Hiring subsidies and temporary work agencies*

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Abstract

This paper evaluates a hiring subsidy for lower-educated youth in Flanders (Belgium) that reduced labour costs by 10% to 15% for a period of two years. The hiring subsidy did not improve the job finding rate of eligible job seekers. We offer a novel explanation for this null finding. We first document that temporary work agencies obtained about 25% to 34% of the subsidies, and hired almost 40% of the subsidised job seekers. We then show that agencies did not respond to the policy by increasing the wages of subsidised workers. Remarkably, despite a 2.8% labour cost reduction, agencies employed 8% fewer eligible individuals after the reform. Our findings highlight the role of temporary work agencies in shaping the effectiveness of active labour market policies targeted at disadvantaged groups.

Keywords: hiring subsidy, temporary work agencies, youth employment, ALMP
JEL Codes: J08, J23, J53, J64, J68

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1 Introduction

Wage and hiring subsidies, designed to reduce labour costs of young workers, are popular policy instruments to combat youth unemployment, in both the EU (Escudero and Mourelo, 2015) and the US (Neumark and Grijalva, 2017). The effectiveness of this policy depends not only on the type of workers it targets but also on the type of employers benefiting from the subsidy, an aspect crucial in shaping its impact. In general, a broad range of employers, including temporary work agencies (TWAs), can take advantage of these subsidies when hiring eligible job seekers. While TWAs often hire a disproportionate share of young, disadvantaged job seekers[1] and may obtain the lion's share of the subsidy, their specific role in shaping the effectiveness of hiring subsidies has not yet been examined.

This paper evaluates the effectiveness of a typical hiring subsidy targeted at lower-educated youths in improving their job finding rate and explores how the subsidy affects wages, labour costs, and employment within TWAs. More specifically, we evaluate a hiring subsidy for high school dropouts and graduates under 25 years of age in Flanders, the Dutch-speaking region of Belgium, in place since July 1, 2016. The hiring subsidy reduces labour costs by 10% to 15% for a period of two years after hiring without imposing specific requirements on employers or employees. In 2019, TWAs obtained 25% of the subsidy for dropouts and 34% of the subsidy for graduates.

The first part of the paper exploits the age discontinuity in a regression discontinuity framework to show that the hiring subsidy does not improve the job finding rate among the population of eligible job seekers. We can reject at the 95% confidence level that the subsidy increases the probability of being employed at least once over a six-month period after entry into unemployment by more than 3.5%. Several scholars argue that disadvantaged groups are more likely to benefit from hiring subsidies (Katz, 1996; Brown, 2015). In this light, our null result is perhaps not surprising for high school graduates, a group that does not face substantial hurdles to employment in Flanders. By contrast, our null finding is far more surprising for high school dropouts, as this group struggles to find (stable) jobs, even in times of labour market shortages.[2]

The second part of the paper endeavours to explain this null finding by investigating the response of TWAs to the subsidy. Using firm-level data on the population of TWAs

[1] For instance, Autor and Houseman (2010) note that 15% to 40% of former welfare recipients who obtained employment in the years following the 1996 US welfare reform were employed by TWAs. In 2020, TWAs accounted for 25% of the new hires in Italy (Assolavoro, 2020).

[2] According to the Labour Force Survey, in 2020, 58% of the dropouts and 83% of the graduates in the age group 20 to 29 (excluding students) were employed in Flanders (Steunpunt Werk, 2020).

and a difference-in-differences design, we find that the wages of the eligible agency workers are not affected by the subsidy, whereas labour costs decreased by 2.8% following the 2016 reform. However, despite the labour cost reduction, TWAs employ 7.9% fewer eligible workers after the reform.

How to explain these puzzling findings? A TWA can adopt two opposing strategies to respond to hiring subsidies: (i) the agency can attract and place more eligible individuals in client firms, or (ii) it can claim the subsidy for those individuals it would anyway support without investing in reaching and placing more of them in client firms. Our findings suggest that the second strategy dominates. Although TWAs claim the subsidy, we find no evidence that these agencies employ more eligible workers. In fact, the number of eligible workers employed by TWAs even declines. Because the job finding rate of eligible job seekers remains unaffected by the subsidy, this finding suggests that regular employers hire more eligible job seekers as a response to the policy, thereby reducing the pool of eligible individuals who enrol at TWAs. As such, job creation among regular employers might be entirely offset by job losses in TWAs.

Our paper contributes to the vast literature on active labour market policies (ALMP) and, more specifically, to the smaller literature on hiring subsidies targeted at lower-educated, young individuals.[3] The reviews of Kluve (2010) and Card et al. (2018) find that ALMP tend to be less effective for youths than for the general population. For this reason, two reviews focus specifically on the potential of youth employment programmes. Caliendo and Schmidl (2016) discuss youth employment programmes in Europe. Four out of the eight studies evaluating wage or hiring subsidies find positive employment effects. Reviewing evaluations of youth employment programmes in developed and developing countries, Kluve et al. (2019) demonstrate that the programmes' design and delivery are crucial aspects of their effectiveness and are more important than the type of intervention. They find some evidence that hiring subsidies are less effective than other interventions in developed countries. Two recent, influential studies report, however, sizeable positive effects of a hiring subsidy targeted at low-wage workers in small firms in France (Cahuc et al., 2019) and of a permanent payroll tax reduction for young workers in Sweden (Saez et al., 2019). We add a precisely estimated null to this literature.

Our paper is closely related to Albanese et al. (2022) and Dejemeppe et al. (2023). Albanese et al. (2022) evaluate a one-shot[4] hiring subsidy for high school dropouts and

[3]For systematic reviews see, Caliendo and Schmidl (2016); Card et al. (2010, 2018); Kluve (2010); Kluve et al. (2019); Vooren et al. (2019)

[4]It is a one-shot subsidy in the sense that only employers who hired eligible workers in 2010 or 2011 were eligible. The subsidy in our paper is a permanent hiring subsidy because the policy was not expected to expire at some pre-announced date.

graduates in Wallonia, the French-speaking part of Belgium, in the aftermath of the Great Recession. They find large and persistent positive employment effects, particularly for graduates. By contrast, Dejemeppe et al. (2023) find no effects of another hiring subsidy for dropouts and graduates in Wallonia in 2017-19 and highlight that TWAs are keen users of the subsidy. One potential explanation for the discrepancy between the three studies is the state of the economy at the time of the intervention. Several papers indeed find that wage and hiring subsidies are more effective during economic recessions (Cahuc et al., 2019; Bruhn, 2020; Benzarti and Harju, 2021; Neumark and Grijalva, 2017). In line with these studies, we find suggestive evidence that the hiring subsidy in Flanders is more effective in slack than tight labour markets, but only for dropouts.

The paper's main contribution is to highlight the role of TWAs in shaping the effectiveness of a hiring subsidy. To the best of our knowledge, only Hamersma and Heinrich (2008) document that TWAs can be among the main beneficiaries of hiring subsidies. Studying hiring subsidies for welfare recipients in the US, they show that subsidised agency workers have a similar job duration as non-subsidised agency workers but have much higher earnings, suggesting that the hiring subsidies are partly passed on to the worker. This latter finding contradicts our results. We do not find any evidence that the hiring subsidy increased agency workers' wages, presumably because Belgian labour law stipulates that agency workers should obtain exactly the same remuneration as regular workers in the same occupations in the client firm. Evaluating the same subsidy, Hamersma (2008) finds some evidence of short-run improvements in the employment levels of subsidised workers.

While not a single paper has examined how TWAs respond to hiring subsidies, a growing literature discusses how regular private-sector firms respond to wage and hiring subsidies. Most studies find favourable effects of these subsidies on firm-level employment and on the economic performance of subsidised firms.[5] To cite a few studies, Kangasharju (2007) shows that firms in Finland did not replace non-subsidised workers with subsidised ones, indicating limited deadweight effects at the firm level; Lombardi et al. (2018) demonstrate that subsidised firms in Sweden outperformed similar non-subsidised firms in terms of employment growth and profits, particularly if caseworkers approve the subsidy; Cahuc et al. (2019) report that a hiring subsidy in France for low-wage workers in firms employing fewer than ten employees led to sizeable increase in employment in the subsidised firms during the Great Recession; and Saez et al. (2019) observe that firms

[5]Exceptions include Collischon et al. (2021) who document that the Minijobs in Germany replaced non-subsidised jobs in small firms, and Fenizia et al. (2024) who show that a payroll tax reduction for apprentices in Italy granted to firms employing nine employees or less did not increase the number of apprentices employed by these small firms.

that employ more young workers in the pre-reform period experienced faster growth in employment, sales, investment, and profits following the payroll tax cut for these workers. Our findings diametrically oppose these positive results. We find that employment of eligible individuals declines in TWAs. This contrast highlights the specificity of TWAs as opposed to regular private-sector firms studied in the aforementioned papers.

The rest of the paper is organised as follows. The next section discusses the policy and the institutional setting. Section 3 describes the panel dataset of job seekers, as well as the firm-level panel dataset of TWAs. Using the first dataset, Section 4 examines the impact of the subsidy on the job finding rate. Using the second dataset, Section 5 investigates the response of TWAs to the subsidy. Section 6 concludes.

2 The policy

Belgium has a long tradition of wage and hiring subsidies for disadvantaged socioeconomic groups (Albanese and Cockx, 2019; Godefroid et al., 2021; Leduc and Tojerow, 2020). Hiring subsidies became a regional competence in 2015, and the four regions[6] subsequently reformed the existing hiring subsidies. Flanders, the Dutch-speaking region in the north of Belgium, replaced the existing subsidies by hiring subsidies for three target groups: high school dropouts and graduates under 25 years of age; individuals over 55 years of age; and individuals with a disability.

This paper focuses on the hiring subsidy in Flanders for individuals under 25 years of age. Employers receive a temporary hiring subsidy when hiring an eligible worker.[7] Workers are eligible if they meet four conditions: (1) they are less than 25 years old on the last day of the quarter in which they are hired; (2) they have at most a high school degree; (3) their wage does not exceed a certain threshold[8]; and (4) they have a part-time or full-time contract, or work at least 27.5% of a full-time worker in a given quarter. This last condition implies that (agency) workers who are only employed for a few days over a quarter are not eligible for the subsidy.

The subsidy is slightly more generous for individuals without a high school degree—referred to as high school dropouts—than for those with a high school degree but

[6]Hiring subsidies differ in Flanders, Wallonia, Brussels, and the German-speaking Community.

[7]The policy does not only target the unemployed. Individuals who were previously employed (i.e., job-to-job transitions), who were out of the labour force, or who entered the labour market after graduating are also eligible.

[8]The quarterly wage cannot exceed €7,500 during quarters one to four and €8,100 during quarters five to eight. Most young, lower-educated workers earn less, implying that this condition does not bind for most of them.

without a university or university college degree—referred to as high school graduates. Employers receive a quarterly Social Security Contribution (SSC) reduction of at most €1,150 for high school dropouts and of at most €1,000 for high school graduates during eight subsequent quarters after hiring. The subsidy is reduced almost proportionally for part-time workers.[9] The reduction cannot exceed SSCs, which currently amount to 25% of wages but are lower for low-wage workers.[10] Because many young, lower-educated workers are low-wage workers, a substantial fraction of employers do not receive the maximum SSC reduction.

A crucial feature of the policy for our identification strategy is that a worker, once hired, does not age out of eligibility. Stated differently, employers who hire an eligible worker will receive the subsidy for eight quarters as long as this worker remains employed, even if the worker becomes older than 25. This feature ensures a (sharp) discontinuity at age 25, as employers who hire workers just under 25 years of age can claim a subsidy over eight quarters of €8,000 (graduates) or €9,250 (dropouts) whereas employers who hire workers just over 25 years of age receive nothing.

The policy came into effect on July 1, 2016, but was reformed in subsequent years. On January 1, 2019, the hiring subsidy became more generous for high school dropouts. Since then, employers have been exempt from SSC for dropouts during eight quarters. The hiring subsidy for high school graduates was abolished on January 1, 2020, and for dropouts on July 1, 2024.

Figure 1 shows the projected impact of the hiring subsidy on labour costs for dropouts (red line) and graduates (black dashed line) in function of quarterly wages. We show the labour cost reduction induced by the subsidy in 2016-17 (left panel) and 2019 (right panel). We focus on two periods because dropouts are exempt from SSC since 2019.[11] Additionally, within the framework of the so-called tax shift, the federal government gradually reduced SSC between 2016 and 2019.[12] This federal policy makes the Flemish hiring subsidy slightly less generous in 2019 than in 2016-17. We also highlight the distribution of quarterly wages of subsidised workers.

[9]Employers receive the entire subsidy if the employee works at least 80%.

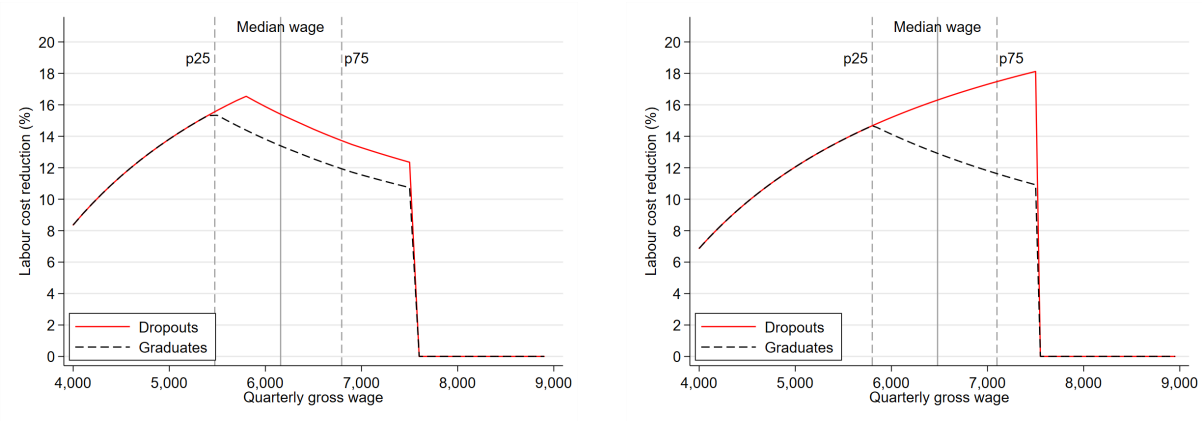
[10]In the second quarter of 2016, low-wage workers are workers whose quarterly full-time equivalent wage does not exceed €7,500.

[11]For conciseness, we do not show the labour cost reduction for the year 2018, during which the tax shift was almost entirely implemented but while the SSC exemption for dropouts was not yet in place. Because the impact of the tax shift is limited, the impact of the hiring subsidy on labour costs in 2018 is comparable to the impact in 2016-17.

[12]The tax shift gradually reduced the nominal payroll tax rates from 32.4% in 2015 to 25% in 2019. The effective tax rate is lower mainly because the rates are lower for low-wage and, prior to the tax shift, high-wage workers. When simulating the impact of the hiring subsidy on labour costs, we use the effective payroll tax rates, which depend on the wage.

Figure 1: Labour cost reduction induced by the subsidy

(a) 2016-17 **(b)** 2019



Notes: The figures shows the labour cost reduction induced by the hiring subsidy by educational level for a full-time worker in function of gross wages during the first four quarters after hiring, taking into account the payroll tax rates (including SSC reductions for low-wage workers) in 2016-17 and 2019. The vertical lines indicate the 25th, 50th and 75th percentile of the distribution of wages of subsidised workers in 2017 and 2019. The median quarterly wage of subsidised workers is €6,158 in 2017 and €6,356 in 2019. In both periods, median wages of subsidised dropouts and graduates are comparable.

The figures demonstrate that the subsidy reduced labour costs by 10% to 16% for graduates in both periods. At relatively low wages, the impact of the subsidy on labour costs is the same for dropouts and graduates. This occurs because the subsidy cannot exceed SSC, implying that the subsidy for dropouts and graduates is the same below a certain wage level. Above this wage level, the subsidy for dropouts exceeds that for graduates, and the labour cost reduction for graduates is about two percentage points higher than for dropouts in 2016-17. The SSC exemption for dropouts, in place since 2019, increases the impact of the subsidy on labour costs for dropouts relative to graduates, but only for those with relatively high wages. At the median wage of a subsidised worker, the labour cost reduction for dropouts (16%) in 2019 is three percentage points higher than the reduction for graduates (13%).

The hiring subsidy is not automatically granted to employers but has to be claimed by employers when filing quarterly wages with the National Social Security Office (NSS0). However, since almost all employers outsource payroll administration to specialised payroll agencies, which are well aware of the subsidies, the take-up rate is likely to be substantial. A non-representative survey among employers indicates that approximately 60% of employers are aware of the existence of hiring subsidies for disadvantaged job seekers (Boucq and Lopez Novella, 2018).

Like other firms, TWAs are eligible for the hiring subsidy. TWAs are private-sector

firms that employ agency workers who are outsourced from the TWA to another company, typically for a short period of time. Agency work is strictly regulated in Belgium.[13] Agencies have to obtain a licence granted by the region where they want to operate before they can start their activities. In principle, private sector firms can only rely on agency work to (1) temporarily replace a permanent worker, (2) address a temporary increase in work due to a demand shock, or (3) execute exceptional work. Depending on the exact motive, client firms can use an agency worker for at most six or twelve months.

Since the agency worker is an employee of the TWA, the TWA is responsible for the payroll tax administration and paying the worker's wage. This is the reason why the TWA, rather than the client firm, receives the hiring subsidy. Belgian labour law stipulates that the wage of the agency worker should be equal to the wage of a regular worker performing similar task in the client firm, as determined by collective bargaining agreements. The client firm pays a fixed fee to the TWA that includes a profit margin. This fee is negotiated between the TWA and the firm.[14]

Using publicly available NSSO data, Table 1 documents the number of full-time equivalent (fte) workers per quarter for whom a subsidy was granted, the quarterly subsidy per fte-worker, and the annual cost of the subsidy for the years 2016 to 2022. The most striking observation is that most subsidies went to high school graduates. In 2019, just before the abolition of the subsidy for graduates, the subsidy was granted to 9,596 dropouts and 25,552 graduates per quarter. The annual cost amounted to €140 million, of which nearly 70% was allocated to high school graduates.

Table 1: Summary statistics of the hiring subsidy, by year and educational level

Year	Dropouts				Graduates			
	Beneficiaries (fte)	Annual cost (€1,000)	Subsidy/fte (per quarter)	TWA (% of subsidy)	Beneficiaries (fte)	Annual cost (€1,000)	Subsidy/fte (per quarter)	TWA (% of subsidy)
2016	3,833	7,571	988	65	9,980	18,164	910	58
2017	7,613	30,008	985	43	19,857	73,252	922	34
2018	9,753	40,048	1,027	36	26,613	100,898	948	27
2019	9,596	44,001	1,146	34	25,552	95,844	938	25
2020	7,369	33,643	1,141	31	13,020	50,175	963	15
2021	7,431	34,006	1,144	29	2,981	11,554	969	10
2022	7,178	31,886	1,111	N.A.	-	-	-	-

Notes: The table reports the average number of full-time equivalent subsidised workers per quarter (averaged over four quarters), the annual cost of the subsidy, and the quarterly subsidy per fte-worker. The subsidy for high school graduates was abolished on January 1, 2020, but employers who had hired eligible individuals before that date continued to receive the subsidy for the remaining quarters.
Source: Publicly available NSSO data, and own calculations based on confidential DWSE data.

The quarterly subsidy per fte-worker in 2018 is €1,027 for high school dropouts and

[13] Temporary agency work is regulated by the Act of 24 July 1987.

[14] To the best of our knowledge, only Fernandez-Mateo (2007) examines how TWAs and client firms bargain about the fee. Interestingly, she shows that in the US larger firms pay lower fees, and agency workers working at firms that obtain a discount have lower wages than similar agency workers working at firms that do not obtain the discount.

€948 for graduates. The average subsidy is lower than the maximum subsidy of €1,150 (€1,000) for dropouts (graduates) because the subsidy cannot exceed SSC. The average subsidy remained fairly constant over the entire period for high school graduates but slightly increased for dropouts from 2019 (from €1,027 in 2018 to €1,146 in 2019) as a result of the 2019 reform that exempts dropouts from SSC.

Confidential data shows that, in 2019, TWAs obtain 34% (25%) of the subsidies for dropouts (graduates) were granted to TWAs (Table 1). The proportion of subsidised jobs in TWAs among all subsidised jobs is even higher. In 2019, 47% (35%) of the subsidised jobs for dropouts (graduates) were temporary agency jobs (results not shown). The observation that TWAs obtain a substantial share of the subsidy is the key motivation to investigate how these agencies respond to the subsidy.

A hiring subsidy for high school graduates[15] did not exist prior to the 2016 reform. By contrast, various subsidies existed for high school dropouts, of which the generosity depended on the level of education and unemployment duration (see Desiere et al. (2020) for details). All these subsidies were abolished in Flanders on July 1, 2016. The existence of a myriad of subsidies for dropouts in the pre-reform period is one of the reasons why we do not estimate difference-in-differences regressions for this group. We will instead exploit the age discontinuity in a donut Regression Discontinuity Design, which does not require interpreting the findings relative to the pre-reform period.

3 Data

We rely on three data sources: (1) data on job seekers from VDAB, the Flemish Public Employment Service; (2) data on subsidised employment spells from the Flemish Department of Work and Social Economy (DWSE); and (3) firm-level data for the population of TWAs in Flanders from the National Social Security Office (NSSO). The first two datasets are used to evaluate the impact of the hiring subsidy on the job finding rate. The last dataset is used to evaluate the response of TWAs to the subsidy.

VDAB data on job seekers

The VDAB granted us access to a panel dataset of the population of job seekers with at most a high school degree under 30 years of age for the years 2012 to 2020. Registration at the VDAB is required to claim unemployment benefits. We restrict the population to job seekers who received unemployment benefits or who are in their so-called waiting period. This latter category consists of job seekers who (typically) graduated recently but

[15] With the exception of a hiring subsidy for high school graduates unemployed for at least six months.

have insufficient work experience to claim unemployment benefits. These job seekers have to wait about twelve months after graduation before becoming eligible for an activation allowance (see Cockx et al. (2020) for details).

Our main identification strategy is a donut RDD. The analysis includes all unemployment spells that started between July 1, 2016, and June 30, 2019 of the population of job seekers who, at the start of their unemployment spell, remain eligible for the subsidy for at most 42 months or who lost their eligibility status at most 36 months ago, excluding those who are eligible for at most 6 months (the donut). These restrictions result in a dataset that contains 46,316 unemployment spells of 38,099 unique job seekers, of which 19,110 unemployment spells are from dropouts and 27,206 from graduates. For high school graduates, we use unemployment spells that started before the policy was in place and after the policy was abolished to conduct placebo tests.

The dataset identifies the exact start and end dates of an unemployment spell. The VDAB is automatically notified when a job seeker resumes employment, but our dataset does not include job characteristics such as the wage, type of contract, or sector. For this reason, our main outcome is the job finding rate within six months. This indicator is equal to one if the job seeker has worked at least one month over a period of six months following entry into unemployment. We do not observe whether individuals are employed by TWA, but individuals who regularly accept agency work (at least ten days over the last 28 days) are classified as employed.

Two job seeker characteristics are crucial for the analysis: birthday and educational level. For privacy reasons, we do not observe the exact birthday, but we observe the year and month of birth. Job seekers' level of education is either self-reported at the time of registration at VDAB or is obtained from the LED database, an administrative dataset that contains degrees awarded by Flemish educational institutions. The level of education can change over time. We always use the highest level of education reported at the start of the unemployment spell.

DWSE data on subsidised employment spells

We match the VDAB dataset with data on subsidised employment spells obtained from the Flemish Department of Work and Social Economy (DWSE), the administration in charge of the Flemish hiring subsidies. This quarterly dataset contains individual-level information on all employees who received a subsidy, including the amount of the subsidy, the wage, the number of days worked, and the sector. We use this dataset to estimate the take-up rate of the subsidy and to determine the amount of the subsidy conditional on being employed in a subsidised job. In addition, this dataset allows us to document the

distribution of the subsidy by sector. Seven out of ten individuals who receive the subsidy are observed in the VDAB data, suggesting that three out of ten subsidised individuals were not unemployed when hired (e.g., job-to-job transitions, individuals who found a job immediately after leaving school without registering at the VDAB).

Using the VDAB and DWSE data, Table 2 presents descriptive statistics for (1) job seekers eligible for the subsidy (the treated group in the RDD); (2) job seekers ineligible for the subsidy (the control group in the RDD); and (3) job seekers who obtained a subsidised job within six months. For reasons explained below, eligible job seekers comprise job seekers who age out of eligibility 6 to 42 months after the start of their unemployment spell. Job seekers in this group are between 21 years, 3 months, and 24 years, 5 months old at the start of their unemployment spell. Ineligible job seekers are job seekers whose spell starts up to 36 months after the last month in which they were eligible for the subsidy. These job seekers are between 24 years, 9 months, and 28 years old.

Table 2: Descriptive statistics

	Eligible	Ineligible	Job seekers with subsidised jobs
Age			
Mean	22.8	26.3	22.9
Range (min - max)	21y3m - 24y5m	24y9m - 28y0m	21y3m - 25y
Characteristics (%)			
Woman	41.8	43.5	41.9
Belgian nationality	84.9	72.2	85.9
Belgian origin	67.1	29.7	68.6
Driving licence	38.7	40.8	38.8
Disability	1.3	4.1	1.2
Education (%)			
Dropouts	35.7	51.6	36.8
Graduates	64.3	48.4	63.2
Unemployment status (%)			
Unemployment benefits	61.5	99.4	67.6
Waiting period	38.5	0.6	32.4
Outcomes (%)			
Subsidised job within 6m	45.6	2.8	100
Job finding rate within 6m	65.1	60.0	99.3
Months of employment within 6m	2.6	2.4	4.0
N	30,205	16,111	15,022

Notes: The table reports summary statistics on eligible, ineligible, and subsidized job seekers based on the VDAB and DWSE datasets. Job seekers are classified as eligible if they remain eligible for the subsidy for 6 to 42 months, and as ineligible if they aged out of eligibility for 1 to 36 months. Finally, subsidized job seekers are eligible job seekers who found a subsidized job within six months after the start of the unemployment spell.
Source: VDAB and DWSE data.

Slightly less than two-thirds of the job seekers eligible for the subsidy are graduates, while one-third are dropouts. The main outcomes, which will be used in the RDD regressions, are reported at the bottom of the table: 46% (65%) of the eligible job seekers will

find a (subsidised) job within six months, and these job seekers are on average employed for 2.6 months over a six-month period following the start of their unemployment spell.

Comparing column (1) to (3) of Table 2 demonstrates that job seekers who receive the subsidy are relatively similar in terms of observable characteristics to the eligible job seekers and do not appear to be positively selected. By contrast, ineligible job seekers (column 2) are more disadvantaged than younger, eligible job seekers. For instance, 67% of the eligible job seekers are of Belgian origin vs. only 29% of the ineligible job seekers, and older job seekers are considerably more likely to be high school dropouts. This illustrates that we expect a negative association between age and the job finding rate in the RDD regressions.

NSSO data on TWAs

The VDAB and DWSE data allow examining the hiring subsidy from the point of view of job seekers, but do not allow studying how firms respond to the hiring subsidy. As mentioned earlier, the DWSE data show that 25% (graduates) to 34% (dropouts) of subsidised employees are employed by TWAs, suggesting that TWAs' behaviour might determine the effectiveness of the subsidy. For this reason, we obtained firm-level data on TWAS from the National Social Security Office (NSSO), the federal administration in charge of SSC.

More specifically, we obtained quarterly firm-level data for the population of TWAs active in Flanders for the years 2009 to 2022. For each TWA, we observe the number of full-time equivalent (fte) workers, the wage bill, the hiring subsidy by level of education, SSC and SSC reductions, disaggregated by the workers' age measured on the last day of the quarter.[16] Because agency workers typically do not work full-time during an entire quarter, it is important to emphasise that fte-employment is defined as the total number of days worked in a given quarter by all agency workers of a certain age employed by the agency in that quarter.

This information allows computing the wage rate, labour costs, and employment by age group. The wage rate is defined as the total quarterly wage bill divided by total fte-employment in that quarter. Labour costs are defined as the sum of the wage bill and SSC minus the SSC reductions, divided by fte-employent. Note that the SSC reductions include the hiring subsidy as well as other reductions, such as the reductions for low-wage workers. The wage rate and labour costs are deflated using the CPI and are expressed in 2013 prices.

[16]The TWAs' own staff, students, and flexi-jobs are excluded. TWAs employ many students and individuals holding flexi-jobs, but these groups are not eligible for the subsidy.

Before 2013, statistics for TWAs active in Flanders are only available in the second and fourth quarter. For this reason, we have data for the second and fourth quarters for the years 2009-12 and for all four quarters for the years 2013-22. In the main analysis, we will compute yearly averages across the available quarters.

The NSSO dataset has two limitations. First, in contrast to the VDAB data, someone's age on the last day of the quarter is recorded in years rather than months. This limitation prevents us from estimating an RDD. We will instead rely on a DiD event study contrasting the evolution of three outcomes (wage rate, labour costs, and employment) for temporary agency workers aged 24 (treated group) to agency workers aged 26 (control group) within the same TWA. This approach is not problematic because, in contrast to the VDAB and DWSE, the NSSO observes SSC reductions in the pre-reform and post-reform periods. Hence, we can compute labour costs in both periods, which takes into account that TWAs might have received SSC reductions for specific disadvantaged workers in the pre-reform period.

The second limitation is that we do not observe workers' educational level nor the number of days worked by individuals employed for less than 27.5% of a fte-worker. For these two reasons, the DiD estimates identify an intention-to-treat (ITT) effect for individuals under 25 years of age, as not all individuals within this age group are eligible for the subsidy.

In 2015, 148 TWAs were active in Flanders, employing 28,235 employees aged 18 to 25 per quarter. This age group accounts for 46% of agency workers in Flanders, indicating that young workers are more likely to be agency workers. The market is dominated by a few large firms. In 2015, the ten largest firms together employed 63% of the agency workers aged 18 to 25.

According to our confidential NSSO dataset, in 2019, TWAs employed on average 2,972 fte subsidised dropouts and 5,944 fte subsidised graduates per quarter and obtained in 14 million and 22 million euros in subsidy for dropouts and graduates, respectively (see Table A.1 for statistics by year). These figures are consistent with the publicly available figures reported in Table 1.

4 Impact on the job finding rate

4.1 The Donut Regression Discontinuity Design (RDD)

We exploit the age discontinuity in a donut RDD to identify the ITT effect of the hiring subsidy on the job finding rate of eligible job seekers. Job seekers are eligible for the subsidy when they are under 25 years of age on the last day of the quarter in which they are hired. This eligibility criterion implies that the running variable is not exactly equal to the job seeker's age at the start of the unemployment spell, but is defined as the number of months between the start of the unemployment spell and the first month in which the job seeker is no longer eligible for the subsidy. Consequently, the running variable depends on the job seeker's birthday and the start date of the unemployment spell, is strictly negative for job seekers eligible for the subsidy, and is equal to zero or positive for ineligible job seekers.

We provide an example to clarify the definition of the running variable. Suppose an individual named John celebrates his 25th birthday in March 2018. The first month during which John is no longer eligible for the hiring subsidy is January 2018. This means that the running variable equals 0 if John's unemployment spell starts in January 2018, is strictly positive for spells starting after January 2018, and is strictly negative for spells starting in preceding months (e.g., equal to -1 f John's unemployment spell starts in December 2017). Note that the value of the running variable is the same for all individuals born in the same quarter if their unemployment spell starts in the same month. For instance, John and an individual who turns 25 in January 2018 (i.e., three months older than John) have the same value of the running variable if the start of their unemployment spell coincides.

One complication of our approach is that some job seekers are only eligible for the subsidy when hired shortly after the start of the unemployment spell. Job seekers who are eligible for a few months are less likely to benefit from the subsidy than younger job seekers who are eligible for the subsidy for several months or even years before ageing out of eligibility. To address this issue, we follow Barreca et al. (2016) and Albanese et al. (2022) and estimate an RDD after removing job seekers who are eligible for the subsidy for six months or less. Concretely, job seekers with a running variable in the range of -6 to -1 (the 'donut') are excluded from the analysis. We extrapolate the linear spline within the donut to estimate the causal effect of the policy at the cutoff.

The following donut RDD is estimated:

$$y_i = \alpha + \beta T_i + \delta_1 z_i T_i + \delta_2 z_i + \tau X_i + \mu_i \qquad z_i \notin [-6, -1]$$

where z_i defines the running variable of unemployment spell i, and $T_i = \mathbf{1}[z_i < 0]$ equals one if the job seeker is eligible for the subsidy.

The terms $\delta_1 z_i T_i$ and $\delta_2 z_i$ capture a linear association between the outcome and the running variable on the left- and right-hand sides of cutoff. X_i are control variables included in a sensitivity analysis, and ϵ_i is the idiosyncratic error component clustered by individuals, as some individuals experience several unemployment spells.[17] The coefficient of interest, β, captures the ITT effect at the cutoff. Following Albanese et al. (2022), we choose a symmetric bandwidth of 36 months on each side of the donut. Observations are weighted using triangular kernel weights to account for the distance of each observation to the cutoff.

We first explore whether the subsidy created exogenous variation at the age cutoff in terms of the take-up rate of the subsidy, the subsidy amount, and labour costs. We then examine the impact of the subsidy on the job finding rate. Our primary outcome of interest is the cumulative job finding rate within six months following the start of the unemployment spell. In this case, the outcome y_i equals one if a job seeker is employed at least once within a period of six months after the start of the unemployment spell, and zero otherwise.[18] As a sensitivity check, we will also examine whether the job finding rate increased in months 1 to 6 after the start of the unemployment spell and whether the total number of months worked over a six-month period increased.

Our estimates and discussion are structured as follows. First, we obtain the effects for the eligible population, which includes both high school dropouts and graduates. Then, we examine the effects separately for each educational level. We expect a larger effect on the job finding rate for dropouts than graduates, not only because dropouts receive a larger subsidy but also because existing literature suggests that more vulnerable job seekers benefit more from hiring subsidies.

We implement numerous robustness and placebo tests. We first test for the continuity of the density of the running variable to rule out manipulation and sorting above and below the cutoff, and then examine the continuity of covariates at the threshold. Next, we examine the sensitivity of the results to using different bandwidths, different donut holes, the inclusion of covariates, and restricting the sample to job seekers claiming un-

[17] Clustering by the running variable, as recommended by Lee and Card (2008) but opposed by Kolesár and Rothe (2018) for RDD with discrete running variables, does not alter the findings.

[18] We follow VDAB conventions to classify job seekers as employed or unemployed, with the exception of individuals in subsidised on-the-job training (called IBO in Dutch). We classify individuals in this programme as unemployed. This choice is unlikely to affect our findings, as only about 4% of the job seekers included in the main analysis participate in this programme within six months after the start of the unemployment spell.

employment benefits. As a placebo test, we estimate the donut RDD for the population of high school graduates before the policy was in place and after it was abolished. Finally, we implement DiD regressions for the graduates.

4.2 Results

4.2.1 Subsidy take-up

We start by presenting graphical evidence to assess whether the eligibility criterion creates exogenous variation in the take-up of the subsidy and in labour costs at the cutoff, which is crucial for establishing causal effects (if any) of the subsidy on the job finding rate in an RDD setting.

Figure 2a shows the share of job seekers who transition to a subsidised job within six months after entry into unemployment. The figure demonstrates a sizeable discontinuity at the cutoff. Slightly more than 40% of the eligible job seekers just below the cutoff find a subsidised job within six months, compared to less than 10% of those who are just over the cutoff.[19] The differential take-up rate at the cutoff is estimated at 30 percentage points (pp).[20] The discontinuity in the take-up of the subsidy induces exogenous variation in labour costs. Figure 2b displays the quarterly subsidy for a full-time equivalent (fte) worker on each side of the cutoff, conditional on finding a job within six months and setting the subsidy equal to zero for those who found a job but did not receive the subsidy. We observe a differential quarterly subsidy of €507 at the cutoff.[21] This finding indicates that employers obtain a considerable subsidy when hiring eligible workers.

Figure 2c shows that the subsidy reduces labour costs by approximately 7.7%. Computing the labour cost reduction requires assumptions about the SSC rate and the incidence of the subsidy. Labour costs are defined as the sum of wages and SSC minus the hiring subsidy. While we observe wages and the hiring subsidy for subsidised individuals, SSC are not directly observed. These contributions can be computed. To this end, we assume that the SSC rate amounts to 21.7% of the wage. This rate corresponds to the 2016-17 SSC rate paid by employers for employees with quarterly wage rates of €6,300, which is close to the average wage rate of subsidised workers. We also assume that the subsidy is entirely captured by the employer and is not shared with the employee. This assumption will be validated in Section 5 for the large subset of individuals who found a

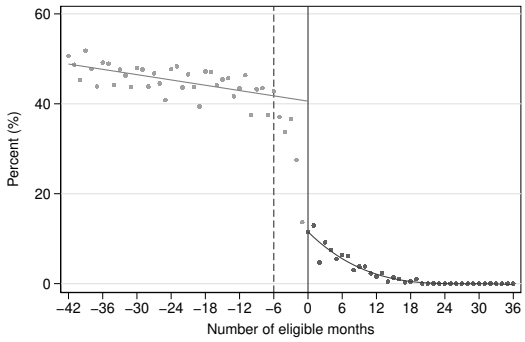
[19] The observation that a small fraction of ineligible job seekers still obtain the subsidy is most likely due to measurement error caused by converting the quarterly DWSE data to monthly data that could be matched with the VDAB data.

[20] When fitting a quadratic spline to the right-hand side of the cutoff, the differential take-up rate is 29.1%; when fitting a linear spline to the right-hand side, the differential take-up rate is 31.7%.

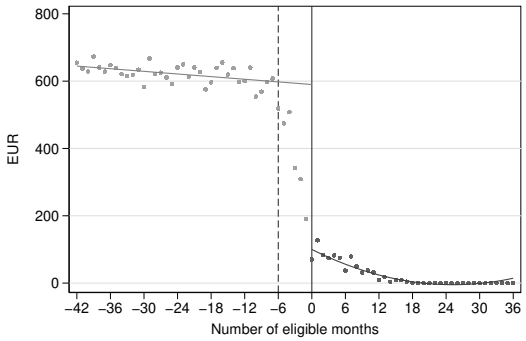
[21] The subsidy amount for a full-time worker conditional on finding a subsidised job is €969.

Figure 2: The discontinuity at the cutoff

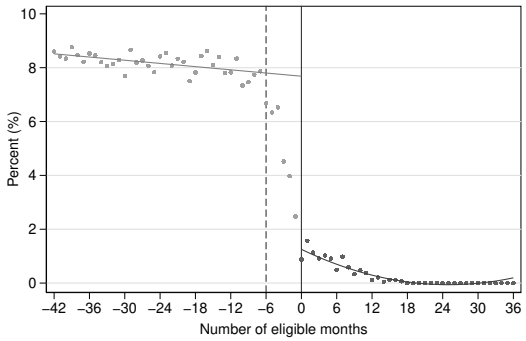
(a) Take-up rate



(b) Quarterly subsidy per fte-worker



(c) Labour cost reduction



Notes: The bandwidth of the Donut RDD is 36 months on each side of the donut. Each dot represents a one-month spaced bin. The outcome in Panel (a) is the probability of having a subsidised job within six months after entry into unemployment. The outcome in Panel (b) is the average quarterly subsidy for a fte-worker conditional on finding a job within six months. The outcome in Panel (c) is the average labour cost reduction conditional on finding a job within six months. In Panel (a), the RDD estimate is 0.32 pp [95% CI: 0.30; 0.34] with N = 46,316. In Panel (b), the RDD estimate is €507 [95% CI: 482; 531] with N = 29,378. In Panel (c), the RDD estimate is 6.6 [95% CI: 6.3; 7.0] with N = 29,378. The number of observations is lower in Panels (b) and (c) than in Panel (a) because we condition on finding a job within six months after entry into unemployment. The six observations within the donut, indicated by the vertical lines, are excluded when estimating the RDD.

subsidised job in a TWA.

The estimate of the impact of the subsidy on labour costs includes individuals who found a job but did not receive the subsidy. The labour cost reduction is, by definition, zero for this group. The labour cost reduction amounts to 12.6% for those who received the subsidy. This estimate closely aligns with the simulated impact of the subsidy on labour costs reported in Section 2.

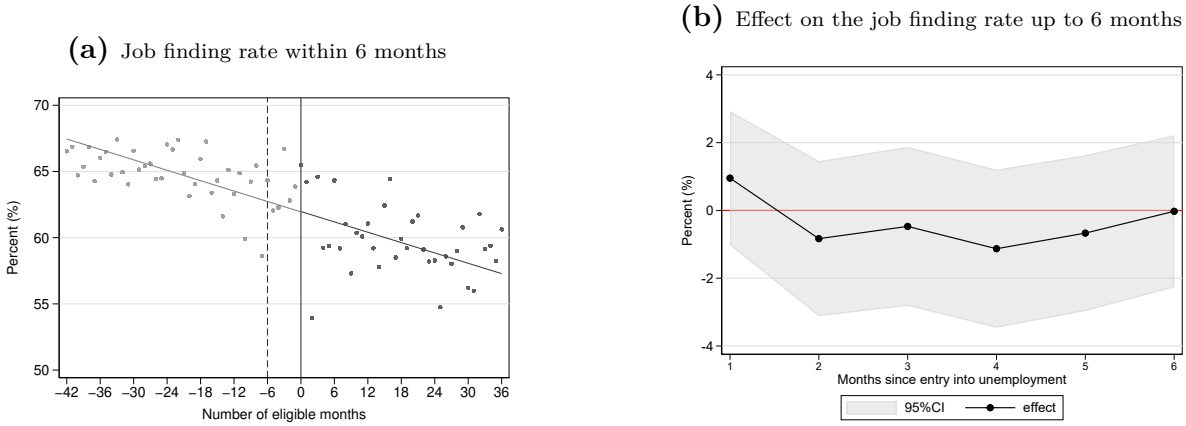
The findings hold for both high school dropouts and graduates (see Figures B.1, B.2 and B.3 for the equivalent figures by educational level). The hiring subsidy has a slightly larger effect on the labour cost of dropouts (a reduction of 8.5%) compared to graduates

(a reduction of 7.0%). Both groups have similar wages, but the subsidy for dropouts is slightly higher than for graduates.

4.2.2 The job finding rate

In this section, we investigate whether the labour cost reduction induced by the subsidy translates into higher job finding rates among eligible job seekers. Figure 3a presents compelling evidence that the subsidy did not improve the job finding rate. The figure shows the probability of working at least one month over a six-month period after entry into unemployment in function of the number of months the job seeker is still eligible for the subsidy. Even though the treated group has a higher probability of receiving the subsidy, there is no discontinuity in the job finding rate at the cutoff. The RDD estimate is small and insignificant (−0.03 pp, [95% CI: −2.27; 2.22]). The average job finding rate at the cutoff is 62.0%. Hence, we can rule out at the 95% confidence level that the subsidy increased the job finding rate by more than 3.5%.[22]

Figure 3: Effect on the job finding rate



Notes: Panel (a) shows the probability of being employed at least one month within six months after entry into unemployment in function of the running variable. The RDD estimate in Panel (a) is −0.03 pp [95% CI: −2.27; 2.22]) with N=46,316. Panel (b) shows the RDD estimates (and their 95% CI) of the effect of the hiring subsidy on the probability of being employed at least one month over a period of d months after entry into unemployment, where d ranges from one to six months.

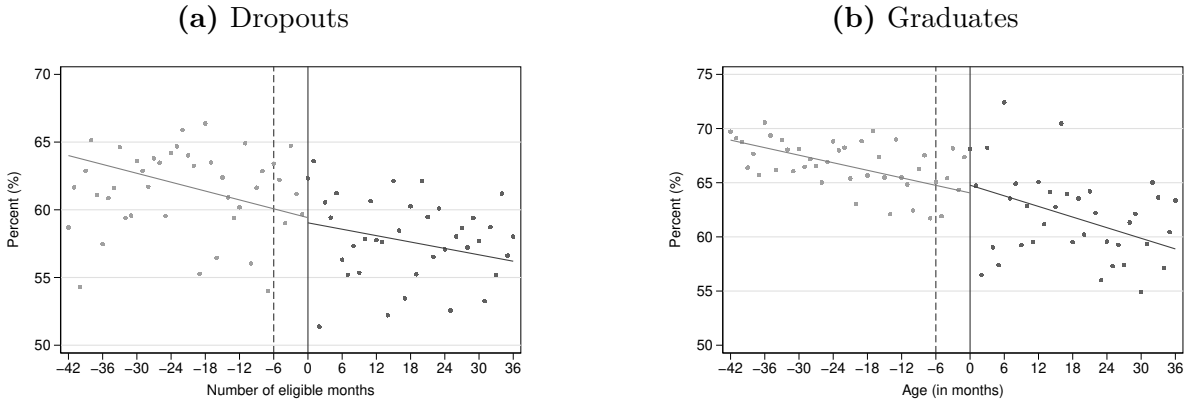
Figure 3b displays the effect of the hiring subsidy on the job finding rate measured at different elapsed unemployment durations. More specifically, the outcome is now defined as the probability of being employed at least one month over a period of d months after the start of the unemployment spell, where d ranges from one to six. The effect is always small and never significantly different from zero at the 95% confidence level. Similarly, we find no effect of the subsidy on the total number of months worked over a six-month

[22]=2.2/62.0

period (results not shown). Both analyses demonstrate that our main finding is not sensitive to defining the outcome as being employed within six months.

Figure 4 shows the effect of the subsidy on the job finding rate within six months separately for high school dropouts and graduates. The effect is small and not statistically significant for either group. The RDD estimate is 0.38 pp [95% CI: −3.07; 3.83] for dropouts[23] and −0.71 pp [95% CI: −3.69; 2.27] for graduates. In our setting, it appears that a hiring subsidy for dropouts is not more effective than for graduates.[24]

Figure 4: Job finding rate by educational level



Notes: The figures show the probability of being employed at least one month within six months after entry into unemployment for dropouts (Panel (a)) and graduates (Panel (b)) in function the running variable. The RDD estimate is 0.38 pp [95% CI: −3.07; 3.83] for dropouts and −0.71 pp [95% CI: −3.69; 2.27] for graduates. The number of observations is 19,110 in Panel (a) and 27,206 in Panel (b).

4.2.3 Previous studies and heterogeneous effects over the business cycle

A few prominent recent studies highlight that hiring subsidies are more effective in times of recessions than in times of booms (Cahuc et al., 2019; Neumark and Grijalva, 2017; Benzarti and Harju, 2021). This could explain our null-finding because the period we study is characterized by a low and decreasing level of youth unemployment (see Figure B.5).

Differences in the economic cycle might also reconcile the opposing results reported in

[23]Since the 2020 reform only abolished the hiring subsidy for graduates but kept the subsidy for dropouts in place, the sample of dropouts can be expanded to those that entered unemployment between July 2016 and August 2019 (six months before the COVID-19 crisis). This increases the sample size to 20,180 (+1,070 observations). Using this extended sample, we obtain a larger RDD estimate for dropouts and a slightly smaller 95% CI: 0.73 pp [95% CI: −2.62; 4.09].

[24]As some studies have reported larger effects of hiring subsidies for women than men (Kunze et al., 2023), we also examined effect heterogeneity by gender. If anything, we find the opposite with larger effects for men than women. The RDD estimate is 0.88 pp [95% CI: −2.07; 3.82] for men (N =26,679) and −1.27 pp [95% CI: −4.73; 2.19] for women (N =19,637).

the studies by Albanese et al. (2022) and Dejemeppe et al. (2023), which are closely related to our study. Both studies use a donut RDD to evaluate a hiring subsidy for graduates and dropouts below 25 years of age in Wallonia, the French-speaking region of Belgium, in respectively 2010 and 2017-19. The first study considers the period following the Great Recession, whereas the second study considers a period characterised by decreasing youth unemployment (see Figure B.5). Using rich administrative data ($N = 9,935$), Albanese et al. (2022) find a sizeable positive effect of the one-off hiring subsidy on the job finding rate within twelve months of 10.5 pp [95% CI: 3.0; 18.1], relative to a counterfactual job finding rate of 42%. The positive effect is more pronounced for dropouts (+13 pp) than graduates (+8 pp). By contrast, Dejemeppe et al. (2023) use a large administrative dataset from the Walloon public employment service ($N = 55,136$) and find no effects for either graduates or dropouts. Their findings are remarkably similar to the ones reported in this paper.

We explore whether the hiring subsidy in Flanders is more effective in slack than tight labour markets. To this end, we exploit variation in the economic environment across municipalities and time. More precisely, we compute the job finding rate of job seekers with at most a high school degree aged 27-30 by municipality and month. This group is not directly affected by the subsidy. Our proxy for the economic environment in month X in municipality Y is defined as the moving average of this job finding rate in municipality Y averaged over a period of twelve months, from month X-5 to X+6. Figure B.6 in Appendix shows the variation of this variable across municipalities and over time. The job finding rate gradually improves over the period considered in the analyses, consistent with the evolution of youth unemployment at the aggregate level. Using this variable, we split the sample equally between municipalities-months with a slack vs. a tight labour market.

The RDD estimates in Table 3 provide suggestive evidence that the hiring subsidy is indeed more effective in slack than tight labour markets but only for dropouts. The RDD estimate for dropouts in slack labour markets is positive and relatively large (although still insignificant), while all other RDD estimates have the wrong sign and are close to zero. The estimate suggests that the hiring subsidy increases the job finding rate of dropouts in slack labour market by 1.6 pp or by 2.8% in relative terms. The implied elasticity of the job finding rate with respect to the labour cost reduction for this group is -0.33[25], which is much smaller in absolute value than the elasticity of -3.1 reported by Albanese et al. (2022) for dropouts, and remains at the lower end of the elasticities reported in a number of other studies that evaluate hiring subsidies targeted at disadvantaged groups

[25] $= (1.57/55.8)/-8.5$

(Desiere and Cockx, 2022).

Table 3: The impact of the hiring subsidy in slack vs. tight labour markets

	Entire population		Dropouts		Graduates	
	Slack LM	Tight LM	Slack LM	Tight LM	Slack LM	Tight LM
ITT	1.04	−1.02	1.57	−0.86	0.15	−1.39
	(1.66)	(1.71)	(2.44)	(2.57)	(2.13)	(2.17)
Constant	58.8***	65.5***	55.8***	62.7***	61.7***	68.1***
	(1.07)	(1.10)	(1.53)	(1.59)	(1.50)	(1.51)
N	24,540	21,776	10,268	8,842	14,272	12,934

Notes: Slack (tight) labour markets are defined as municipalities-months where the the 12-month moving average of the job finding rate of job seekers aged 27-30 is lower than (greater than) 59.2%. The average job finding rate of job seekers aged 27-30 in slack and tight labour markets is 51.6% and 64.9%, respectively.

4.2.4 Validation and placebo tests

We conduct the standard validation and placebo tests. We briefly discuss the results here, but, for the sake of conciseness, we do not include all relevant tables and figures in the paper.

First, the local polynomial density estimation test proposed by Cattaneo et al. (2020) confirms that the density of the running variable evolves continuously around the cutoff, which rules out manipulation and sorting across the running variable, which is, in any case, unlikely in our setting. In a similar vein, we test whether the predetermined covariates such as the origin of the job seeker, place of residence and year-quarter of inflow in unemployment evolve continuously around the cutoff. We only observe small (but statistically significant) discontinuities for high school graduates. These observations support the assumption that the outcome would have evolved continuously at the cutoff in the absence of the policy.

Second, we examine whether the results are sensitive to using different bandwidths, different donut holes (9 and 12 months rather than 6 months), and the inclusion of covariates. Regardless of the specification and the significance of some covariates, all point estimates lie within the 95% CI of our benchmark estimate (Table A.2).

Third, we consider the possibility that the "Activation allowance" threatens the validity of our identification strategy. After graduation, job seekers registered at the VDAB have to wait about one year before becoming eligible for an activation allowance, which is similar to unemployment benefits but does not require work experience. The rules governing the waiting period and activation allowance are complex and depend on the job seeker's age and educational level (Cockx et al., 2020, 2023). One rule stipulates that job

seekers have to be registered for the first time at the VDAB before 24 years of age to be eligible for an activation allowance in the future, implying that individuals who are 24 or older at the time of graduation are never eligible for an activation allowance. One might be concerned that this specific rule changes the composition of the population around the cutoff. For instance, our data restrictions imply that job seekers over 25 years of age always claim unemployment benefits, while 39% of the job seekers aged 21.5-24.5 are in their waiting period and do not yet claim benefits (see Table 2). To test the sensitivity of our estimates to the inclusion of job seekers in their waiting period, we exclude this group from the analysis and estimate the donut RDD for the population of job seekers claiming unemployment benefits. This restriction reduces the sample size by 26%, but our findings for both dropouts and graduates remain unaltered (Table A.2).

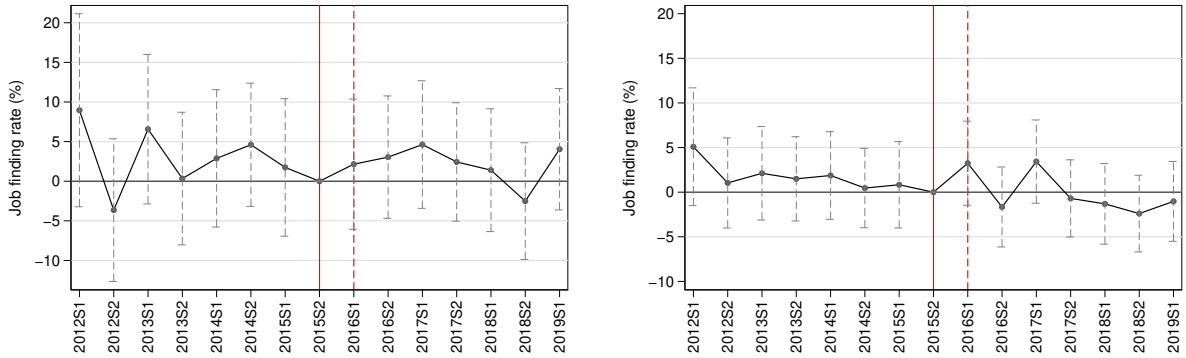
Fourth, we implement a placebo test to examine whether there is a significant difference in the job finding rate at the cutoff for high school graduates when the hiring subsidy was not yet in place or after the policy was abolished. In both periods, the difference in the job finding rate at the cutoff is not statistically significant (Table A.2). We cannot conduct a similar placebo test for dropouts because this group was already eligible for various hiring subsidies before 2016, and the hiring subsidy for this group was not abolished in 2020 but remained in place until July 1, 2024.

Finally, we implement a difference-in-differences (DiD) regression for high school graduates. We first contrast the job finding rate of job seekers aged 23.5-24.5[26] (treatment group) to those aged 25-26 (control group) in pre-reform and post-reform period. We chose small age groups because this choice makes it likely that the parallel trend assumption holds and makes the DiD estimate comparable to the RDD estimate, which identifies a local effect for job seekers around the age of 25. Figure 5a shows the DiD event study plot. Reassuringly, we do not observe differential trends in the pre-reform period. Consistent with the RDD estimate, the DiD estimates in the post-reform period are small and not statistically significant. We then expand the age groups to go beyond a local effect and to increase the precision of the estimates. The DiD event study plot contrasting the job finding rate of job seekers aged 21-24.5 to those aged 25-28 do not show differential trends in the pre-reform period, and do not suggest an increase in the job finding rate of the treated group in the post-reform period (Figure 5b). Overall, the DiD regressions confirm that the subsidy had no effect on the job finding rate of high school graduates and suggest that the null-finding not only holds for the 25-year-olds but for all job seekers aged 21-24.5.

[26] Age is measured on the last day of the quarter in which the jobseeker became unmployed.

Figure 5: DiD event studies for graduates

(a) 23.5-24.5 vs. 25-26 **(b)** 21.5-24.5 vs. 25-28



Notes: The figure shows a DiD event study for graduates using different control and treatment groups. Panel (a) compares graduates aged 23.5-24.5 (treatment group, $N = 10,474$) to those aged 25-26 (control group, $N = 6,295$). Panel (b) compares graduates aged 21-24.5 (treatment group, $N = 53,939$) to those aged 25-28 (control group, $N = 15,837$). The outcome is the probability of being employed for at least one month over a six-month period following the start of the unemployment spell. Job seekers are grouped according to semester of the start of the unemployment spell. The reference semester is 2015S2. The subsidy came into force on July 1, 2016, which implies that job seekers in 2016S1 are only partially treated. The vertical bars indicate 95% confidence intervals based on robust standard errors.

5 The response of TWAs

The previous section shows that the hiring subsidy does not improve the job finding rate among eligible job seekers. As noted earlier, in 2019, TWAs obtained 34% (25%) of the subsidies for dropouts (graduates). For this reason, understanding the response of TWAs to the subsidy could help us explain the null finding. In this section, we study the response of TWAs by exploiting in a difference-in-differences design that only individuals under 25 years of age are eligible for the subsidy.

We first conduct the analysis at the sectoral level and investigate how temporary agency employment evolved in Flanders for workers aged 24 relative to those aged 26, before and after the reform. We then leverage our firm-level data and examine how employment of eligible and ineligible agency workers evolved within TWAs. The sector-level analysis has the advantage of capturing the response of the entire sector; the firm-level analysis has the advantage of capturing the response within individual TWAs but requires restricting the population to a balanced sample of TWAs.

5.1 DiD

In the first part of the analysis, we implement a standard DiD design using grouped data on temporary agency work for the years 2011 to 2019 in Flanders.

We compare two groups of young workers: (i) agency workers aged 24 (eligible group) and (ii) agency workers aged 26 (control group). We deliberately choose two groups close in age, as this choice makes it likely that the parallel trend assumption holds. We do not use agency workers aged 25 as the control group because individuals hired by an agency before turning 25 remain eligible for the subsidy as long as they remain employed by the agency. Indeed, 13% of agency workers aged 25 are subsidised and this share remains stable in years 2017 to 2019. By contrast, there are almost no subsidised agency workers aged 26.

The NSSO data does not allow distinguishing between workers with and without university (college) degrees, with the first being never eligible for the subsidy. In addition, only agency workers who work a sufficient number of days over a quarter are entitled to the subsidy, but the share of agency workers who meet this condition is not observed. These limitations imply that the DiD estimates capture the ITT. However, the data permits us to compute the share of subsidised agency workers among all agency workers per age group. One-fourth of the 24-year-olds are subsidised workers in the last two quarters of 2016, and around 42% of agency workers in this age group are subsidised from 2017 to 2019.

We focus on three outcomes that reveal TWAs response to the hiring subsidy: the (gross) wage rate, labour costs, and full-time equivalent employment in TWAs. The first two outcomes allow us to study the incidence of the hiring subsidy. We thus investigate whether the subsidy increases employees' wages or reduces TWAs' labour costs. The third outcome allows us to test if TWAs expanded employment of eligible individuals as a response to the policy.

Following Saez et al. (2019), the sector-level analysis consists in estimating the following DiD specification using yearly data aggregated at the sector level by age group:[27]

$$\frac{y_{g,t}}{y_{g,2015}} = \alpha_t + \beta_g + \gamma \;\; \mathbf{1}(g \;<\; 25) \;\times\; \mathbf{1}(t \;>\; 2015) \;+ \varepsilon_{gt}$$

where the outcome is defined as the outcome variable in year t for the age cohort g ($y_{g,t}$) relative to the outcome in 2015 (e.g., growth in agency work between 2015 and year t). α_t are year fixed effects controlling for time-varying shocks common to both eligible and ineligible age groups. β_g are cohort or age fixed effects and control for cohorts' characteristics that are constant over time. ε_{gt} is the error term. The parameter of interest γ identifies the ITT.

[27]This choice implies that we rely only on 18 observations covering nine years for the two age groups.

In the second part of the analysis, we examine the impact of the hiring subsidy on the same three outcomes, but we exploit variation within TWAs. This firm-level analysis has the advantage of examining how individual TWAs respond instead of examining the aggregate responses for the entire TWA sector. The main disadvantage of this approach is that it requires a balanced panel of TWAs. Therefore, the estimates do not capture the response of the entire sector but capture the average response of TWAs in the balanced panel.

More specifically, we estimate the following DiD event study:

$$\frac{y_{i,g,t}}{y_{i,g,2015}} = \sum_{t\,=\,2011,\ t\,\neq\,2015}^{t\,=\,2019} \delta_t\ \mathbf{1}(g\ <\ 25)\ \times\ \mathbf{1}(t\ >\ 2015)\ +\ \alpha_t +\ \gamma_g\ +\ \rho_i\ +\ \varepsilon_{igt}$$

where $y_{i,g,t}$ is the outcome variable in firm i in year t for the age cohort g, normalised to the outcome in the reference year 2015. α_t are year fixed effects and γ_g are cohort fixed effects. ρ_i are firm fixed effects that control for firms' time-invariant characteristics. ε_{igt} is the error term. Standard errors are clustered at the firm level. To make the estimate representative for the TWA sector, regressions are weighted by the firm-level average employment in the pre-reform years 2011-2015.

The parameters of interest are δ_t, which correspond to the difference in the outcome for individuals aged 24 versus those aged 26 before and after the reform within the same TWA. The coefficients should be equal to zero in the pre-reform period (2011-14) and identify the impact of the policy in the post-reform period (2016-19). In the first post-reform year (2016), TWAs are only partially treated since the reform was implemented in the third quarter of 2016. We will evaluate the sensitivity of the benchmark results to a more precise definition of the post-reform period.

Identification in this setting rests on the assumption that (firm-specific) time shocks have the same effect on agency workers aged 24 and 26 within the same firm. This assumption appears reasonable as, in the absence of the subsidy, both groups are likely to be very similar. Estimates of the parameters in the pre-reform period allow testing the parallel trend assumption before the implementation of the policy.

Following Miller (2023), we restrict the population of TWAs to a balanced panel of firms that were active throughout the period 2011 to 2019, employ temporary workers aged 24 and 26 in all years, and have at least 5 fte-workers, on average, during the period 2011 to 2019.[28] While 234 TWAs were active over this period in Flanders, only

[28]The latter criterion is implemented because a large number of TWAs are tiny and have less than

56 firms met the three conditions mentioned above. A minority of these firms (3.8%) were excluded because they did not employ workers in the relevant age groups, but many firms had less than 5 fte-workers or were not observed throughout the entire 2011-2019 period (65.9%). However, the firms included in the balanced sample account for a large share of temporary agency work. In 2015, the last pre-reform year, TWAs in the sample employed 96.4% of agency workers aged 24 and captured 94.8% of the hiring subsidies allocated to TWAs for the relevant age group in 2016.[29]

5.2 Sector-level analysis

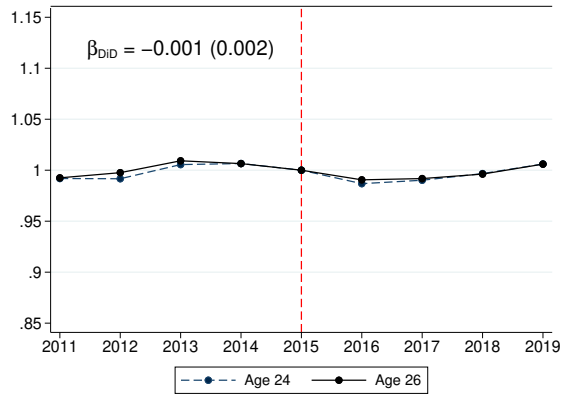
Using the aggregate sector-level data, Figure 6 shows the evolution of wages, labour costs, and employment of temporary agency workers aged 24 and 26 from 2011 to 2019, and shows the DiD estimates. Wages and labour costs are expressed in 2013 prices using the CPI. All outcomes are normalised relative to 2015. Reassuringly, the outcomes coincide in the pre-reform period, suggesting that the parallel trend assumption holds, and start to diverge immediately after the 2016 reform, thereby providing strong evidence that the difference between the two groups observed from 2016 on can be attributed to the hiring subsidy.

5 fte-worker. For these firms, discrete adjustment of employment would result in very high employment growth values (e.g., 100 percent for TWAs growing from 1 to 2 workers).

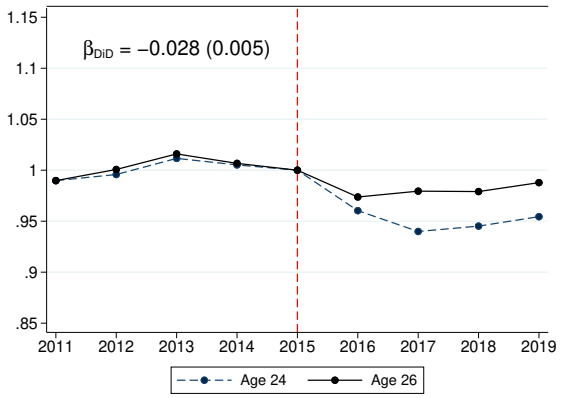
[29]The ratio of temporary agency workers included in the sample is stable during the period 2011-2019, as is the ratio of the hiring subsidy allocated to firms in our sample in the years 2016 to 2019.

Figure 6: Evolution of wages, labour costs and employment in the TWA sector

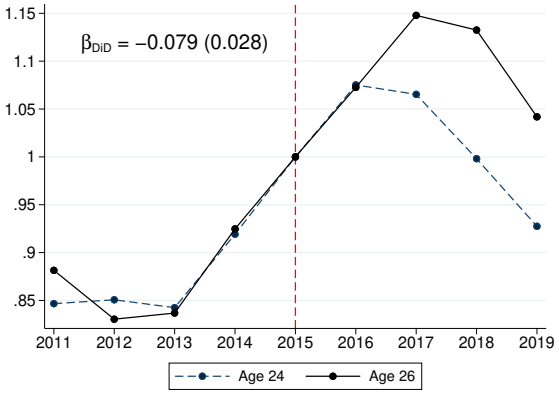
(a) Wage rate



(b) Labour costs



(c) Employment



Notes: These graphs show the evolution of the wage rate, labour costs, and full-time equivalent employment in the TWA sector in Flanders for agency workers aged 24 (eligible for the subsidy) and workers aged 26 (ineligible). The wage rate is defined as the wage bill divided by full-time equivalent employment. Labour costs are defined as the sum of the wage bill and SSC minus SSC reductions, and are normalized by full-time equivalent employment. Wages and labour costs are expressed in 2013 prices. Outcomes are normalized to the reference year 2015. In 2015, the quarterly wage rate is €6,112 (6,175) for a worker aged 24 (26), the quarterly labour costs is €7,558 (7,753) for a worker aged 24 (26), and the sector employed in each quarter 3,688 (2,893) fte-workers aged 24 (26). The dashed line distinguishes between the pre- and post-reform periods.

Two findings stand out. First, Figure 6a indicates that wages of eligible agency workers have not increased following the reform. At the same time, labour costs for the eligible workers decreased starting in 2016 and throughout the post-reform period (Figure 6b) and decreased by on average 2.8% in the post-reform period. Together, these two observations demonstrate that the hiring subsidy was fully incident on TWAs, and was not passed on to the eligible workers. Second, despite the labour cost reduction, employment of eligible workers by TWAs decreased by 7.9 percent in the post-reform period (Figure 6c). Although we only have 18 observations, the point estimates are precisely estimated because the outcomes of the eligible and ineligible groups almost perfectly coincide in the

pre-reform period.

5.3 Firm-level analysis

We now turn to the firm-level analysis and investigate how individual TWAs respond to the hiring subsidy using the balanced panel of TWAs. Figure 7 displays the point estimates of the DiD event study for each outcome, contrasting the evolution of these outcomes within the same firms for eligible and ineligible agency workers. For each outcome, we plot the coefficients $\widehat{\delta}_t$ of firm-level DiD event study for all years from 2011 to 2019. We rely on the pre-reform coefficients $\widehat{\delta}_t$ to validate the parallel trends assumption. We also report the average of the four coefficients in the post-reform period in the figures to summarise the effect of the policy.

Overall, the firm-level analysis supports the findings of the sector-level analysis. There are no differential trends in the pre-reform period for agency workers aged 24 vs. those aged 26 for the three outcomes. The DiD estimates in the post-reform period indicate that the hiring subsidy did not affect the wage rate of eligible workers (Figure 7a) but reduced labour costs by 2.7% (Figure 7b). Finally, Figure 7c shows that the hiring subsidy reduced employment in TWAs for eligible youths by 7.6%. The point estimates of the firm-level analysis are close to those in the sector-level analysis, but the effect on employment is more precisely estimated.

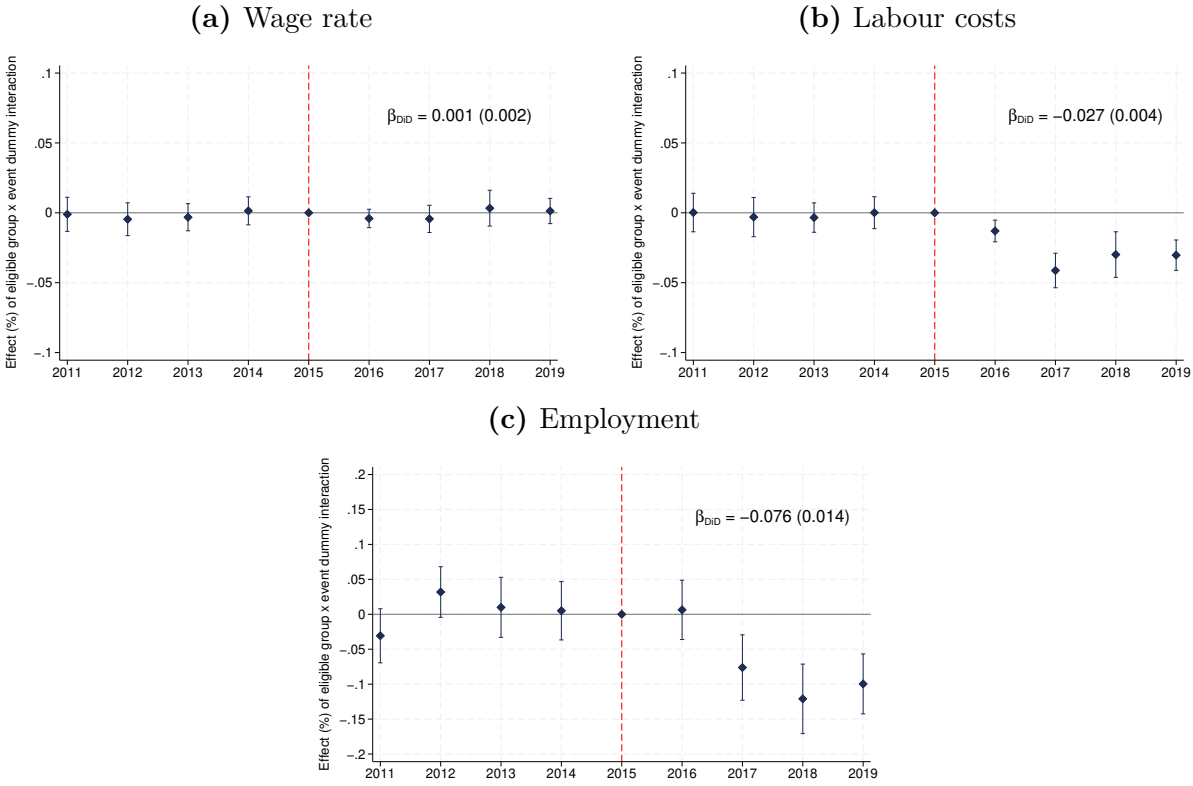
5.3.1 Robustness checks and sensitivity analysis

The benchmark analysis contrasts the outcomes for the TWA sector and within TWAs for agency workers aged 24 vs. agency workers aged 26. As a robustness check, we expand the age groups included in the treatment and control groups to, respectively, agency workers aged 22-24 and agency workers aged 26-28 using a balanced set of 58 firms, two more than in the benchmark analysis. Furthermore, we examine the sensitivity of the sector-level and firm-level results to the timing of the intervention. Graphical evidence, which confirms the absence of differential trends in the pre-reform period in all specifications, is presented in Appendix C. The main results are summarised in Table 4.

Extended age groups (22-24 vs. 26-28). Panel A of Table 4 presents the results of sector-level and firm-level analyses for the three outcomes contrasting agency workers aged 22-24 to those aged 26-28. One-third of the agency workers aged 22-24 are subsidised. All point estimates and standard errors remain close to those in the benchmark analysis, although the negative effect on employment is somewhat larger.

New definition of post-intervention period. In the benchmark analysis, TWAs

Figure 7: Firm-level DiD event plots of the effect of the hiring subsidy



Notes: These graphs show the coefficients $\hat{\delta}_t$ from the DiD event study for all years $t \in [2011, 2019]$ for the firm-level growth rate of wages, labour costs, and employment, contrasting agency workers aged 24 (treated group) vs. those aged 26 (control group), using the balanced sample of 56 firms. The omitted year is 2015. The vertical bars indicate 95% confidence intervals based on standard errors clustered at the firm level. Average employment in the TWA firm in the pre-reform period 2011-2015 are used as weights. β_{DiD} is computed as the average over the four post-reform coefficients.

in 2016 are partially treated because only individuals hired after July 1, 2016 were eligible. For this reason, we adopt a new definition of a year, different from the calendar year. We define each year as starting in the third quarter of the calendar year and ending in the second quarter of the subsequent calendar year. For example, the year 2016 comprises the quarters 2016Q3-2017Q2, so all individuals hired in this period are eligible. As in the benchmark analyses, we contrast workers aged 24 to those aged 26.

The DiD event study plots (Figures C.3) reveal that labour costs and employment decreased immediately following the reform. As expected, the effect of the subsidy on labour costs and employment is slightly larger in this specification than in the benchmark specifications in both the sector-level and firm-level analyses. The reason is that the effect in 2016 in the benchmark specification is lower than in the new specification because, in the benchmark specification, TWAs are only partially treated in 2016.

Table 4: Robustness of benchmark effects

	Wage rate	Labour costs	Employment
PANEL A. Extended age groups (22-24 vs. 26-28)			
Sector-level: $\widehat{\gamma}$	0.006***	−0.025***	−0.107**
	(0.001)	(0.005)	(0.023)
Firm-level: $\frac{1}{T}\sum_{t=2016}^{t=2019}\widehat{\delta}_t$	0.004	−0.026***	−0.102***
	(0.003)	(0.005)	(0.013)
PANEL B. New definition of post-intervention period			
Sector-level: $\widehat{\gamma}$	−0.001	−0.033***	−0.099***
	(0.001)	(0.001)	(0.02)
Firm-level: $\frac{1}{T}\sum_{t=2016}^{t=2019}\widehat{\delta}_t$	−0.000	−0.033***	−0.093***
	(0.003)	(0.001)	(0.014)

Notes: These panels repeat the benchmark sector-level and firm-level analysis with two modifications. The upper panel reports the estimated coefficients when contrasting agency workers aged 22-24 to those aged 26-28. The lower panel reports the estimated coefficients when contrasting agency workers aged 24 to those aged 26 but after adopting a new definition of year, so that a year starts in the third quarter of each calendar year and ends in the second quarter of the subsequent calendar year. For the firm-level analysis, the reported coefficient is the average of the four post-reform coefficients δ_t. ***,**,* denotes statistical significance at the 1%, 5% and 10%, respectively.

6 Conclusion

This paper evaluates a hiring subsidy for lower-educated youths that reduced labour costs by 10% to 15% for a period of two years after hiring in Flanders, Belgium. Using population data on job seekers combined with a donut RDD, we do not find any evidence that the subsidy enhanced the job finding rate of eligible job seekers within six months following the start of the unemployment spell. This finding holds for high school graduates, who perform well on the Flemish labour market, and high school dropouts, who struggle to secure stable employment even during economic booms. In line with earlier studies, we find some suggestive evidence that hiring subsidies are more effective in times of recession, particularly for dropouts. These null findings support the decision of the Flemish government to abolish these hiring subsidies.

We attempt to understand the null finding by examining how TWAs respond to the subsidies. These agencies obtain 25% and 34% of the subsidies for, respectively, graduates and dropouts, implying that their response is crucial for the effectiveness of the policy. Relying on firm-level data and a DiD framework, we find that wages of the eligible agency workers do not increase, whereas labour costs decrease by 2.8%. Together, these two observations imply that the subsidy is not passed on to agency workers but is entirely captured by the agency, consistent with recent evidence of Saez et al. (2019). The most surprising and puzzling finding, however, is that, despite the labour cost reduction, TWAs employ 8% fewer eligible workers.

Our preferred explanation is that regular employers hire more eligible workers, thereby reducing the pool of eligible job seekers who would otherwise enrol at TWAs. In this case, job creation by regular employers is entirely offset by job losses in TWAs. This is in line with qualitative insights obtained from conversations with relevant stakeholders. These stakeholders explained that TWAs have no internal policies in place to actively respond to hiring subsidies by, for instance, trying to attract more eligible job seekers or by placing eligible job seekers into client firms at the expense of ineligible ones.[30] In this sense, TWAs are passive players who support individuals who take the initiative to reach out to a TWA but do not actively recruit individuals eligible for subsidies. At the same time, these conversations confirmed that agencies are well aware of the existence of the subsidy and always claim the subsidy for those agency workers that meet the eligibility criteria.

It is important to emphasize that our findings do not necessarily imply that the subsidy is entirely pocketed by the agencies. A key finding of Saez et al. (2019) is that the permanent payroll tax rate for young workers in Sweden did not increase their wages but was shared among all workers within subsidised firms and led to job creation in these firms. Our data do not allow testing whether a similar mechanism is at play here. Some stakeholders argue that the subsidy increases the overall competitiveness of the agencies, leading to job creation at the sectoral level across all age groups. Again, we cannot test this claim with our data.

From a policy perspective, our findings lend some support to making hiring subsidies conditional on offering permanent contracts or on offering jobs with a minimal duration of, for example, a year. These conditions would make it harder for TWAs to claim the subsidy, thereby reducing the budgetary costs and, potentially, leading to more favourable outcomes for the target group. The recent decision of the Walloon government to make hiring subsidies for youths hired after July 1, 2023, conditional on offering a permanent contract or a contract of at least two months goes in this direction.

The critical role of TWAs in shaping the effectiveness of an active labour market policy is a novel finding in the literature. The key remaining question is whether TWAs are only a relevant factor in the Flemish context or whether they also shape labour market policies in other settings. While TWAs play an increasingly important role in many OECD countries and often employ vulnerable groups (OECD, 2021), it is as yet unclear whether these agencies are typically eligible for hiring subsidies and receive, as in Flanders, a large share of the subsidy. The existing evaluations do not report these issues. Therefore, it would be helpful if future evaluations of hiring subsidies discussed

[30] One reason cited by one of the stakeholders is that, in times of labour market shortages, TWAs do not have the luxury to be selective but have to place all candidates into client firms.

the role of TWAs.

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Appendices

A Tables

Table A.1: Hiring subsidies for TWAs in Flanders — NSSO data

Year	Dropouts			Graduates		
	Beneficiaries (fte)	Annual cost (€1,000)	Subsidy/fte (per quarter)	Beneficiaries (fte)	Annual cost (€1,000)	Subsidy/fte (per quarter)
2016	2,318	4,738	1,023	5,505	10,063	912
2017	3,323	13,696	1,030	7,071	26,242	928
2018	3,379	14,133	1,045	6,916	26,050	942
2019	2,989	14,199	1,182	5,971	22,270	931
2020	2,123	9,989	1,168	1,869	7,072	948
2021	2,419	11,590	1,181	322	928	966

Notes: This table provides descriptive statistics based on confidential NSSO data on TWAs in Flanders. Statistics reported are the average number of full-time equivalent subsidised workers per quarter (averaged over four quarters), the annual cost of the subsidy, and the quarterly subsidy per fte-worker. The subsidy for high school graduates was abolished on January 1, 2020, but employers who had hired eligible individuals before that date continued to receive the subsidy for the remaining quarters.

Table A.2: Validation and placebo tests - RDD estimates

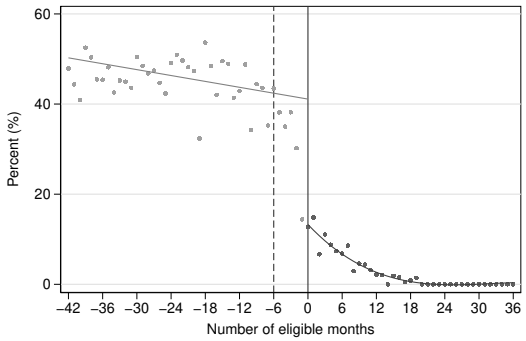
	Entire population	Dropouts	Graduates
A. Different bandwidths			
[-48, 42]	0.543	1.452	−0.414
	(1.041)	(1.602)	(1.384)
N	54,934	22,075	32,859
[-36, 30]	-0.644	−0.840	-1.871
	(1.288)	(1.980)	(1.706)
N	38,284	16,196	22,088
[-30, 36]	−1.302	−1.769	-1.396
	(1.435)	(2.218)	(1.889)
N	34,793	15,456	19,337
[-42, 24]	−0.135	−0.034	-0.427
	(1.238)	(1.890)	(1.650)
N	41,940	16,801	25,139
B. Donut hole width			
9 months	0.502	1.700	−0.666
	(1.222)	(1.920)	(1.600)
N	44,291	18,238	26,053
12 months	1.632	3.050	0.373
	(1.335)	(2.147)	(1.725)
N	42,212	17,372	24,840
C. Inclusion of covariates			
Covariates 1	−0.598	0.309	−1.387
	(1.132)	(1.740)	(1.501)
N	46,300	19,097	27,203
Covariates 2	−0.276	0.394	−0.894
	(1.127)	(1.730)	(1.500)
N	46,300	19,097	27,203
D. Pre- and post-reform (Graduates)			
Pre-reform			-0.868
			(1.645)
N			27,605
Post-reform			-4.339
			(4.119)
N			3,874
E. Without job seekers in Activation Allowance			
	−0.323	− 0.794	− 0.003
	(1.276)	(1.845)	(1.762)
N	34,577	17,159	17,418

Notes: Robust standard errors are reported in parentheses. ***,**,* denotes statistical significance at the 1%, 5% and 10%, respectively. This table shows the donut RDD estimates using the job finding rate within six months as the outcome. " Covariates 1" include: sex, country of origin, disability and driving licence dummies." Covariates 2" include all the covariates in " Covariates 1" as well as province of residence and quarter of inflow into unemployment.

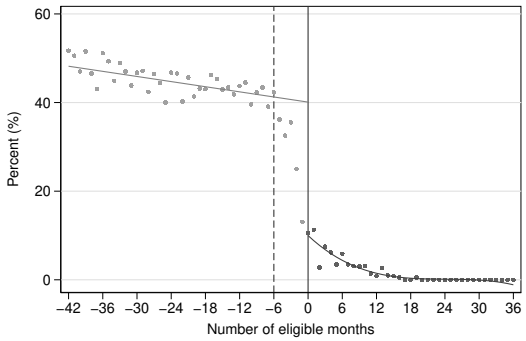
B Figures

Figure B.1: Take-up rate by educational level

(a) Dropouts



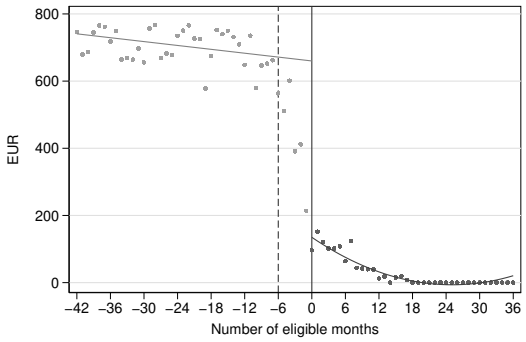
(b) Graduates



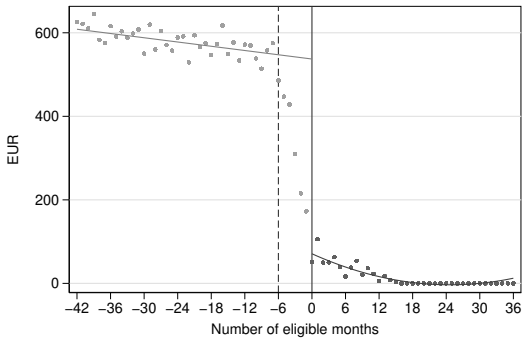
Notes: The outcome is the probability of having a subsidised job within six months after entry into unemployment for dropouts (Panel (a)) and graduates (Panel (b)). The RDD estimate for dropouts and graduates is, respectively, 0.31 [95% CI: 0.28; 0.34] with N = 19,110 and 0.33 [95% CI: 0.30; 0.35] with N = 27,206.

Figure B.2: Quarterly subsidy per fte-worker by educational level

(a) Dropouts



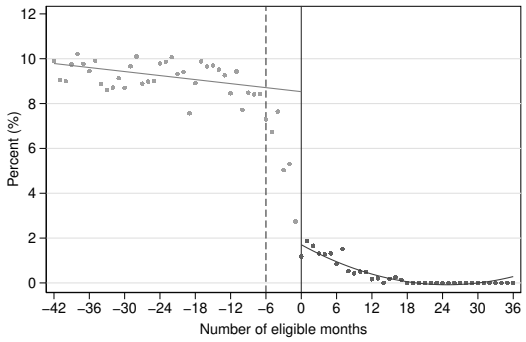
(b) Graduates



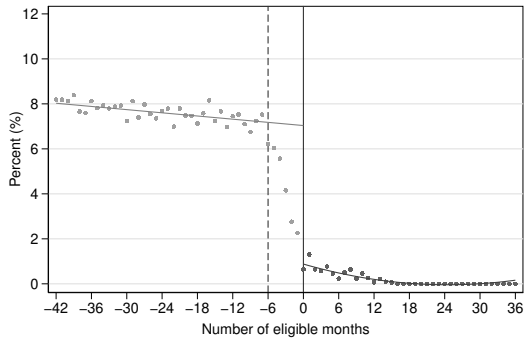
Notes: The outcome is the average quarterly subsidy for a fte-worker conditional on finding a job within six months for dropouts (Panel (a)) and graduates (Panel b). The RDD estimate for dropouts and graduates is, respectively,€549 [95% CI: 506; 592] with N = 11,278. The RDD and €478 [95% CI: 449; 508] with N = 18,100.

Figure B.3: Labour cost reduction by educational level

(a) Dropouts



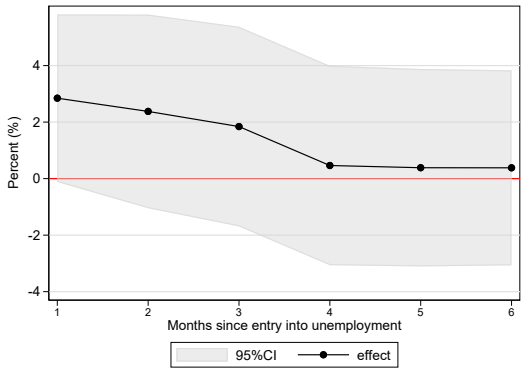
(b) Graduates



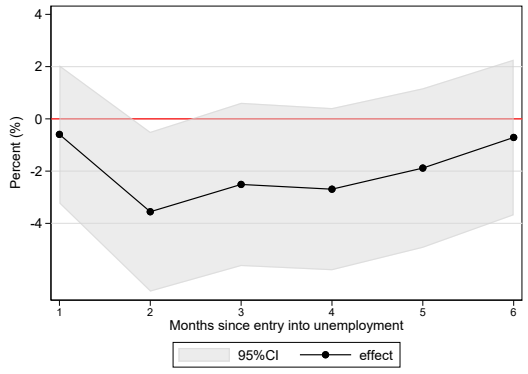
Notes: The outcome is the labour cost reduction conditional on finding a job within within six months for dropouts (Panel (a)) and graduates (Panel (b)). The RDD estimate for dropouts and graduates is, respectively, is 7.14 [95% CI: 6.59; 7.68] with N = 11,278 and is 6.31 [95% CI: 5.94; 6.68] with N = 18,100.

Figure B.4: Effect on the job finding rate in month 1 to 6 by educational level

(a) Dropouts

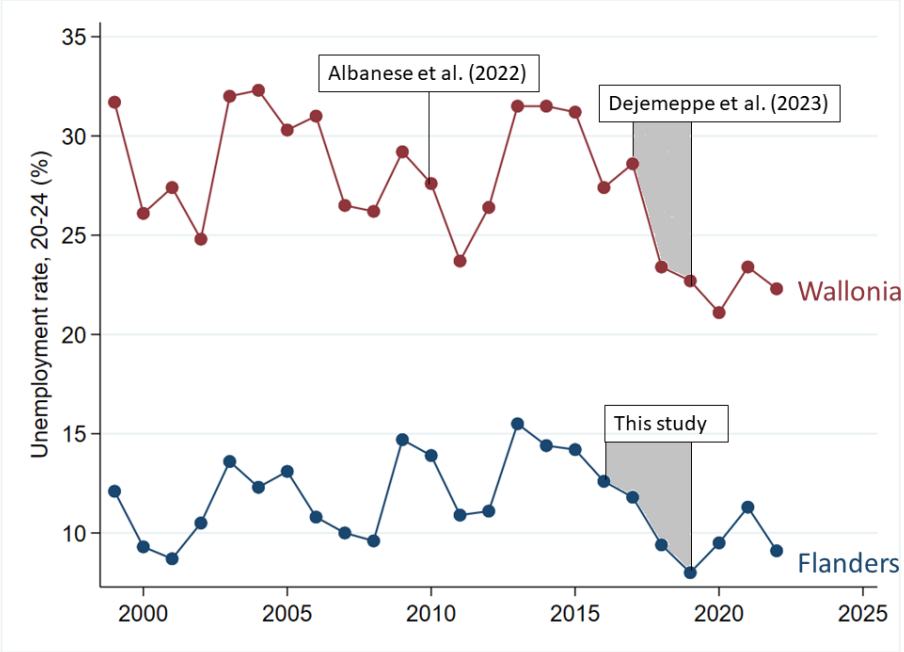


(b) Graduates



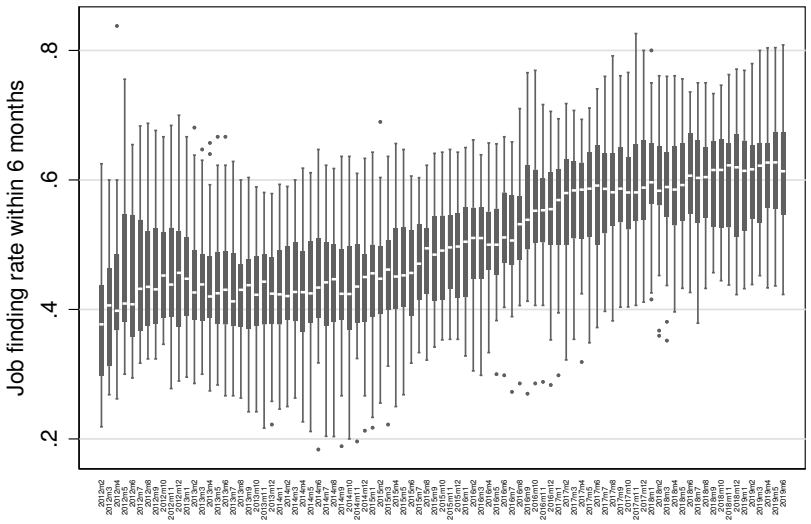
Notes: The figures show the effect of the hiring subsidy on the probability of being employed at least one month over a period of d months after entry into unemployment, where d ranges from one to six months, for dropouts (Panel (a)) and graduates (Panel (b)).

Figure B.5: Youth (20-24) unemployment rate in Flanders and Wallonia



Notes: LFS statistics by region, compiled by Steunpunt Werk.

Figure B.6: Job finding rate of job seekers with at most a high school degree aged 27 to 30 at the municipality level.

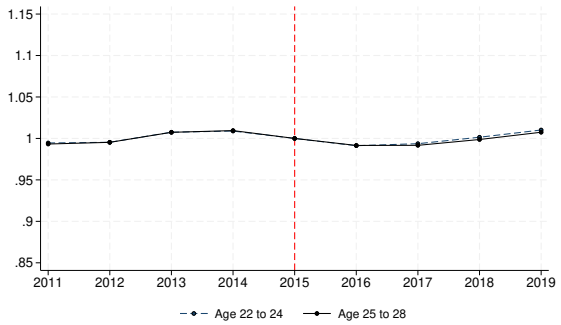


Notes: This graph shows the computed job finding rate of job seekers with at most a high school degree aged 27 to 30 by municipality and month. This proxy for the economic environment in month X in municipality Y is defined as the moving average of the job finding rate in municipality Y averaged over a period of twelve months, from month X-5 to X+6.

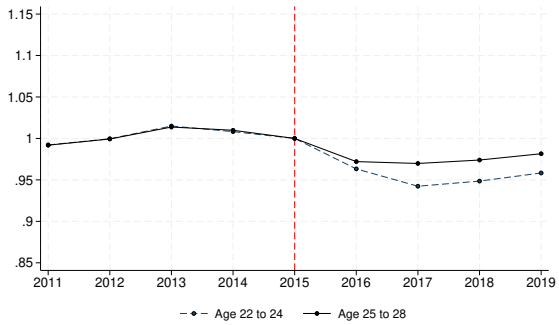
C TWA response: robustness analyses

Figure C.1: Evolution of wages, labour costs and employment in the TWA sector, agency workers aged 22-24 vs. agency workers aged 26-28

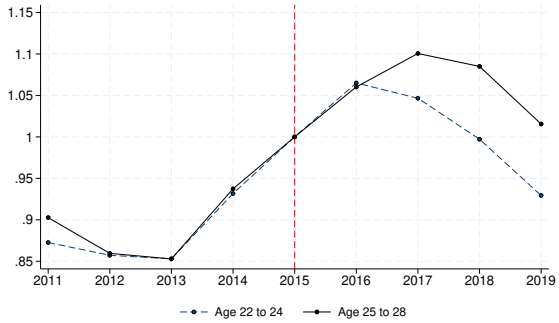
(a) Wage rate



(b) Labour costs



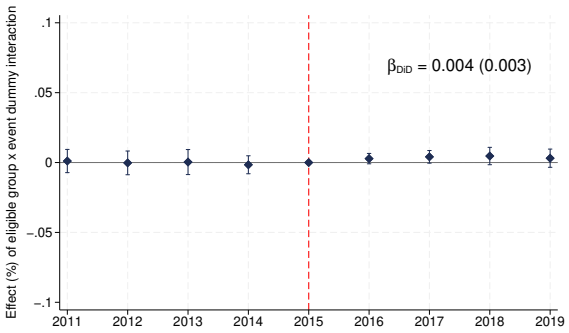
(c) Employment



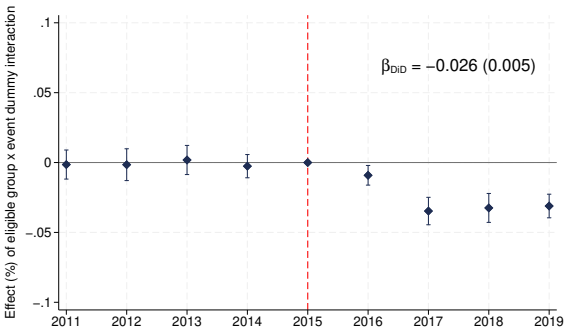
Notes: These graphs show the evolution of wages, labour costs, and full-time equivalent employment in the TWA sector in Flanders for agency workers aged 22-24 (eligible for the subsidy) and workers aged 26-28 (ineligible). Wages and labour costs are expressed in 2013 prices. Outcomes are normalized to the reference year 2015. In 2015, the quarterly wage rate is €6,045 (6,213) for an eligible (control) worker, the labour costs of a fte-worker is €7,456 (7,822) for an eligible (control) worker, and the sector employed each quarter 3,703 and 2,594 fte-workers in the eligible and control group, respectively.

Figure C.2: Extending the age groups (22-24 vs. 26-28)

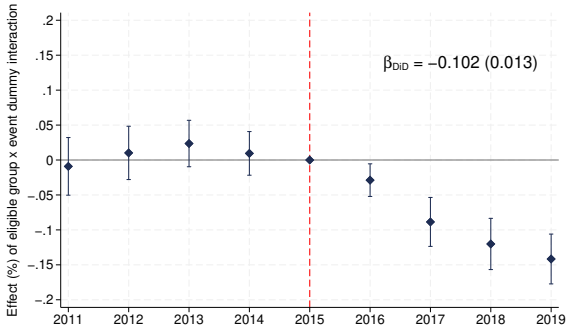
(a) Wage rate



(b) Labour costs



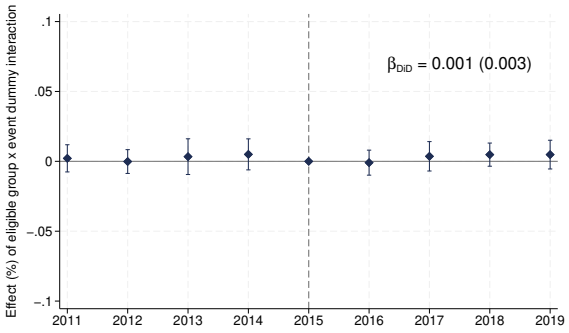
(c) Employment



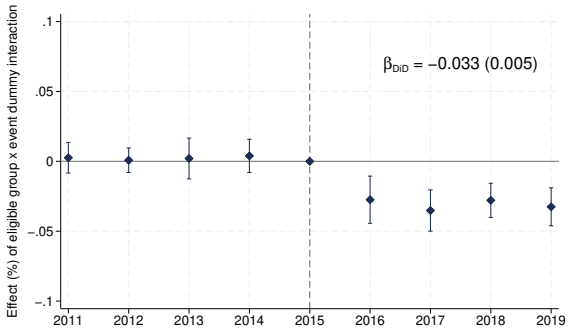
Notes: These graphs show the coefficients δ_t of the firm-level DiD event study for all years $t \in [2011, 2019]$ for the firm-level growth rate of wages, labour costs, and employment, contrasting agency workers aged 22-24 (treated group) vs. those aged 26-28 (control group), using a balanced sample of 58 firms. The omitted year is 2015. The vertical bars indicate 95% confidence intervals based on standard errors clustered at the firm level. Average employment in the TWA firm in the pre-reform period 2011-2015 are used as weights. β_{DiD} is computed as the average over the four post-reform coefficients.

Figure C.3: Alternative definition of a year

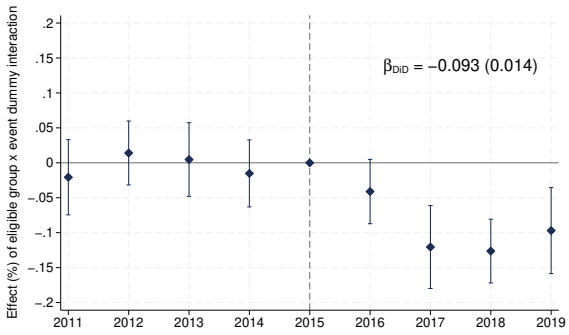
(a) Wage rate



(b) Labour costs



(c) Employment



Notes: These graphs repeat the benchmark analysis contrasting outcomes for agency workers aged 24 to those aged 26, but redefine a year so that a year starts in the third quarter of each calendar year and ends in the second quarter of the subsequent calendar year.