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The price of flexible jobs

Wage differentials between permanent and flexible jobs in The Netherlands^{*}

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Abstract

Employees with a flexible contract, i.e., those with either a temporary contract, temporary agency workers, or those on a contract with flexible working hours, face more job and income insecurity than employees with a permanent contract. In competitive labor markets, they should be compensated for this uncertainty. In most countries, however, wages of flexible jobs are lower than those of permanent jobs. We find that this is also the case for The Netherlands between 2006 and 2019, in particular for men and higher educated employees. A critique on wage comparisons is that sample selection may lead to biased results. We use two methods to control for sample selection - Regression Adjustment and Propensity Score Matching - and find wage differentials close to our baseline estimates.

Keywords: Wage Gap; Flexible Employment; Earnings; Hourly wages, Wage differential; Non-standard work

JEL classification: J31

1 Introduction

Flexible employment, including temporary employment contracts, temporary agency work, and employment contracts with a variable number of hours per week, has raised concerns among policy makers. Workers with these types of contracts face more job and income insecurity.¹ Employers invest less in skills of workers with a temporary contract

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¹Self-employment is sometimes considered as a type of flexible employment. In this paper, we focus on wage-employees, because there is no data available about hourly wages of the self-employed.

(Poulissen et al., 2021). Flexible employment can be a stepping stone to a permanent job, but the empirical support for this hypothesis is limited (Filomena & Picchio, 2022). Likewise, most employees prefer a permanent job, but some do not manage to obtain one (Bolhaar et al., 2018).

In addition, wages of flexible jobs are on average lower than those of permanent jobs. One would expect higher wages for flexible jobs than for permanent jobs, to compensate for lower job security and other disadvantages mentioned above (De Graaf-Zijl, 2005; Sullivan & To, 2018). However, the empirical literature typically finds lower wages for flexible or temporary employment than for permanent employment in most countries (Dias da Silva & Turrini, 2015; Kahn, 2013; Stancanelli, 2002).

The wage differential between permanent and flexible work in The Netherlands is among the highest in Europe (Dias da Silva & Turrini, 2015; Kahn, 2013). Furthermore, both the growth rate and the level of flexible employment in The Netherlands are exceptional from an international point of view (OECD, 2019). The share of employees with a flexible job, i.e., employees with a temporary contract, temporary agency work, and jobs with flexible working hours, has increased from 16% in 2003 to almost 27% in 2019 (Statistics Netherlands, 2020).

Therefore, wage differentials between flexible and permanent jobs in The Netherlands received attention in the literature. De Graaf-Zijl (2005) and Dekker (2007) find wage differentials between -3% and -5% using survey data between 1991 and 2002. More recently, Smits and Skriabikova (2019) find a wage differential of -7% on average using administrative data in 2016. The size of this wage differential depends on the type of flexible employment: the authors find a wage differential of -3% for employment contracts with a variable number of hours per week to -15% for temporary jobs with a duration less than one year in 2016, compared to permanent jobs.

We study wage differentials in The Netherlands between 2006 and 2019 for different types of flexible employment: temporary employment contracts, temporary agency work, and employment contracts flexible working hours. We estimate these differentials in the baseline using Weighted Least Squares (WLS) and exploiting a matched employer-

employee dataset with a sample of Dutch employees, including 1.1 million individuals. We use WLS to make our analysis representative for the target population.² This dataset is a combination of administration and survey data and contains individual characteristics such as level of education, age and gender, and job characteristics such as occupation, tenure, and whether the job includes managerial tasks.

We contribute to the literature in two ways. First, we examine how the wage differential between different types of flexible employment has evolved between 2006 and 2019. It is interesting to examine this development over time. The share of flexible employment almost doubled, thus flexible employment became a more important feature in the Dutch labour market. Moreover, the existing literature in The Netherlands suggests an increase in the wage differential over time, but this could be a result of different methods used in different studies. Second, we use robust methods to estimate wage differentials. A critique on OLS is that is that unobserved heterogeneity may lead to biased results.

Second, we control for potential differences between employees with a permanent contract and multiple types of flexible employment with regression adjustment (RA) and propensity score matching (PSM) techniques. RA allows for variation in the coefficients of all regressors by type of flexible employment. PSM is a pseudo-randomized method. It compares wages of individual employees with similar characteristics, where one of them has a flexible job and the other a permanent job. Our results from RA and PSM are close to those for our baseline WLS model.

The following research questions will be addressed: 1) How large is the differential in gross hourly wages between different types of flexible employment and permanent employment after adjusting for individual and job characteristics? 2) How has this wage differential evolved between 2006 and 2019? and 3) How does this wage differential vary by gender, level of education, and migration background?

We find an average wage differential of -8.9% between flexible and permanent employment between 2006 and 2019, in line with the literature. This differential is -8.1% for temporary employment contracts, -10.9% for employment contracts with a flexible

²WLS is a generalization of Ordinary Least Squares, where sample weights are used to weight the observations.

number of hours per week and -13.8% for temporary agency work. Moreover, we find that wage differentials for flexible employment are relatively large for men and the higher educated. We do not find evidence for an increase in the wage differential between flexible and permanent jobs between 2006 and 2019.

The remainder of this paper is structured as follows. Section 2 describes the dataset and Section 3 provides some descriptive statistics of the sample. Section 4 explains the method. Section 5 presents the results, and Section 6 offers the results of a sensitivity analysis. Finally, Section 7 concludes.

2 Data

We use administrative and survey data from Statistics Netherlands to construct a matched employer-employee dataset. Administrative data provides employee demographic characteristics, payroll information, and employer characteristics. The Labor Force Survey (LFS) provides job characteristics such as occupation and the individual's level of education. The LFS is conducted quarterly on a representative sample of 1% of the Dutch population over 15 years old. The sample is a rotating panel: each respondent is invited for five consecutive quarters. We use LFS waves from 2006 to 2019 and use weights provided by Statistics Netherlands to reduce biases by selection and non-response.

To construct our sample, we select employees between 15 and 75 years old that participate in the LFS within a year. This is consistent with the definition of the labor force by Statistics Netherlands. Moreover, we select inhabitants of Dutch municipalities, and exclude short-term labor migrants. We also exclude interns, participants of social employment programs, and director-major shareholders. The wage level of a director-major shareholder is not representative, since they have a tax incentive to keep their wages low. We also exclude full time students from our dataset, since their wages are not representative either. Finally, we remove outliers by dropping the 0.5% lowest and highest hourly wages. There are 1.1 million observations in our sample after these selections. The final sample, including individuals for whom all regressors are available, includes 946,068

observations and 630,217 individuals.

The dependent variable in our analysis is the log hourly wage. Gross hourly wages are deflated using a consumer price index with 2019 as base year. We calculate gross hourly wages of individuals by dividing gross annual wages by the number of hours worked. Both are available from the administrative payroll data and from the LFS. We use wages and hours worked from the administrative data, because self-reported wages can be affected by measurement error. Gross annual wages include regular wages, end-of-year bonuses and other special remunerations, overtime pay, and employee pension contributions. The number of hours worked is constructed by Statistics Netherlands and it is based on the number of hours worked including paid overtime hours corrected by vacation days (in line with Smits and de Vries (2018)).

We examine wage differentials between permanent employment and three types of flexible employment. Permanent employment contracts are open-ended, while temporary employment contracts end after a specified amount of time, unless the contract is renewed. Temporary agency workers have an agreement with an agency to work for a third party on contract basis. Employment contracts with flexible working hours can be permanent or temporary; the number of hours paid may vary depending on the amount of work available.³

We use regressors from administration and survey data. The Municipal Population Register provides age, gender and migration background, and address of residence. We use the latter to include the degree of urbanization on a five point scale as a regressor. The General Business Register provides the company size and the sector of employment. Contract type and tenure at the current employer are retrieved from payroll information.

The LFS provides some additional regressors: household composition, level and field of education, level and field of occupation, and whether a job includes managerial tasks. Household composition is derived by Statistics Netherlands based on the reported rela-

³Smits and Skriabikova (2019) furthermore distinguish between temporary contracts with a duration of less than one year, temporary contracts with a duration more than one year and a temporary contract that is expected to be converted in an open-ended contract after expiration. This information not available in the administrative data, but is self-reported. We use contract type information rather than self-reported contract type because the latter may induce a larger measurement error. We examine the effect of the source of contract type data on wage differential estimates in Section 6.

tionship between the respondent and the main earner of the household. It is classified in single without children, single parent, couple with children, couple without children, and other.

The self-reported occupation is classified by Statistics Netherlands in 1-digit job categories using the Beroepenindeling Roa-Statistics Netherlands 2014 (BRC 2014), based on the International Standard Classification of Occupations 2008 (ISCO 2008). Moreover, occupations are classified in four skill levels in line with ISCO 2008. Level and field of education are classified following the international ISCED classification in lower education, medium education, bachelor’s degree, and master’s or PhD degree. Finally, whether the job includes managerial tasks or not is based on the question “Do you manage one or more employees in your current job?”.

3 Descriptive statistics

The geometric mean gross hourly wage of employees with a permanent contract was €23.30 per hour between 2006 and 2019. In the same period, the average wage of employees with a temporary contract was €17.70⁴. The geometric mean gross hourly wage of temporary agency workers and flexible hours contracts was even lower: €14.30 and €14.50 per hour, respectively (see Table 1).

The difference between average wages of employees with permanent and flexible contracts is partly attributable to differences in job and employee characteristics. For example, Table 1 shows that workers with flexible employment are, on average, younger than employees with a permanent contract, in particular employees with a flexible hours contract. Moreover, employees with a flexible contract, in particular temporary agency workers and employees on a contract with flexible hours, are less likely to be higher educated. Employees with a flexible job are also less likely to have a job at a higher professional level or a job that includes managerial tasks. 74.6% of the employees of temporary agencies has a job tenure of less than two years; this is 17.7% of the employees with a permanent contract.

⁴The geometric mean is the exponent of the logarithm of the arithmetic mean hourly wage.

Table 1: Sample characteristics by contract type, 2006-2019

	Perm- anent	Fixed- term	Agency work	Flex hours	Total
<i>Geometric mean gross hourly wage</i>	23.3	17.7	14.3	14.5	21.8
<i>Gender</i>					
Male	53.9	51.7	61.2	36.4	53.4
Female	46.1	48.3	38.8	63.6	46.6
<i>Migration background</i>					
None	83.3	78.3	63.4	75.4	81.7
Western	2.4	4.3	7.3	5.8	2.9
Non-Western	14.4	17.4	29.3	18.8	15.4
First generation	9.2	11.6	23.4	14.9	10.1
Second generation	7.6	10.1	13.3	9.7	8.2
<i>Age</i>					
≤ 24	3.1	15.2	17.1	20.6	5.8
25-35	21.2	37.8	33.1	24.5	24.2
35-45	27.6	22.5	20.8	19.2	26.4
45-55	29.1	16.6	18.1	19.2	26.7
≥ 55	19.0	8.0	10.8	16.5	17.0
<i>Degree of urbanization</i>					
Extremely urbanized	22.6	28.5	26.1	24.6	23.7
Strongly urbanized	31.8	31.5	31.8	32.5	31.8
Moderately urbanized	15.8	14.1	14.0	14.8	15.5
Hardly urbanized	22.2	19.3	20.2	20.9	21.6
Not urbanized	7.6	6.6	7.9	7.2	7.4
<i>Company nr. of employees</i>					
0-10	9.1	17.4	1.8	21.7	10.4
10- 50	15.4	22.7	6.4	20.8	16.4
50-250	20.0	20.2	14.6	14.7	19.7
≥ 250	55.5	39.7	77.3	42.8	53.5
<i>Level of education</i>					
Low	18.3	19.0	32.7	30.8	19.1
Medium	42.7	41.6	46.0	49.6	42.8
Bachelor's degree	25.5	23.0	15.6	15.1	24.6
Master's degree	13.5	16.4	5.8	4.5	13.5
<i>Field of education</i>					
Education	6.4	4.6	2.4	3.6	6.0
Arts and humanities	3.5	4.7	4.6	3.8	3.7
Social sciences	3.5	4.7	3.0	2.2	3.7
Business, admin. and law	20.8	19.7	19.1	17.9	20.5
Sciences	1.9	2.2	1.1	0.6	1.9

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Table 1 – Continued from previous page

	Perm- anent	Fixed- term	Agency work	Flex hours	Total
ICT	2.1	2.0	1.8	1.0	2.1
Engineering	19.4	16.1	20.8	9.6	18.7
Agricultural	2.2	2.3	2.8	2.0	2.2
Health and welfare	14.8	14.5	6.5	18.0	14.6
Services	8.9	12.0	11.5	14.0	9.5
Generic	16.5	17.2	26.4	27.5	17.1
<i>Level of occupation</i>					
Skill Level 1	4.7	7.3	18.6	16.5	5.7
Skill Level 2	40.4	44.4	62.0	62.8	42.2
Skill Level 3	20.9	17.9	10.6	11.9	20.0
Skill Level 4	34.0	30.4	8.8	8.8	32.2
<i>Field of occupation</i>					
Educational jobs	7.9	6.8	1.6	5.0	7.5
Arts jobs	1.2	1.9	0.6	0.6	1.3
Sales and PR jobs	8.8	12.3	5.3	24.6	9.5
Administration jobs	22.9	20.3	25.1	8.8	22.2
Managerial jobs	6.5	4.2	1.0	3.0	5.9
Public admin. jobs	4.8	4.7	3.2	1.3	4.6
Technical jobs	16.5	15.4	31.4	7.3	16.6
ICT jobs	4.7	3.9	1.7	0.8	4.4
Agricultural jobs	1.0	1.2	2.7	1.7	1.1
Health, welfare jobs	15.0	14.0	3.3	15.6	14.5
Services jobs	5.2	8.5	6.6	18.4	6.0
Logistics jobs	5.3	6.6	16.6	12.7	6.0
Other jobs	0.1	0.2	1.0	0.1	0.2
<i>Household situation</i>					
Single, no children	14.1	17.7	21.9	14.9	14.9
Single parent	4.1	3.7	4.1	4.4	4.0
Couple with children	49.4	34.5	29.7	34.5	46.2
Couple, no children	27.9	27.7	23.3	25.0	27.6
Other	4.6	16.4	21.0	21.2	7.3
<i>Contract type</i>					
Full time	56.9	55.6	37.2	21.2	55.4
Part time	43.1	44.4	62.8	78.8	44.6
<i>Job with managerial tasks</i>					
Yes	28.5	20.9	9.4	18.3	26.5
No	71.5	79.1	90.6	81.7	73.5
<i>Job duration</i>					
≤1 year	8.1	37.3	50.0	24.4	14.3
1-2 years	9.5	25.6	24.6	18.0	12.6

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Table 1 – Continued from previous page

	Perm- anent	Fixed- term	Agency work	Flex hours	Total
2-5 years	22.9	23.1	19.6	25.8	22.9
5-10 years	24.7	9.7	4.9	17.3	21.7
10-20 years	22.9	3.4		10.2	19.0
≥ 10 years	11.8	1.0		4.3	9.6
<i>Sector of employment</i>					
Agriculture	1.0	1.0		1.8	1.0
Manufacturing	11.3	8.1		3.2	10.3
Electricity, gas, water	1.1	0.6		0.1	1.0
Construction	5.5	3.9		2.1	5.0
Trade	13.5	17.0		34.9	14.1
Transportation, storage	5.1	5.3		5.9	5.0
Accommodation, food	1.7	4.6		10.6	2.3
ICT	3.9	3.8		1.2	3.7
Finance and insurance	4.3	2.4		0.4	3.8
Business services	11.7	18.7		11.6	15.4
Public administration	9.5	5.3		0.2	8.4
Education	8.9	7.2		1.7	8.2
Health, social work	19.5	17.5		22.3	18.7
Other service activities	3.0	4.7		4.0	3.2
Observations ($\times 1000$)	767	136	25	18	946
Weighted obs. ($\times 1,000,000$)	26.0	5.1	1.0	0.7	32.8

Source: Statistics Netherlands Microdata, own computations.

Notes: Sector of employment is not available for temporary agency workers. The percentage of temporary agency workers with a job duration of 10-20 years and ≥ 20 years are not reported because the number of observations is very small. Results are weighted using LFS weights.

4 Method

In the baseline regression model we adjust wage differentials for employee and job characteristics. More specifically, we estimate the following model:

$$\ln(wage_{i,t}) = \alpha + \delta' F_{i,t} + \beta' X_{i,t} + \gamma' Y_t + \varepsilon_{i,t} \quad (1)$$

where $wage_{i,t}$ is the hourly wage of individual i in year t , α is a constant, δ is the estimated log-wage differential between permanent and flexible employment, $F_{i,t}$ are indicators for type of flexible employment - fixed-term contract, temporary agency contract, or flexible hours contract (the reference group consists of people with a permanent contract) - $X_{i,t}$ is a vector of background characteristics, and Y_t is a vector of year dummies.

We add interaction terms in a second specification to examine differences between the flexible work wage differential and other potential sources of heterogeneity, like gender or level of education:

$$\ln(wage_{i,t}) = \alpha + (\delta + \Delta_{F,X} X_{i,t})' F_{i,t} + \beta' X_{i,t} + \gamma' Y_t + \varepsilon_{i,t} \quad (2)$$

A third model includes an interaction term between contract type and year. We use this model to examine the development of the wage differential between permanent and different types of flexible employment over time, but do not find a change in the wage differentials over time:

$$\ln(wage_{i,t}) = \alpha + (\delta + \Delta_{F,t} Y_{F,t})' F_{i,t} + \beta' X_{i,t} + \gamma' Y_t + \varepsilon_{i,t} \quad (3)$$

We use Weighted Least Squares (WLS) to estimate models (1), (2) and (3) and report standard errors that are robust to clustering at the individual level.

5 Results

After adjusting for employee and job characteristics, we find a significant average gross hourly wage differential of -8.9% between flexible and permanent employment in the 2006-2019 period if we don't make a distinction between the different types of flexible work.⁵ This estimate is in line with findings of recent literature on wage differentials in The Netherlands (see, for example Smits and de Vries (2018)). However, this wage differential varies quite a bit across type of flexible work: it is -8.1% for employees with

⁵This is the log-transformed value of the coefficient reported in specification E in Table 2: $= \exp(-0.093) - 1) * 100 = -8.9\%$.

a fixed-term contract, -13.8% for temporary agency workers, and -10.0% for employees with a flexible hours contract (see specification D in Table 2).

Table 2: Estimated wage differential between flexible and permanent employment using model (1), 2006-2019

Specification	A	B	C	D	E
Fixed-term	-0.274*** (0.002)	-0.108*** (0.001)	-0.091*** (0.001)	-0.084*** (0.001)	
Agency work	-0.484*** (0.002)	-0.353*** (0.003)	-0.157*** (0.003)	-0.149*** (0.003)	
Flex hours	-0.476*** (0.004)	-0.191*** (0.003)	-0.110*** (0.003)	-0.105*** (0.003)	
Flexible job (all types)					-0.093*** (0.001)
Demographics ^a	No	Yes	Yes	Yes	Yes
Job chars ^{a,b}	No	Yes	Yes	Yes	Yes
Education, household ^b	No	No	Yes	Yes	Yes
Occupation ^b	No	No	Yes	Yes	Yes
Year FE	No	No	No	Yes	Yes
Observations (× 1000)	946	946	946	946	946
R ²	0.106	0.374	0.623	0.624	0.624

Source: Statistics Netherlands Microdata, own computations.

Notes: Standard errors are robust to clustering at the individual level.

*** = 1%, ** = 5%, * = 10% significance level. Standard errors between parentheses.

^a = from register data, ^b = from survey data (LFS)

Demographics are gender, migration background, age and degree of urbanization of the location of residence. Job characteristics are sector of employment, company size, job duration and contract type (full time or part time) and from the LFS: whether the job includes managerial tasks. Education includes level and field of the highest level of education achieved. Occupation includes the field and level of occupation.

Results are weighted using LFS weights.

Table 2 shows the estimates of model (1). We gradually include more employee and job characteristics as control variables, in specifications A - D. Specification A shows that the unadjusted hourly wage gap is -24.0% for fixed-term contracts, -38.4% for temporary agency work and -37.9% for flexible hours contracts. The type of employment explains 10.6% of the variation in wages. The estimated wage differentials decrease in absolute value after gradually including regressors, and the explanatory power of the model -

measured by R^2 - improves. Most notably, the estimated wage differential between flexible hours contracts and permanent contracts reduces by more than half after adjusting for job characteristics such as part time work, job tenure, sector of work, and company size (specification B). This is presumably because flexible hours contracts are common in employment sectors with relatively low wages, such trade, restaurants and hotels, and healthcare. The explanatory power of the model improves to 62.3% when the level and type of education and the level and type of occupation are included (obtained from survey data, see specification C in Table 2). Finally, we include year fixed effects in column D. This does not substantially improve the explanatory power of the model, but it does result in a slightly smaller estimate of the wage differential (-8.7% without, and -8.1% with year fixed effects).

Specific groups

The wage differential between flexible and permanent employment differs across groups of employees (see Table 3). For example, the effect of having a fixed-term contract on hourly wages is for low-educated male employees with no migration background -7.4% and -3.7% for similar female employees.⁶ Likewise, wage differentials are about two times larger for men than for women. This is consistent with the findings of previous research (Dias da Silva & Turrini, 2015).

Moreover, wage differentials between permanent and flexible employment increase with level of education, most notably for temporary agency workers. A potential explanation is that labour market institutions, such as the minimum wage, compress the wage distribution at the bottom. The wage differential between temporary agency work and permanent employment is -10.4% for low-educated employees (the reference group), -15.8% for medium educated workers, -22.1% for employees with a bachelor's degree, and -31.0% for employees with a master's degree. The wage differentials of fixed-term con-

⁶The marginal effect of a fixed-term contract on hourly wages of low-educated males without migration background is simply the coefficient of fixed-term contracts, because males are the reference group in the WLS model. 14.8% of the females in our sample has a fixed term contract. The average treatment effect on the treated of a fixed-term contract (ATE) on hourly wages for females is $\exp(-0.077+0.040)-1 = -3.7\%$.

Table 3: Estimated wage differential between flexible and permanent employment using model (2), 2006-2019

	All β -coefficients	Fixed- term	Agency work	Flex hours
All δ -coefficients		-0.077*** (0.003)	-0.110*** (0.004)	-0.118*** (0.007)
		Interactions ($\Delta_{F,X}$ -coefficients)		
Female	-0.121*** (0.001)	0.040*** (0.002)	0.039*** (0.004)	0.056*** (0.007)
<i>Migration background</i>				
Western	-0.104*** (0.004)	0.006 (0.007)	0.064*** (0.009)	0.070*** (0.013)
Non-western	-0.061*** (0.002)	-0.004 (0.003)	0.032*** (0.005)	0.021* (0.008)
<i>Level of education</i>				
Medium	0.094*** (0.001)	-0.007* (0.003)	-0.062*** (0.005)	-0.021*** (0.006)
Bachelor's degree	0.232*** (0.001)	-0.028*** (0.003)	-0.140*** (0.007)	-0.058*** (0.009)
Master's degree	0.403*** (0.002)	-0.101*** (0.004)	-0.261*** (0.010)	-0.139*** (0.023)
Background characteristics included			Yes	
Time fixed effects included			Yes	
Observations			946,068	

Source: Statistics Netherlands Microdata, own computations.

Notes: Standard errors between parentheses. Standard errors are robust to clustering at the individual level.

*** = 1%, ** = 5%, * = 10% significance level.

The model estimated here includes all regressors included in model F in Table 2 (demographics, job characteristics, education, household composition, and occupation) and the interactions presented here. Results are weighted using LFS weights.

tracts and flexible hours contracts decrease with level as education as well, but not to the same extent as that of temporary agency workers.

Finally, wage differentials for temporary agency work and flexible hours contracts are slightly lower for employees with a migration background than for employees without a migration background. They include individuals born abroad and individuals with one or both parents born abroad. The wage differential between fixed-term contracts and permanent contracts is not significantly different for people with and without a migration

background.

Wage differentials over time

Table 4 shows that there is no evidence of a time trend in the wage differentials between different types of flexible employment and permanent contracts. It provides the estimations of model (3). The majority of the interaction terms between year dummies and type of employment are insignificant. The interaction term between flexible hours contracts and 2008 is significant and substantial (-0.163^{***} , see Table 4), but since this is an exception we consider this an outlier rather than a trend. The interaction term between temporary agency work and year dummies is negative for 2010-2019; this suggests that the wage differential has slightly increased in absolute value over time. However, this could be a result of the small number of temporary agency workers in our sample. Still, we can conclude that the wage differentials between different types of flexible employment and permanent contracts are persistent between 2006 and 2019.

6 Sensitivity analysis

Our baseline result is that gross hourly wages of employees with a flexible job - a fixed-term contract, a temporary agency contract or a contract with flexible hours - are on average -8.9% lower than those of employees with a permanent contract, after adjusting for individual and job characteristics. Next, we change some of the assumptions in our approach to examine the robustness of these baseline results.

First, we change the estimation method from WLS to regression adjustment (RA). A critique on using OLS/WLS is that the groups in the comparison are not the same, because they are not randomly assigned. This argument may hold for jobs as well, e.g. because employees with a flexible job are younger than employees with a permanent contract (see Table 1). RA is a more flexible estimation technique that adjusts for differences in observed characteristics. The RA procedure consists of two steps. First, the separate regression models are fit for different employment types (permanent contract, fixed-term

Table 4: Estimated wage differential between flexible and permanent employment using model (3), 2006-2019

	All γ -coefficients	Fixed- term	Agency work	Flex hours
All δ -coefficients		-0.086*** (0.004)	-0.117*** (0.008)	-0.085*** (0.010)
		Interactions ($\Delta_{F,t}$ -coefficients)		
2007	-0.017*** (0.001)	0.003 (0.005)	0.000 (0.010)	-0.012 (0.013)
2008	-0.012*** (0.002)	0.008 (0.005)	-0.002 (0.011)	-0.163*** (0.017)
2009	-0.003* (0.002)	0.016** (0.005)	-0.019 (0.011)	-0.009 (0.015)
2010	-0.006** (0.002)	0.008 (0.005)	-0.047*** (0.011)	-0.010 (0.014)
2011	-0.020*** (0.002)	0.011* (0.005)	-0.032** (0.011)	-0.000 (0.014)
2012	-0.030*** (0.002)	0.006 (0.005)	-0.046*** (0.011)	0.020 (0.014)
2013	-0.048*** (0.002)	0.001 (0.005)	-0.034** (0.011)	0.019 (0.014)
2014	-0.051*** (0.002)	-0.005 (0.005)	-0.047*** (0.011)	-0.008 (0.014)
2015	-0.040*** (0.002)	-0.007 (0.005)	-0.029** (0.011)	-0.015 (0.015)
2016	-0.031*** (0.002)	-0.003 (0.005)	-0.036*** (0.010)	-0.020 (0.013)
2017	-0.030*** (0.002)	-0.012* (0.005)	-0.046*** (0.010)	-0.028* (0.014)
2018	-0.028*** (0.002)	0.002 (0.005)	-0.046*** (0.010)	-0.025 (0.013)
2019	-0.028*** (0.002)	-0.000 (0.005)	-0.036*** (0.010)	-0.043** (0.013)
Background characteristics included			Yes	
Observations			946,068	

Source: Statistics Netherlands Microdata, own computations.

Notes: Standard errors between parentheses. Standard errors are robust to clustering at the individual level.

*** = 1%, ** = 5%, * = 10% significance level.

The model estimated here includes all regressors included in model F in Table 2 (demographics, job characteristics, education, household composition, and occupation) and the interactions presented here. Results are weighted using LFS weights.

contract, and flexible hours contract). All coefficients may differ by employment type in RA: year fixed effects (as in model (2)) and individual characteristics (as in model (3)). We use the same set of regressors as in the baseline WLS model. Second, the treatment effect is calculated as the weighted difference in conditionally expected wages. The ATET is the effect of the contract type on wages for those with a flexible job. The estimated wage differential for employees with a flexible contract using RA is slightly higher than our baseline WLS estimate (-9.7%. see Table 5).

Table 5: Estimated wage differential with alternative assumptions between flexible jobs (all types) and permanent jobs using model (1), 2006-2019

	Wage gap	Observations
WLS, Baseline	-0.093*** (0.001)	946,068
RA (ATET)	-0.102*** (0.001)	946,068
PSM (ATET)	-0.082*** (0.002)	946,068
WLS, Alternative wage def.	-0.085*** (0.001)	946,015
WLS, Alternative contract type	-0.095*** (0.001)	942,359
<i>WLS Models without LFS regressors</i>		
LFS-participants	-0.148*** (0.001)	946,068
All employees	-0.146*** (0.000)	111,673,431

Source: Statistics Netherlands Microdata, own computations.

Notes: *** = 1%, ** = 5%, * = 10% significance level. Standard errors between parentheses. Standard errors are robust to clustering at the individual level and results are weighted using LFS weights in WLS and RA models. Standard errors are Abadie-Imbens robust in the PSM model.

Next, we also estimate the wage differentials by means of propensity score matching (PSM), a pseudo-randomized method. It compares wages of individual employees with similar characteristics, where one of them has a flexible job and the other a permanent job. The PSM procedure is applied separately for different flexible employment types (fixed-term contract and flexible hours contract) and it consists of two steps. First,

the probability of having a flexible job is estimated using observed characteristics for every employee.⁷ Second, the wage differential between flexible and permanent work is calculated for individuals with a very similar probability of having a flexible job.⁸ We use a method proposed by Abadie-Imbens to obtain robust standard errors.

This method adjusts for the estimation error of the propensity score in the first step of the model and adjusts for the number of matched neighbors in the second step. See Abadie and Imbens (2011) for further details. The estimated wage differential from PSM is -7.8%, slightly below our baseline estimate from WLS. This package does not allow for sample weights. However, when we manually weights after running the matching procedure, the estimated wage differential between flexible and permanent jobs is -8.7%, which is close to our baseline result from WLS.⁹

Our definition of hourly wages in the baseline model includes total remuneration in cash. Alternatively, we can define hourly wages as regular fixed salary only, excluding end-of-year bonuses and other special remunerations, overtime pay, and employer pension contributions. The estimated wage differential using this alternative wage definition is -8.1%. This indicates that employees with a permanent contract receive more special remunerations than employees with a flexible contract.

Next, the contract type can be derived from registration data or from survey data. We use registration data in our baseline model, because we believe the risk of misspecification is lower. However, if we use self-reported contract type instead, in line with Smits and Skriabikova (2019), our wage differential estimate is -9.1%. This is again close to our baseline result.

Our sample consists of participants in the LFS, because the LFS provides information about job characteristics. We examine the effect of selecting LFS-participants only by estimating the same model twice, once on the full sample and once on the baseline sample

⁷This probability is estimated with a logit model and the same regressors as in our baseline WLS model. See Table 6 in the appendix for the estimated coefficients of this logit model.

⁸We match each employee with a flexible contract with at least 5 nearest neighbors with a permanent job from our pooled sample to calculate the ATET.

⁹We obtain this estimate by predicting the treatment effect after the PSM procedure and summarizing the treatment effect on the treated using sample weights. This estimate does not provide correct standard errors.

of LFS-participants. The estimated coefficients are close: -13.8% and -13.6% (see Table 5).

7 Conclusion

Employees with a flexible job face more job and income insecurity and lower wages than employees with a permanent contract. Theoretically, we expect higher wages for expect higher wages for flexible jobs than for permanent jobs, to compensate for lower job security (De Graaf-Zijl, 2005; Sullivan & To, 2018). However, we find negative wage differentials for all three types of flexible employment in The Netherlands. This result is in line with findings reported by previous studies. We show that the wage differential between permanent and flexible employment is persistent between 2006 and 2019. Our results are robust to sample selection and alternative definitions of contract types and gross hourly wages. Moreover, RA and PSM provide estimates of the wage differential between flexible and permanent employment that are close to our baseline WLS estimate.

We show that the wage differential between flexible and permanent employment is heterogeneous. The differential is larger, on average, for temporary agency workers (-13.8%) and somewhat smaller for employees with a flexible hours contract (-10.0%) and a temporary contract (-8.1%). Moreover, we show that the wage differential between flexible and permanent employment is larger for men than women and it increases with level of education. Furthermore, we show that wage differentials are heterogeneous across groups of employees and range up to -31.0% for temporary agency workers.

It remains a puzzle why wage differentials between flexible and permanent employment can be so persistent. A potential explanation is that there is unobserved heterogeneity between employees with a flexible and a permanent contract. For example, employers might offer a permanent contract and higher wages to the most productive employees only. Unfortunately, our database does not provide information on productivity. Alternatively, the wage differential between flexible and permanent employment may reflect poor bargaining power. Employees with a flexible contract are most-often not a member

of a trade union. Moreover, they might put less effort in bargaining higher wages, because they prefer a contract extension. Examining the drivers of the unexplained wage differential between flexible and permanent employment is an interesting topic for future research.

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Appendix

Table 6: Estimations of probability to have a fixed term and a flexible hours contract or a permanent contract using Logit model, 2006-2019

	Fixed-term	Flex hours
Female	-0.068*** (0.009)	0.048** (0.023)
<i>Migration background</i> (reference=none)		
Western	0.190*** (0.023)	0.453*** (0.047)
Non-Western	0.137*** (0.015)	0.280*** (0.033)
Second generation	-0.065*** (0.019)	-0.229*** (0.043)
<i>Age</i> (reference= ≤ 24)		
25-35	-0.330*** (0.015)	-0.654*** (0.033)
35-45	-0.643*** (0.017)	-0.813*** (0.037)
45-55	-0.804*** (0.017)	-0.807*** (0.037)
≥ 55	-0.985*** (0.018)	-0.649*** (0.037)
<i>Part time</i> (reference=full time)		
	0.124*** (0.009)	1.453*** (0.022)
<i>Job duration</i> (reference = ≤ 1 year)		
1-2 years	-0.897*** (0.011)	-0.631*** (0.029)
2-5 years	-2.085*** (0.010)	-1.286*** (0.026)
5-10 years	-3.070*** (0.013)	-1.789*** (0.029)
10-20 years	-3.898*** (0.017)	-2.217*** (0.033)
≥ 20 years	-4.178*** (0.026)	-2.158*** (0.042)
<i>Sector of employment</i> (reference=agriculture)		
Manufacturing	0.047 (0.039)	-0.829*** (0.083)
Electricity, gas, water	-0.145*** (0.055)	-2.110*** (0.261)
Construction	-0.164***	-0.540***

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	Fixed-term	Flex hours
	(0.041)	(0.089)
Trade	0.238***	0.386***
	(0.038)	(0.074)
Transportation and storage	0.286***	-0.225***
	(0.040)	(0.081)
Accommodation, food	0.704***	0.619***
	(0.043)	(0.080)
ICT	-0.002	-0.699***
	(0.042)	(0.104)
Finance and insurance	-0.135**	-1.954***
	(0.043)	(0.143)
Business services	0.365***	-0.238**
	(0.038)	(0.076)
Public administration	0.179***	-3.423***
	(0.040)	(0.196)
Education	0.593***	-1.494***
	(0.041)	(0.099)
Health, social work	0.326***	-0.323***
	(0.039)	(0.078)
Other service activities	0.491	-0.287***
	(0.041)	(0.083)
<i>Company nr of employees</i> (reference= ≤ 10)		
10-50	-0.018	-0.142***
	(0.012)	(0.026)
50-250	-0.276***	-0.342***
	(0.012)	(0.028)
≥ 250	-0.523***	-0.269***
	(0.011)	(0.024)
<i>Degree of urbanization</i> (reference=extremely urbanised)		
Strongly urbanised	-0.030**	-0.017
	(0.010)	(0.024)
Moderately urbanised	-0.074***	-0.048
	(0.012)	(0.028)
Hardly urbanised	-0.087***	-0.093***
	(0.011)	(0.026)
Not urbanised	-0.080***	-0.144***
	(0.015)	(0.035)
<i>Household type</i> (reference=single without children)		
Single parent	-0.033	-0.274***
	(0.020)	(0.045)

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	Fixed-term	Flex hours
Couple with children	-0.238*** (0.011)	-0.331*** (0.028)
Couple without children	-0.127*** (0.012)	-0.211*** (0.028)
Other	0.072*** (0.016)	0.305*** (0.037)
<i>Level of education</i> (reference=low)		
Medium	-0.041*** (0.011)	-0.010 (0.022)
Bachelor	-0.097*** (0.015)	0.069** (0.033)
Master	0.072*** (0.017)	-0.202*** (0.050)
<i>Field of education</i> (reference=education)		
Arts and humanities	0.262*** (0.025)	-0.162* (0.065)
Social sciences, journalism and information	0.225*** (0.025)	-0.167* (0.074)
Business, administration and law	0.126*** (0.020)	-0.128** (0.051)
Natural sciences, mathematics and statistics	0.391*** (0.030)	-0.340** (0.114)
ICT	0.095** (0.033)	-0.255* (0.114)
Engineering, manufacturing and construction	0.176*** (0.022)	-0.399*** (0.057)
Agriculture, forestry, fisheries and veterinary	0.161*** (0.031)	-0.599*** (0.077)
Health and welfare	0.227*** (0.021)	-0.155** (0.050)
Services	0.309*** (0.022)	-0.160** (0.053)
Generic programmes	0.244*** (0.022)	-0.041 (0.052)
<i>Level of occupation</i> (reference=Skill Level 1)		
Skill Level 2	-0.311*** (0.019)	-0.279*** (0.032)
Skill Level 3	-0.527*** (0.021)	-0.975*** (0.043)
Skill Level 4	-0.521*** (0.022)	-1.542*** (0.050)
<i>Field of occupation</i> (reference=educational jobs)		

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	Fixed-term	Flex hours
Arts jobs	0.320*** (0.035)	-0.140 (0.112)
Sales and PR jobs	0.132*** (0.023)	-0.036 (0.052)
Administration jobs	-0.088*** (0.020)	-1.165*** (0.052)
Managerial jobs	-0.136*** (0.025)	0.125 (0.068)
Public admin. jobs	0.412 *** (0.027)	-0.267** (0.086)
Technical jobs	0.064** (0.023)	-0.702*** (0.060)
ICT jobs	-0.236*** (0.028)	-0.795*** (0.105)
Agricultural jobs	0.016 (0.043)	-0.014 (0.087)
Health, welfare jobs	-0.031 (0.021)	-0.315*** (0.046)
Services jobs	-0.177*** (0.026)	-0.307*** (0.053)
Logistics jobs	0.044 (0.027)	0.156** (0.060)
Other jobs	0.063 (0.091)	-0.545* (0.218)
<i>Job with managerial tasks</i> (reference=Yes)		
No	0.121** (0.009)	0.056* (0.023)
<i>Year</i> , (reference=2006)		
2007	0.940*** (0.020)	0.534*** (0.053)
2008	1.696*** (0.020)	1.037*** (0.050)
2009	1.929*** (0.020)	1.160*** (0.051)
2010	2.034*** (0.020)	1.269*** (0.050)
2011	2.259*** (0.020)	1.438*** (0.050)
2012	2.375*** (0.020)	1.577*** (0.049)
2013	2.538*** (0.020)	1.763*** (0.048)

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	Fixed-term	Flex hours
2014	2.584*** (0.020)	1.817*** (0.048)
2015	2.591*** (0.020)	1.802*** (0.048)
2016	2.589*** (0.020)	1.855*** (0.048)
2017	2.501*** (0.020)	1.941*** (0.047)
2018	2.307*** (0.020)	1.726*** (0.046)
2019	2.090*** (0.020)	1.661*** (0.046)
Constant	-0.842*** (0.055)	-2.213 (0.119)
Number of observations ($\times 1000$)	902	785

Source: Statistics Netherlands Microdata, own computations.

Notes: Results are weighted using LFS weights.

*** = 1%, ** = 5%, * = 10% significance level.

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