The employment effects of a wage subsidy for the young during an economic recovery*

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October 2022

[draft version, please do not quote]

Abstract

This study investigates the employment effects of a large-scale wage subsidy programme that was introduced during a recovery of the Polish economy in 2016 for the young unemployed. The focus is on the question whether the effects differ between men and women. The study employs a large population administrative data set from the unemployment register and exploits that firms are only eligible to the wage subsidy programme introduced in 2016 if the newly recruited worker is below age 30 and was unemployed before. A challenge is that already before 2016, standard packages of active labour market programmes for all unemployed and specific programmes for those below age 30 had been in place. Exploiting the long period and broad data coverage, we estimate the impact of the program availability by a difference-in-discontinuities design. The main finding is that in the medium term, the new wage subsidy programme has been effective for young low skilled eligible women but not for men. We discuss the policy implications of such programmes targeting young unemployed.

JEL classification: J08, J64, J68

Keywords: Wage subsidy; youth unemployment; difference-in-discontinuities, gender differences

* The research was supported by the EEA and Norway Grants Fund for Youth Employment under grant number 2017-1-008 and co-financed from the Polish funds granted for science in 2018-2022 for the implementation of international projects. We thank Karol Madoń for his outstanding research assistance and participants of the Budapest Institute Research Seminar 2022 for their valuable comments.

1. Introduction

Long before the economic and health crisis during the Covid-19 pandemic, research has shown that the young face severe labour market challenges during recessions. Compared to older groups in the labour market, they are more likely to suffer in economic downturns, experience higher risks of job loss and have lower chances of job finding. As a result, the young face difficulties in entering the labour market (Gielen & van Ours, 2006; Kahn, 2010; Oreopoulos et al., 2012), higher risks of long-term unemployment, scarring effects (Bell & Blanchflower, 2011; Nilsen & Reiso, 2014), and adverse effects on employment overall and wages (Altonji et al., 2016; Brunner & Kuhn, 2014; Kahn, 2010). Given the current and future costs of youth unemployment and inactivity, there is a strong need for policy interventions to assist young people in combating difficulties in entering jobs.

Several countries offer a wide range of policy interventions to young people. The most used interventions include intensive job search assistance, training (including on-the-job training), wage subsidies and public sector programmes. The empirical literature on the evaluation of active labour market programmes for youth has found mixed evidence regarding their effectiveness, and their impact is context-dependent. For example, positive employment outcomes of youth active labour market policies (ALMP) have been found by Blundell et al. (2004). In contrast, Martin and Grubb (2001), Kluve et al. (2008), Kluve (2010), and Card et al. (2010) all discuss lower effectiveness of selected youth measures compared to their effectiveness in the general population. Caliendo and Schmidl (2016) have also emphasised that the findings of the effectiveness of ALMP for adults are most likely not valid for youth.

In this paper, we focus on the effectiveness of a wage subsidy programme for young unemployed introduced in 2016. We expect the intervention to increase the likelihood of young people entering employment and remaining in the labour market – thus decrease youth unemployment - for three reasons. First, a wage subsidy leads to a relative decrease in the labour cost paid by the employer, holding reservation wages constant, which will increase labour demand. Second, we expect the positive employment effect to last even when the subsidy expires, owing to the experience young workers gained and thus their increased productivity, which makes them more likely to outweigh the unsubsidised employment costs. Finally, employers may be willing to keep the workers after the subsidy period expired to lower the costs of vacancy and new hiring.

So far the existing empirical evidence provides inconclusive results regarding the effectiveness of wage subsidies in terms of an increase in the employment of young people. Martin and Grubb

(2001) suggest that wage subsidies are among promising programmes for youth to increase employment, but they should be of short duration, targeted and closely monitored. Comparing different options available to the UK's New Deal for Young People (NDYP, a youth measure introduced in the UK in 1998) participants, Dorsett (2006) showed that the wage subsidy was the most effective measure in reducing unemployment among youth. Speckesser et al. (2019) conclude that the working experience gained owing to wage subsidy programmes helps to lower youth unemployment in Europe. A wage subsidy programme targeting vulnerable youth in Chile was effective in increasing employment and participation rate, but the effects decreased with time (Bravo & Rau, 2013). Levinsohn, Rankin, Roberts, & Schöer (2014) showed that a wage subsidy voucher programme in South Africa significantly increased employment also when the voucher was not valid anymore. At the same time, there are studies showing zero effects of wage subsidies for youth (Caliendo and Schmidl (2016) provide a meta-analysis of European studies). Even if hiring subsidies help their participants, they are likely to suffer from large dead-weight loss and substitution effects (Martin and Grubb, 2001; Caliendo and Schmidl, 2016). The variation in the design and effectiveness of wage subsidies across countries calls for considering the business cycle and institutional settings in the analysis (Speckesser et al., 2019).

The effects of various policy interventions are also likely to be heterogeneous across various groups of unemployed (Kluve et al., 2019). In this respect, researchers pay growing attention to the gender dimension of ALMP and their effectiveness. There is evidence that women benefit more from ALMP in general and that it is especially the case when the labour force participation of women is relatively low compared to men (Bergemann & Van den Berg, 2008; Card et al., 2017). However, there are still relatively few studies that consider the gender dimension, in particular, among young people. Larsson (2003) found that the negative effects of subsidised jobs were smaller among women. Blundell et al. (2004) show that the positive effect of the NDYP is not present among women. Card et al. (2017) find larger positive effects for women in their meta-analysis of recent evaluations, whereas Kluve et al. (2019) find no gender differences in the effectiveness of youth programmes.

The variation in the results of ALMP evaluations, particularly regarding young unemployed, suggests that there is a constant need to collect new evidence and provide it to policymakers. The fact that it is uncertain to what extent the previous "know-how "is still relevant reinforces these needs. The relevance of existing studies is weakened by new challenges that are faced mostly by young people. Decreased job stability (Baranowska & Gebel, 2010; Dolado et al., 2002), changes in labour market perspectives due to technological change, automation and

artificial intelligence (Dauth et al., 2021; Lewandowski et al., 2020), or growing mental health problems (Vancea & Utzet, 2017) may call for new youth policy interventions and further studies of policy effectiveness.

This paper attempts to estimate the effects separately for men and women of a large-scale wage subsidy programme introduced in 2016 for young unemployed in Poland. The program was introduced in response to the uncertain labour market opportunities for young people. The programme operated from 2016 to 2018 and consisted of a wage subsidy up to the minimum wage plus social contributions. It was paid for a full-time job contract during 12 months to the employer, and the employers were obliged to prolong the job contract for another 12 months after the subsidy expired. The programme had an unprecedented scale: 18.9% of ALMP participants aged 18-29 participated in this programme in 2016, and it cost 15% of the total spending on ALMP for all unemployed individuals by the Polish government in 2016-2018.[1]

Given such high costs, it begs the question of whether the programme was effective, that is, whether it improved youth employment outcomes. It is challenging to estimate the direct effect of receiving a wage subsidy on youth labour market outcomes since the employer needs to be willing to hire a subsidised worker. The participants in wage-subsidy programs are selected not only by caseworkers but also by potential employers. This determines our empirical strategy: rather than looking at the group taking up the wage subsidies, we focus on the group eligible for the wage subsidy and use the group of similar but not eligible youth for comparison. Hence, we estimate an intention-to-treat (ITT) effect. We exploit the sharp discontinuity in eligibility for the wage subsidy at the age of below 30. A further challenge is that already before 2016 standard packages of active labour market programmes for all unemployed as well as specific programmes for those below age 30 through the European Youth Guarantee (YG) Programme have been in place in Poland. In order to distinguish the effect of the new programme in 2016 from policies previously in place, we exploit a "difference-in-discontinuities" (diff-in-disc) design (Grembi et al., 2016). It combines exploiting the sharp discontinuity created through the 2016 reform around age 30 by a regression-discontinuity design (RDD) with a difference-in-differences design (DiD) exploiting before and after the introduction of the 2016 reform. Other studies have addressed similar challenges, such as Schünemann et al. (2015) and Sjögren & Vikström (2015), who evaluated wage subsidies for other groups of unemployed, and Chetty et al. (2013) and Lindner & Reizer (2020).

[1] Own calculations based on data from MRPiPS-02 forms shared by the Ministry of Family, Labour and Social Policy.

This study contributes to the existing literature in two ways. First, it evaluates a programme of wage subsidies broadly targeting unemployed youth. All the aforementioned studies evaluated programmes targeting a subpopulation of unemployed youth: either unemployed for at least some time (Blundell et al., 2004 for the UK; Larsson, 2003 for Sweden) or youth from disadvantaged backgrounds (Bravo & Rau, 2013 for Chile). Second, it assesses the gender differences in the effectiveness of a wage subsidy programme.[2] Third, we present estimates of the effectiveness of a wage subsidy programme introduced during a period of high GDP growth and improving labour market performance.

2. Economic and institutional context

Poland has experienced high fluctuations in GDP growth and unemployment during the period that we study. As Figure 1 shows, the financial crisis in 2008 led to dramatic increases in youth unemployment, similar to the rest of Europe. It reached 18,9% in 2013 in EU28 and Poland. The increase in youth unemployment rates was stronger among women (Figure 2), but young women's unemployment rates have declined quickly after 2013 and have converged with male unemployment rates. The past experiences of youth unemployment larger than 30 percent and compositional changes of the young unemployed during the 2000s make the period we study in this paper different from previous periods of high unemployment in Poland.[3]

[Figure 1 and 2]

As a policy response, the EU countries have expanded ALMP, mainly in the framework of the pan-European programme – the Youth Guarantee (YG) (Tosun et al., 2019) in 2013. Within the YG framework, people under the age of 30[4] can access a high-quality offer of employment,

[2] Furthermore, it is one of the first impact evaluations of youth ALMP in Poland with novel administrative data that were not accessible before. The data covers the entire population of registered unemployed, thus allowing to avoid the potential biases that arise with survey data. The meta-analysis by Kluve et al. (2019) does not include a single study from Eastern Europe, suggesting that the research on the topic is very limited in this region (and limited to the post-transition period) despite generous spending on youth ALMP in the region in recent years.

[3] While the increase in youth unemployment between 2008 and 2013 was a challenge for policy support, Poland has experienced episodes of higher youth unemployment during the transition period to a market economy. Figure 2 shows that in 1999, which is after the Russian crisis in 1998, the youth unemployment rate was already high, at 20%, but then increased to a peak of 30% in 2002- 2003. The two episodes of high youth unemployment (2002-2003 and 2008-2013) were quite distinct because of two factors. First, the demography shifted between the early 2000s, when the group of 15 to 24 years old accounted for 25% of the population, and 2016 when their share was reduced to 17%. The demographic shift was also reflected in the unemployment registers, where young unemployed accounted for 26% of all registered unemployed in 2003, and 13% in 2016. Second, between 2003 and 2015 the share of tertiary educated individuals registered as unemployed increased from 4% to over 13%, which is more than a threefold increase within 12 years.

[4] In some countries only unemployed individuals under 25 years old were eligible to YG.

further education, an apprenticeship or a traineeship within 4 months of leaving formal education or becoming unemployed. The programme was backed up by significant expansion of EU financing.

The Polish government also responded to the rise in youth unemployment and the YG programme, by introducing new measures for the young unemployed (below 30 years of age) in 2014. The programme made several training and employment policies available to the young registered with the local labour office. These included on-the-job training vouchers, classroom training vouchers, employment vouchers and reallocation vouchers.[5]

2.1 The wage subsidy programme in 2016

The programme we investigate is the new youth wage subsidy programme targeting young unemployed below 30 years of age that was introduced in January 2016 and has lasted for three years. This programme came as a result of the presidential election campaign which paid particular attention to the challenges of young people to enter the labour market. The programme offered a subsidy to employers up to the minimum gross wage plus social security contributions which was paid for 12 months. It contained in addition the obligation for the employers to prolong the full-time employment contract for another 12 months after the subsidy expired. The new programme was considerably large and costly compared to previous measures in place. Its total spending amounted to 15% of the total spending of local labour offices on ALMP between 2016 and 2018. More young people participated in the new subsidy (18.9% of young ALMP participants in 2016) than before, and the new programme was more generous than the "standard" wage subsidies available to all unemployed. The standard programmes offered a subsidy up to half of the minimum gross wage plus the social security contributions.

The 2016 wage subsidy programme was implemented to address high youth unemployment but was introduced at a time of economic expansion and improving labour market situation. The labour market started recovering from the post-2008 downturn in 2014. In 2016, when the programme was introduced, the youth unemployment rate reached the lowest level in the preceding decade (11.8% among 15-29 years old) and continued to decline to 7.6% in 2018 (Figure 1). International studies have found that wage subsidies are most effective among the menu of ALMP offered to youth, but are dependent of business cycle effects and seasonality

[5] The YG programme and the Polish youth ALMP targeting the registered unemployed came in addition to standard measures the unemployed of all ages have already been eligible for before. These include on-the-job training, classroom training, standard wage subsidy, public works, entrepreneurial subsidy and equipment subsidy. A detailed description of the standard measures can be found in Madoń et al. (2021) who also evaluated the relative employment effectiveness of selected measures offered to young people in 2015 and 2016.

(Speckesser et al., 2019). We therefore expect the gradual improvement of labour market opportunities to weaken the effectiveness of ALMP generally, including the large wage subsidy programme we evaluate. Most labour market programmes are introduced to fight the effects of a recession whereas less is known about their impact during an economic boom. Among the few studies, Lechner and Wunsch (2009) studied the period of 1984 -2003, which included the economic downturn after the 2nd oil shock, German unification, and post-September-11 economic slowdown. They found a positive relationship between the effectiveness of the training programmes and the unemployment rate over time in Germany.

The wage subsidy introduced in 2016 is targeted at employers if they employ a new worker who is unemployed and under 30 years old. The wage subsidy is paid for a period of 12 months with the obligation for employers to prolong the employment for another 12 months period after the subsidy has expired. The subsidy covers up to the full minimum gross wage plus social security contributions. In 2016, the general minimum monthly gross wage was 1850 PLN (~420 EUR) and 1480 PLN (340 EUR) for workers during their first year of work after the first entry into the labour market (80% of the standard minimum wage). For comparison, the average monthly gross wage was 4050 PLN (~930 EUR) in 2016. The subsidised social security contributions (old-age pension contribution, disability pension contribution, accident insurance and contribution to the Labour Fund) accounted for about 20% of the monthly gross salary. The subsidy accounted for 79% of the minimum wage in case of workers in their first year of work and between 79% and the full minimum wage in case of all other workers. Hence, since most employers used the wage subsidy for jobs near the minimum wage they bear only a small wage cost for the young employee during the first 12 months.

In practice, the eligible employer applied for the subsidy with the PES. All employers were eligible except employers who have reduced employment during the 6 months before the application to the programme. PES was opening a call for proposals for employers who wanted to employ a registered unemployed person, at the minimum wage or above. If the application was accepted, PES and an employer signed a contract with the details about the wage subsidy level, the period of employment and the details of the position. Then, PES suggested an unemployed person to be employed at the incumbent employer. There are no official guidelines on how a potential candidate is to be selected. If an employer decided to hire an unemployed young person suggested by the PES, the employer was obliged to offer a full-time work contract during the first 12 months when the wage subsidy is received and during the following 12

months. From interviews with the PES workers, we know that the employers could suggest a specific person they wanted to hire.

The programme started operating in January 2016 and ran until end of 2017 which we confirm by reported number of entries across calendar months into the programme in Figure 3. The contracts between employers and the PES could be signed until the end of 2017 but PES could have closed the call earlier in case that the funds had been used up earlier. Figure 3 shows that contracts were signed during the entire programme period and the last contracts were signed in December 2017. The wage subsidies were paid out until December 2018 which is three years after start of the programme.

PES did not collect information on wages paid by the employers to the unemployed in the subsidised jobs. However, PES required documentation that the labour contract was signed and the social security contributions were paid. The qualitative information collected from PES workers suggests that most of the subsidised jobs in this programme were jobs paid at the minimum wage. In the following analysis, we, therefore, focus on unemployment and employment as the outcome of main interest to evaluate the programme effectiveness.

[Figure 3]

3. Identification strategy

We attempt to estimate the effect of the wage subsidy programme starting in 2016 on the likelihood of exiting the unemployment registers and entering employment. The focus is to estimate the effect in the medium-term and separately by gender. To identify the effect, we exploit the sharp discontinuity of the programme that is eligible to those just below age 30 and not to those just age 30. The challenge is that already before the implementation of the programme in 2016 the European YG programme and the Polish ALMP for youth introduced in 2014 were in place. In the following, we refer to these as potentially confounding policies. To address the identification challenge, we first estimate the marginal effect of the 2016 programme at the threshold, comparing 30 years old to 29 years old. Next, we estimate the marginal effect in the most recent period before, which is 2015 at the corresponding threshold, comparing those below age 30 (and eligible to previously in place ALMP youth programmes) and those just 30 years of age (and not eligible). Therefore, we combine the regression-discontinuity design with the difference-in-differences design to specify a difference-in-discontinuity regression to estimate the reform's effect (see Grembi et al., 2016).

There are several underlying identification assumptions that we need to address. Since we can observe eligibility for these programmes in the administrative data of the PES, the design leads us to identify an intention-to-treat framework (ITT). Since selection into the programmes is arguably not random and driven by decisions of individuals, the PES and employers, we prefer this parameter to treatment on the treated parameter estimate.

To derive the main regression that we estimate, we define two treatments that change sharply at the age threshold $A_c = 30$ years: (i) the eligibility for the wage subsidy expires, and (ii) the rules regarding other employment policies change. We define D_{it} as the first treatment for unemployed i at time t. It is equal to 1 if the unemployed are eligible for the wage subsidy introduced in 2016 and zero otherwise:

$$D_{it} = \begin{cases} 1 \;\; if \; Age_{it} < A_c \; and \; t \geq 2016 \; and \; t < 2018 \\ 0 \;\; otherwise \end{cases}$$

The second treatment (P_t) is equal to 1 if the unemployed are below A_c (and is thus eligible to additional employment policies in every year since 2014):

$$P_{it} = \begin{cases} 1 \;\; if \; Age_{it} < A_c \\ 0 \;\; otherwise \end{cases}$$

Individuals of a certain age (Age_{it}) below the threshold A_c are eligible for additional employment policies available since 2014, while the new wage subsidy programme we evaluate was introduced at time t = 2016 for individuals below the age threshold A_c. It was available until the end of 2017.

We define $Y_{it}(d,p)$ as the potential labour market outcome if $D_{it} = d$ and $P_{it} = p$, with d = *0,1* and p = *0,1*. The observed outcome is thus equal to $Y_{it} = D_{it}P_{it}Y_{it}(1,1) + D_{it}(1-P_{it})Y_{it}(1,0) + (1-D_{it})P_{it}Y_{it}(0,1) + (1-D_{it})(1-P_{it})Y_{it}(0,0)$. We consider three labour market outcomes to measure exit from unemployment.

We attempt to identify the causal effect of D_{it} on the outcome Y_{it}, taking into account the fact that there is a confounding policy P_{it}. In other words, we want to identify the impact of the eligibility to the wage subsidy on being outside the unemployment register, in the absence of other confounding policies.

We fit local linear regression functions (Gelman & Imbens, 2019) to the observations within a bandwidth h on each side of A_c, both in 2015 and 2016. We restrict the sample to individuals within the age range $Age_{it} \in [A_c - h, A_c + h]$ measured at the moment of registration, where h is equal to one year in the main specification. Formally, this means restricting the sample to the unemployed 29 to 30 years old.

We estimate the following difference-in-discontinuity model:

$$Y_{it} = \beta_0 + \beta_1 Age^*_{it} + S_i(\gamma_0 + \gamma_1 Age^*_{it}) + T_t[\alpha_0 + \alpha_1 Age^*_{it} + S_i(\delta_0 + \delta_1 Age^*_{it})] + \in_{it}, \quad (1)$$

where S_i is a dummy equal to 1 if the individual is below 30 years old (treatment indicator) and equal to 0 otherwise, T_t is an indicator for a post-treatment period when the wage subsidy was introduced and $Age^*_{it} = Age_{it} - A_c$ is the re-centred age at the moment of registration. The coefficient δ_0 is the difference-in-discontinuity estimator and identifies the treatment effect of being eligible for the wage subsidy introduced in 2016. In the estimations, we use only individuals eligible during the first four months of the programme. We estimate the model separately for men and women to test whether the effectiveness of the programme differs by gender. We supplement our main results by robustness tests of our results to multiple bandwidths *h*, first the predefined $h = 2$, and then optimally computed, following Calonico et al. (2014a, 2014b) in Section 6.

4. Data and sample selection

We use administrative data from the Polish Public Employment Services (PES) register, which includes information on all unemployed individuals registered at the PES between 2011 and 2018, and their complete history of unemployment registrations and ALMP participation from 2005 until April 30, 2019. The register contains daily information about the beginning and the end of each unemployment spell and participation in labour market programmes. It also includes information on personal characteristics, such as age, sex, level of education, place of residence (urban/rural), disability status, presence of children aged six or younger in the household, and lack of qualifications. The register data also contain detailed individual labour market history information. All characteristics are reported at the beginning of each unemployment spell. In addition, we merge data collected by Statistics Poland on local labour markets to the individual dataset. These include the local unemployment rate and the local average wage as a percentage of the country average at the regional NUTS-4 level and a

distance to the poviat city from the municipality of residence (at the NUTS-5 level). The richness of the data available is a great advantage over survey data, which usually contain much smaller samples, increasing the risk of bias in the data.

Our main dataset consists of two groups of 29 and 30 years old individuals who are followed for at least 36 months since registration. We select a group of 29-30 years old individuals who all start an unemployment spell from January to April in 2016 and of those 29 years old were eligible for the newly introduced subsidy. As a second group, we select similar individuals, in terms of age, who registered as unemployed from January to April 2015 when none of them was eligible for the wage subsidy programme. The choice of the threshold of 30 years old is determined by the institutional setting, as the eligibility for the wage subsidy expires at this age threshold. Figure 4 presents the average participation rate in the 2016 wage subsidy programme as a function of age. It confirms that none of the non-eligible individuals have entered the programme.

[Figure 4]

To select our sample we start with a larger sample that consists of 267,389 unemployment spells of individuals who were 29-30 years old at the time of entry into unemployment (one cohort below and one cohort above the threshold of 30 years). We limit our sample to unemployment spells starting between January 1, 2016, and April 30, 2016, for the reform period and between January 1, 2015, and April 30, 2015, for the pre-reform period, to be able to observe the outcomes for 36 months after registration (95,485 observations left). We exclude individuals who were registered as unemployed or participated in an ALMP during the 6 months before registration to ensure that we analyse a new entry registration spell and not a part of a longer unemployment spell (62,678 observations left). After excluding observations with missing values in any of the control or outcome variables, the final sample consists of 61,801 observations, 32,134 from 2015 and 29,667 from 2016.

We construct two main labour market outcomes that proxy labour market success: (1) being out of the unemployment register and (2) the cumulative number of days out of the unemployment register.[6] An advantage of the register data is that unemployment is reported with the start and the end date. For each individual, we can therefore measure the outcomes every 30 days for 36 consecutive periods since the registration.

[6] An ALMP participant is automatically removed from the unemployment register.

A caveat is that being out of the unemployment register does not necessarily mean that the person is in employment. He or she may be an unemployed person, who did not register with the labour office, for example, because of a lack of faith in the effectiveness of PES support. He or she may also be inactive and caring at home for family members. However, the institutional design of the labour market policy in Poland entails a strong incentive to register with the PES even if one is not interested or able to take up work. Registering as an unemployed is necessary to be covered by health insurance. Being registered as unemployed implies that the health insurance contribution is paid from the Labour Fund's budget. Hence, this strengthens the coverage of the unemployment register and our outcome variables. Another caveat is that individuals are dropped from the unemployment register if they participate in an ALMP. To take account of this in our outcome variables, we also use as an outcome variable whether (3) an individual is not registered as unemployed and not enrolled in ALMP.

Employers participating in the wage subsidy programme have the obligation to retain the wage subsidy participants as employees for at least 12 months after the subsidy programme expires. The PES registry data does not include an indicator variable distinguishing the status during the ALMP and the following period of obligatory employment. As a result, individuals during the obligatory employment linked to ALMP are counted as participants in ALMP. This feature of the data does not impact the first outcome "being out of the unemployment register" but it has an impact on the second outcome "being out of the unemployment register and not in ALMP". Individuals during obligatory employment without any support from PES are counted as ALMP participants which results in a downward bias in the probability of the second outcome.

Table 1 presents the descriptive statistics for the first year when the wage subsidy was available, 2016, separately for those who are eligible to receive the wage subsidy (those aged 29 years) and those who are non-eligible (30-year olds), separately for men and women. The eligible individuals are better educated but have less work experience than the non-eligible ones. The eligible individuals also have a lower number of earlier registrations and days in the unemployment register. The non-eligible women are more likely to have the right to the unemployment benefit, which is a signal of recent job loss[7]. The eligible women live in regions with a higher unemployment rate and lower average income more often than the non-eligible ones.

[7] The unemployment benefits are granted to individuals who have worked for at least 12 months in the past 18 months and who were dismissed or their contract expired. The benefits are paid for a maximum of 6 months. This is the main benefit of being registered as unemployed, in addition to receiving health insurance.

Eligible women have a higher probability than non-eligible ones of being out of the unemployment register (outcome 1) and being out of the unemployment register and not on ALMP (outcome 2) 36 months after the registration. There are no differences in the probability of these outcomes between eligible and non-eligible men. Both eligible men and eligible women were longer out of the unemployment register 36 months after registration than their non-eligible counterparts (14 and 35 days respectively – outcome 3). A possible explanation of the difference in employment outcomes of men and women could be due to their composition. Registered unemployed women are better educated: they are twice as likely to have tertiary education than men and twice less likely to have low educational attainment. The second important gender gap among registered unemployed concerns parenthood: women are more than twice likely to have a pre-school child. Furthermore, the shares of individuals entitled to the unemployment benefit are also much higher among women, compared to men. However, these raw differences in the employment outcomes of men and women, as well as the differences among eligible and non-eligible individuals do not yet explain whether the wage subsidy programme was effective or not.

[Table 1]

5. Identifying assumptions

In our setting, we can identify the causal effect of the wage subsidy introduced in 2016 among those who are also eligible for the confounding employment policies in place since 2013/2014 under two assumptions (Grembi et al., 2016; Leonardi & Pica, 2013). First, all potential outcomes (in t = 2015 & t = 2016) must be continuous at the age threshold of 30 (A_c). We test this assumption by verifying that each determining variable of employment is continuous at the age threshold of 30. These are listed in Table 1 where we report the means for each variable together with the t-test testing whether the differences in means are significantly different from zero between the eligible and non-eligible, that is at the threshold. The t-test statistics reveal that the means of several of the characteristics are significantly different below and above the threshold of 30 years of age, both for men and for women. Additionally, for each of the variables, we graphically assess how the control variables vary with age, when we consider the age groups 25 to 29 years old and 30 to 35 years old (the results are presented in Figures 9 and 10 in the Appendix). We draw on an RDD to test if the analysed characteristics are continuous

at the age threshold of 30 years of age and find that many are not.[8] To take these findings into account, we control for all of the variables listed in Table 1 in our main regression in the empirical analysis.

We also investigate potential manipulation at the threshold of 30 years of age. While it is difficult to manipulate one's age, individuals could manipulate the age at entry into unemployment by speeding up their registration. If it was the case, we would technically expect the number of registrations to increase significantly among people just below the 30-year threshold in comparison to those just above the threshold. Non-random selection to registrations could also violate our identification strategy regarding the RD around the 2016 reform if some eligible individuals, who would otherwise not register as unemployed, start to register at the PES only to receive the subsidy once the programme is available. However, Figures 5A and 5B suggest no such manipulations are present. Figure 5A and 5B compare the number of registrations among the two age cohorts that we study, the 29-years old and 30-years old. In Figure 5A we split the number of registrations by age cohort and gender, and in Figure 5B we plot the ratio of the registered of age 30 relative to those of age 29. As can be seen, the ratio is fairly constant across time, so that there is no jump upward in the ratio in 2016 when the subsidy was introduced. We therefore argue that individuals are unlikely to manipulate their age at registration and unlikely to start registering in greater numbers. We argue this is because of the strong incentives to register as unemployed as soon as possible in order to receive free health insurance. Another reason is that we analyse the unemployment inflows during the first four months of the programme. Hence, the information about the programme has not yet had a chance to spread, since usually only after registering with the PES the unemployed learn about the programmes.[9]

[Figure 5]

Second, the assumption that is crucial for identification is that the effect of the second treatment (P_{it}), that is the confounding policy at A_c in the case of no D_{it} treatment (eligibility to the wage

[8] Detailed results are available upon request.

[9] Formally, the standard test for treatment assignment manipulation is the McCrary's (2008) test. This density test is however not useful in our case due to the strong seasonality we have in our data. We analyse registrations from the first four months of a year only. That means that the individuals who are exactly 29 years old were born in different months than individuals who are exactly 29 and a half years old in this timeframe. As births are seasonal, we observe also seasonality in the number of registrations when analysing the registrations from only part of the year.

subsidy) is constant over time. In other words, individuals aged just below and just above A_c should be on parallel trends in case of the absence of the wage subsidy. To indirectly test for this assumption, we estimate the pattern of discontinuities in Y_{it} before 2016 to show that observations just below and just above A_c were not on differential trends before the introduction of the wage subsidy. Figure 6 shows the differences at the threshold 30 years of age in the analysed employment outcomes before the introduction of the wage subsidy programme in 2016 estimated by the RDD for those who registered in years 2012 to 2015. As the confidence bands clearly show, all of the point estimates both for men and women are not significantly different from zero. Therefore, the test shows no evidence of differential trends before the introduction of the wage subsidy in 2016.

[Figure 6]

An additional assumption we may need to estimate the effect among those who were not eligible to confounding policies is that the effect of the wage subsidy at A_c does not depend on the confounding policy (P_{it}) (Grembi et al., 2016). In our setting, this assumption would be violated if an unemployed aged 30 reacted differently to being eligible to the wage subsidy than a 29-year-old who were simultaneously affected by the confounding policy. It is not possible to test the assumption 3 but the constant zero effect of the confounding policy shown in Figure 6 suggests that the confounding policy and the wage subsidy are not correlated in this way.

Under this set of assumptions – that is continuous co-variates at the threshold, no non-random selection and no correlation of the main and the confounding policies at the individual level – we can identify the employment effect of the introduction of the wage subsidy targeting the young unemployed.

6. Results

We present two sets of results in this section. First, we show the results when we estimate the effect of the wage subsidy programme in 2016 by a regression discontinuity design. Hence, this is a first estimate not taking into account contaminating factors through the previous policies. Alongside these results, we also present RD estimates of the effect among new unemployed in 2015, which were not yet eligible for the new wage subsidy but only for ALMP previously in place for the young unemployed. For both periods, we exploit the threshold at age 30, below which the unemployed were eligible for the wage subsidy programme (in 2016) or other policies

(in 2015 and 2016). The results of the new wage subsidy are graphically presented in Figure 7. Second, we discuss the diff-in-disc regression results in Figure 8, which are our main results. We supplement the results with further heterogeneity analysis and some more discussion of robustness.

In Figure 7, we present on the right-hand side for 2016 the point estimates of the difference in employment outcomes at the threshold of 30 years of age for men and women separately. We use the RD design and compare the employment outcomes of eligible individuals, those below the age threshold, to the employment outcomes of ineligible individuals, those above the age threshold. In panels A-C, the graphs for each of our outcomes are presented. To include information on statistical significance at the 5% significance level in the graphs, we use markers on the lines at a particular point in time.

For men in panel A, we find that eligible men were about 3 p.p. more likely to be out of the unemployment register shortly after registration as unemployed. Still, quite soon after, the effects fall to zero. Women eligible for the wage subsidy were more likely to be out of unemployment registers than non-eligible women throughout most of the 36 months after registration. This effect fluctuates between 1.2-4.9 p.p. (Figure 7, panel A). When we look at panel B, the effects for women are reduced because they seem to remain in ALMP programmes for some time. Among men, we observe a negative effect of wage subsidy eligibility on the probability of being out of the register and not on ALMP between months 15-26, when the wage subsidy participants are still in obligatory employment and treated as participating in an ALMP (Figure 7, panel B). Eligible women also have a higher number of cumulative days out of unemployment registers throughout most of the 36 months after registration, compared to non-eligible women. For men the increase is only in the first 12 months since registering as unemployed (Figure 7, panel C).

These observations point to gender differences in the effects of the wage subsidy on labour market outcomes that have previously in empirical research not been investigated.

Figure 7 on the left-hand side presents the corresponding analysis results when we use 2015 as the period of estimation and entries into unemployment during the first four months. When looking at panels A-C, we observe that now the results for men and women are very close. Hence, we do not find gender differences in the effects of other employment policies available for the unemployed under 30. For our first outcome, being out of unemployment, we find a declining trend in the estimates, from slightly positive during the first 12 months to slightly negative. In panel B, we find an effect close to zero throughout 36 months post entry into

unemployment. The effect on the accumulated number of days out of unemployment is quite solid around zero. Hence, we do not find any statistically significant differences at the threshold of 30 and no gender differences (Figure 7, left panels).

The comparison of 2016 and 2015 in Figure 7 suggests that the 2016 results' divergence is driven by the marginal effect of the new wage subsidy under evaluation.

[Figure 7]

To distinguish the direct effect of the new wage subsidy programme in 2016 from the effect of the previous policies, we now turn to the results from the diff-in-disc estimator as specified in equation (1). The estimation results are presented in Figure 8 and Table 2 for each of the three employment outcomes. Figure 8 reports the point estimates, and Table 2 reports point estimates with standard errors and significance in 6-month intervals since registration.

Figure 8 plots, for the three employment outcomes in panels A-C, the key coefficient δ_0 which is the difference-in-discontinuity estimator. It identifies the treatment effect of being eligible for the wage subsidy introduced in 2016 month by month and separately for men and women. The diff-in-disc results show that the wage subsidy has positively impacted employment outcomes for young eligible women but not men. Among women, being eligible for the wage subsidy raises the probability of being out of the unemployment register 25 to 35 months after the registration by 2.7 to 4.5 p.p. However, the effects are not statistically significant for some periods (Figure 8, panel A). Once we consider ALMP participation and look at the probability of being out of the register but not in ALMP, there is no effect of eligibility for women up to 30 months after registration. Still, eligibility later increases the probability of being out of the register and not in ALMP by 2.8 – 4.8 p.p. Only the last two periods are statistically insignificant (Figure 8, panel B). The effect is quite large given it is an ITT estimate. Among men, being eligible for the wage subsidy does not affect the probability of being out of the register (Figure 8, panel A). It harms the probability of being out of the register and not in ALMP in the second year after registration (Figure 8, panel B). 12 months is when the subsidy expires, but the employer is obliged to retain the employee for an additional 12 months. This period is treated as ALMP participation. The effect disappears in the third year after registration, suggesting a presence of a "lock-in" effect of the wage subsidy for men in the second year.

The effect of eligibility for the wage subsidy programme on the number of days out of the unemployment register accumulated over time after registration (Figure 8, panel C) is consistent with the effects on the probability of being out of the register. On average, eligible women have

accumulated an additional 34 days out of the unemployment register than non-eligible women during 36 months after registration. There is no statistically significant effect in the case of men (Figure 8, panel C).

[Figure 8]

[Table 2]

The main result from our analysis is that young unemployed women are positively affected by the wage subsidy programme, and young unemployed men are not. Hence, women's employment is positively affected, which suggests the success of the expansive ALMP introduced during a period of economic upswing in 2016. This result is based on those entering unemployment during the first four months of the wage subsidy programme and who can be followed for up to 36 months. Hence, during a period when the youth labour market situation was improving (Figure 1), we observe that women were more likely to exit unemployment owing to the new wage subsidy programme. This is the interpretation of the intention-to-treat effect that we can identify with our data. The question arises whether gender differences in the marginal effect are related to heterogeneity in other characteristics.

Heterogeneity analysis

In supplementary estimates of our model, we test whether results differ depending on the educational level of unemployed individuals. As the summary statistics in Table 1 show, unemployed women are more highly educated than unemployed men, e.g. 41 % of women have tertiary education compared to 18 % of men. We present the results in Table 3 in the Appendix separately for men and women and separately for those who completed secondary education or less to individuals with tertiary education. Among men, the partial effects of the wage subsidy are insignificant regardless of the level of completed education (Appendix, Table 3). Among women, the effects are larger and more precisely estimated among women with lower levels of education. This result may reflect that women work more often in low-paid jobs close to minimum wage, and hence, transitioning out of unemployment reflects this match.

We also investigate heterogeneity concerning regional differences in unemployment rates by dividing our sample of unemployed into those living in regions with unemployment above and below the country median. For our sample of men, the results remain unchanged, and we find no significant effects for both sub-groups (Appendix, Table 4). For our sample of women, we now find relatively strong effects in the regions where the unemployment rates are below the

country's median unemployment rate of 6.0%. The size of the marginal effects is similar to those for the relatively lowly skilled.

Robustness checks

Our main results on gender differences are also robust to other tests we have conducted. The results remained unchanged when we estimated the diff-in-disc model without covariates compared to our main specification with the full set of covariates. The point estimates of the coefficients change slightly, but qualitatively the results and interpretations remain (Appendix, Figure 11).

We also estimated the diff-in-disc model modifying the bandwidths around the threshold. We have used a predetermined bandwidth of 2 years, including 28-31 years old in the sample (Appendix, Table 5), and find that the results are robust. We have also estimated optimal bandwidths *h* following the algorithm developed by Calonico et al. (2014a, 2014b) (Appendix, Table 6). The general pattern of the results remained unchanged, and some estimates gained statistical significance.

7. Conclusions

We study a large-scale wage subsidy programme for the young unemployed in Poland that started in 2016 and lasted for three years. We identify the effects of the policy by a difference-in-discontinuity estimator that purges the marginal effect of the policy from other effects through previously in place active-labour market policies for the young. We exploit the clear threshold of eligibility at age 30 and rich administrative data on unemployment for Poland during that period. We find that the wage subsidy positively affected eligible women regarding the probability of being out of the unemployment register and accumulated days out of unemployment. This is strong evidence of positive employment effects in the medium run. By contrast, we find no statistically significant effects on employment among men.

Most evidence on wage subsidy programmes in the literature comes from recessions, while the programme we studied was introduced when Poland underwent a period of economic expansion. As we show, employment rates increased at the mean and the labour market recovered during that period. Our results suggest that there was a significant group of firms and female unemployed who still benefitted from the wage subsidy programme, suggesting that there is a group of women who could not re-enter the labour market through positive labour

demand effects. We show in the heterogeneity analysis that among these, particularly low to medium-skilled and regions with below-the-median unemployment rates benefitted from the wage subsidy programme.

A potential explanation of this finding could be related to wage rigidities resulting from minimum wages. A study by Cahuc, Carcillo and Le Barbanchon (2019) found that wage subsidies targeted at low-wage workers effectively increase employment. However, they studied a period of recession. In Poland, women are more likely to work in jobs paid not more than the minimum wage than men (25% and 17%, respectively).[10] This may explain the higher effectiveness of the 2016 wage subsidy among women with a lower level of education, as they may be more likely to work in jobs with rigid wages.

The result seems surprising that the positive employment effects were relatively high for women living in areas with relatively low unemployment. This may reflect a mix of labour demand and supply factors. Employers may have preferred to keep female employees at previously subsidised workplaces in a labour market that was becoming relatively tight, and women may have been in favour of remaining in these workplaces. Little research exists on the effects of ALMP during the recovery of the economy and gender differences among young unemployed and transitions from unemployment to employment.

The results of our study point to important policy implications. The results highlight that the evaluation of labour market policies is enriched by accounting for heterogeneity across gender and age. Economic incentives, costs and benefits associated with labour market entry and labour supply and net returns to educational investment are likely to differ by gender, particularly among the young below age 30-35. Therefore, incorporating these in conceptual and empirical policy analysis leads to more informative estimates of policy effects and labour market performance. More particularly, our results suggest that wage subsidies should be targeted at women with a lower level of education since they are much more likely to benefit from them than highly educated women, or men. This might be because they are stepping stones to enter firms and reduce matching costs of lower-skilled unemployed women and jobs.

[10] 2016 SILC data.

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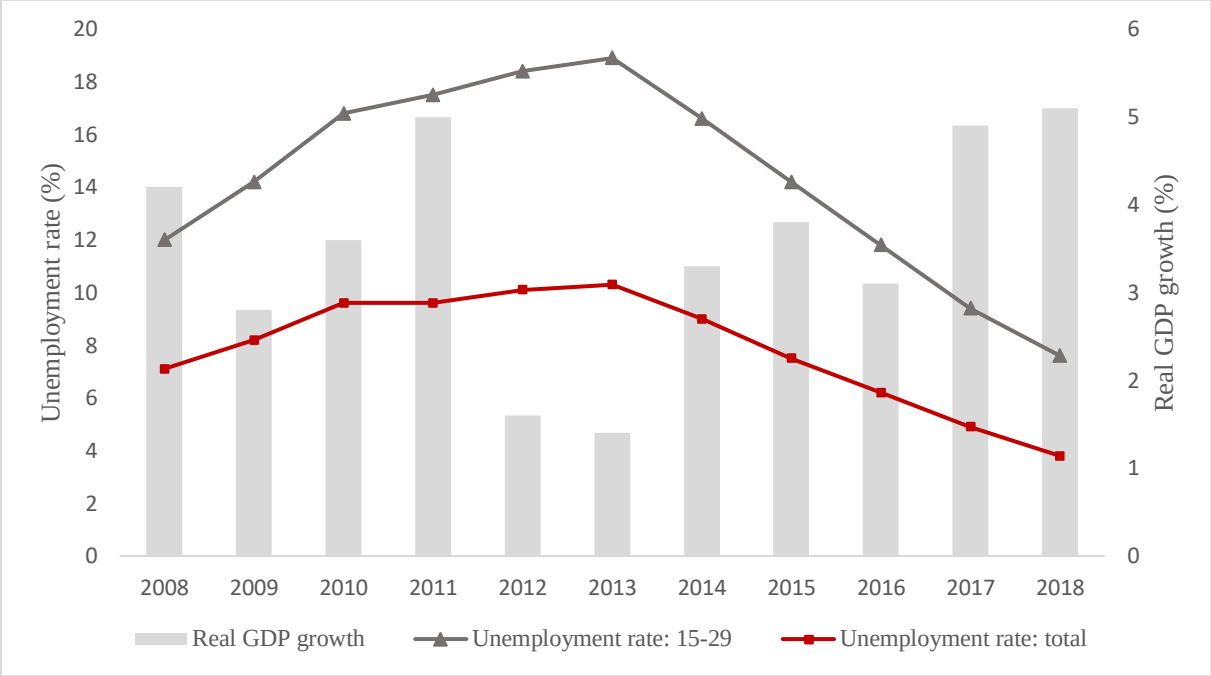
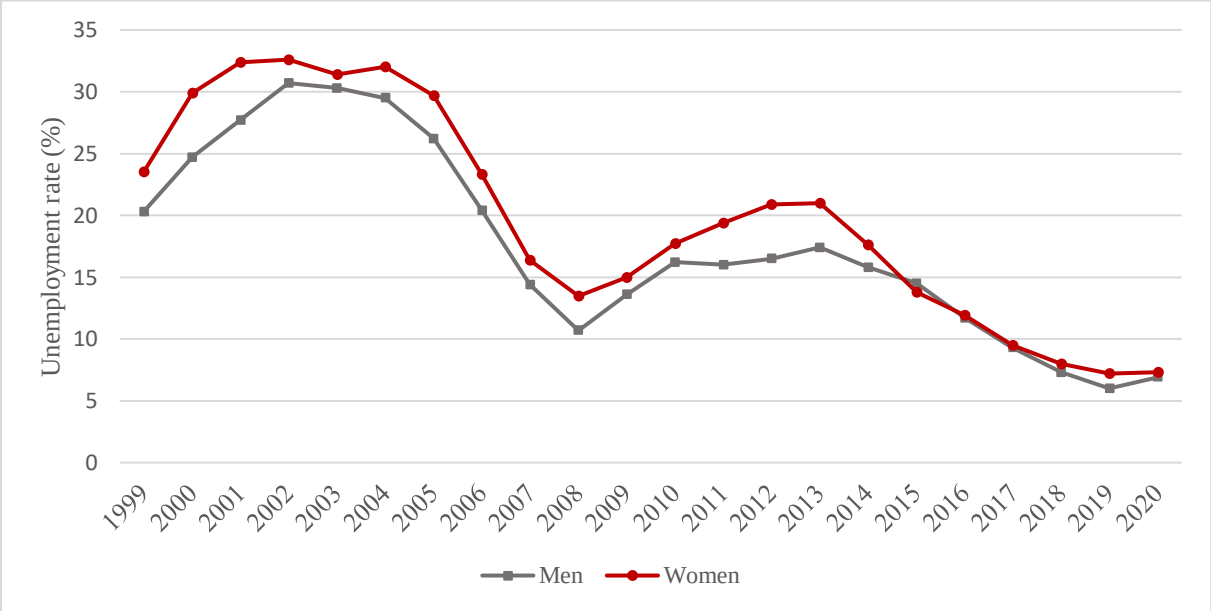
Figure 1. Unemployment and real GDP growth in Poland during the period 2008 to 2018



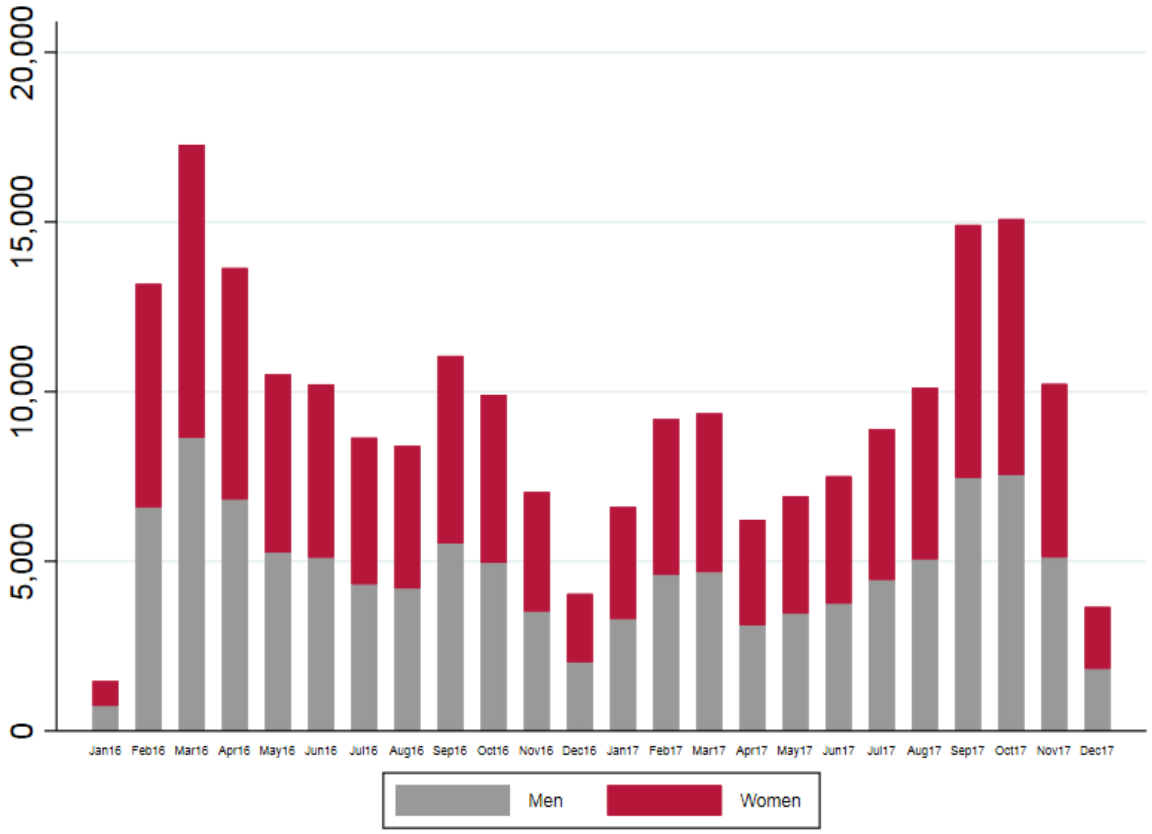
Source: Unemployment rates (Statistics Poland); Real GDP growth (Eurostat).

Figure 2. Youth unemployment rates (age 15 to 29) in Poland, 1999-2020, in %



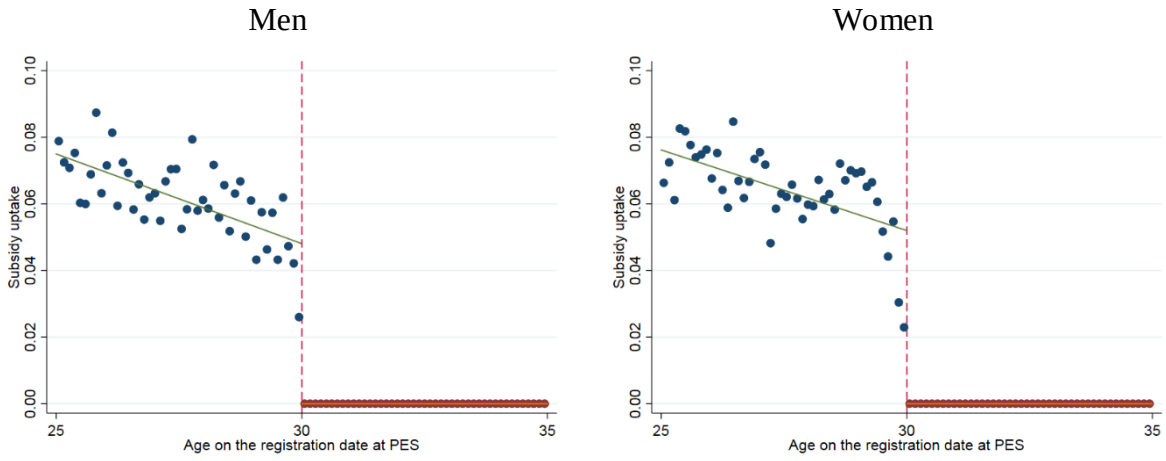
Source: Own calculations based on the Polish Labour Force Survey (LFS).

Figure 3. The number of entries into the 2016 wage subsidy programme over time and by gender



Note: The figure includes all entries into the 2016 wage subsidy programme regardless of the individual's registration date.

Figure 4. The 2016 wage subsidy uptake share measured as the percentage of registrations by age and gender[1]



Note: [1]The period from 1st January to 30th April 2016. Dots represent the sample averages within bins; the lines represent the linear fit. Age is continuous and measured in days converted to years. Registrations are limited to registrations of individuals who were not registered as unemployed and had not participated in an ALMP during the six months before the current registration.

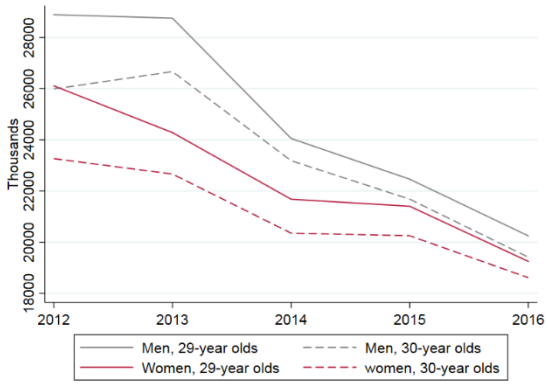
Table 1. Descriptive statistics for the control and outcome variables using the main analysis sample for the 2016 wage subsidy reform (2016), by gender

	Men					Women				
	Eligible (age=29)		Non-eligible (age=30)		Diff.	Eligible (age=29)		Non-eligible (age=30)		Diff.
	Mean	Sd.	Mean	Sd.		Mean	Sd.	Mean	Sd.	
Control variables										
Lower Education[1]	0.46	0.50	0.48	0.50	0.02**	0.21	0.40	0.22	0.41	0.02*
Secondary Education[1]	0.36	0.48	0.36	0.48	0.00	0.38	0.49	0.38	0.49	0.00
Tertiary Education[1]	0.18	0.38	0.16	0.37	-0.02***	0.41	0.49	0.39	0.49	-0.02*
No work experience	0.17	0.37	0.14	0.35	-0.03***	0.13	0.34	0.12	0.33	-0.01
Work experience (days)	1396	1092	1603	1189	207***	1404	1016	1661	1156	257***
Number of earlier registrations	3.56	2.88	4.04	3.17	0.48***	3.23	2.72	3.47	2.90	0.24***
Cumulated unemployment (days)	589	581	701	655	112***	658	703	762	792	103***
Disability	0.02	0.13	0.02	0.15	0.00	0.02	0.14	0.02	0.14	0.00
Child under 6 years old	0.17	0.38	0.19	0.39	0.02**	0.39	0.49	0.41	0.49	0.02*
City	0.58	0.49	0.60	0.49	0.01	0.60	0.49	0.62	0.49	0.01
Long-term unemployed	0.06	0.23	0.05	0.23	0.00	0.07	0.25	0.06	0.24	0.00
No qualifications	0.29	0.46	0.25	0.43	-0.04***	0.25	0.43	0.19	0.40	-0.05***
Eligible for unemployment benefits	0.22	0.41	0.22	0.42	0.01	0.36	0.48	0.39	0.49	0.02**
Interest in working in another EU country	0.18	0.38	0.18	0.38	0.00	0.07	0.25	0.07	0.25	0.00
Regional unemployment (NUTS 4, %)	6.18	2.58	6.14	2.55	-0.04	5.94	2.58	5.82	2.50	-0.12**
Income related to country average (NUTS 4, %)	88.30	14.32	88.46	14.16	0.16	88.90	14.47	89.65	15.36	0.74**
Average distance to city (NUTS 5, km)	9.25	10.84	9.07	10.82	-0.18	8.84	10.52	8.83	10.68	-0.01
Outcome variables										
Not in register (after 36 months)	0.90	0.30	0.90	0.30	0.00	0.84	0.36	0.82	0.38	-0.02**
Not in register and not in ALMP (after 36 months)	0.88	0.32	0.88	0.33	0.00	0.82	0.38	0.80	0.40	-0.02**
Cumulated days not in register (after 36 months)	859	226	845	227	-15***	757	313	724	323	-33***
Observations	7974		7758			7035		6900		

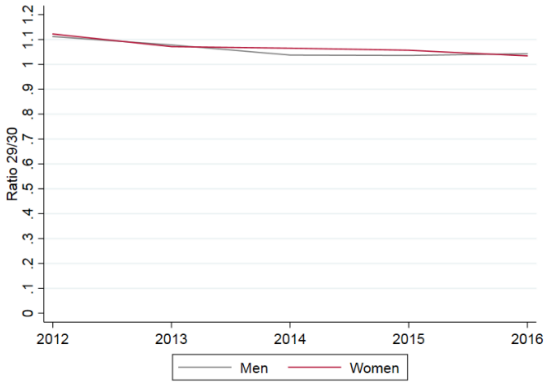
*Note: [1]Lower education is lower secondary education or lower, with upper secondary vocational education with no access to post-secondary or tertiary education (ISCED levels 0-2, and 3C according to ISCED 1997 classification). Secondary education is upper-secondary programmes (both vocational and general) which give access to tertiary education and post-secondary education (ISCED levels 3A and 4 according to ISCED 1997 classification). Tertiary education is ISCED levels 5 and 6 according to ISCED 1997 classification. We combined upper secondary vocational education (ISCED 3C) with the lowest category because the labour outcomes of this group differ from the other upper-secondary categories and the share of people with lower-secondary education or below is very small. ***/**/* indicate statistical significance at the 0.1%/1%/5%-level.*

Figure 5. The number and ratio of registrations of 29- and 30-year-olds in 2012-2016, by gender

A. Number of registrations (in thousands)



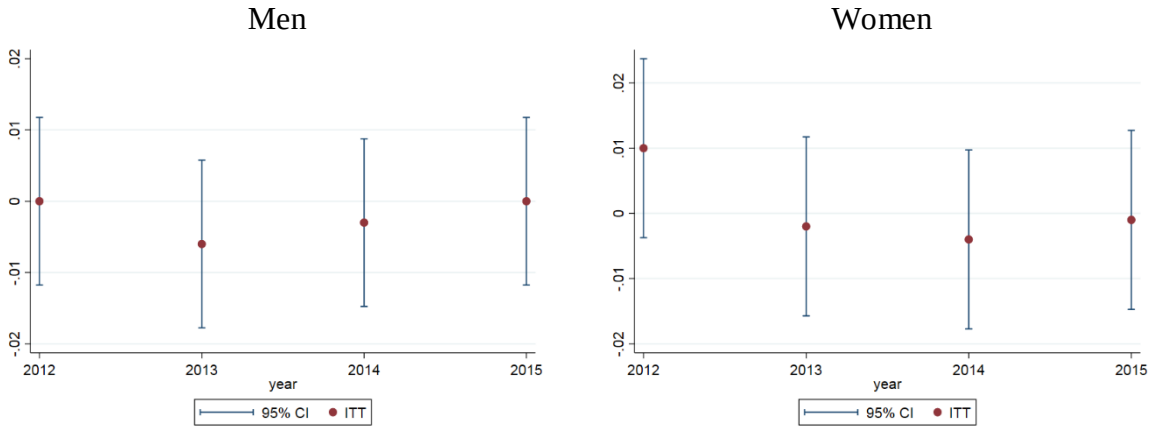
B. The ratio of registrations (age 29 to age 30)



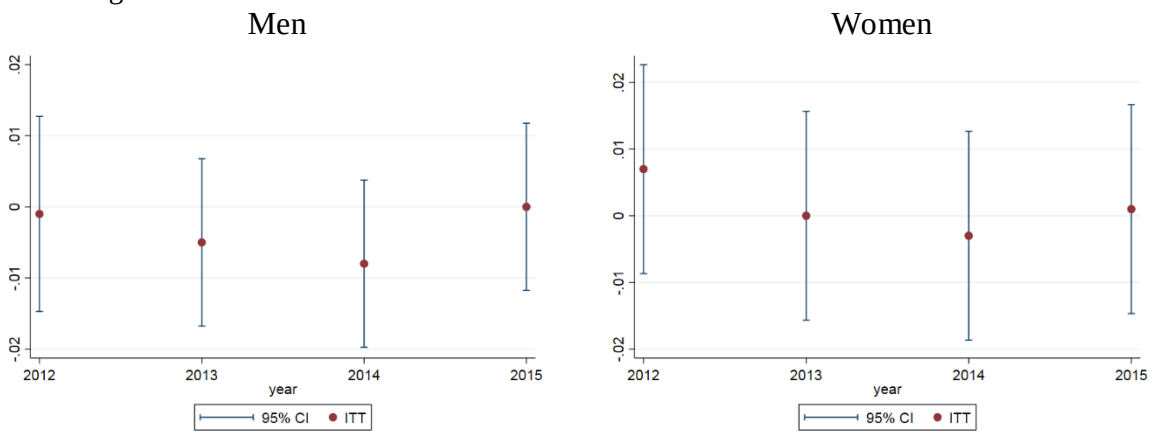
Note: Registrations are limited to registrations of individuals who were not registered as unemployed and had not participated in an ALMP during the six months before the current registration.

Figure 6. Pre-treatment trend: regression discontinuity estimates at the 30-year threshold and their confidence intervals for outcomes 36 months after registration in the years 2012-2015, by gender.

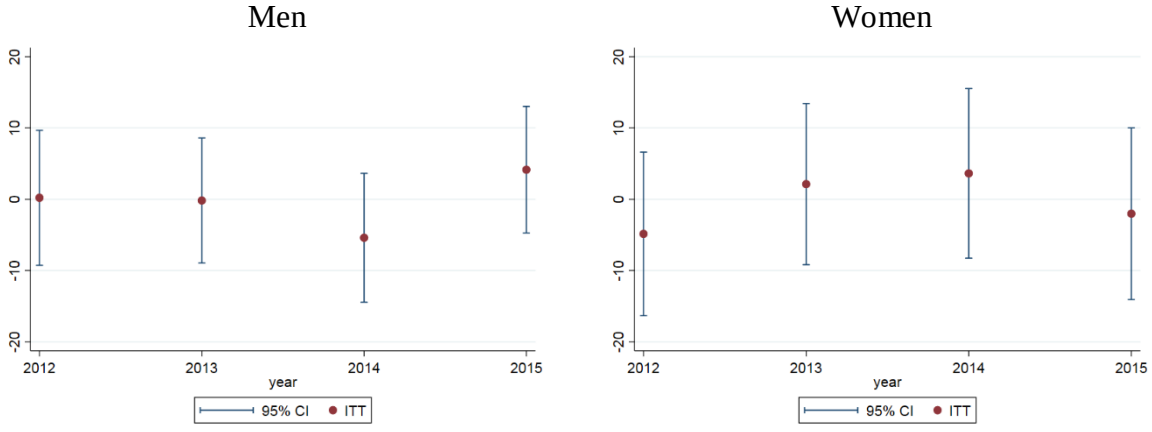
A. Outcome: Being out of the unemployment register 36 months after registration



B. Outcome: Being out of the unemployment register and not in ALMP 36 months after registration



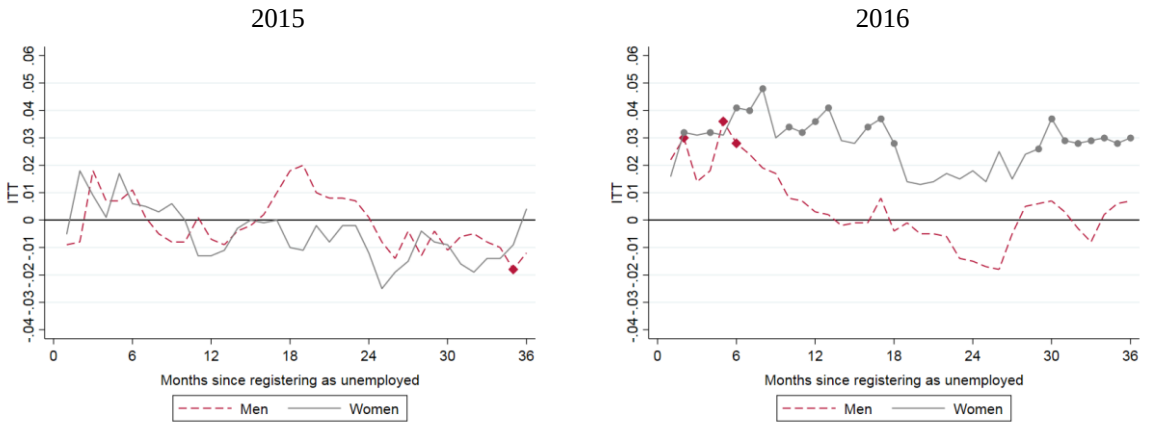
C. Outcome: Cumulative # of days out of unemployment register 36 months after registration



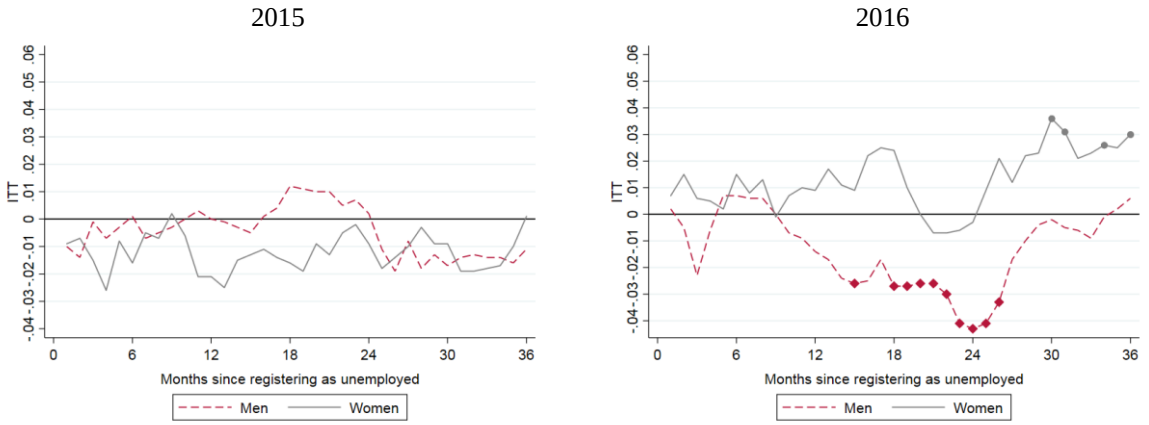
Note: The dots represent point estimates of the difference in the respective employment outcomes (presented in panels) at the 30-year threshold. The lines represent 95% confidence intervals.

Figure 7. Regression discontinuity estimates and their significance at the 30-year threshold 1 to 36 months after registration in 2015 and 2016, by gender

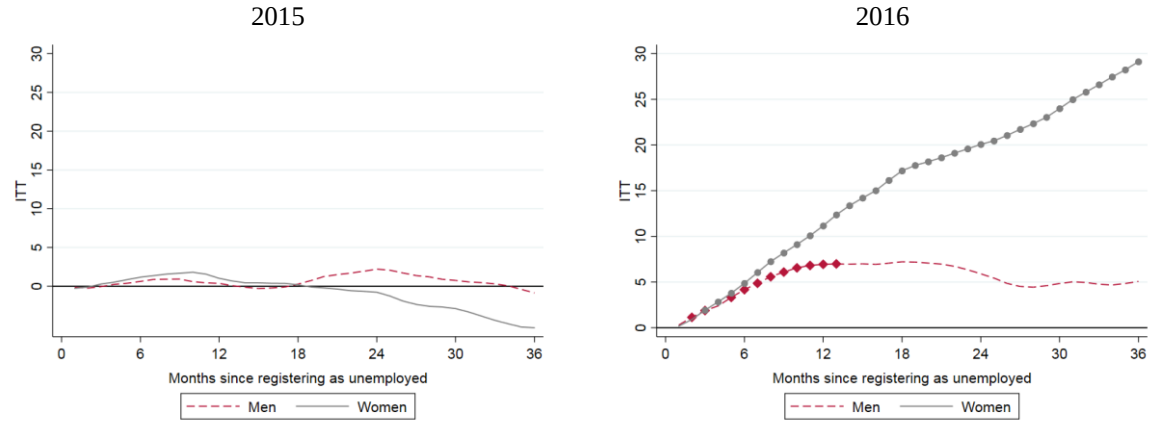
A. Outcome: Being out of the unemployment register



B. Outcome: Being out of the unemployment register and not in ALMP



C. Outcome: Cumulative # of days out of the unemployment register

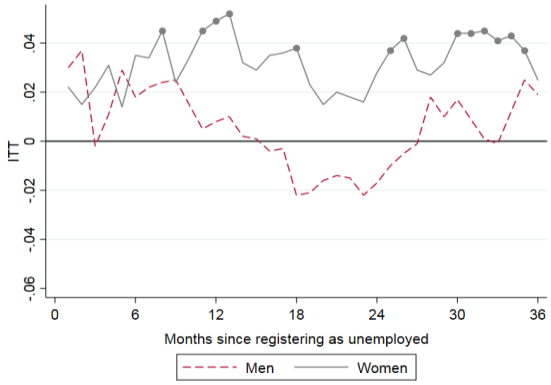


Note: This figure depicts the difference in outcomes at the 30-year threshold by months since registering as unemployed. The effects are estimated using regression discontinuity design. The sample includes all men (women) 29 and 30 years old who registered as unemployed from January to April 2015 (2016) and were not registered as unemployed and had not participated in an ALMP during the six months before the current registration. The marker on the line at a particular point in time indicates that the effect is statistically significant at the 5% significance level. The control variables include the level of education, place of residence (urban/rural), disability status, presence of children aged six or younger in the household, lack of qualifications, a dummy for long-term

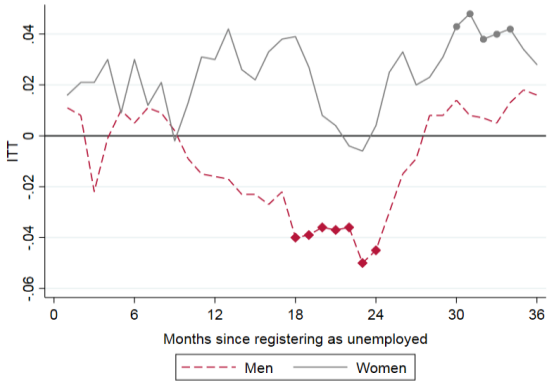
unemployment, total work experience, a dummy for having no work experience, total time in the unemployment register, the number of earlier registrations, a dummy for eligibility to receive unemployment benefits, and a dummy for declaring an interest in migrating to other EU countries, the local unemployment rate (at the NUTS 4 level), the local average wage as a percentage of the country average (at the NUTS 4 level), and distance to the poviat city from the municipality of residence (at the NUTS-5 level).

Figure 8. The effects of eligibility to the 2016 wage subsidy (ITT) and their significance estimated by the difference-in-discontinuity approach 1 to 36 months after registration, by gender

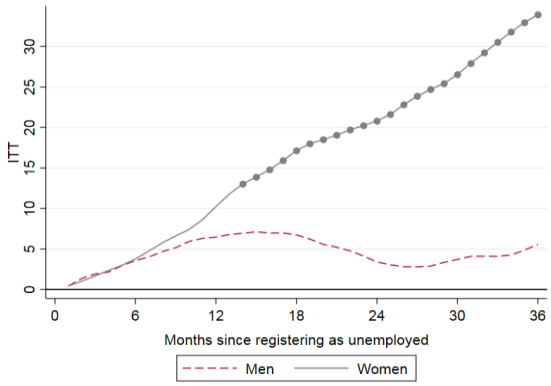
A. Outcome: Being out of the unemployment register



B. Outcome: Being out of the unemployment register and not in ALMP



C. Outcome: Cumulative # of days out of the unemployment register



Note: This figure depicts the marginal effects of being eligible to the 2016 wage subsidy by months since registering as unemployed. The effects are estimated using the difference-in-discontinuity approach. The sample includes all men (women) 29 and 30 years old who registered as unemployed during the periods January to April 2015 and January to April 2016 and were not registered as unemployed and had not participated in an ALMP during the six months before the current registration (the main analysis sample). The marker on the line at a particular point in time indicates that the effect is statistically significant at the 5% significance level. The control variables include the level of education, place of residence (urban/rural), disability status, presence of children aged six or younger in the household, lack of qualifications, a dummy for long-term unemployment, total work experience, a dummy for having no work experience, total time in the unemployment register, the number of earlier registrations, a dummy for eligibility to receive unemployment benefits, and a dummy for declaring an interest in migrating to other EU countries, the local unemployment rate (at the NUTS 4 level), the local average wage as a percentage of the country average (at the NUTS 4 level), and distance to the poviat city from the municipality of residence (at the NUTS-5 level).

Table 2. The effects of eligibility to the 2016 wage subsidy (ITT) estimated by the difference-in-discontinuity approach 6, 12, 18, 24, 30, and 36 months after registration, by gender

	Men					
	M6	M12	M18	M24	M30	M36
Outcome 1	0.018	0.008	-0.022	-0.017	0.017	0.019
	(0.020)	(0.018)	(0.015)	(0.015)	(0.013)	(0.013)
Outcome 2	0.005	-0.016	-0.040*	-0.045**	0.014	0.016
	(0.021)	(0.020)	(0.017)	(0.016)	(0.015)	(0.014)
Outcome 3	3.565	6.471	6.732	3.391	3.708	5.556
	(2.595)	(4.673)	(6.228)	(7.476)	(8.626)	(9.698)
N	33077	33077	33077	33077	33077	33077
	Women					
	M6	M12	M18	M24	M30	M36
Outcome 1	0.035	0.049*	0.038	0.028	0.044*	0.025
	(0.023)	(0.021)	(0.020)	(0.018)	(0.017)	(0.017)
Outcome 2	0.030	0.030	0.039	0.004	0.043*	0.028
	(0.022)	(0.023)	(0.021)	(0.020)	(0.019)	(0.018)
Outcome 3	3.762	10.238	17.149*	20.799*	26.547*	33.925*
	(2.819)	(5.647)	(8.105)	(10.248)	(12.168)	(13.943)
N	28724	28724	28724	28724	28724	28724

Note: The sample includes all men (women) 29 and 30 years old who registered as unemployed during the periods January to April 2015 and January to April 2016 and were not registered as unemployed and had not participated in an ALMP during the six months before the current registration (the main analysis sample). The table reports the marginal coefficients of being eligible to the 2016 wage subsidy. Standard errors are reported in parenthesis. The control variables include the level of education, place of residence (urban/rural), disability status, presence of children aged six or younger in the household, lack of qualifications, a dummy for long-term unemployment, total work experience, a dummy for having no work experience, total time in the unemployment register, the number of earlier registrations, a dummy for eligibility to receive unemployment benefits, and a dummy for declaring an interest in migrating to other EU countries, the local unemployment rate (at the NUTS 4 level), the local average wage as a percentage of the country average (at the NUTS 4 level), and distance to the poviat city from the municipality of residence (at the NUTS-5 level). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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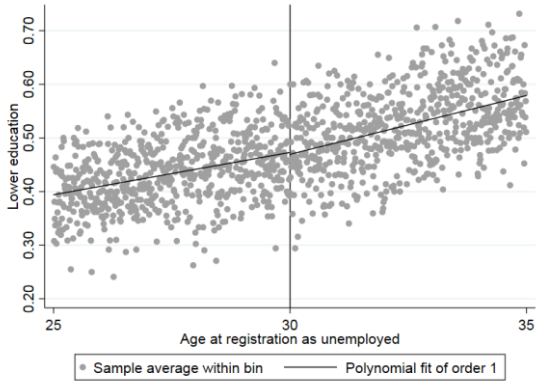
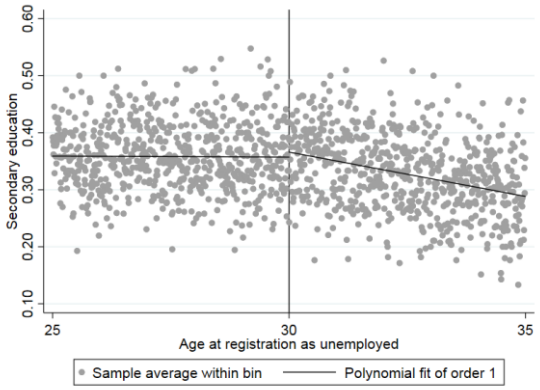
Appendix

Figure 9. Control variables as a function of age: men[1]

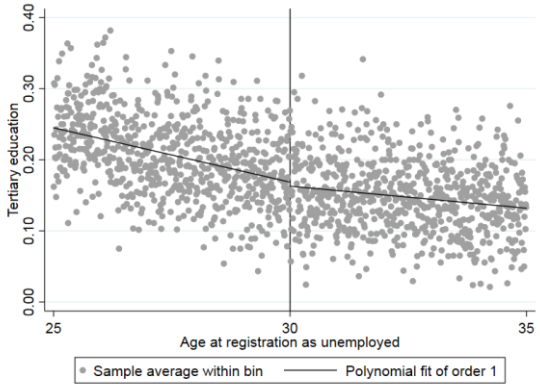
Lower education (ISCED 0-2, 3C)



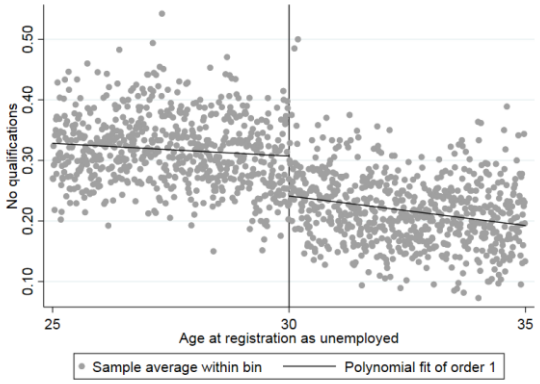
Secondary education (ISCED 3A and 4)



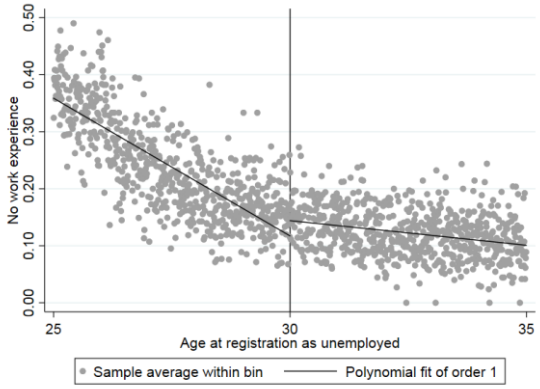
Tertiary education (ISCED 5 and 6)



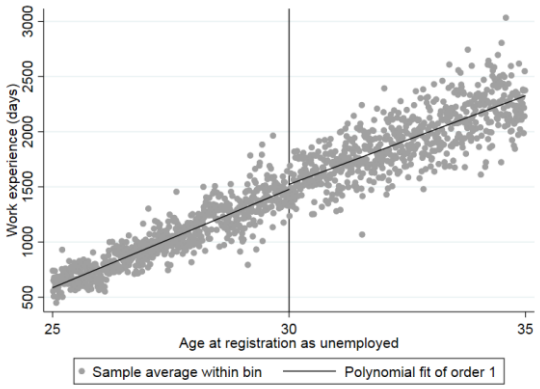
No qualifications



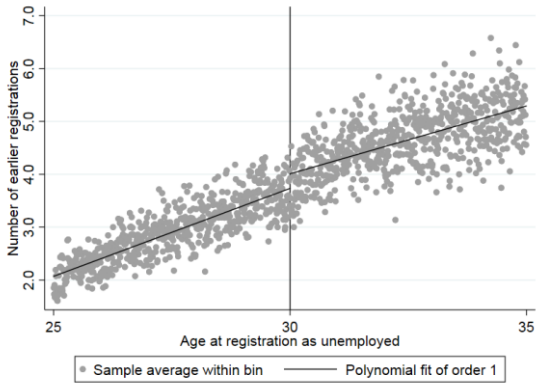
No work experience



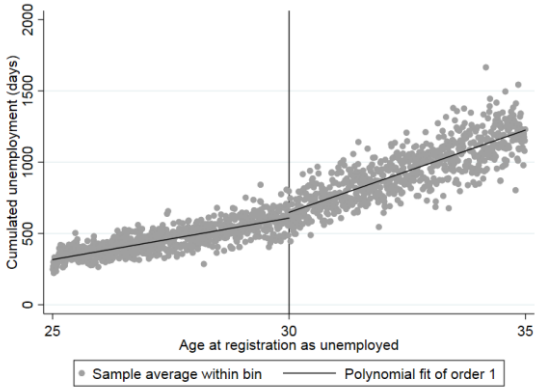
Work experience (days)



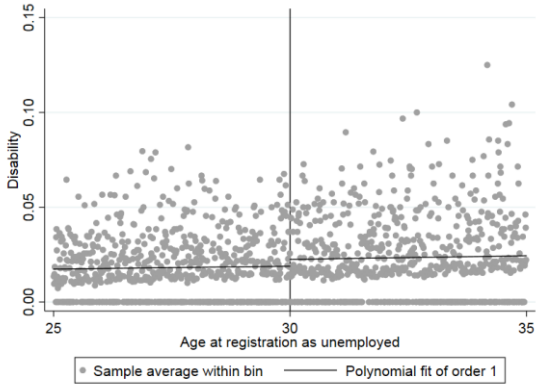
Number of earlier registrations



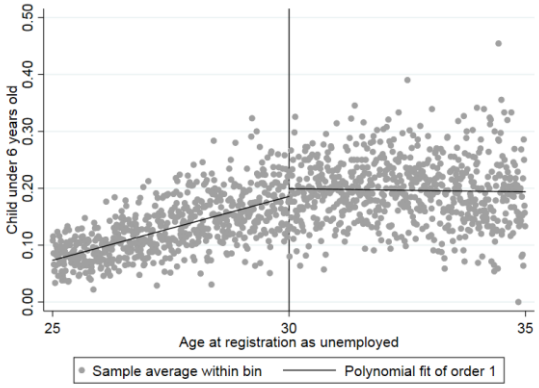
Cumulated unemployment (days)



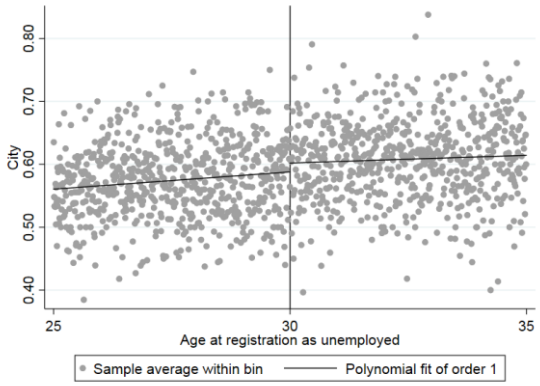
Disability



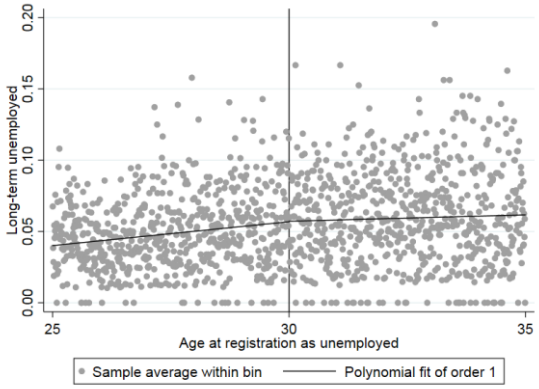
Child under 6 years old



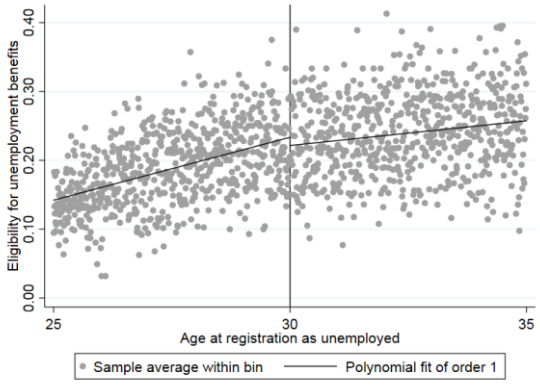
City



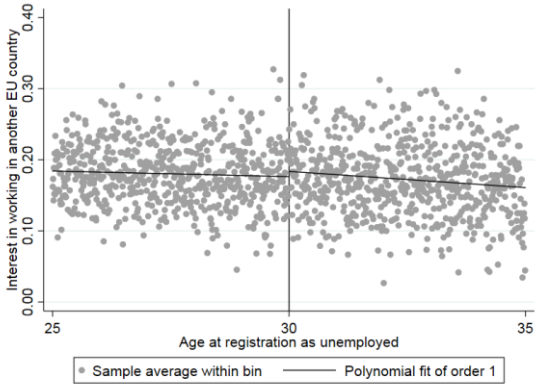
Long-term unemployed



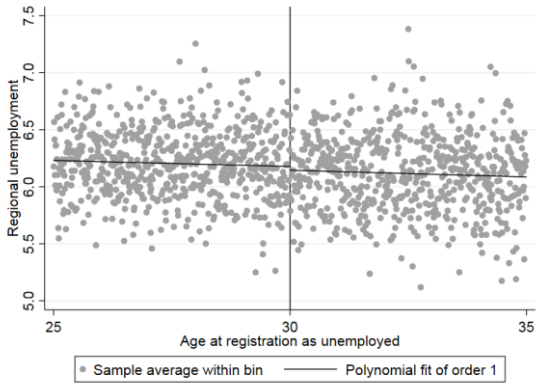
Eligibility for unemployment benefits



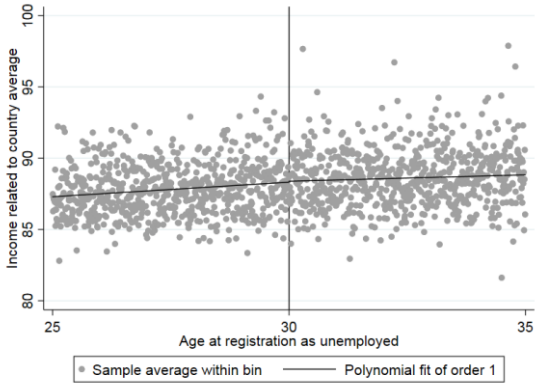
Interest in working in another EU country



Regional unemployment (NUTS 4)



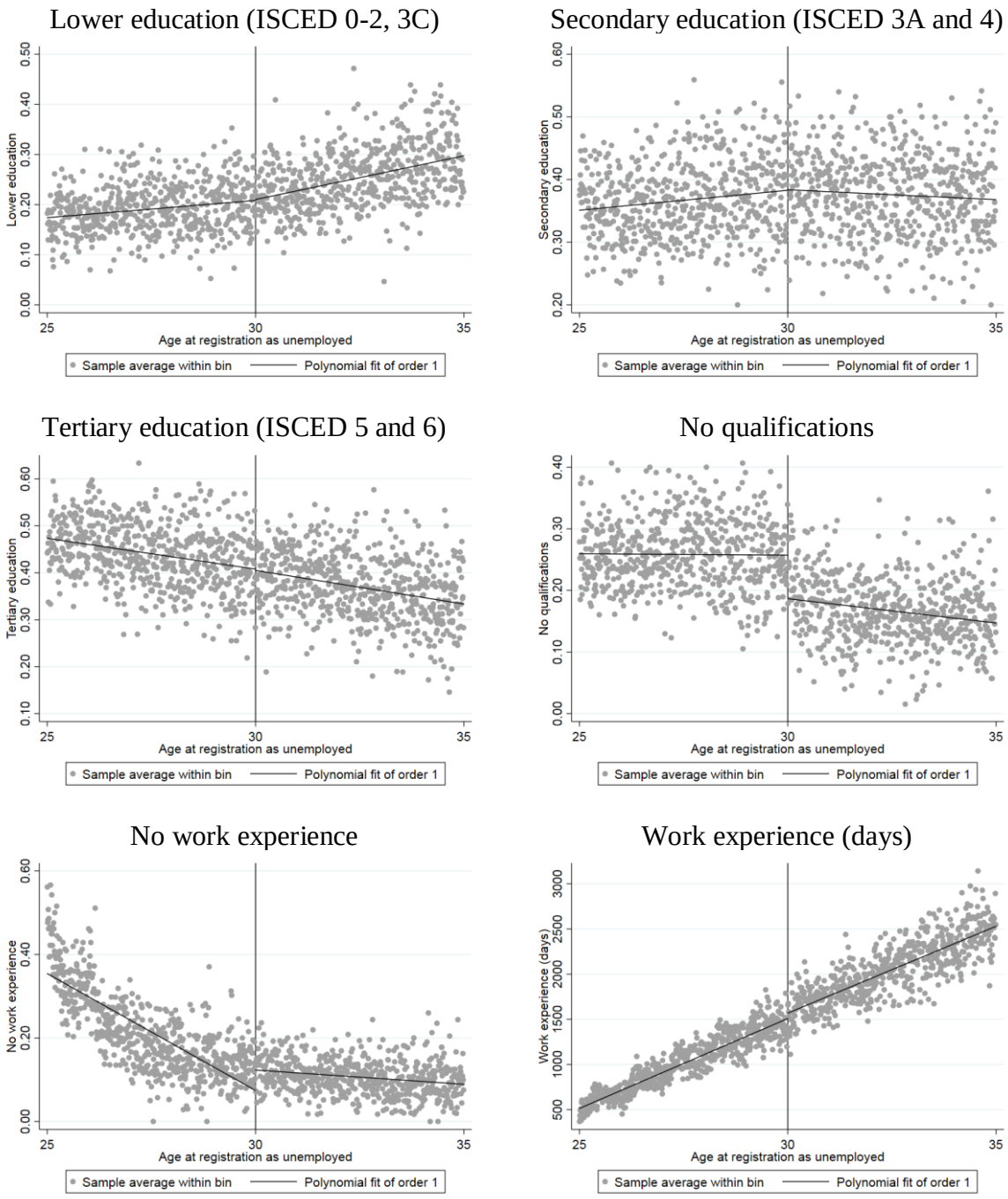
Income related to country average (NUTS 4)



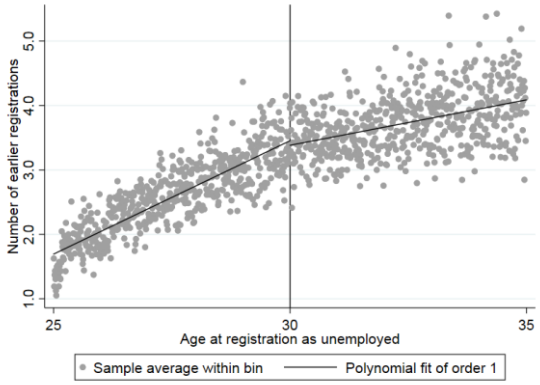
Average distance to city (NUTS 5)

Note: [1] The period from 1st January to 30th April 2016. Dots represent the sample averages within bins. The line is a second-order polynomial fit. Age is continuous and measured in days converted to years.

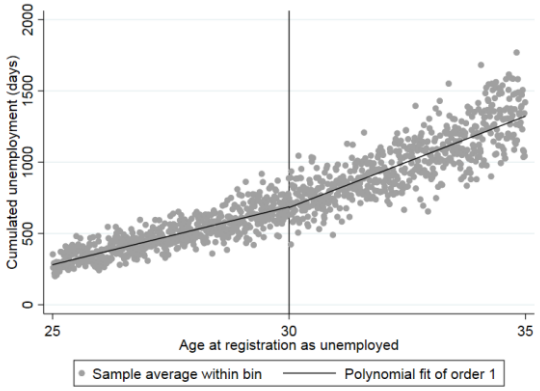
Figure 10. Control variables as a function of age: women[1]



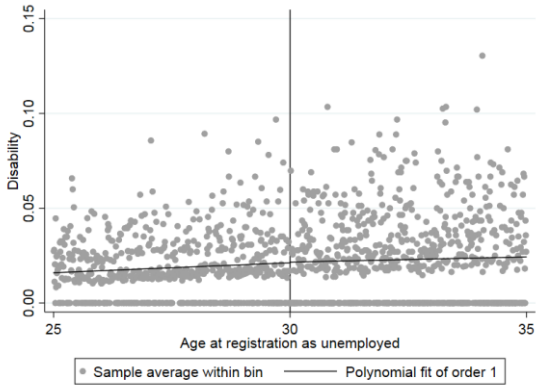
Number of earlier registrations



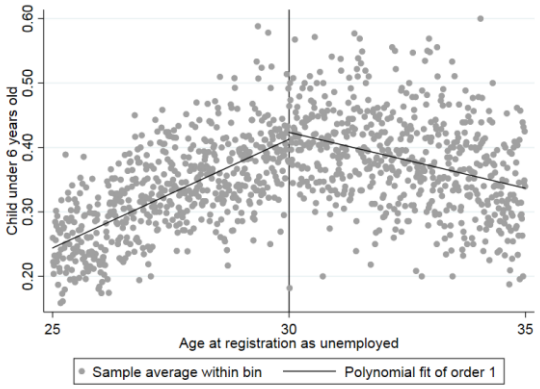
Cumulated unemployment (days)



Disability

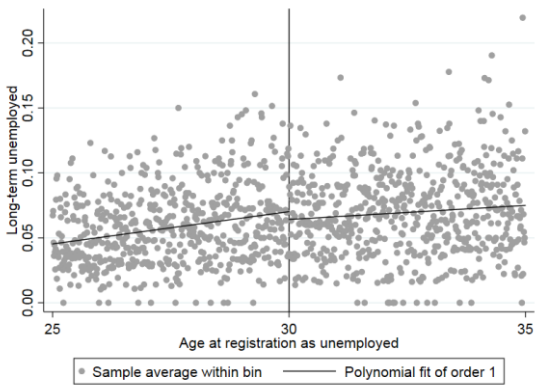


Child under 6 years old

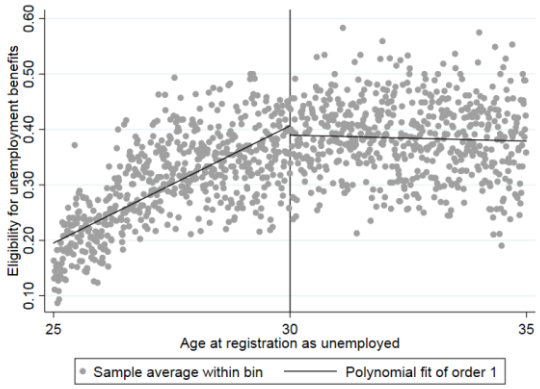


City

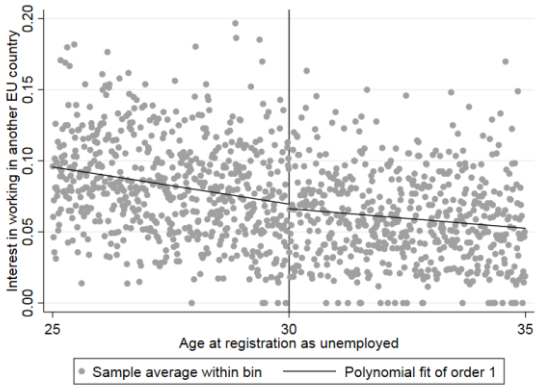
Long-term unemployed



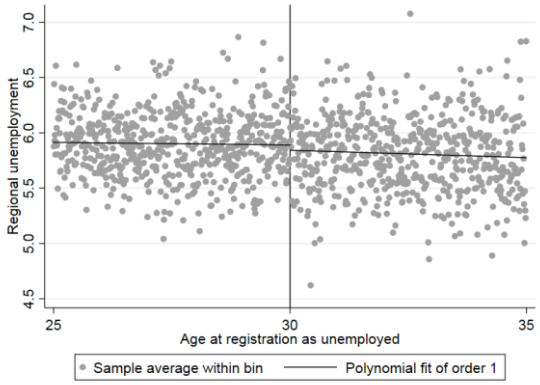
Eligibility for unemployment benefits



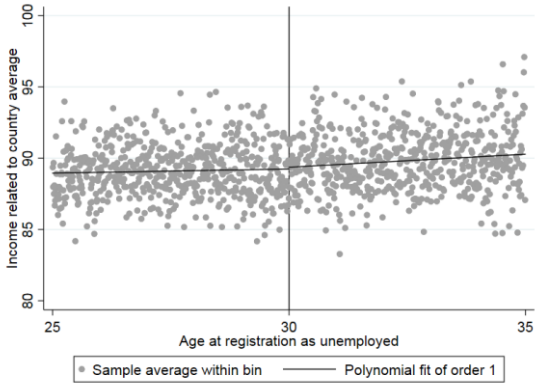
Interest in working in another EU country



Regional unemployment (NUTS 4)



Income related to country average (NUTS 4)



Average distance to city (NUTS 5)

Note: [1] The period from 1st January to 30th April 2016. Dots represent the sample averages within bins. The line is a second-order polynomial fit. Age is continuous and measured in days converted to years.

Table 3. The effects of eligibility to the 2016 wage subsidy (ITT) estimated by the difference-in-discontinuity approach 6, 12, 18, 24, 30 & 36 months after registration, by education level and gender

	Men											
	Secondary education or less						**Tertiary education**					
	M6	M12	M18	M24	M30	M36	M6	M12	M18	M24	M30	M36
Outcome 1	0.011	0.011	-0.026	-0.023	0.014	0.018	0.055	0.003	0.002	0.020	0.035	0.024
	(0.022)	(0.020)	(0.016)	(0.016)	(0.015)	(0.015)	(0.048)	(0.040)	(0.033)	(0.031)	(0.028)	(0.027)
Outcome 2	0.008	-0.005	-0.045*	-0.050**	0.008	0.013	-0.003	-0.068	-0.016	-0.019	0.045	0.035
	(0.023)	(0.022)	(0.019)	(0.018)	(0.016)	(0.016)	(0.051)	(0.048)	(0.042)	(0.037)	(0.032)	(0.030)
Outcome 3	4.216	5.465	4.969	0.341	-0.746	0.567	1.013	13.386	17.811	21.498	28.884	33.351
	(2.849)	(5.132)	(6.843)	(8.224)	(9.499)	(10.695)	(6.283)	(11.284)	(14.988)	(17.902)	(20.552)	(22.956)
N	27342	27342	27342	27342	27342	27342	5687	5687	5687	5687	5687	5687
	Women											
	Secondary education or less						**Tertiary education**					
	M6	M12	M18	M24	M30	M36	M6	M12	M18	M24	M30	M36
Outcome 1	0.038	0.060*	0.040	0.032	0.057*	0.038	0.034	0.035	0.037	0.025	0.026	0.007
	(0.029)	(0.029)	(0.027)	(0.026)	(0.025)	(0.024)	(0.035)	(0.032)	(0.028)	(0.025)	(0.024)	(0.022)
Outcome 2	0.026	0.015	0.033	0.012	0.045	0.028	0.040	0.052	0.048	-0.005	0.041	0.028
	(0.028)	(0.029)	(0.028)	(0.027)	(0.026)	(0.025)	(0.035)	(0.035)	(0.032)	(0.029)	(0.027)	(0.025)
Outcome 3	4.560	12.332	20.268	25.507	32.483*	42.261*	2.586	7.523	13.231	14.905	18.882	22.763
	(3.589)	(7.356)	(10.708)	(13.704)	(16.450)	(19.053)	(4.541)	(8.796)	(12.345)	(15.294)	(17.818)	(20.013)
N	17059	17059	17059	17059	17059	17059	11640	11640	11640	11640	11640	11640

Note: The sample includes all men (women) 29 and 30 years old who registered as unemployed during the periods January to April 2015 and January to April 2016 and were not registered as unemployed and had not participated in an ALMP during the six months before the current registration (the main analysis sample). The table reports the marginal coefficients of being eligible and the 2016 reform. Standard errors are reported in parenthesis. The control variables include the level of education, place of residence (urban/rural), disability status, presence of children aged six or younger in the household, lack of qualifications, a dummy for long-term unemployment, total work experience, a dummy for having no work experience, total time in the unemployment register, the number of earlier registrations, a dummy for eligibility to receive unemployment benefits, and a dummy for declaring an interest in migrating to other EU countries, the local unemployment rate (at the NUTS 4 level), the local average wage as a percentage of the country average (at the NUTS 4 level), and distance to the poviat city from the municipality of residence (at the NUTS-5 level). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

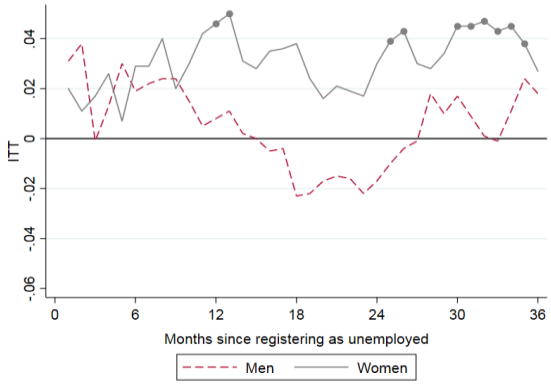
Table 4. The effects of eligibility to the 2016 wage subsidy (ITT) estimated by the difference-in-discontinuity approach 6, 12, 18, 24, 30 & 36 months after registration, by unemployment level and gender

	Men											
	Regions with unemployment below the median						**Regions with unemployment above the median**					
	M6	M12	M18	M24	M30	M36	M6	M12	M18	M24	M30	M36
Outcome 1	0.018	0.046*	-0.010	0.005	0.008	0.004	0.021	-0.026	-0.031	-0.032	0.024	0.029
	(0.028)	(0.024)	(0.019)	(0.019)	(0.017)	(0.017)	(0.028)	(0.026)	(0.022)	(0.022)	(0.019)	(0.020)
Outcome 2	-0.007	0.018	-0.029	-0.008	0.021	-0.002	0.018	-0.043	-0.047	-0.075**	0.006	0.028
	(0.031)	(0.027)	(0.024)	(0.022)	(0.019)	(0.018)	(0.029)	(0.028)	(0.025)	(0.024)	(0.022)	(0.022)
Outcome 3	7.895*	14.908*	18.154*	18.880	19.735	21.600	0.448	0.259	-2.141	-8.636	-8.950	-7.197
	(3.853)	(6.542)	(8.533)	(10.108)	(11.564)	(12.909)	(3.555)	(6.685)	(9.029)	(10.923)	(12.666)	(14.296)
N	14828	14828	14828	14828	14828	14828	18249	18249	18249	18249	18249	18249
	Women											
	Regions with unemployment below the median						**Regions with unemployment above the median**					
	M6	M12	M18	M24	M30	M36	M6	M12	M18	M24	M30	M36
Outcome 1	0.028	0.096***	0.052*	-0.006	0.053*	0.010	0.034	-0.000	0.024	0.057*	0.035	0.034
	(0.032)	(0.029)	(0.026)	(0.025)	(0.023)	(0.022)	(0.032)	(0.031)	(0.029)	(0.028)	(0.027)	(0.026)
Outcome 2	0.022	0.068*	0.051	-0.023	0.060*	0.024	0.035	-0.011	0.024	0.023	0.023	0.028
	(0.033)	(0.032)	(0.029)	(0.027)	(0.025)	(0.023)	(0.030)	(0.033)	(0.032)	(0.030)	(0.029)	(0.028)
Outcome 3	2.631	14.697	27.891*	30.758*	35.544*	41.439*	4.411	5.250	5.907	9.861	16.257	24.497
	(4.049)	(7.913)	(11.245)	(14.094)	(16.586)	(18.866)	(3.984)	(8.168)	(11.818)	(15.047)	(17.995)	(20.736)
N	14132	14132	14132	14132	14132	14132	14592	14592	14592	14592	14592	14592

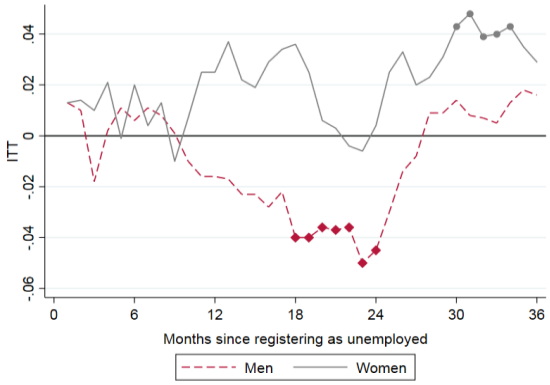
Note: The sample includes all men (women) 29 and 30 years old who registered as unemployed during the periods January to April 2015 and January to April 2016 and were not registered as unemployed and had not participated in an ALMP during the six months before the current registration (the main analysis sample). The table reports the marginal coefficients of being eligible and the 2016 reform. Standard errors are reported in parenthesis. The control variables include the level of education, place of residence (urban/rural), disability status, presence of children aged six or younger in the household, lack of qualifications, a dummy for long-term unemployment, total work experience, a dummy for having no work experience, total time in the unemployment register, the number of earlier registrations, a dummy for eligibility to receive unemployment benefits, and a dummy for declaring an interest in migrating to other EU countries, the local unemployment rate (at the NUTS 4 level), the local average wage as a percentage of the country average (at the NUTS 4 level), and distance to the poviat city from the municipality of residence (at the NUTS-5 level). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 11. The effects of eligibility to the 2016 wage subsidy (ITT) estimated by the difference-in-discontinuity approach without control variables 1 to 36 months after registration, by gender

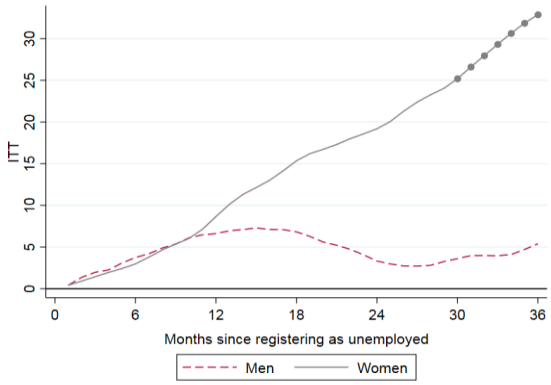
A. Outcome: Being out of the unemployment register



B. Outcome: Being out of the unemployment register and not in ALMP



C. Outcome: Cumulative # of days out of the unemployment register



Note: This figure depicts the marginal effects of being eligible to the 2016 wage subsidy by months since registering as unemployed. The effects are estimated using the differences-in-discontinuity approach without control variables. The sample includes all men (women) 29 and 30 years old who registered as unemployed during the periods January to April 2015 and January to April 2016 and were not registered as unemployed and had not participated in an ALMP during the six months before the current registration (the main analysis sample). The marker on the line at a particular point in time indicates that the effect is statistically significant at the 5% significance level.

Table 5. The effects of eligibility to the 2016 wage subsidy (ITT) estimated by the difference-in-discontinuity approach (bandwidth *h*=2) 6, 12, 18, 24, 30, and 36 months after registration, by gender

	Men					
	M6	M12	M18	M24	M30	M36
Outcome 1	0.022	0.020	-0.014	-0.019	0.007	0.012
	(0.014)	(0.012)	(0.010)	(0.010)	(0.009)	(0.009)
Outcome 2	-0.002	-0.012	-0.037**	-0.048***	0.002	0.008
	(0.015)	(0.014)	(0.012)	(0.012)	(0.010)	(0.010)
Outcome 3	2.770	7.526*	8.751*	6.859	6.787	8.245
	(1.847)	(3.318)	(4.421)	(5.301)	(6.112)	(6.868)
N	66504	66504	66504	66504	66504	66504
	Women					
	M6	M12	M18	M24	M30	M36
Outcome 1	0.029	0.037*	0.033*	0.028*	0.033**	0.019
	(0.016)	(0.015)	(0.014)	(0.013)	(0.012)	(0.012)
Outcome 2	0.011	0.002	0.006	-0.008	0.031*	0.020
	(0.016)	(0.016)	(0.015)	(0.014)	(0.013)	(0.013)
Outcome 3	3.864	10.638**	16.488**	20.589**	26.929**	31.910**
	(1.998)	(3.993)	(5.719)	(7.226)	(8.590)	(9.849)
N	57742	57742	57742	57742	57742	57742

Note: The sample includes all men (women) 28 - 31 years old who registered as unemployed during the periods January to April 2015 and January to April 2016 and who were not registered as unemployed and had not participated in an ALMP during the six months before the current registration. The table reports the marginal coefficients of being eligible and the 2016 reform. Standard errors are reported in parenthesis. The control variables include the level of education, place of residence (urban/rural), disability status, presence of children aged six or younger in the household, lack of qualifications, a dummy for long-term unemployment, total work experience, a dummy for having no work experience, total time in the unemployment register, the number of earlier registrations, a dummy for eligibility to receive unemployment benefits, and a dummy for declaring an interest in migrating to other EU countries, the local unemployment rate (at the NUTS 4 level), the local average wage as a percentage of the country average (at the NUTS 4 level), and distance to the poviat city from the municipality of residence (at the NUTS-5 level). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6. The effects of eligibility to the 2016 wage subsidy (ITT) estimated by the difference-in-discontinuity approach (optimal bandwidths following Calonico et al. (2014a, 2014b)) 6, 12, 18, 24, 30, and 36 months after registration, by gender

	Men					
	M6	M12	M18	M24	M30	M36
Outcome 1	0.010	0.008	-0.019	-0.024*	0.013	0.019
	(0.016)	(0.015)	(0.012)	(0.012)	(0.010)	(0.010)
h	1.54	1.36	1.46	1.49	1.83	1.58
N	51293	45269	48568	49665	60663	52701
Outcome 2	-0.010	-0.018	-0.041**	-0.054***	-0.001	0.008
	(0.017)	(0.017)	(0.013)	(0.012)	(0.011)	(0.010)
h	1.62	1.28	1.74	1.93	1.63	2.00
N	53896	42716	57909	63994	54242	66666
Outcome 3	2.996	5.936	5.394	1.732	1.113	3.036
	(2.275)	(4.171)	(5.401)	(6.405)	(7.33)	(8.091)
h	1.32	1.27	1.35	1.38	1.40	1.45
N	43776	42195	44716	45820	46419	48106
	Women					
	M6	M12	M18	M24	M30	M36
Outcome 1	0.038	0.054**	0.033*	0.032	0.047**	0.028
	(0.021)	(0.019)	(0.015)	(0.018)	(0.018)	(0.015)
h	1.17	1.25	1.69	1.08	0.99	1.24
N	33943	36268	48443	31326	28423	35956
Outcome 2	0.028	0.023	0.018	0.003	0.044*	0.036*
	(0.018)	(0.018)	(0.016)	(0.018)	(0.019)	(0.016)
h	1.47	1.55	1.74	1.31	0.99	1.36
N	42378	44678	49819	37949	28504	39164
Outcome 3	4.474	11.491*	20.290**	25.509**	29.671**	34.555**
	(2.315)	(5.039)	(7.066)	(8.798)	(10.559)	(12.166)
h	1.50	1.26	1.31	1.35	1.33	1.31
N	43257	36333	37949	39073	38244	37805

Note: The sample includes individuals who registered as unemployed during the periods January to April 2015 and January to April 2016 and who were not registered as unemployed and had not participated in an ALMP during the six months before the current registration. The optimal bandwidth h is estimated following Calonico et al. (2014a, 2014b). The table reports the marginal coefficients of being eligible and the 2016 reform. Standard errors are reported in parenthesis. The control variables include the level of education, place of residence (urban/rural), disability status, presence of children aged six or younger in the household, lack of qualifications, a dummy for long-term unemployment, total work experience, a dummy for having no work experience, total time in the unemployment register, the number of earlier registrations, a dummy for eligibility to receive unemployment benefits, and a dummy for declaring an interest in migrating to other EU countries, the local unemployment rate (at the NUTS 4 level), the local average wage as a percentage of the country average (at the NUTS 4 level), and distance to the poviat city from the municipality of residence (at the NUTS-5 level). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.