates from a linear probability model where the dependent variable is a binary indicator for applying for a ZHC position, regressed against the full set of available applicant-level demographic variables[21] for job applicants. Like Table 2, column (2) includes a job-establishment fixed effect. The general patterns are very similar to those who actually hold the positions. Specifically, being female is a strong predictor for applying for a ZHC position, as well as living in a high student population area, in a more expensive owner-occupied house, and having a higher education level (though the latter becomes statistically insignificant in column (2)).

Table 8 utilises data on the outcome of the recruitment process and presents estimates of the firm selection decision (i.e., whether an individual gets an offer) and the applicant decision, conditional on receiving an offer. The table reports corresponding results for both permanent and ZHC jobs, as interaction terms, for ease of comparison. The results are instructive in determining whether certain demographic characteristics are more likely to be selected by the firm for permanent or ZHC positions, and the subsequent applicant decisions on whether to accept the offer. Column (1), which documents the firm's selection, contains job-post FEs, and therefore conditions on the pool of applicants for that particular advert. The results suggest that the firm is more likely to make offers to females for both permanent and ZHC positions (by around 2-3 percentage points), and the only other predictor is the likelihood of being an owner-occupier. However, the effect size is small: living in an OA with 10 percentage points more owner-occupiers is associated with a 0.5-1 percentage point increase in the likelihood of re-

[21]Coefficients on age bands are not included as they are not collected for applicants.

Table 7: Demographics of Applicants by Job Type

	(1) ZHC	(2) ZHC
Female	0.193***	0.0487***
	(0.00477)	(0.00329)
Prop. Student (OA)	0.249***	0.0790***
	(0.0462)	(0.0303)
ln(House Price) (Postcode)	0.0407***	0.0147***
	(0.00479)	(0.00382)
Owner Occupier (OA)	0.0971***	0.0314***
	(0.00930)	(0.00661)
Highest Education Level (OA)	0.0224***	0.00477
	(0.00618)	(0.00397)
Establishment-Job FE	No	Yes
N	46718	46718

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: *The table presents applicant-level demographic regressions estimated with a linear probability model of the form* $ZHC_{iej} = \beta' X_{iej} + \gamma_{ej} + \varepsilon_{iej}$. *The sample include 46,718 applicants who applied to positions in The Company over 2016-2019. Data on gender is based off The Company's own applicant records, data on proportion of students, proportion of owner occupier and highest education level are based off census data for the output area data where the applicant lives. Data on house prices is based off the postcode where the applicant lives and is based off data from HMLR. Heterokedastic robust standard errors are reported in parantheses.* * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Firm Selection & Applicant Decision

	(1) Offer	(2) Rejected Offer
Perm X Female	0.0212***	0.0193*
	(0.00458)	(0.0114)
ZHC X Female	0.0377***	0.0102
	(0.00647)	(0.00777)
Perm X Prop. Student (OA)	-0.0163	0.0695
	(0.0392)	(0.111)
ZHC X Prop. Student (OA)	0.0738	-0.107*
	(0.0613)	(0.0614)
Perm X ln(House Price) (Postcode)	0.00652	-0.0300***
	(0.00529)	(0.00814)
ZHC X ln(House Price) (Postcode)	0.0108	-0.0224***
	(0.00828)	(0.00826)
Perm X Prop. Owner Occupier (OA)	0.0578***	-0.0296
	(0.00894)	(0.0193)
ZHC X Prop. Owner Occupier (OA)	0.114***	-0.0342**
	(0.0146)	(0.0168)
Perm X Highest Education Level (OA)	0.00686	0.0288**
	(0.00546)	(0.0134)
ZHC X Highest Education Level (OA)	0.00504	0.0114
	(0.00869)	(0.0118)
Job Post FE	Yes	No
N	46077	8496
Sample	All Applicants	Received Offer

Note: *The table presents applicant and offer level demographic regressions estimated with a linear probability model of the form* $Offer_{ia} = \beta' X_{ia} + \gamma_a + \varepsilon_{ia}$ *where* $Offer$ *is a binary variable of whether the applicant received an offer from the firm, and Rejected* $Offer_{ia} = \beta' X_{ia} + \varepsilon_{ia}$ *where Rejected* $Offer$ *is a binary variable of, conditional on an offer, if the applicant rejected the job offer. Column (1) uses a sample of 46,718 applicants (46,077 after dropping singletons) who applied to positions in The Company over 2016-2019. Column (2) conditions Data on those who received an offer. Gender is based off The Company's own applicant records, data on proportion of students, proportion of owner occupier and highest education level are based off census data for the output area data where the applicant lives. Data on house prices is based off the postcode where the applicant lives and is based off data from HMLR. Heterokedastic robust standard errors are reported in parantheses.* * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

ceiving an offer. No other variables significantly predict being offered a permanent or ZHC job. Column (2) suggests females are twice as likely to turn down a permanent position compared to a ZHC, although the difference is not statistically significant. Individuals living in more populated student areas are more likely to accept a ZHC position compared to a permanent one. Individuals living in more expensive postcodes and OAs with more owner-occupiers are more likely to accept both permanent and ZHC positions, while more highly educated individuals are more likely to turn down permanent positions.

6.2 Preference for ZHCs

I lastly turn to estimating workers' preferences for contract types. To do this, I make use of the fact that the posting and applicant data include information on whether internal workers apply for a posted job. Therefore, for each job posting, I am able to construct choice sets for all relevant workers and document whether they apply or not. This allows me to observe the rates at which ZHC workers apply for internal permanent positions, and vice versa, and how this varies according to the wage difference between their incumbent position and the posted position. Descriptive evidence shows that only 15% of ZHC workers apply for permanent positions, which is similar to the proportion of actual transitions documented in 4.5.

Specifically, we can observe if worker i in a ZHC (permanent) position in establishment e and job-role j applies for a posted permanent (ZHC) advert a in establishment e' and job-role j' in year-month ym within The Company, and how that relates to the wage difference between their incumbent position and the posted advert $\Delta Wage_{ia}^{Perm,ZHC}$. To elicit this I estimate equations of the form:

$$Apply_{iejae'j'ym}^{ZHC \to Perm} = \beta_{11} \Delta Wage_{iejae'j'ym}^{Perm,ZHC} + \gamma_{ej} + \lambda_{e'j'} + \theta_{jym} + \eta_{j'ym} + \varepsilon_{iejae'j'ym} \quad (10)$$

$$Apply_{iejae'j'ym}^{Perm \to ZHC} = \beta_{12} \Delta Wage_{iejae'j'ym}^{ZHC,Perm} + \gamma_{ej} + \lambda_{e'j'} + \theta_{jym} + \eta_{j'ym} + \varepsilon_{iejae'j'ym} \quad (11)$$

where $Apply_{iejae'j'ym}^{ZHC \to Perm}$ is a binary variable equal to 1 if ZHC worker i applies to a permanent job advert a, and zero otherwise. The equations control for the rate of applications by ZHC (permanent) workers in establishment-job ej and the rate of applications to permanent (ZHC) adverts in establishment-job $e'j'$, as well as time-varying shocks to jobs j and j'. I also estimate a more restrictive version, which controls for the rate of applications from the worker's establishment-job to the advert's establishment-job $eje'j'$.

I restrict the sample to only entry-level positions, focusing on lateral moves within the hierarchy and within 50km of the incumbent worker's current establishment. I do this for three reasons. First, entry-level positions are the dominant occupations in both The Company and the wider economy, where ZHCs are more common. Second, this reduces the computational burden of the estimation procedure. In an unrestricted sample of choice set options, it would include every single job posting interacted with every single employed worker at the firm at the time of posting, resulting in an excessively large matrix. It would also include moves across the hierarchy that are very unlikely to happen (e.g., a manager applying for an entry-level position) and across geographic locations. Lastly, by restricting the sample to like-for-like job roles in terms of hierarchy, I ensure that I am estimating preferences over contract type rather than preferences for movement across the job ladder. To ensure I am not capturing preferences over distance, I also run a highly local specification that includes establishments within only 10km (6 miles) of the incumbent establishment.

To elicit causal estimates in equations (10) and (11), I exploit the fact that ZHC workers are, on average, paid less than their permanent counterparts, but the Living Wage treatment almost fully equalises this pay differential.[22] Specifically, I instrument $\Delta Wage^{Perm,ZHC}_{iejae'j'ym}$ and $\Delta Wage^{ZHC,Perm}_{iejae'j'ym}$ using the Living Wage instrument discussed in sections 3.1 and 5.1. I use two instruments in both specifications, $Living\ Wage_{eym}$ and $Living\ Wage_{e'ym}$, which are binary variables indicating whether the incumbent establishment is treated with the Living Wage in period ym, and whether the posting establishment is.

Table 9 presents estimates of $\hat{\beta_{11}}$. Columns (1) and (2) use a sample of the full set of entry-level worker-advert combinations,[23] where incumbent workers are on a ZHC and the posted job has a permanent contract, while column (3) restricts the sample to job adverts within a highly local distance to the incumbent worker's establishment (within 10km). Estimates are transformed according to $\frac{\hat{\beta}}{\bar{Apply}} * \Delta \bar{Wage}$ so they have an elasticity interpretation.

The estimate in column (1) implies that a 10% decrease (increase) in the permanent-ZHC wage differential reduces (increases) the ZHC-to-permanent application rate by 1.7%. Column (2), which uses the more restrictive set of fixed effects, gives a lower rate of 1.4%. Column (3), which restricts the sample to only local applications, implies that the rate is even less sensitive, with a 10% decrease (increase) in the permanent-ZHC wage differential reducing (increasing) the ZHC-to-permanent application rate by 0.9%. All estimates suggest that incumbent ZHC workers are relatively wage-insensitive to their contract decisions.

For transparency, table 10 below presents the first stage impact of the two Living Wage treatments on the wage differential (in levels), estimated according to:

$$\Delta Wage^{Perm,ZHC}_{iejae'j'ym} = \beta_{13} LW_{eym} + \beta_{14} LW_{eym} + \gamma_{ej} + \lambda_{e'j'} + \theta_{jym} + \eta_{j'ym} + \varepsilon_{iejae'j'ym} \qquad (12)$$

As expected, Living Wage treatment at the incumbent (ZHC worker's) establishment significantly reduces the ZHC-permanent pay differential by approximately £0.50 ($0.67) per hour, and this holds even at a very local level, consistent with the within-establishment differentials

[22] Table 14 in the appendix presents estimates of the within establishment-job-year-month wage differential between permanent and ZHC workers and documents that it is approximately 13% for non-Living Wage establishments, shrinking to 2.5% for Living Wage establishments.

[23] Column (2) drops a small proportion of observations (less than 1%) due to the highly restrictive FEs resulting in singleton observations, which are dropped.

Table 9: Contract Preference Estimates- ZHC to Perm

	(1) Apply	(2) Apply	(3) Apply
$\Delta Wage$ (Elasticity)	0.171***	0.136***	0.087***
	(0.036)	(0.038)	(0.032)
Establishment-Job FE	Yes	No	Yes
Establishment'-Job' FE	Yes	No	Yes
Establishment-Establishment'-Job-Job' FE	No	Yes	No
Job-YM FE	Yes	Yes	Yes
Job'-YM FE	Yes	Yes	Yes
Sample of Job Adverts	All	All	Local
First Stage F-Stat	5605	8959	4894
N	4228864	4189123	1085085

Note: *The table presents estimates of* $\hat{\beta_{11}}$ *from equation 10 transformed according to* $\frac{\hat{\beta}}{\bar{Apply}} * \Delta \bar{Wage}$ *to give an elasticity interpretation.* $\Delta Wage$ *in all specifications is instrumented with Living* $Wage_{eym}$ *and Living* $Wage_{e'ym}$*, and the table presents the corresponding Kleibergen-Paap F-statistics. The sample uses all ZHC worker-permanent advert combinations of entry-level workers at The Company between 2016-2019. Columns(1) and (2) use the full set of worker-advert combinations within 50km, while column (3) includes those where posted adverts are within 10km of the worker's incumbent establishment. Standard errors clustered at the Establishment-Establishment' level are reported in parentheses. ** $p < 0.10$*, *** $p < 0.05$*, **** $p < 0.01$

described in Table 14 in the appendix. Although the effect is about half the size, Living Wage treatment at the advertising (permanent job) establishment also generates considerable positive variation in the wage differential. This key point ensures that the identification of the point estimate of preferences comes from both decreases and increases in the wage differential.

Table 10: Contract Preference Estimates- ZHC to Perm First Stage

	(1) $\Delta Wage$	(2) $\Delta Wage$	(3) $\Delta Wage$
Living $Wage_{eym}$	-0.500***	-0.497***	-0.539***
	(0.003)	(0.004)	(0.006)
Living $Wage_{e'ym}$	0.272***	0.263***	0.286***
	(0.003)	(0.004)	(0.008)
Establishment-Job FE	Yes	No	Yes
Establishment'-Job' FE	Yes	No	Yes
Establishment-Establishment'-Job-Job' FE	No	Yes	No
Job-YM FE	Yes	Yes	Yes
Job'-YM FE	Yes	Yes	Yes
Sample of Job Adverts	All	All	Local
N	4228864	4189123	1085085

Note: *The table presents estimates of* $\hat{\beta_{13}}$ *and* $\hat{\beta_{14}}$ *from equation 12. The sample uses all ZHC worker-permanent advert combinations of entry-level workers at The Company between 2016-2019. Columns(1) and (2) use the full set of worker-advert combinations within 50km, while column (3) includes those where posted adverts are within 10km of the worker's incumbent establishment. Standard errors clustered at the Establishment-Establishment' level are reported in parentheses.* ** $p < 0.10$*, *** $p < 0.05$*, **** $p < 0.01$

Turning to the contract preferences of incumbent permanent workers, Table 11 presents the equivalent estimates from equation (11), again transformed according to $\frac{\hat{\beta}}{Apply} * \Delta \bar{Wage}$. The estimates suggest that incumbent permanent workers are much more wage-sensitive than their ZHC counterparts, with an elasticity closer to -1, approximately 10 times larger in absolute value. Readers should note that the wage differential between incumbent permanent workers and advertised ZHC jobs is generally negative, and therefore a percentage decrease in the (negative) differential reflects an increase in ZHC wages relative to permanent. Specifically, the estimates suggest that a 10% decrease[24] (increase) in the ZHC-permanent wage differential increases the permanent-to-ZHC application rate by 10%, 7%, and 15% across the three specifications, respectively. In other words, the results suggest that some workers on the margin are very sensitive to switching from a permanent contract to a ZHC contract, particularly in the presence of moving towards wage equality between the two contracts.

Table 11: Contract Preference Estimates- ZHC to Perm

	(1) Apply	(2) Apply	(3) Apply
$\Delta Wage$ (Elasticity)	-0.982***	-0.720*	-1.498**
	(0.377)	(0.409)	(0.660)
Establishment-Job FE	Yes	No	Yes
Establishment'-Job' FE	Yes	No	Yes
Establishment-Establishment'-Job-Job' FE	No	Yes	No
Job-YM FE	Yes	Yes	Yes
Job'-YM FE	Yes	Yes	Yes
Sample of Job Adverts	All	All	Local
First Stage F-Stat	1815	1526	199
N	1024117	4189123	232813

Note: *The table presents estimates of* $\hat{\beta_{12}}$ *from equation 11 transformed according to* $\frac{\hat{\beta}}{Apply} * \Delta \bar{Wage}$ *to give an elasticity interpretation.* $\Delta Wage$ *in all specifications is instrumented with Living* $Wage_{eym}$ *and Living* $Wage_{e'ym}$*, and the table presents the corresponding Kleibergen-Paap F-statistics. The sample uses all Permanent worker-ZHC advert combinations of entry-level workers at The Company between 2016-2019. Columns(1) and (2) use the full set of worker-advert combinations within 50km, while column (3) includes those where posted adverts are within 10km of the worker's incumbent establishment. Standard errors clustered at the Establishment-Establishment' level are reported in parentheses.* * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6.3 Discussion

Within this low-pay industry firm, ZHCs attract more applicant interest than like-for-like permanent positions, and the demographics of the applicants closely align with those of the position holders, as documented in Section 4.1. More generally, when examining the results of firm selection and final decisions from applicants who received offers, the demographic makeup of ZHC workers appears to be largely supply-driven. Only approximately 15% of all ZHC workers within the firm ever apply for a permanent contract job, and they seem relatively wage-insensitive to applying to permanent positions. This suggests that they have a strong preference for their ZHC. Given that ZHCs have relatively high turnover rates, as documented in Section 4.2, it is possible that those who stay longer have a stronger preference for ZHCs, while those who

[24] I.e., pushes it closer to zero.

leave quickly may prefer more secure positions and are using the ZHC as a temporary stepping stone during job search. Given that permanent workers are paid more than ZHC workers, this suggests that workers are willing to forgo some salary for the flexibility that a ZHC offers. While this wage differential may partly reflect differences in marginal productivity due to the the risk associated with such a contract to the firm (e.g., if a worker does not turn up), the lack of wage sensitivity suggests firm's employing ZHC workers with strong preferences for such a contract will have a greater ability to markdown ZHC wages (Manning, 2021). This view is consistent with estimates of monopsony power from online gig-work labour markets (Dube et al., 2020).

Even fewer permanent contract workers apply for ZHC positions—approximately 8%[25]. However, some do appear to be very wage-sensitive, willing to move to a ZHC position as wages between the two become equalized. This suggests that there are some workers in permanent positions who, on the margin, would prefer a ZHC over a permanent contract if wages were equal.

The identification strategy exploited in this section arises from the fact that ZHCs were generally paid less than permanent positions, and therefore the associated wage sensitivities are estimated based on changes, in both directions, in the permanent-ZHC wage differential, although this differential almost always remained positive. Mas and Pallais (2017) implement a model with a breakpoint in the WTP distribution when estimating preferences for "employer discretion" jobs (the closest they estimate to a ZHC) to test for breaks that may arise around the zero point. However, they find no substantial break at this point. While that is reassuring, given this is a different setting, it cannot be ruled out that there are important discontinuities in preferences around the zero wage differential point.

7 Conclusion

Schedule-flexible work arrangements represent a significant departure from the traditional 9-to-5 structure that dominated the latter half of the last century. As such, they are understandably a politically charged topic, where policymakers are eager to act, but data limitations restrict the availability of crucial information. This is particularly true for zero-hours contracts (ZHCs) in the UK, where ongoing policy suggestions have ranged from outright bans to taking no action. However, the available data is largely based on self-reported surveys, which suffer from clear measurement issues. This paper fills an important gap in the literature by providing detailed information on the demographics, turnover, and earnings volatility of ZHC workers compared to their permanent counterparts, as well as offering causal estimates of the role of ZHCs from both the firm and worker perspectives. The findings suggest that firms use ZHCs, in part, to respond to volatile production and demand conditions, while many workers—though not all—show a strong preference for them, and some results are suggestive workers use them for temporary

[25]This figure is lower than the actual proportion of transitions described in 4.5, likely driven by the fact that some permanent workers may take on ZHC roles without applying, as not all ZHC positions are required to be externally advertised by British law, whereas this is true for permanent positions. It may also be due to changes over time, as the figure in 4.5 is based on 2011-2019 data, while the application data is from 2016-2019.

income during job-search. Policymakers should therefore be cautious about imposing strict regulations on ZHCs. However, the analysis also indicates that ZHC workers are more likely to experience larger wage markdowns due to their contract preferences, suggesting that policies addressing wage differentials may be more appropriate.

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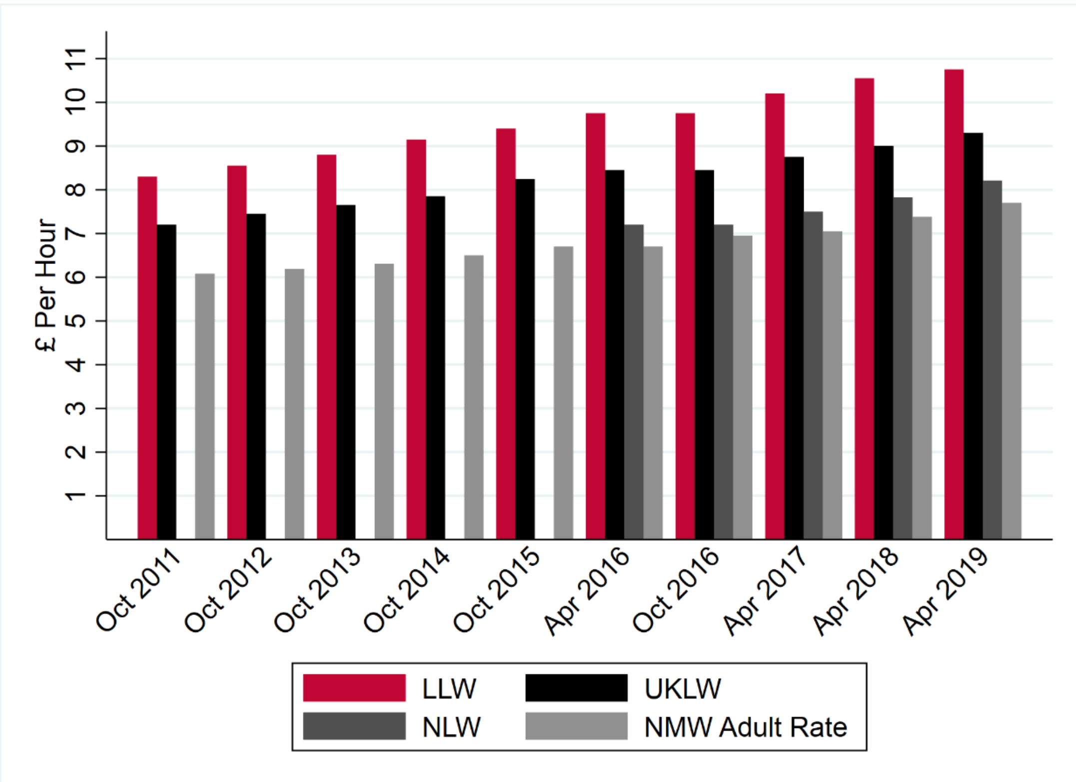
A Additional Figures and Tables

Figure 13: Living Wage and Minimum Wage Rates



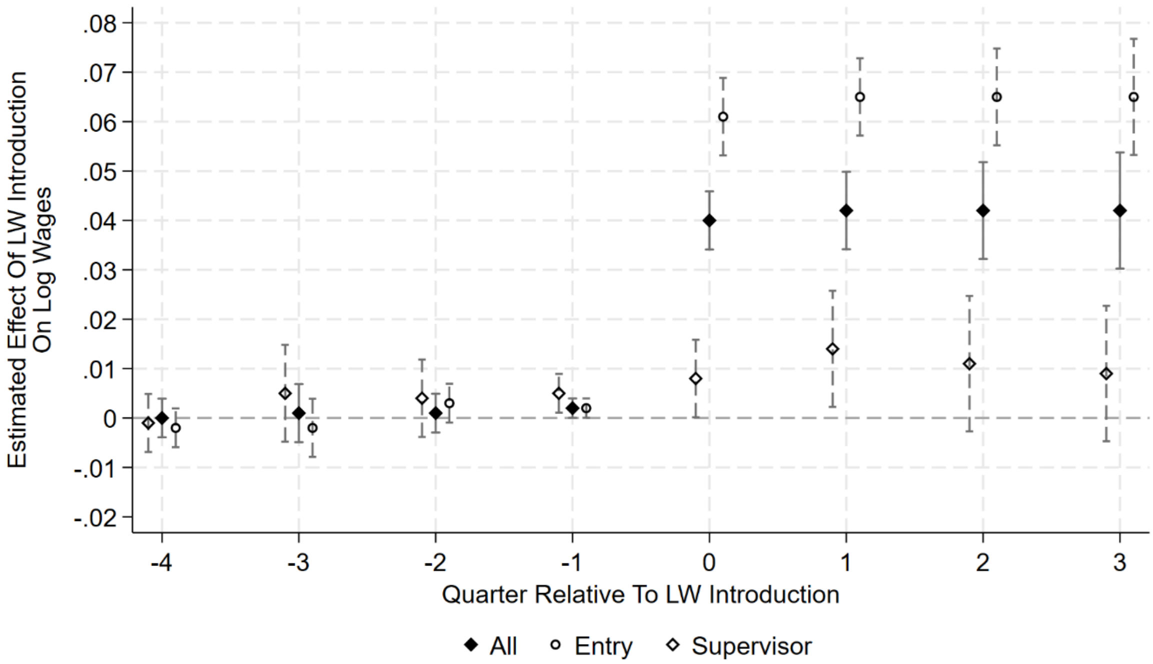
Note: *The figure shows the Living Wage Foundations' London and UK wide rates, as well as the statutory National Living Wage and National Minimum Wage adult rate for 2011 - 2019.*

Table 12: London Borough of Hackney, Employment

	London Borough of Hackney (estim)	
Sector	Employment	%
All	133,000	100
Private	115,100	86
Public		
NHS	5,549	4.3
Council	4,390	3.3
Civil Service	1,790	1.4
Education (LEA)	2,148	1.6
Education (Acad.)	2,864	2.1
Other	1159	1.3

Note: *The table presents employment shares by sector for the London Borough of Hackney for the year 2019.*

Figure 14: Living Wage Impact on Wages



Note: *The figure shows the impact of the Living Wage on wages, by worker group, for The Company, estimated using a staggered difference-in-difference approach. For more information see Datta and Machin (2024).*

Table 13: Applicants by Job Type - Transformations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$ln(1+y)$	$ln(y+y\_p50)$	$ln(\frac{y}{\bar{y}+1})$	$ln(y)$	$ihs(y)$	y^1	$y^{1/2}$	$y^{1/3}$	$y^{1/4}$
ZHC	0.247***	0.144***	0.115***	0.259***	0.297***	2.189***	0.375***	0.194***	0.134***
	(0.0301)	(0.0173)	(0.0140)	(0.0333)	(0.0364)	(0.422)	(0.0474)	(0.0256)	(0.0195)
Wage Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Establishment-Job FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Establihsment-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Job-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5707	5707	5707	5153	5707	5707	5707	5707	5707
Semi-Elasticity	0.25	0.14	0.12	0.26	0.3	0.28	0.27	0.29	0.32

Note: *The table presents estimates of $\hat{\beta_{10}}$ from equation (9) using different transformations of the dependent variable, applications. The bottom row presents their semi-elasticity counterparts. For $ln(1+y)$, $ln(y+y_{p50})$, $ln(\frac{y}{\bar{y}}+1)$, $ln(y)$ they correspond directly to the estimated coefficient. For transformation $ihs(y)$ it the number corresponds to the implied elasticity calculated according to $\hat{\beta}_1 * \frac{\sqrt{\bar{y}^2+1}}{\bar{y}}$ as recommended in Bellemare and Wichman (2020). For all power transformations, y^k, the number corresponds to the implied semi-elasticity is calculated according to $\frac{\hat{\beta_1}}{k*\bar{y}^k}$ where $\bar{y}$ is the mean of the untransformed outcome variable. y_{p50} is the median of the untransformed outcome variable. The specification using the transformation $ln(y)$ drops all observations such that y is equal to 0.*

Table 14: Contract Wage Differentials

	(1)
	ln(Hourly Wage)
ZHC X $\mathbb{1}[Living\ Wage = 0]$	-0.135***
	(0.00599)
ZHC X $\mathbb{1}[Living\ Wage = 1]$	-0.0248***
	(0.00645)
Establishment-Job-Year-Month FE	Yes
N	967170

Note: *The table presents estimates from the regression equation $ln(hourly\ wage_{iejym}) = \beta_a ZHC_{iejym}\ X\ \mathbb{1}[Living\ Wage_{ejym} = 0] + \beta_b ZHC_{iejym}\ X\ \mathbb{1}[Living\ Wage_{ejym} = 1] + \gamma_{jeym} + \varepsilon_{iejym}$ for worker i in establishment e, job-role j at year-month ym. The sample includes all worker-year-months for The Company between 2011-2019. Standard errors clustered at the establishment-job are presented in parentheses.*

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