




From Unemployed to Self-Employed: Analysis of Treatment Effects of a Dutch Self-Employment Programme

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Abstract

This paper evaluates the effectiveness of a programme that aims to activate welfare recipients to become self-employed. We use unique administrative data which contain applicants for a self-employment programme between 2007 and 2010. We examine the long-term effects of the programme on people's welfare, employment and income until 8 years after they applied to the programme. The estimations show positive long-term effects of being accepted into the programme. It seems that even applying to the programme and subsequently being rejected also had positive employment effects. This was probably due to the training and guidance the applicants received while writing a business plan, which was a prerequisite to participating in the programme. Moreover, a cost–benefit analysis showed that the programme is cost-effective.

Keywords Start-up subsidies · Self-employment · Welfare recipients · Cost–benefit analysis · Matching

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1 Introduction

Entrepreneurship is recognised as an important way to create jobs. Specifically, the European Commission focuses on encouraging unemployed individuals to start businesses. In 2018, 2.5% of unemployed people in the EU started a business. However, unemployed people face barriers such as credit restrictions. Hence, self-employment programmes for the unemployed exist in about half of the EU member states (OECD/European Union, 2019). These programmes support unemployed individuals in starting a business and usually provide a combination of income support or credit and professional counselling.

Empirical evidence of the effectiveness of such programmes is growing. The results show strong and positive effects on employment outcomes compared to unemployed people not participating in the programme, both in Sweden (Behrenz et al., 2016) and in Germany (Caliendo & Künn, 2011; Wolff et al., 2016). In addition, positive effects on the survival rates of subsidised firms versus non-subsidised start-ups have been reported in Germany (Caliendo et al., 2015), Finland (Tokila, 2009) and France (Duhautois et al., 2015).

We investigate the impact of a self-employment programme for welfare recipients in the Netherlands. We calculate the long-term effects on welfare recipients, employment and income up to 8 years after the person's application to the programme. Preparation for the programme starts with a 'pre-start period' in which the potential entrepreneur receives guidance in writing a business plan. During the 'pre-start period' they are exempted from the usual job-search requirements which are in place while they receive welfare payments. The business plan is then assessed by either the municipality or a third party. Once the business plan is approved, the welfare recipient is admitted to the self-employment programme itself, which provides financial assistance and professional guidance. The financial assistance usually consists of both an interest-free loan that supplements their income to the level of a social welfare payment, for a maximum of 3 years, and credit of no more than €32,905 at 8% interest (in 2010). The programme has about 5000 applicants per year, at an average cost per applicant of €4900. The yearly societal investment in the self-employment programme adds up to about €25 million.

This study and previous research have relied mainly on propensity score matching to evaluate the effectiveness of self-employment programmes. The results thus present the comparison of a treated group and a non-treated control group, assuming the analysis can control for all relevant characteristics that influence both the probability of entrance into the programme and labour market outcomes. Because this conditional independence assumption (CIA) cannot be tested, the large effects of self-employment programmes found in previous research raise the question of whether results are attributable to an actual effect or by any remaining selection in the programme. Selection may arise if an unobserved characteristic, like motivation, drives as well entry in the programme as labour market outcomes.

Our study contributes to the literature in three ways. First, all previous research has compared a treatment group of accepted applicants with a control group of non-participants. By contrast, we estimate the treatment effects using three different

compositions of treatment and control groups. Each composition of treatment and control group measures a different aspect of participation in the programme. This enables us to distinguish between the effects of applying and the effects of participating in the programme, conditional on applying. Moreover, each composition of treatment and control group deals with a specific type of possible selection bias. Using these three configurations of the treatment and control groups provides a rigorous check on possible selection bias. Our second contribution is that we focus on the effects regarding welfare recipients, whereas most researchers have studied the effect regarding unemployed people in general; an exception is Wolff et al. (2016). Welfare recipients are of special interest, as recent literature indicates that start-up programmes are most effective for disadvantaged unemployed individuals (Behrenz et al., 2016; Caliendo & Künn, 2011; Wolff et al., 2016). Third, we add to the literature by calculating the cost-effectiveness of the programme. Dvoutely et al. (2016) evaluated 18 studies on the effects of start-up subsidies and mentioned that cost–benefit analyses were missing in earlier literature. Because substantial investments are involved, the positive effects should also be substantial if the programme is to be cost-effective.

Our results show that the self-employment programme decreases unemployment. These results are confirmed by all three matching strategies. We find that the programme is most effective for disadvantaged welfare recipients, namely, low-educated individuals and non-western immigrants. Notably, rejected applicants also benefit from the application procedure as they receive guidance in writing their business plans. Therefore, in the cost–benefit analysis, we also considered the effect on rejected applicants. The results show that the benefits outweigh the costs of the programme.

The remainder of the paper is structured as follows. Section 2 provides a literature review, explains the three matching strategies, and outlines the theory behind the provision of self-employment programmes for unemployed people. Section 3 describes the Dutch start-up programme in more detail. Section 4 gives an overview of the data and descriptives. Section 5 explains the matching methodology. The results, the cost-benefit analysis and a discussion are reported in Sect. 6. Sect. 7 concludes the paper.

2 Literature Review and Theory

2.1 Previous Evidence

The effects of traditional re-integration services for unemployed people—such as job counselling, training and (private) wage subsidies—are small but positive. These effects increase the probability of the person resuming work by a few percentage points (see Card et al., 2018 for an overview). Usually, the effects are relatively small in the short run, given the lock-in effect of these programmes, meaning individuals are not highly involved in active job searches and therefore unlikely to resume work while they are still attending the training programme. In the medium to long run (i.e. more than one year after the start of the programme), larger effects

Table 1 Overview of the literature

Paper	Intervention	Sample	Empirical design	Results
Calliendo and Künn, (2011) Germany	<p>1. Bridging allowance (BA): Six months of unemployment benefit and social security contributions during the initial stages of self-employment</p> <p>Entry conditional on approval of the business plan</p> <p>2. Start-up subsidy (SUS): Participants receive a fixed sum of €600/month in the first year, €360/month (€240/month) in the second (third) year, unless income exceeds €25,000 per year</p> <p>No business proposal needed to be written in the period under investigation</p>	<p>A sample of entries in the third quarter of 2003, men only, in West Germany</p>	<p>Propensity score matching</p> <p>The final sample consisted of 486 participants in SUS, 780 recipients of BA and 929 non-participants</p>	<p><i>Employment probability (self-employed or salaried employed) after 56 months</i></p> <p>BA: 14.5%-point higher than the matched control group</p> <p>SUS 22.1%-point higher than the matched control group</p> <p><i>Probability of being unemployed after 56 months</i></p> <p>BA: 10.6% higher probability of not being registered as unemployed compared to non-participants</p> <p>SUS: 15.6% higher probability of not being registered as unemployed compared to non-participants</p> <p><i>Heterogenous effects</i>: Start-up subsidies for the unemployed tend to be most effective for disadvantaged groups in the labour market</p>

Table 1 (continued)

Paper	Intervention	Sample	Empirical design	Results
Behrenz et al., (2016) Sweden	<p>The Swedish self-employment scheme entitles its participants to six months' income support equivalent to unemployment compensation. Earnings from self-employment are not deducted from the subsidy</p> <p>Participants can be offered advice and information in the initial stage of being self-employed and may be given the opportunity to take part in a training course for running a business</p> <p>Entry conditional on approval of the business plan</p>	<p>Jobseekers who were unemployed in 2003 and who were transferred to the self-employment programme for a six-month period starting in 2003. Administrative</p>	<p>Propensity score matching</p> <p>The treatment group consisted of 15,106 participants. The comparison group consisted of either (1) all eligible non-participants (n = 466,691); (2) receiving only job search assistance (n = 331,906); (3) participants in other ALMPs (n = 127,742)</p>	<p><i>Employment probability (self-employed or salaried employed) after 5 years:</i></p> <p>37%-point higher for the treatment group compared to all eligible non-participants;</p> <p>37.4%-point higher compared to non-participants receiving only job assistance and 34.9%-point higher compared to participants in other ALMPs</p> <p><i>Heterogenous effects:</i> Effects were strongest for low-educated people</p>

Table 1 (continued)

Paper	Intervention	Sample	Empirical design	Results
Wolff et al., (2016) Germany	A SUS (Einstiegsgeld) for welfare recipients that can be granted for up to 2 years. The Einstiegsgeld benefit level is defined as a percentage of the basic cash benefit to cover welfare recipients' regular expenses Besides providing financial assistance, job centres provide coaching and training for participants to develop their business plans Entry conditional on approval of the business plan	The treatment group was the total inflow into the start-up scheme, between February and April 2005	Propensity score matching. The treatment group consisted of 1206 participants and the control group of 224,641 non-participants	<i>Probability of receiving welfare after 72 months:</i> 10% to 15%-point decrease in the share of participants receiving the welfare benefit <i>Probability of being unemployed after 72 months:</i> 10% to 15%-point decline in the share of unemployed participants
Caliendo & Tübbicke, 2020 Germany	Reformed SUS. Successful applicants receive a monthly payment equivalent to their unemployment benefits plus a lump sum of €300 for the first six months after entering the programme. Participants may also apply for a second benefit period, which only provides a monthly payment of the lump sum for an additional nine months Entry conditional on approval of the business plan	A random sample of previously unemployed participants who joined the programme between February and June 2012	Propensity score matching and IV analysis, exploiting regional variation in take-up due to the discretionary power of case workers to deny access to the programme. The final dataset contained 1248 participants (17% of all programme participants) and 1204 non-participants	<i>Employment probability after 40 months</i> Matching results: 21.5%-points more likely to be self-employed or salaried employed IV results: 29%-point higher probability of being in self- or salaried employment

prevail. In general, these programmes tend to be effective mainly for people whose characteristics may decrease their labour market chances unless they participate in a programme, such as women and people in long-term unemployment.

In comparison to studies on the effectiveness of the traditional re-integration services, studies on the effectiveness of self-employment programmes for the unemployed usually show relatively large effects in both the short and long run. Table 1 presents an overview of a selection of studies. Unlike traditional re-integration services, self-employment subsidies show an immediate and large employment effect once the subsidy is granted and the individual starts up their business. Although in the long run, some businesses fail, the treatment effect of the programme in terms of employment after around 5 years is high, ranging from a 15 percentage-point higher employment probability in Germany (Caliendo & Künn, 2011) to a 37% increase in Sweden (Behrenz et al., 2016). Caliendo and Tübbicke (2020) estimated the effect of the reformed self-employment programme in Germany and used propensity score matching as well as IV analyses. They estimated that after 40 months, a 21.5 percentage-point higher employment probability occurred under propensity score matching; likewise, there was a 29 percentage-point higher employment probability in the IV analysis.

The self-employment programmes reduce unemployment and welfare dependency by an estimated 10–15 percentage points (Caliendo & Künn, 2011; Wolff et al., 2016). Similar to traditional re-integration services, there is some evidence that self-employment subsidies are particularly effective for long-term unemployed people (Wolff et al., 2016) and those who face ‘unfavourable’ labour market prospects (Caliendo & Künn, 2011).

2.2 Three Matching Strategies

Most evidence on the effectiveness of self-employment programmes to date has been obtained from research using propensity score matching methods. This approach compares a treated group and a non-treated control group under the Conditional Independence Assumption (CIA). The CIA entails that one can control for all variables that influence both the probability of entrance in the programme and the labour market outcomes. The large effects of the self-employment programmes in previous studies therefore raise the question of whether the estimated effects are causal or the result of selection bias, due to unobserved variables (like motivation). Caliendo et al. (2016) strengthened confidence in the CIA by showing that it is unnecessary in the estimation to control for personality traits of the individual. Moreover, Caliendo and Tübbicke (2020) showed that an IV analysis yielded even higher effects of the programme than the analysis based on propensity score matching (see Table 1).

Our research also tests the CIA, but in a different way. All research so far has compared a treatment group of accepted applicants (i.e., those who applied for the programme and whose business proposal was successfully approved) with a control group of non-participants. The control group consists of non-applicants and rejected applicants (Behrenz et al., 2016; Caliendo & Künn, 2011; Wolff et al., 2016). This type of comparison introduces two possible sources of violation of the CIA:

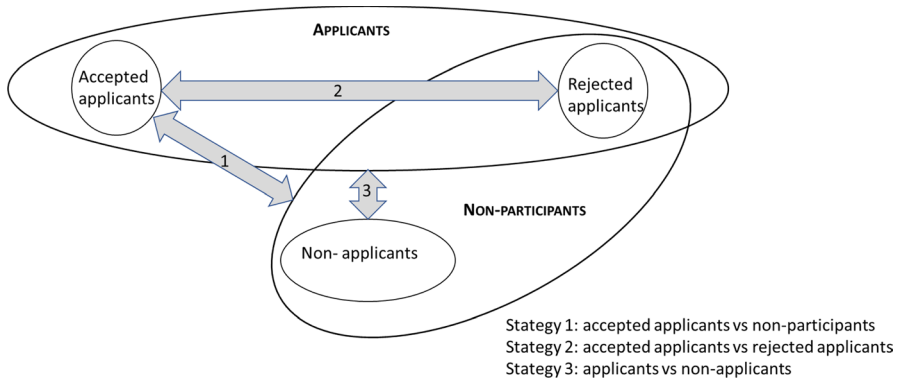


Fig. 1 Overview of treatment and control groups

selection bias (a) resulting from applying for the programme and selection bias (b) resulting from the approval of the business proposal.

Available data on the acceptance and rejection of a business proposal enabled us to formulate various treatment and control groups. Figure 1 gives an overview of the three strategies. We compare (1) accepted applicants versus non-participants (non-applicants and rejected applicants), as in the studies in Table 1; (2) accepted applicants versus rejected applicants; and (3) applicants versus non-applicants. Strategies 2 and 3 deal with only one of the two types of selection bias. Strategy (2) might be subject to selection bias as a result of the approval of the business proposal. Strategy (3) is subject to selection bias caused by deciding to apply to a self-employment programme. The three strategies therefore all assume different types of selection bias to be absent, which serves as a sensitivity analysis for the CIA assumption.

In the absence of any selection bias, the traditional comparison of accepted applicants versus non-participants should produce the largest effects. This comparison estimates the full benefits of applying (i.e., receiving guidance during the pre-start period) plus the benefits of subsequent participation in the self-employment programme, usually consisting of a subsidy and advice.¹ Comparing the accepted versus rejected applicants will only estimate the benefits of actual participation in the self-employment programme. Finally, comparing applicants with non-applicants yields an estimation of a mix of the benefits of just applying (for rejected applicants), and the benefits of applying plus participating (for accepted applicants). This approach measures the total effect on all applicants, namely the so-called ‘intention to treat’ (ITT) effect.

However, one cannot predict which comparison will suffer the most from any remaining selection bias after controlling for observables. Therefore, we could not predict which of the three strategies would produce the largest results in the

¹ For the small part of rejected applicants in the control group, the benefits of strategy (1) are equal to the benefits of participating. In the discussion we abstract from this since only a very small part of the actual matched control group consists of rejected applicants and estimation results for strategy (1) are not sensitive to excluding the rejected applicants.

presence of any remaining selection bias. When remaining selection bias resulting from the approval of the business proposal matters most, the comparison of accepted applicants versus rejected applicants (strategy 2) will be most (upward) biased. When selection bias from the decision to apply for the programme matters most, the comparison of applicants versus non-applicants (strategy 3) will be most (upward) biased. The traditional comparison of accepted applicants versus non-participants (strategy 1) suffers from a mix of both potential sources of selection bias. The weights in this mix depend on the percentages of non-applicants in the control group and non-applicants who would have been able to write a winning business proposal if they had applied (potential participants). Written as equations, the estimated effects are as follows:

$$\text{Strategy(1)} : \text{Benefits of participation(BP)} + \text{Benefits of applying (BA)} + f(\text{bias a, bias b}) \quad (1)$$

$$\text{Strategy(2)} : \text{Benefits of participation(BP)} + \text{bias b} \quad (2)$$

$$\text{Strategy(3)} : x * \text{Benefits of participation(BP)} + \text{Benefits of applying (BA)} + \text{bias a} \quad (3)$$

where x equals the accepted applicants as a percentage of total applicants, and $f()$ is a function.

Table 2 gives an overview of the strategies and their potential sources of selection bias, as well as the effects as measured in the absence of any (remaining) selection bias.

2.3 Economic Mechanisms Behind Previously Found Effects

The expected direct effect of a self-employment programme is that it decreases the unemployment rate by re-employment through self-employment. Moreover, starting up a business improves the participant's labour market network and human capital, which means that if the business fails, the participant enjoys better labour market opportunities. Additionally, helping unemployed people to start businesses can create more jobs in the future, as they will employ other individuals (Cowling et al., 2004). In addition to the positive effect on the employment rate, there could be a macro economic effect as new firms entering the market will increase the competition.

But why do we need a programme for this? Government intervention is not essential where a well-functioning capital market exists, as people can get loans to start a business. The Social and Economic Council in the Netherlands identifies four potential market failures in the credit market: information-asymmetry, transaction costs, market power and external effects (SER, 2014). The council concludes that in the Dutch context, information asymmetry and transaction costs are the main challenges that inhibit a well-functioning credit market for small enterprises in general and for people starting from unemployment in particular. Information asymmetry occurs because it is difficult and relatively expensive for banks to assess the creditworthiness of small companies. Those companies are not always able to provide the information that banks need to make a credit assessment. This situation creates

Table 2 Overview of strategies

Treatment and control groups	Selection bias	Measured effects*
Accepted applicants versus non-participants	Mix of type (a) and (b)	Benefits of applying + subsequent participation (BA + BP) Largest expected effect
Accepted versus rejected applicants	Type (b)	Benefits of participation only versus benefits of just applying (BP – BA) Effect expected to be smaller than for strategy (1)
Applicants versus non-applicants	Type (a)	Benefits of offering the programme, intention to treat effect (BA + xBP) Consists of benefits of applying + subsequent participation for part of the treatment group, and benefits of applying only for another part Effect expected to be smaller than for strategy (1)

*The effects in the absence of (remaining) selection bias

BA Benefits of applying, BP Benefits of participating, $x = \#$ of accepted applicants/ $\#$ total applicants. Type (a) selection bias is caused by applying for the programme. Type (b) selection bias is caused by approval of the business proposal

uncertainty for banks, which leads to a risk premium on the interest rate or to stricter conditions (Hebbink et al., 2014). The less collateral that start-ups possess, the larger the risk premium (Blanchflower & Oswald, 1998). Unemployed individuals face difficulties to receive financing by a bank as they do not have a fixed income to serve as collateral. Inadequate information puts viable companies at risk of stricter conditions and possible refusals of credit applications (Hebbink et al., 2014). Transaction costs might inhibit access to credit, especially for small start-ups, because small loans are rather onerous relative to the size of the loan. When passed on in the price, the transaction costs become so high that credit becomes unprofitable.

From an individual point of view, the programme helps to reduce the risk for unemployed people to start a business. Bianchi and Bobba (2013) showed that the risk of failure is the main factor that prevents individuals from starting a business. A self-employment programme is a form of insurance against the failure of a company and a low income in the start-up phase, which lowers the cost of failure. This insurance is especially important for social welfare recipients, who generally lack wealth.

Economic theory posits there are both positive and negative consequences of self-employment programmes. First, according to Shane (2009), start-up programmes attract businesses that are not promising to begin with. This is called adverse selection. The businesses are not innovative, create few jobs and generate little wealth. Most importantly, they have little impact on employment. However, not all literature acknowledges this view. Caliendo et al. (2015) stated that the subsidy removes a barrier for individuals with considerable constraints but similar potentials as the entrepreneurs that start a business without the grant. A second problem is moral hazard, which implies that entrepreneurs may reduce their efforts if they face a lower risk. That is, if the business fails, they do not have to reimburse the received income support. Third, there is a risk of financing start-ups that would have started anyway

without the financial support. Fourth, there is a risk of subsidising individuals who could rather have found jobs as employees. In these cases, the programme is not additive. In practice, research indicates that deadweight loss is fairly small. Caliendo et al. (2015) concluded that only 21% of entrepreneurs who started a business with a subsidy would also have done so without the subsidy.

3 Institutional Setting

The Dutch self-employment programme we studied is a labour market policy that supports welfare recipients to found a business. The programme was introduced in 1985 with the purpose to support welfare recipients to find work. To be eligible for the programme, the person should have received social welfare benefits at the end of the year before their application. Another condition to qualify is that the new company is expected to be viable. This condition is verified based on a submitted business plan. The Dutch start-up programme differs from the German and Swedish self-employment programmes in that it includes the possibility of receiving a loan and professional guidance.

The programme is administered by municipalities and provides professional guidance and financial support for the applicants. Welfare recipients either apply on their own initiative or on the initiative of their caseworker. Before being admitted to the actual programme, potential entrepreneurs have a 'pre-start period', in which they are not obliged to search for a job and are given professional guidance from their caseworker in writing a business plan. To be admitted to the pre-start period, municipalities can submit starters to an entrepreneurial test. This test determines to what extent a potential entrepreneur possesses the right characteristics and skills to start their own business. For example, independence and risk appetite are examined. After the pre-start period, the entrepreneur can apply for the actual programme. The financial assistance consists of two parts: income support and credit. The income support is an interest-free loan that supplements the person's income to the level of a social welfare payment, and in most cases, it is converted to an allowance. Income support can last for up to 3 years. In 2010 the credit was a loan of at most €32.905 at 8% interest (5% until July 2009), to be paid off within a maximum period of 10 years. In practice, municipalities try to restrict this period to 5 years. Based on the business plan, municipalities decide on the duration and magnitude of the credit. Only business plans that cannot be financed by a bank are eligible for credit. The programme also provides professional guidance through training and coaching for pre-starters and starters, offered by the municipality or a specialised company. The differences across municipalities are large. Smaller municipalities may provide all the guidance themselves, while in other municipalities everything is outsourced.

According to a survey in 2016 under 54 municipalities (of the 390 municipalities in 2016) municipalities assessed around 65% of the business plans themselves, while 35% was submitted to a third party. The third party is usually a private agency such as IMK and Friedeberg Consultancy (hereafter IMK/FR). Municipalities mainly assess simple applications themselves, such as requests for income support, possibly in combination with a small loan. Municipalities reject an estimated 25%

of plans (Kok et al., 2018). Because caseworkers have information on the welfare recipient and their abilities, the caseworkers can discourage potential applicants who have no chance of being accepted (Kok et al., 2018). The more complicated applications are handled by third parties, like IMK/FR. Municipalities outsource these applications to ensure objectivity and because they lack the expertise. Of the applications assessed by IMK/FR, 54% are rejected based on the business plan. This figure is not likely to vary across municipalities, as the assessment is not influenced by the municipality. IMK/FR assess the entrepreneurial skills of the applicant and the viability of the business plan itself. The business plan is assessed on commercial and financial characteristics. Of all applicants rejected by IMK/FR, 26% are rejected because of a lack of entrepreneurial skills, 27% because the business plan is insufficient and 31% for both reasons. The remaining 16% are rejected for other reasons.

4 Data and Descriptives

4.1 Data

The analysis focuses on applications for start-up subsidies between 2007 and 2010. We used two data sources:

1. Confidential administrative data from various sources, such as municipalities, the employee insurance agency called UWV, the tax office and the population registry. These data contain a rich set of information on each inhabitant of the Netherlands. The dataset provides information about welfare reciprocity, work and self-employment, income from work or other sources and personal characteristics. The data were obtained from Statistics Netherlands, which provides anonymised data within a secured environment. This dataset contains information about participation in the programme; however, this information is not complete, as municipalities do not administer participation in the self-employment programme in a uniform way. Moreover, the dataset does not contain information about rejected applicants.
2. A dataset from the private national SME agencies, namely IMK and Friedeberg Consultancy. They assess around 70% of the externally assessed business plans. As 35% of the business plans are assessed externally, they handle around 25% of all business plans. This dataset contains information about the viability of the business plans and the reasons for rejection. We merged these data at the individual level with the data from Statistics Netherlands.

The dataset of IMK/FR in 2007–2010 contains 4683 applicants. We omitted 2235 applicants because they did not receive welfare at the end of the year before application. These were people who had already started a business but ran into problems after the start. A further 369 people were omitted because they received a wage cost subsidy in the year of application, so this group was already working. This left 2079 people in the group of applicants to the self-employment programme; they became

the treatment group in matching strategy 3. Among them, 964 were accepted, who became our group of accepted applicants (the treatment groups in matching strategies 1 and 2).

The control group consisted of rejected applicants, non-applicants or non-participants (both non-applicants and rejected applicants), depending on the matching strategy. Rejected applicants are those who completed the pre-start period and had their business plan assessed but not approved. Rejected applicants had their plans assessed by either IMK/FR (1133 individuals) or by other third parties and municipalities (approximately 4037 individuals). Non-applicants were all those in 2007–2010 who received social welfare benefits at the end of the previous year and thus were eligible for the programme at the moment of matching. For strategy 1 (participants versus non-participants, including rejected applicants), we omitted 8736 participants from the control group. This probably resulted in an understatement of the total number of participants in the control group, as municipalities sometimes register the participants as regular welfare recipients. We estimate that 3296 participants were not visible in the control group and thus could not be omitted. For strategy 3 (applicants versus non-applicants), we also omitted applicants rejected by IMK/FR from the control group. It was not possible to exclude rejected applicants who were not assessed by IMK/FR from the control group, as there is no information on rejected applicants in the database of Statistics Netherlands. We estimate that 4037 rejected applicants remained in the control group. Overall, we estimated the total applicants in the control group at 7334, of whom 3296 were accepted and 4037 rejected. As the control group contained more than 1 million individuals, this was unlikely to influence the results. If it did influence the results, the analysis would underestimate the effects of the programme.

By combining data on the 2097 applicants and more than a million non-applicants with the administrative data from Statistics Netherlands for 2002–2018, we were able to follow the individuals over 14 years: from 5 years before until 8 years after their applications to join the programme. The resulting dataset contains information on the accepted and rejected applicants and non-applicants regarding their labour market status, personal characteristics and income. Labour market status includes indicators for self-employment, employment and unemployment status. Notably, because data were available until 8 years after an application, nearly all participants had stopped receiving financial support during the period we considered.

4.2 Descriptives Statistics

Table 3 shows that the background characteristics of the accepted applicants versus the non-applicants were notably different. On average, accepted applicants were younger, more often male, had a higher level of education and had spent more months in employment prior to their applications compared with the non-applicants. The accepted and rejected applicants were more similar to one another. Some differences still remained: the accepted applicants were more likely to be native Dutch

and to have a parent who was an entrepreneur, compared with rejected applicants. Appendix A gives a detailed overview of the background characteristics.

We are interested mainly in the effects of the self-employment programme on the labour market status and personal income of participating welfare recipients. Outcome variables are defined as follows:

- *Self-employed*. This variable indicates the part of the year in which the individual receives income from self-employment.
- *Salaried employed*. This variable indicates the part of the year in which the individual receives labour income from salaried employment as an employee. The number of months in a particular calendar year for which an individual receives labour income from salaried employment is divided by 12.
- *Social welfare recipient*. This variable indicates the part of the year the individual receives welfare payments, excluding the social welfare payments which are part of the programme.
- *Labour income*. This variable indicates the total yearly gross labour income of the individual. It includes income from both self-employment and salaried employment.
- *Total income*. This variable indicates total yearly gross income of the individual. It includes labour income and financial support, such as unemployment benefits and social welfare benefits, including the social welfare payments which are part of the programme.

The figures below show descriptive statistics of the outcome variables for the calendar year in which the business proposal was assessed ($t=0$) and developments before and after that year. For the control group of non-applicants who did not have a business proposal assessed, we define $t=0$ as the year in which the treatment group(s) of (accepted) applicants had their business proposals assessed.

Figure 2 shows that 72% of accepted applicants were self-employed in the calendar year after the assessment of the business plan ($t+1$), compared with 28% of rejected applicants. The rise in the percentage of self-employed among rejected applicants shows that even without being admitted to the self-employment programme, some individuals were able to start a business after the pre-start period in which they received counselling and wrote their business plan. Non-applicants were those who were on welfare and therefore were eligible but did not apply. Among them, only 2% were self-employed in the year after the assessment of the business plans of applicants. The share of self-employed people did not rise for the control group of non-applicants, which was as we expected.

Figure 3 shows that the share of employees was—and remained—the lowest among the accepted applicants, but it increased after $t+1$. That is, starting in $t+1$, the percentage of accepted applicants who were self-employed decreased, as this group substituted self-employment with salaried employment (i.e. they became employees). Similarly, the proportion of rejected applicants who became employees rose from $t+1$ onwards, immediately after the rejection of the business plan in $t=0$. The share of non-applicants who found jobs rose as early as

Table 3 Background characteristics of welfare recipients in the year of application (2007–2010)

	Accepted applicant	Rejected applicants	Non-applicants	T-test* of equal means between treatment and control groups; column headers indicate the matching strategy		
				(1)	(2)	(3)
<i>Female</i>	0.368	0.299	0.624	***	***	***
<i>Age</i>						
18–30 years	0.126	0.118	0.137			**
31–40 years	0.342	0.346	0.218	***		***
41–55 years	0.462	0.470	0.401	***		***
56+ years	0.071	0.065	0.244	***		***
<i>Education</i>						
Low	0.244	0.278	0.360	***		***
Medium	0.265	0.234	0.144	***		***
High	0.107	0.096	0.035	***		***
Unknown	0.385	0.392	0.461	***		***
<i>Background</i>						
Native Dutch	0.526	0.286	0.481	**	***	***
Western immigrant	0.091	0.072	0.078			
Moroccan/Surinam/Antillean/ Turkish immigrant	0.143	0.244	0.249	***	***	***
Other non-western immigrant	0.240	0.398	0.192	***	***	***
<i>Employment history</i> (proportion of months 2–4 years before application)						
Employed	0.246	0.225	0.136	***		***
Salaried employed	0.164	0.155	0.120	***		***
Self-employed	0.095	0.076	0.017	***	*	***
Social welfare benefit recipient	0.709	0.742	0.834	***	**	***
Unemployment benefit	0.067	0.060	0.030	***		***
Disability benefits	0.032	0.026	0.043	**		***
Other benefits	0.024	0.013	0.022		**	*
<i>Parent self-employed</i>	0.171	0.091	0.079	***	***	***
N	964	1133	1,138,004			

*t-test of equal means between (1) accepted applicants versus non-applicants, (2) accepted applicants versus rejected applicants, (3) applicants versus non-applicants. ***/**/* denote significance at the 1/5/10% level

$t=0$. However, in the long run, salaried employment was in $t+8$ not much higher than in $t-5$ among non-applicants.

Figure 4 shows that the employment status of the accepted applicants was consistently higher than that of the rejected applicants and the non-applicants. The employment status of accepted and rejected applicants tend to converge in $t+8$.

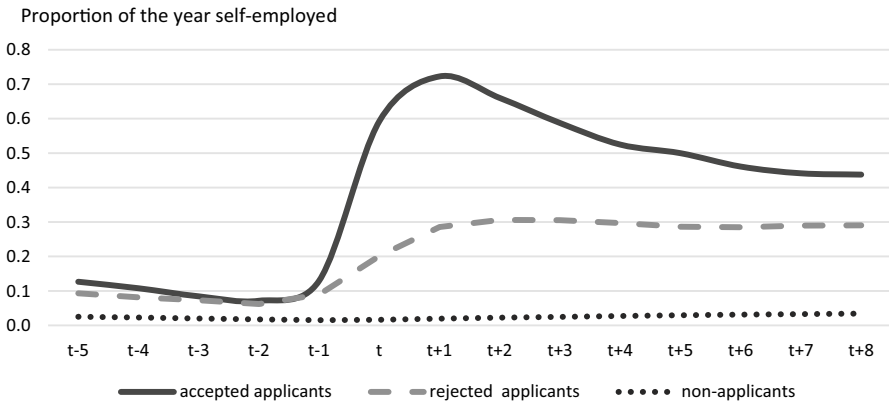


Fig. 2 Proportion of the year of self-employed

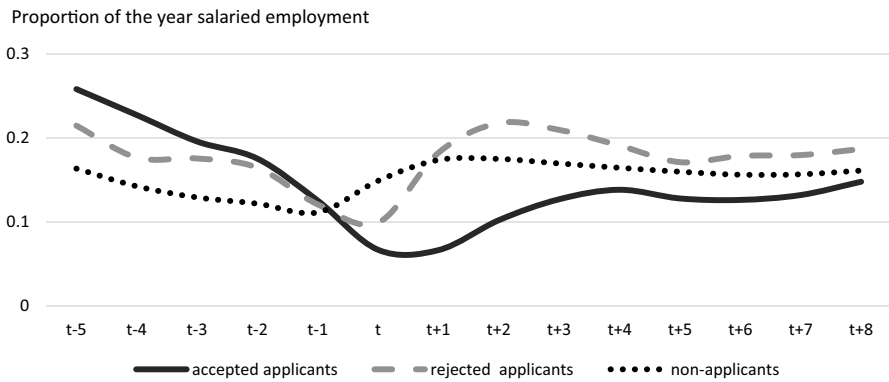


Fig. 3 Descriptives: proportion of the year in salaried employment

Figure 5 shows that welfare reciprocity was high in all three groups for year $t - 1$, as this was a prerequisite for entering the programme. Welfare dependency declined fast after $t - 1$ for accepted applicants and rose from $t + 1$ onwards, although it did not reach the same level as before they entered the programme. Accepted applicants can receive income support, but this is usually in the form of a loan, which are not included in Fig. 5. Welfare dependency declined much more slowly for rejected applicants and especially for non-applicants.

Starting in the year of application, labour income from self-employment and/or salaried employment rose markedly for accepted applicants and substantially for rejected applicants (see Fig. 6). The labour income of non-applicants rose in the year of application, but in subsequent years it lagged substantially behind the income of applicants.

Total gross income of accepted applicants shows a sharp decline in the year of acceptance of the business plan (see Fig. 7). In the long term, the differences in

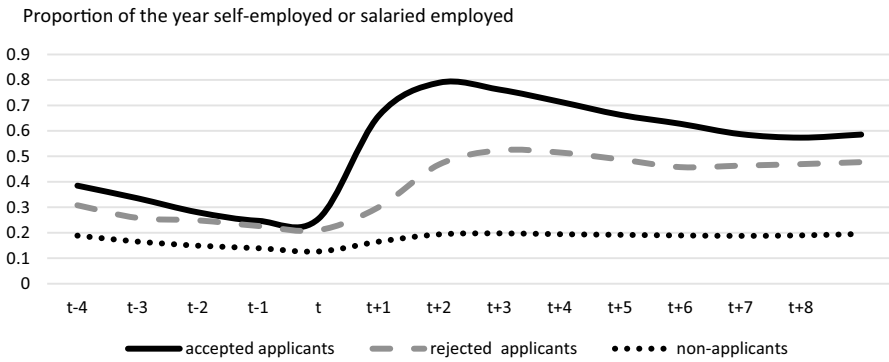


Fig. 4 Descriptives: proportion of the year employed (either salaried or self-employed)

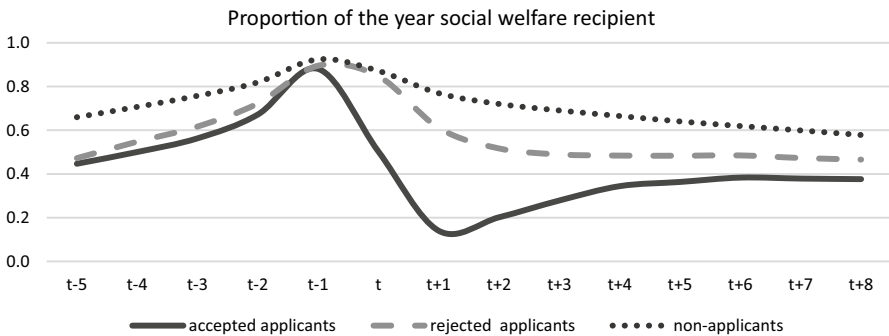


Fig. 5 Descriptives: Social welfare recipiency

total gross incomes are relatively small, at roughly €3000 per year for accepted applicants versus the non-applicants. However, the main income source is very different, as accepted applicants gain a large share of their income from self-employment, while non-applicants have a higher income from social welfare.

Figures 2, 3, 4, 5, 6, and 7 show large and significant differences in the outcome variables for accepted applicants versus the rejected or non-applicants. These numbers point to better employment outcomes for the accepted applicants, four to 8 years after the application, compared to non-applicants. In addition, the employment outcomes among the rejected applicants are more favourable than the outcomes among the non-applicants. However, the differences are descriptive evidence only and should not be interpreted as a causal effect. Applicants could have had a shorter distance to the labour market than non-applicants, even without the self-employment programme. The next section deals with controlling for such a priori differences between the treatment and control groups using matching techniques.

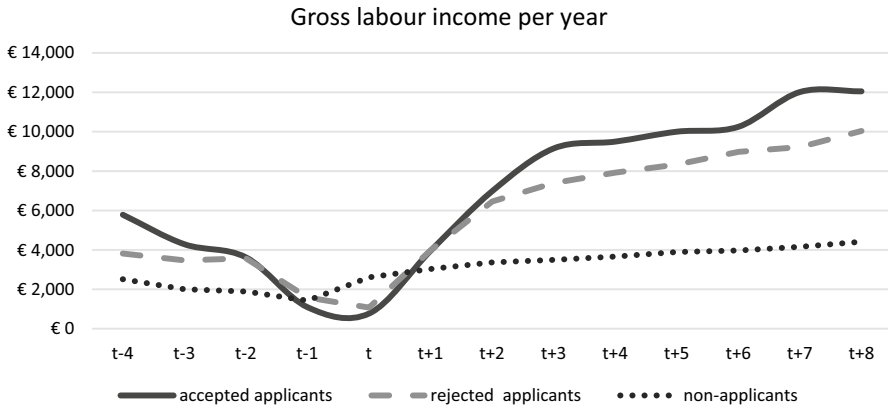


Fig. 6 Descriptives: Gross labour income

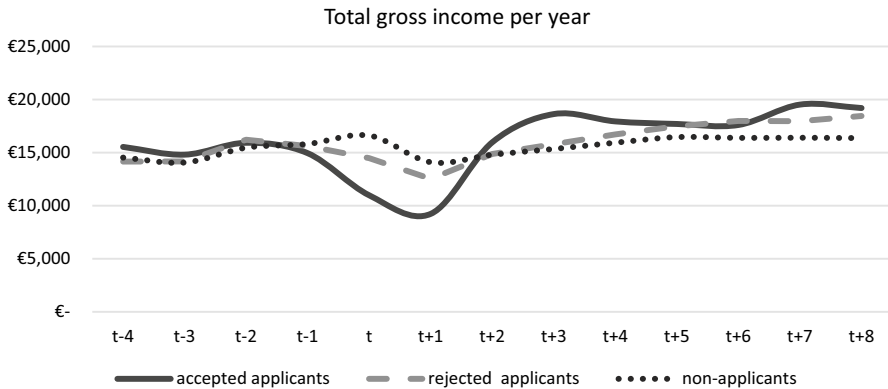


Fig. 7 Descriptives: Total gross labour income

5 Methodology

5.1 Matching

The standard framework for evaluating the causal effect of a programme is the potential outcome model by Roy (1951) and Rubin (1974). The treatment effects can be calculated by comparing the outcome for the individuals who join the self-employment programme (Y^1) with the counterfactual outcome in the case where the individual does not join the programme (Y^0). As the counterfactual is not observed, a group should be found that does not receive treatment, namely, the control group.

However, this control group differs from the participants in a way that affects their outcomes even in the absence of the treatment. This situation leads to selection bias.

A matching technique reduces the selection bias by searching for a control group that is similar in observed characteristics to the treatment group but did not receive the treatment. Instead of conditioning on all relevant observables, it is more efficient to condition on a function of the observed characteristics, called a balancing score. Specifically, the propensity score ($P(X)$) can be used as a balancing score. This score is the probability of a person participating in the programme given the observed characteristic X . The method is referred to as propensity score matching (Rosenbaum & Rubin, 1983). Specifically, we follow Huber et al. (2013), who suggest the use of biased adjusted radius matching. They demonstrated that the radius matching estimator combined with regression performed better than all other major classes of propensity score-based estimators. This was especially true when the robustness to misspecification of the propensity score was important and there are different types of outcome variables.

The treatment effect is defined by

$$\tau = E[Y^1 | D = 1] - E[Y^0 | D = 0] \quad (4)$$

where D is the treatment indicator, indicating whether an individual applied to or participated in the programme, depending on the treatment group definition.

There are two key assumptions when applying the potential outcome framework, namely the conditional independence assumption (CIA) and the weak overlap assumption. The CIA assumes that the potential outcomes are independent of the treatment assignment conditional on the observed characteristics (X). The weak overlap assumption is defined as $\Pr(D = 1 | P(X)) < 1$ and it eliminates the possibility of a perfect predictor for participation.

5.2 Validity of the CIA

Previous studies have emphasised the importance of the CIA (e.g., Caliendo & Kopeinig, 2008). The validity of the assumption is crucial for interpreting the outcome as a causal effect. Because the CIA cannot be tested, it is argued that the assumption holds true if a rich set of variables is included that would explain the participation of an individual in the programme as well as the outcome variables. The rich set of variables often consists of background characteristics and employment history. For the evaluation of active labour market programmes for unemployed people, Lechner and Wunsch (2013) showed that information such as personal characteristics, duration of current unemployment, regional information, recent labour market history and pre-treatment outcomes eliminated nearly all selection bias. Self-employment history might be an important determinant for becoming self-employed in the future too. In addition to these major determinants, the self-employment of parents increases the probability of self-employment of the child (see Dunn & Holtz-Eakin, 2000; Colombier & Masclat, 2008).

Ignoring important characteristics would increase the bias of the estimates (Heckman et al., 1997). To check whether the previously mentioned rich set of variables is sufficient, researchers can add extra variables. Caliendo et al. (2016) included personality traits that are not usually examined, such as individuals' personalities, locus of control and risk preferences. These measures are likely to affect both the treatment and employment-related outcomes. However, if the set of control variables is rich enough, these personality traits do not have to be included in the analysis.

We had an exhaustive dataset including background characteristics, recent (un)employment history, self-employment history, regional information, pre-treatment outcomes and parental entrepreneurship. We controlled for these variables in the estimation. In this, we follow Caliendo et al. (2016), who showed that if labour market history and parental entrepreneurship are rigorously controlled for, the individual's personality traits do not influence the estimated effects, such as outflow to work. We are therefore confident that no large biases remain in our estimation. However, because the CIA is untestable, we performed various sensitivity analysis (see Sect. 6.3). The three comparisons of treatment and control groups served as an additional sensitivity test.

We identified a matched control group, similar in observed characteristics to the treatment group, through propensity score matching. Results of the probit-estimations appear in Appendix B. The quality of the match was verified by comparing the means of the treatment and matched control groups using a t-test. The results (Appendix A) indicate that most of the covariates of the treatment group(s) resemble the covariates of the control group(s). Additionally, we checked the quality of the match by comparing pre-treatment outcomes of the treatment and control groups. Figures 8, 9, 10, and 11 in Sect. 6.1 show that the treatment and control groups were similar in their outcomes before treatment. This point strengthens our confidence that when we allowed for time-invariant unobserved characteristics that differed between the treatment and control, the results would be similar. Furthermore, only a few—between one and five—observations of the treatment group lay outside the common support region for the different treatment strategies (see Appendix C). These observations were excluded from the analysis. Additional quality checks appear in Appendix C.

5.3 Validity of the Weak Overlap Assumption

The matching technique requires the presence of non-treated individuals with similar characteristics to those of the treated individuals. This requirement was likely to be met by both the non-applicants and the rejected applicants. First, some non-applicants would have been motivated to enter the programme but did not apply because of a source of conditional randomness of the treatment. This conditional randomness is introduced by the role of caseworkers in making decisions about whether to apply for the subsidy. Welfare recipients make this decision together with their caseworker. Therefore, some non-applicants probably would have applied to the self-employment programme if they were assigned to another caseworker, and others who did apply would not have applied under a

different caseworker. This makes it plausible that there exist individuals who did not apply to the programme but had the same characteristics as those who did apply. We cannot exploit caseworker assignment since our data does not show which client is assigned to which caseworker.

Second, the assessment depends on the person at the external party who reviews the proposal. Hence, some rejected applicants actually do have the ability to start a business. The data confirms this point because some of the rejected applicants started a business by themselves after their application was rejected (Fig. 2).

6 Results

6.1 Main Results

Figures 8, 9, 10, and 11 show the treatment effects over time. Each line depicts the effect according to one of the three strategies. Appendix D provides the values corresponding to Figs. 8, 9, 10, and 11 at selected time moments.

All three matching strategies found a significant positive effect on employment. There was a long-lasting and significant effect of the self-employment programme on a person's probability to be either self-employed or in salaried employment when we compared the accepted applicants with non-participants (strategy 1). Four years after the application, the difference in employment status between the accepted applicants and the matched non-participants (non-applicants and rejected applicants) was 33 percentage points. Eight years after the application, the difference was 29 percentage points.

As we expected, both alternative strategies yielded somewhat smaller estimated effects. Strategy 2 estimates only the benefits of eventual participation (i.e. accepted applicants) versus the benefits of the pre-start period and writing a business plan but then not getting the subsidy (i.e. rejected applicants). The estimated long-term treatment effect 8 years after application is 15 percentage points. This is lower than the estimated effect using the traditional strategy (1). This result indicates that although the rejected applicants are not financially supported to start a business, even the application phase and pre-start period has an effect on their future employment. The final line in the figures shows the intention-to-treat (ITT) effect of making an application (strategy 3). This effect includes the full benefits of applying and some of the benefits of being accepted (i.e. accepted applicants only). After 8 years, the effect is 23 percentage points.

All three strategies indicate long-run effects on self-employment. After 8 years, the difference between the accepted applicants and the matched non-participants is 37 percentage points (strategy 1). When the control group consists of matched rejected applicants, the treatment effect is reduced by more than half and is equal to 15 percentage points (strategy 2). The total effect on self-employment for applicants versus non-applicants is 29 percentage points after 8 years (strategy 3). A negative effect for salaried employment is also evident, indicating that the programme substitutes some of the salaried employment with self-employment.

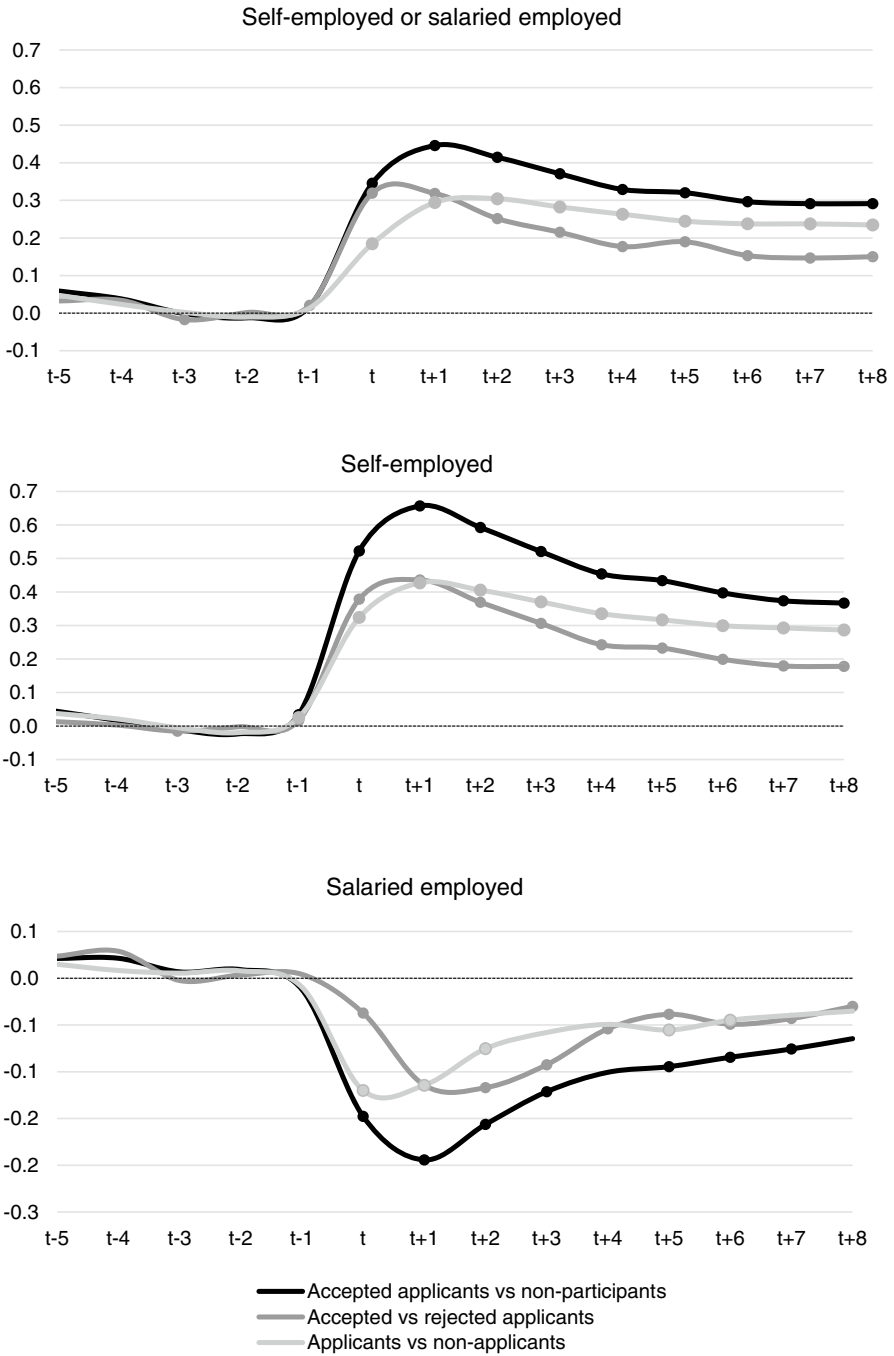


Fig. 8 Treatment effect—proportion of the year employed. *Note* Time t is the moment of application. The lines display the treatment effect for the three definitions of the treatment and control groups. • denotes treatment effects significantly different from zero at the 5%-level, based on bootstrapped standard errors with 100 replications

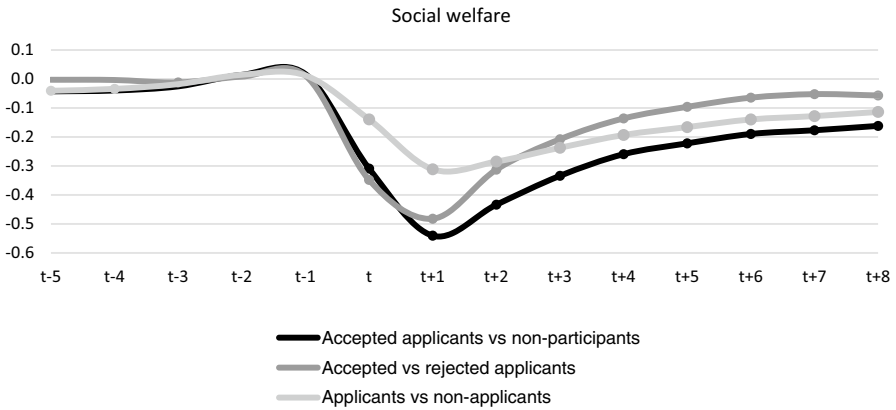


Fig. 9 Treatment effect—proportion of the year receiving social welfare. *Note* Time t is the moment of application. The difference between the two lines equals the ITT-effect. • denotes ITT-effects significantly different from zero at the 5%-level, based on bootstrapped standard errors with 100 replications

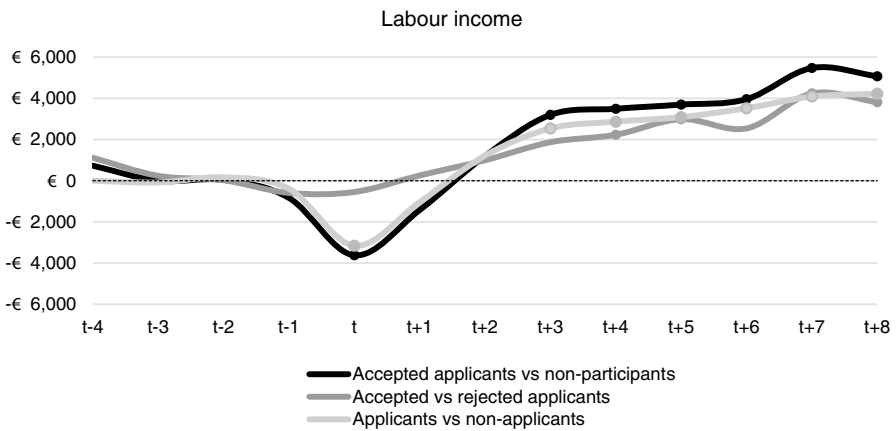


Fig. 10 Treatment effect—Gross labour income. *Note* Time t is the moment of application. The difference between the two lines equals the ITT-effect. • denotes ITT-effects significantly different from zero at the 5%-level, based on bootstrapped standard errors with 100 replications

All strategies point towards a long-run negative on social welfare recipience (Fig. 9). In other words, the treated individuals received social welfare less often than the controls. The income support of the self-employment programme is not included in these numbers. Therefore, the largest effect occurs during the first years after application. This is the period during which the income of the accepted applicants is supplemented by the programme—which can last a maximum of 3 years. Interestingly, after this three-year period there is still a significant negative effect. The effect after 8 years was –16 percentage points under strategy 1, which compared the accepted applicants with matched non-participants. For the other two

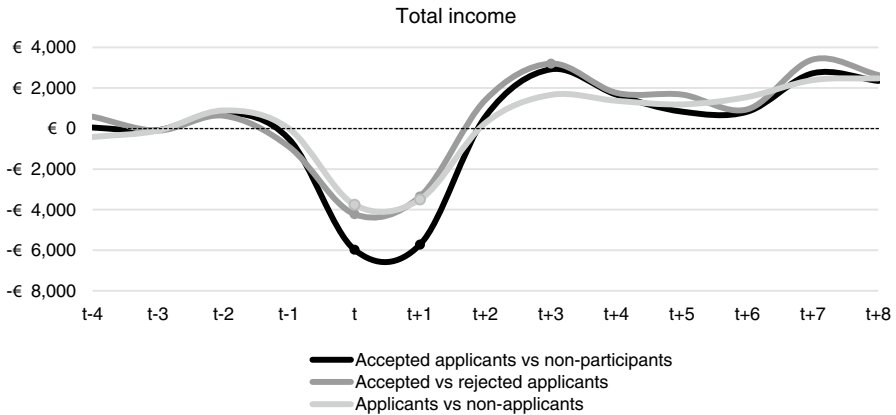


Fig. 11 Treatment effect—Gross total income. *Note* Time t is the moment of application. The difference between the two lines equals the ITT-effect. • denotes ITT-effects significantly different from zero at the 5%-level, based on bootstrapped standard errors with 100 replications

strategies, long-lasting significant negative effects were again evident, at -6 (strategy 2) and -11 percentage points (strategy 3) 8 years after the application.

Figure 10 shows participants' labour income over time. At the start-up period of a business, a negative effect on labour income occurred under the two strategies with non-applicants in the control group. The effect is negative for the first 2 years, since the income from self-employment is often not high in the start-up phase of a business, and the non-applicants in the control group often find work as employees. After 8 years, a positive treatment effect is evident under all three strategies. The difference in income between the treatment and control groups ranges from €3800 to €5100.

The programme had no statistically significant effect on total income (see Fig. 11). The total income includes (welfare) benefits, including income support provided by the programme. The extra income from labour is not high enough to compensate for the loss in (welfare) benefits.

6.2 Heterogeneous Effects

We examined which groups benefited most from the self-employment programme by replicating the estimation procedures using different subgroups of the data regarding education, migration background and age. All results in this subsection refer to the treatment effects of an application (applicants versus matched non-applicants). This approach left us with large enough samples within all the subgroups. The results are summarised in Table 4. For all of the subgroups, we found significant effects on employment; for most of them, we also found significant results for social welfare recipience. However, there was no significant effect on social welfare recipience 8 years after the application for individuals older than 40, for the group of native Dutch and western immigrants, and for the two subgroups based on education level.

First, we consider the effect by education level. The effect in the long run is larger for low-educated individuals than for middle or highly educated individuals. After 8 years, the ITT effect for employment was equal to 24 percentage points for low-educated people and 20 percentage points for middle or highly educated people. The effect on welfare recipients, 4 years after application, was also larger for low-educated people. This means that on average, low-educated individuals benefit more from applying to the programme than do high or middle educated individuals.

Second, the results stratified by migration background indicate that the effect on employment is larger for non-western immigrants than for native Dutch or western immigrants. The difference between the two groups increases over time. After 8 years, the ITT effect is equal to 25 percentage points for the non-western immigrants, whereas it is 21 percentage points for native Dutch or western immigrants. Hence, in the long run, non-western immigrants generally benefit more than native Dutch or western immigrants. Furthermore, it seems that age does not matter much. The effect on individuals older than 40 years is relatively similar to the effect on younger individuals.

6.3 Sensitivity Analysis

6.3.1 Rosenbaum Bounds

Given that the CIA is an assumption that cannot be tested, a sensitivity analysis of the CIA is necessary to determine whether the results are robust. The reliability of the CIA is examined by testing to what degree the results are robust against a simulated unobserved factor.

To test the sensitivity of the matching estimator to a hidden bias, we followed the approach of Rosenbaum (2002). The Rosenbaum bounds sensitivity test evaluates the robustness of the matching estimator by adding an unobserved factor (Γ). Increasing the hidden bias enables us to find the point at which the results are no longer significant. This point indicates the degree to which the unobserved factors must influence the probability of treatment for the matching results to no longer be significant.

Let π_i and π_j denote the probability of treatment of two individuals with identical observed characteristics (X). The individuals differ in unobserved characteristics (u). When this unobserved variable affects the probability of treatment, a hidden bias arises. Consequently, the probability of treatment is defined by

$\pi_i = P(D_i = 1 | X_i, u_i) = F(\beta X_i + \gamma u_i)$, which relies on both the observed characteristics (X) and unobserved characteristics (u).

Rosenbaum (2002) shows the following relation between Γ and the odds ratio of receiving treatment:

$$\frac{1}{\Gamma} \leq \frac{\pi_i(1 - \pi_i)}{\pi_j(1 - \pi_j)} \leq \Gamma \quad (5)$$

Table 4 Heterogenous effects on employment and welfare recipience

	Education	
	High/middle	Low
<i>Outcome: self-employed or salaried employed</i>		
After 4 years (in percentage points)	0.243 (0.042)***	0.246 (0.104)**
After 8 years (in percentage points)	0.200 (0.055)***	0.238 (0.072)***
<i>Outcome social welfare</i>		
After 4 years (in percentage points)	-0.165 (0.042)***	-0.180 (0.088)**
After 8 years (in percentage points)	-0.094 (0.063)	-0.126 (0.081)
N treated	732	543
N control	199,106	324,370
	Nationality	
	Native Dutch/western immigrant	Non-western immigrant
<i>Outcome: self-employed or salaried employed</i>		
After 4 years (in percentage points)	0.252 (0.049)***	0.266 (0.039)***
After 8 years (in percentage points)	0.212 (0.053)***	0.253 (0.044)***
<i>Outcome social welfare</i>		
After 4 years (in percentage points)	-0.153 (0.050)***	-0.228 (0.042)***
After 8 years (in percentage points)	-0.068 (0.042)	-0.151 (0.039)***
N treated	100	1094
N control	600,737	478,429
	Age	
	40-	40+
<i>Outcome: self-employed or salaried employed</i>		
After 4 years (in percentage points)	0.265 (0.042)***	0.267 (0.038)***
After 8 years (in percentage points)	0.232 (0.046)***	0.238 (0.035)***
<i>Outcome social welfare</i>		
After 4 years (in percentage points)	-0.200 (0.042)***	-0.177 (0.049)***
After 8 years (in percentage points)	-0.126 (0.039)***	-0.063 (0.042)
N treated	898	1195
N control	362,083	745,574

Differences in outcomes of applicants and non-applicants (ITT effect). Standard errors are in parenthesis and are based on bootstrapping with 100 replications

*10%, ** 5%, *** 1% denote significance level of t-test

where $\Gamma = \exp^{\gamma}$. When Γ is equal to 1, there are no unobserved characteristics that affect the treatment assignment. When Γ is larger than 1, a hidden bias emerges and increases with Γ .

We start by setting $\Gamma = 1$. In that case, we do not add any unobserved factors, which means the results are identical to the main results in the previous section. Next, we increase the hidden bias; we increase Γ to a point where the results become

insignificant. We call this point Γ^* . The larger the Γ^* value, the more robust the results are to an unobserved factor. We found that $\Gamma^* = 4.2$ for the self-employed or salaried employed outcome variable, 8 years after application (strategy 3, applicants versus non-applicants, see Appendix E for detailed results). In other words, for the results to become insignificant, an unobserved characteristic must increase the odds of treatment by a factor of 4.2 relative to an individual without this unobserved characteristic.

To clarify, we consider an individual with an estimated probability of treatment of 50%. For the results to be insignificant, there must be an unobserved characteristic that influences the probability of treatment in such a way that the real probability of treatment is above 96% or below 4%. Hence, according to the Rosenbaum sensitivity test, the unobserved factor should be large enough to render the results insignificant.

We found values of Γ^* ranging between 1.4 (for strategy 2) and 5.2 (for strategy 1). These values are similar to those reported by Caliendo and Künn (2011), who estimated the effectiveness of two German start-up programmes with $\Gamma^*=3$ and $\Gamma^*=1.5$. The relatively low value of Γ^* for strategy (2) was found because the treatment and control groups of accepted and rejected applicants under strategy 2 consisted of relatively few individuals and smaller estimated effects than under the other two strategies. This situation results in a higher likelihood of insignificant results. However, the relatively lower estimated effect is exactly what we would expect if no bias was present since this strategy only estimates the benefits of participating, versus the benefits of just applying (i.e. Equation 2 in Sect. 2.2).

6.3.2 Different Matching Algorithm

We investigate the robustness of the results for different estimators by applying nearest neighbour matching and kernel matching (applicants versus non-applicants). The results for the ITT effect are shown in Table 5. The choice of a matching algorithm had no noteworthy effect on the estimates, indicating that the results were not sensitive to the specific matching algorithm used.

6.3.3 Subset Analysis

One concern in the baseline estimation is that most individuals in the self-employment programme were people who entered welfare not long ago. By contrast, the control group (non-applicants) consisted of everyone who received welfare in December of the year before an application. This included all those who have been on welfare for a long time and have a low probability of leaving welfare and/or resuming work. The control group, before matching, therefore has a much larger share of long-term unemployed than the treatment group. In the baseline estimation, we include past welfare recipience as a regressor in the matching algorithm. However, since past welfare recipience is an important predictor of future employment probability, we also conducted a sensitivity analysis. Here, we estimated the treatment effects only on individuals who did not receive social welfare benefits for all 5 years before their applications. Hence, we essentially excluded people receiving

long-term welfare. The sample then consisted of 1583 applicants (vs. 2097 in the main analysis) and 564,410 in the control group (vs. 1,138,004 in the main analysis). The last column of Table 5 shows that the results were similar to the baseline results, which strengthened our confidence that long-term welfare recipients did not strongly affect our baseline estimations. Moreover, this finding signals that the self-employment programme can be equally effective for both short- and long-term welfare recipients.

6.4 Discussion of Results

We found a long-lasting and significant effect of the self-employment programme on a person's probability to be either self-employed or salaried employed, under all three strategies. All three strategies estimate different treatment effects. Table 6 repeats the treatment effect formulas stated in Sect. 2.2 and lists the estimated effects on employment 8 years after the person applied for the programme.

Assuming away any selection bias, our results are very much in line with the stated formulas in column 2 of Table 6. From the results of strategy (2), no bias would imply $BP=15$. From the results of strategy (1), this would imply $BA=29-15=14$. The estimated effect for strategy (3) would then be $0.46 * 15 + 14=21$. The actual estimation result for strategy (3) is 23 which is slightly higher, implying that there is some bias left in the estimation strategies.

The estimation results of strategy (1) and (3) include the estimated benefits from applying to the programme, i.e. going through the 'pre-start' programme where welfare recipients get guidance to write their business plan. The much larger results on these estimations strengthen our confidence that there are at least some benefits from applying to the programme, i.e. going through the 'pre-start' period in which the welfare recipients get guidance to write a business plan.

The magnitude of the results are in line with previous research. Eight years after application, the difference in employment using strategy 1 is 29 percentage points (33 percentage points after 4 years). Caliendo and Künn (2011) found an effect of 14.5 and 22.1 percentage points for the two programmes after 56 months. Caliendo and Tübbicke (2020) reported an effect of the reformed German programme of 21.5 percentage points after 40 months under propensity score matching and 29 percentage points using IV analysis (see Table 1). These studies controlled for similar background characteristics. Our larger estimates after 4 years might be due to differences between the German and Dutch programmes. First, the Dutch policy is intended for welfare recipients instead of unemployment insurance recipients. Most active labour market programmes are particularly effective for people who face a low chance of finding work, including welfare recipients (Lammers & Kok, 2019). Second, the Dutch programme includes the possibility of receiving a loan and professional guidance, which might have an additional positive effect, whereas the German programme does not offer that possibility.

Our results for welfare reciprocity and labour income are also in line with previous research. Using strategy 1, we find the probability of being a welfare recipient

Table 5 Results using various matching algorithms: applicants versus non-applicants

	Baseline results (radius match- ing)	Nearest neighbour matching	Kernel matching	Baseline results (radius match- ing): Subset of 'short term' welfare recipients
<i>Percentage-point change: self-employed or salaried employed</i>				
After 4 years	0.26***	0.24***	0.27***	0.25***
After 8 years	0.24***	0.20***	0.23***	0.23***
<i>Percentage-point change: social welfare</i>				
After 4 years	-0.19***	-0.22***	-0.23***	-0.18***
After 8 years	-0.11***	-0.16***	-0.17***	-0.10***
<i>Change in gross yearly labour income</i>				
After 4 years	€ 2865***	€ 2507***	€ 3007***	€ 2922***
After 8 years	€ 4224***	€ 3749***	€ 4366***	€ 4573***
N treated	2097	2097	2097	1583
N control	1,138,004	1,138,004	1,138,004	564,410

The alternative matching algorithms are (1) Kernel matching with a bandwidth of 12 and (2) a one-to-one nearest neighbour matching with replacement

***1% denote significance level of t-test based on based on bootstrapped standard errors with 100 replications

decreases by 16 percentage points 8 years after application. Wolff et al. (2016) reported similar results: 6 years after participation, the effect was between -10 and -15 percentage points for different subgroups (see Table 1). The effect we found for labour income is consistent with the income effect reported by Caliendo and Künn (2011).

Our estimations of heterogeneous effects also confirm previous research. We find that people with unfavourable labour market characteristics, such as low levels of education or immigration, benefitted the most from the Dutch self-employment programme. These findings confirm previous literature which found that people who benefitted the most from (other) ALMPs were usually disadvantaged (e.g. Lammers & Kok, 2019 and the references therein).

6.5 Cost-Benefit Analysis

Until now, we have discussed the effectiveness of the self-employment programme. We have shown that the programme is beneficial to the participant in terms of employment and income up to 8 years after their application. Next, we consider the benefits in a broader sense. The cost-benefit analysis focuses on the welfare effects of the self-employment programme. The goal of the analysis is to understand the total costs and benefits of the policy from the perspectives of the participant as well as the local and national governments. The costs and benefits from these three perspectives are combined to form an overall conclusion about the welfare effects of the programme for society as a whole. The cost-benefit analysis is conducted for applicants versus non-applicants. The results are summarised in Table 7. The analysis

Table 6 Treatment effects as measured by three different strategies

Treatment and control groups	Measured effects*	Percentage point increase of probability of employment
Accepted applicants versus non-participants	Benefits of participation (BP) + Benefits of applying (BA) + f(bias a, bias b)	29
Accepted versus rejected applicants	Benefits of participation (BP) + bias b	15
Applicants versus non-applicants	0.46*Benefits of participation (BP) + Benefits of applying (BA) + bias a	23

*The effects in the absence of (remaining) selection bias

BA Benefits of applying, *BP* Benefits of participating. Type (a) selection bias is caused by applying for the programme. Type (b) selection bias is caused by approval of the business proposal. 0.46 is the accepted applicants as a percentage of total applicants, and f() is a function

conforms with the guidelines specified in Koopmans et al. (2016). Costs and benefits are calculated over a period of 8 years.

The direct costs of the programme are administration costs and non-refunded loans (figures are based on Kok et al., 2018). Administrative costs consist of the costs of counselling and the assessment of the business plans. These tasks are performed partly by the local government and partly by third parties. Local governments spend an estimated €3500 per applicant. External counselling is offered to 90% of the accepted applicants and costs €1500 per participant. Per applicant, this cost amounts to €600. About a third (35%) of the business proposals are assessed by a third party, and each outsourced assessment costs €2300, which averages out at €800 per applicant. Ten percent is paid for by the local government, whereas 90% is paid for by the national government. Non-refunded loans add up to €3200 per applicant, of which 25% is accounted for by local municipalities. Total costs for the government (local and national) add up to €8100 per applicant, of which €4900 are administration costs and €3200 waived loans. The waived loans are benefits from the perspective of the participant and thus are zero on a societal level, see Table 7. Hence, the total societal programme costs are €4900 per applicant.

Productivity increases are the main benefit of active labour market policies (Heckman et al., 1999; Jespersen et al., 2008). An increase in production leads to a higher gross national product. Programmes may also lead to less dependence on benefits and higher tax contributions by the formerly unemployed. These benefits are essentially transfers; they represent costs for the taxpayer and benefits for unemployed people who receive them. There are also immaterial benefits in terms of greater happiness among those who find work as well as better health and less crime. It is well documented that unemployed people who return to work report a higher quality of life (see for example Winkelman, 2014). On the other hand, the leisure time of those who find work decreases, which is a welfare loss (Lammers & Kok, 2019).

We proxy productivity increases by total labour costs: gross earnings as either self-employed or employee. We define the effects of the programme on labour

Table 7 Net present value of costs and benefits per applicant until 8 years after application

	Applicant	Local government	National government	Total society
<i>Administration costs</i>				
Training, coaching and viability assessment of business plan by local government		- € 3500		- € 3500
External training and coaching		- € 600		- € 600
External viability assessment of business plan		- € 100	- € 700	- € 800
Non-refunded loans	€ 3200	- € 800	- € 2400	€ 0
Total administration costs	€ 3200	- € 5000	- € 3100	- € 4900
<i>Effects</i>				
Productivity	€ 14,100			€ 14,100
Benefit payments (including income support from the self-employment programme)	- € 12,000	€ 12,000		€ 0
Taxes	- € 400		€ 400	€ 0
Total benefits	€ 1700	€ 12,000	€ 400	€ 14,100
Total net benefits	€ 4800	€ 7000	- € 2700	€ 9200

Figures reflect costs and benefits of applicants versus non-applicants

Negative values are costs, while positive values are benefits

income, benefits and tax payments as the cumulative difference between the applicants and the non-applicants, over 8 years. The net present value of these effects is calculated by using a discount factor of 3% as prescribed by the Dutch Ministry of Finance (2015). The net present value of the productivity gain of applicants versus non-applicants is €14,100 over 8 years. Benefit payments (including income support of the self-employment programme) decrease on balance by €12,000 per applicant. This is a cost for the applicant but a benefit for the municipality, so from a societal point of view these costs are zero. As labour income over 8 years is higher than the benefit payments, the applicants pay €400 more in taxes than non-applicants. This is a cost for the applicant but a benefit for the government.

For the applicant and the municipality, we show positive monetary efficiency. For the government, the balance of costs and benefits is negative over the 8 years. The total benefits outweigh the total costs over the period of 8 years. The total programme costs accrue to €4900 and the total benefits are €14,100. Hence, the net total benefits of the self-employment programme are €9200. Ultimately, this figure is the result of the higher employment rate among the starting entrepreneurs compared to the control group. The total benefits increase over time, as the costs remain constant while a positive benefit is added each year. In the longer term, the benefits will outweigh the cost even for the government. Baumgartner and Caliendo (2008) reported higher costs than benefits for a programme in Germany (Start-up Subsidy)

in the region of €6000 or €7000 over an observation period of 28 months. Our results would also be negative (i.e. higher costs than benefits) over a period of two to 3 years. The turning point occurs after about 5 years.

There are also immaterial benefits in terms of greater happiness of those who find work, better health and less crime (see, for example, Schuring et al., 2010; Lin, 2008). The cost–benefit analysis does not include these immaterial costs and benefits. We did not include the (positive) effects on health and crime because there is no robust data on the size of these effects. On the other hand, we did not include the (negative) effect of people having less leisure time, because there are no empirical estimates on the value of leisure time. In theory, the value of leisure time is equal to a person's hourly net wage. However, this is only valid for marginal changes and only if there is free choice regarding the number of hours worked. These conditions are not met when involuntarily unemployed people return to work. The value of leisure time will therefore be much lower than 100% of the net wage increase for these people (Lammers & Kok, 2019).

7 Conclusion

This paper analyses the effect of a self-employment programme for welfare recipients in the Netherlands. We observed individuals for a total of 14 years, from 5 years before their applications until 8 years after the application. This enabled us to identify the long-term effect of the programme. The effectiveness is analysed using propensity score matching on a rich dataset for three different compositions of treatment and control groups.

Our results suggest that the effect of the programme on employment outcomes is positive, and the results are robust with respect to deviations from the identifying assumption. Positive effects are found for all three different compositions of treatment and control groups. First, we consider the effect using the method that has been used in the literature (accepted applicants vs. non-participants, consisting of non-applicants and rejected applicants). Our results show a treatment effect of 29 percentage points on employment and –16 percentage points on welfare recipience. The estimated effects in our study are slightly larger than those cited in literature. Because we controlled for similar personal background characteristics in our study, we conclude that the larger effect is due to the differences between the evaluated programmes. Unlike the programmes in other countries, the Dutch policy is intended for welfare recipients, and applicants might be able to receive a loan and professional guidance.

In the second strategy we compared a treatment group of accepted applicants with a control group of rejected applicants. Positive significant treatment effects were found, albeit smaller than the previous findings (15 points for employment and –6 for welfare recipience). Therefore, it seems that rejected applicants also benefitted

from the application procedure, which consists of a ‘pre-start period’ in which welfare recipients get guidance in writing a business plan.

These results justify our third strategy, for which we consider the total effect for all applicants compared to non-applicants. The estimation results are indeed positive and significant: we found a treatment effect of 23 percentage points on employment and –11 percentage points on welfare receipt. The treatment effect on labour income was the equivalent of around €4000 to €5000 euros under all three strategies, 8 years after application. Ultimately, because the three treatment strategies rely on different assumptions but all show positive and significant results, there is little uncertainty about the untestable CIA.

Using the found results in a cost–benefit analyses, we show that over a period of 8 years the societal benefits outweigh the direct costs of the programme. Moreover the programme is cost-effective both for the participant and the local government who offers the programme.

Our study is subject to some limitations. First, the identification of the effect relies on the CIA, and selection bias is therefore a common problem when evaluating the effectiveness of such programmes. A sensitivity analysis indicated that the unobserved factors would have to be large to render our results insignificant. The second limitation is that we only focus on the effect on the (accepted) applicants, which means possible macroeconomic effects were not identified. It could for example be that firms substitute employees by subsidised self-employed individuals. Gautier et al. (2018) showed that these effects are small for subsidised employment. Hence, we expect this finding also to be the case for subsidised self-employment. However, further research is needed to address the crowding out and substitution effects.

Another recommendation for further research is to gain a broader perspective on the costs and benefits of self-employment, such that those can be taken into account in a societal cost–benefit analysis. For example, future research could examine the gains of self-employment versus welfare or salaried employment using outcome measures such as health expenditures and crime. A higher income may lead to less financial stress and better mental health. Self-employment may also lead to a stronger sense of control over life and therefore less use of mental health care or medicine. A higher income may reduce income-generating crime such as theft and financial fraud. Statistics Netherlands can provide information on theft, crime and debts at the individual level, which might make such analyses possible.

Appendix

Appendix A: Descriptive Statistics

See Table 8.

Table 8 Background characteristics of applicants and non-applicants

	Descriptives				Treatment		Control		Treatment		Control	
	Accepted applicants		Rejected applicants		Non-applicants		Accepted applicants		Matched non-participants		Matched rejected applicants	
	Accepted applicants	Rejected applicants	Non-applicants	Accepted applicants	Matched non-participants	Matched rejected applicants	Accepted applicants	Matched non-participants	Matched rejected applicants	Accepted applicants	Matched rejected applicants	Matched non-participants
<i>Female</i>	0.368	0.299	0.624	0.368	0.365	0.368	0.368	0.368	0.368	0.331	0.368	0.331
<i>Age</i>												
18–30 years	0.126	0.118	0.137	0.126	0.125	0.126	0.126	0.125	0.124	0.122	0.124	0.122
31–40 years	0.342	0.346	0.218	0.342	0.343	0.342	0.342	0.343	0.342	0.344	0.342	0.344
41–55 years	0.462	0.470	0.401	0.462	0.464	0.462	0.462	0.464	0.462	0.466	0.462	0.467
56+ years	0.071	0.065	0.244	0.071	0.068	0.071	0.071	0.068	0.071	0.068	0.071	0.067
<i>Education</i>												
Low educated	0.244	0.278	0.360	0.244	0.243	0.244	0.244	0.243	0.244	0.262	0.244	0.262
Middle educated	0.265	0.234	0.144	0.265	0.266	0.265	0.265	0.266	0.264	0.248	0.264	0.248
High educated	0.107	0.096	0.035	0.107	0.106	0.107	0.107	0.106	0.106	0.101	0.106	0.101
Unknown	0.385	0.392	0.461	0.385	0.385	0.385	0.385	0.385	0.385	0.389	0.385	0.389
<i>Background</i>												
Native Dutch	0.526	0.286	0.481	0.526	0.527	0.526	0.526	0.527	0.531	0.396	0.531	0.428
Western immigrant	0.091	0.072	0.078	0.091	0.076	0.091	0.091	0.076	0.094	0.081	0.094	0.070
Moroccan/Surinam/Antillean/Turkish	0.143	0.244	0.249	0.143	0.166	0.143	0.143	0.166	0.151	0.197	0.151	0.210
Other non-westernimmigrant	0.240	0.398	0.192	0.240	0.230	0.240	0.240	0.230	0.225	0.325	0.225	0.292
<i>Household composition</i>												
Couple with children	0.300	0.380	0.192	0.300	0.301	0.300	0.300	0.301	0.300	0.343	0.300	0.344
Couple without children	0.071	0.071	0.114	0.071	0.070	0.071	0.071	0.070	0.071	0.071	0.071	0.071
Single with children	0.223	0.201	0.238	0.223	0.223	0.223	0.223	0.223	0.224	0.211	0.224	0.211
Single without children	0.353	0.290	0.389	0.353	0.351	0.353	0.353	0.351	0.351	0.319	0.351	0.319
Living with parents	0.047	0.047	0.046	0.047	0.048	0.047	0.047	0.048	0.047	0.047	0.047	0.047
Other	0.001	0.009	0.007	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.005

Table 8 (continued)

	Descriptives				Treatment		Control	
	Accepted applicants	Rejected applicants	Non-applicants	Accepted applicants	Matched non-participants	Matched rejected applicants	Applicants	Control
<i>Employment history (number of months prior to application)</i>								
Employed	0.246	0.225	0.136	0.246	0.247	0.243	0.235	0.235
Salaried employed	0.164	0.155	0.120	0.164	0.165	0.163	0.159	0.160
Self-employed	0.095	0.076	0.017	0.095	0.095	0.092	0.084	0.084
Social welfare benefit recipient	0.709	0.742	0.834	0.709	0.708	0.712	0.727	0.727
Unemployment benefit	0.067	0.060	0.030	0.067	0.067	0.066	0.063	0.063
Disability benefits	0.032	0.026	0.043	0.032	0.032	0.031	0.028	0.028
Other benefits	0.024	0.013	0.022	0.024	0.024	0.021	0.018	0.018
<i>Yearly working income year before application</i>								
<€ – 10 k	0.004	0.002	0.000	0.004	0.004	0.000	0.003	0.003
Between € – 10 k and €0	0.048	0.035	0.002	0.048	0.048	0.050	0.041	0.041
Between €0 and €10 k	0.874	0.904	0.935	0.874	0.874	0.877	0.890	0.890
Between €10 k and €25 k	0.064	0.050	0.052	0.064	0.065	0.064	0.057	0.057
Between €25 k and €50 k	0.008	0.004	0.003	0.008	0.008	0.008	0.006	0.006
> €50 k	0.001	0.005	0.008	0.001	0.001	0.001	0.003	0.003
<i>Total yearly income year before application</i>								
<€ – 10 k	0.004	0.000	0.000	0.004	0.004	0.000	0.002	0.002
Between € – 10 k and €0	0.001	0.002	0.001	0.001	0.001	0.004	0.001	0.001
Between €0 and €10 k	0.145	0.114	0.119	0.145	0.145	0.145	0.128	0.128
Between €10 k and €25 k	0.796	0.845	0.851	0.796	0.796	0.796	0.822	0.822
Between €25 k and €50 k	0.053	0.034	0.021	0.053	0.053	0.053	0.042	0.042

Table 8 (continued)

	Descriptives				Treatment		Control		Treatment		Control	
	Accepted applicants	Rejected applicants	Non-applicants	Accepted applicants	Matched non-participants	Matched rejected applicants	Matched non-participants	Matched rejected applicants	Accepted applicants	Matched non-participants	Matched rejected applicants	Accepted applicants
>€50 k	0.001	0.006	0.008	0.001	0.001	0.001	0.001	0.001	0.004	0.004	0.004	0.004
<i>Urban-Rural</i>												
1 (most urban)	0.248	0.312	0.382	0.248	0.302	0.257	0.316	0.283	0.335	0.331	0.161	0.132
2	0.337	0.333	0.311	0.337	0.325	0.345	0.163	0.163	0.156	0.064	0.059	0.042
3	0.175	0.152	0.145	0.175	0.174	0.172	0.047	0.045	0.034	0.037	0.037	0.037
4	0.167	0.147	0.108	0.167	0.130	0.157	0.054	0.031	0.031	0.024	0.024	0.024
5 (most rural)	0.073	0.056	0.053	0.073	0.070	0.069	0.125	0.138	0.074	0.129	0.129	0.129
<i>Province</i>												
Groningen	0.046	0.030	0.052	0.046	0.047	0.043	0.047	0.037	0.037	0.037	0.037	0.037
Friesland	0.033	0.028	0.039	0.033	0.041	0.036	0.041	0.031	0.031	0.031	0.031	0.031
Drenthe	0.049	0.042	0.027	0.049	0.047	0.049	0.047	0.045	0.034	0.037	0.037	0.037
Overijssel	0.047	0.024	0.057	0.047	0.054	0.041	0.054	0.034	0.034	0.034	0.034	0.034
Flevoland	0.039	0.024	0.021	0.039	0.023	0.036	0.023	0.031	0.031	0.031	0.031	0.031
Gelderland	0.138	0.139	0.095	0.138	0.125	0.150	0.125	0.138	0.074	0.129	0.129	0.129
Utrecht	0.063	0.084	0.056	0.063	0.057	0.062	0.057	0.074	0.074	0.074	0.074	0.074
North Holland	0.124	0.191	0.191	0.124	0.141	0.131	0.141	0.160	0.160	0.171	0.171	0.171
South Holland	0.253	0.237	0.261	0.253	0.253	0.245	0.253	0.244	0.244	0.247	0.247	0.247
Zeeland	0.029	0.025	0.016	0.029	0.025	0.027	0.025	0.027	0.027	0.019	0.019	0.019
North Brabant	0.116	0.107	0.109	0.116	0.116	0.118	0.116	0.111	0.111	0.112	0.112	0.112
Limburg	0.062	0.071	0.077	0.062	0.071	0.061	0.071	0.067	0.067	0.075	0.075	0.075
Parents are/were self-employed	0.171	0.091	0.079	0.171	0.171	0.169	0.171	0.128	0.128	0.128	0.128	0.128
<i>Number of observations</i>	964	1133	1,138,004	964	1,051,588	1133	1,051,588	2097	2097	2097	2097	2097

Bold numbers indicate a significant difference at a 5% level between treatment group and matched control group or (for descriptives) the difference between accepted applicants and rejected or non-applicants

Appendix B: Propensity Score Estimation

See Table 9, 10, 11.

Table 9 Results of probit estimation: strategy (1): accepted applicants and non-participants

	2007	2008	2009	2010
<i>Age (ref: 18–30 years)</i>				
31–40 years	0.168**	0.135	0.112	0.149
41–55 years	0.0582	0.0941	0.0258	0.160*
56+ years	-0.273**	-0.372***	-0.291*	-0.0155
Female	-0.418***	-0.372***	-0.435***	-0.301***
<i>Background (ref: Native Dutch)</i>				
Moroccan/Surinam/Antillean/Turkish	-0.177**	-0.131*	-0.340***	-0.0830
Other non-western immigrant	-0.0312	-0.0200	-0.0359	0.0284
Western immigrant	0.0741	0.132*	-0.167	0.0408
<i>Education (ref: unknown)</i>				
Low educated	0.00605	-0.0561	-0.195**	-0.125*
Middle educated	0.174***	0.158**	0.0932	0.160**
High educated	0.283***	0.375***	0.279**	0.240**
<i>Household composition (ref: other)</i>				
Couple with children	0.310***	0.433***	0.372**	0.304**
Couple without children	0.0911	0.233	-0.00860	0.242*
Single with children	0.335***	0.435***	0.328**	0.314**
Single without children	0.140	0.256*	0.112	0.174
<i>Yearly working income year before application (ref: > €50 k)</i>				
<€-10 k	3.522	4.087	0	3.095

Table 9 (continued)

	2007	2008	2009	2010
Between €-10 k and €0	4.024	3.964	3.726	3.515
Between €0 and €10 k	3.098	3.337	2.866	2.817
Between €10 k and €25 k	3.009	3.043	2.966	2.668
Between €25 k and €50 k	2.673	3.298	2.623	3.045
<i>Yearly working income 2 year before application (ref: > €50 k)</i>				
<€ - 10 k	-0.685	0	0	0.638
Between € - 10 k and €0	-0.904***	-0.213	-0.668	0.202
Between €0 and €10 k	-0.155	-0.170	0.0316	0.473*
Between €10 k and €25 k	-0.228	-0.0330	0.147	0.623*
Between €25 k and €50 k	-0.264	-0.379	0.357	0.599*
Personal income unknown year before application	0	0	0	3284
Personal income unknown 2 years before application	-0.00862	0.0968	0.230	0.277*
Household income below social minimum 2 years before application	0.0209	-0.0814	-0.0336	-0.0689
Household income below social minimum 1 year before application	-0.0927*	0.0539	0.00363	-0.00153
Household income unknown year before application	-0.0646	-0.178	-0.0768	-0.0585
<i>Province (ref:Limburg)</i>				
Groningen	0.223*	0.0411	0.0175	-0.586*
Friesland	0.110	-0.246	-0.185	0.0879
Drenthe	0.265*	0.0563	0.266*	0.197
Overijssel	0.149	-0.0261	-0.131	-0.0593
Flevoland	0.556***	0.0390	0.117	0.274
Gelderland	0.251*	0.230**	0.165	0.0369
Utrecht	0.321**	0.167	0.215	0.104
North Holland	0.132	0.143	0.0534	0.0318

Table 9 (continued)

	2007	2008	2009	2010
South Holland	0.397***	0.221*	0.124	0.245*
Zeeland	0.290	0.270*	0.304*	0.170
North Brabant	0.175	0.0321	0.0491	0.223*
<i>Urban–Rural (ref: most rural, 5)</i>				
1 (most urban)	-0.122	-0.352***	-0.274*	-0.278**
2	-0.0154	-0.0823	0.0652	-0.176
3	0.0606	-0.0552	0.0442	-0.143
4	0.129	0.108	0.0601	-0.214*
<i>Employment history (number of months 2–4y prior to application)</i>				
Social welfare benefit recipient	-0.128	-0.163	-0.123	-0.157
Disability benefits	-0.121	-0.411*	-0.762*	-0.0653
Unemployment benefit	0.164	0.159	0.159	0.379*
Other benefits	0.178	-0.0381	0.197	-0.0268
Salaried employed	0.190	0.346	0.129	-0.00466
Employed	-0.185	-0.282	-0.220	-0.132
Self-employed	0.790**	0.835**	0.559	0.498
Parents are/were self-employed	0.189***	0.0404	0.167*	0.325***
Constant	-6.247	-6.358	-6.003	-6.535
N	312,341	283,404	258,763	277,530

Stars denote significance results on a * 10%, ** 5%, *** 1% level

Table 10 Results of probit estimation: strategy (2): accepted applicants versus rejected applicants

	Total
<i>Age (ref: 18–30 years)</i>	
31–40 years	– 0.00498
41–55 years	– 0.0164
56 + years	– 0.111
Female	0.113
<i>Background (ref: Native Dutch)</i>	
Moroccan/Surinam/Antillean/Turkish	– 0.679***
Other non-western immigrant	– 0.698***
Western immigrant	– 0.235*
<i>Education (ref: unknown)</i>	
Low educated	– 0.0530
Middle educated	0.0598
High educated	0.0527
<i>Household composition (ref: other)</i>	
Couple with children	0.196
Couple without children	0.148
Single with children	0.157
Single without children	0.267
<i>Yearly working income year before application (ref: > €50 k)</i>	
<€– 10 k	4.861
Between €– 10 k and €0	4.601
Between €0 and €10 k	4.444
Between €10 k and €25 k	4.630
Between €25 k and €50 k	4.976
<i>Yearly working income 2 year before application (ref: > €50 k)</i>	
<€– 10 k	0.0324
Between €– 10 k and €0	– 0.153
Between €0 and €10 k	0.242
Between €10 k and €25 k	0.339
Between €25 k and €50 k	0.153
Personal income unknown year before application	3298
Personal income unknown 2 years before application	0.289
Household income below social minimum 2 years before application	– 0.0136
Household income below social minimum 1 year before application	– 0.00504
Household income unknown year before application	0.0993
<i>Province (ref: Limburg)</i>	
Groningen	0.161
Friesland	– 0.0658
Drenthe	0.114
Overijssel	0.532**
Flevoland	0.449*
Gelderland	0.138

Table 10 (continued)

	Total
Utrecht	-0.0232
North Holland	-0.116
South Holland	0.365**
Zeeland	0.0978
North Brabant	0.0645
<i>Urban–Rural (ref: most rural, 5)</i>	
1 (most urban)	-0.197
2	-0.0739
3	0.0159
4	-0.0758
<i>Employment history (number of months 2-4y prior to application)</i>	
Social welfare benefit recipient	-0.0970
Disability benefits	-0.0684
Unemployment benefit	-0.100
Other benefits	0.607
Salaried employed	1135
Employed	-1180
Self-employed	1.127*
Parents are/were self-employed	0.216*
<i>Year of application (ref: 2010)</i>	
2007	0.195*
2008	0.292***
2009	0.104
Constant	-4.828
N	2.097

Stars denote significance results on a * 10%, ** 5%, *** 1% level

Table 11 Results of probit estimation: strategy (3): applicants versus non-applicants

	2007	2008	2009	2010
<i>Age (ref: 18–30 years)</i>				
31–40 years	0.128**	0.138**	0.142*	0.196***
41–55 years	0.0669	0.0582	0.0469	0.143**
56+ years	-0.240***	-0.380***	-0.297***	-0.159*
Female	-0.461***	-0.439***	-0.509***	-0.448***
<i>Background (ref: Native Dutch)</i>				
Moroccan/Surinam/Antillean/Turkish	-0.0117	0.0162	-0.0190	0.0214
Other non-western immigrant	0.172***	0.141***	0.173***	0.224***
Western immigrant	0.139**	0.142**	-0.0249	0.0892
<i>Education (ref: unknown)</i>				
Low educated	0.00311	-0.0611	-0.114**	-0.0755*
Middle educated	0.210***	0.151***	0.144**	0.170***
High educated	0.331***	0.360***	0.257***	0.240***
<i>Household composition (ref: other)</i>				
Couple with children	0.335***	0.418***	0.386***	0.220**
Couple without children	0.139	0.193*	0.0872	0.0777
Single with children	0.359***	0.377***	0.443***	0.304***
Single without children	0.152*	0.183*	0.166	0.0263
<i>Yearly working income year before application (ref: > €50 k)</i>				
<€–10 k	0.466	1817	0	3219
Between €–10 k and €0	0.965*	1611	3980	3937
Between €0 and €10 k	0.0393	1087	3111	3309
Between €10 k and €25 k	-0.113	0.825	3008	3175
Between €25 k and €50 k	-0.223	0.715	2757	3248
<i>Yearly working income 2 year before application (ref: > €50 k)</i>				

Table 11 (continued)

	2007	2008	2009	2010
<€–10 k	-0.198	0	0	0.0989
Between €–10 k and €0	-0.662**	-0.196	-0.171	-0.0370
Between €0 and €10 k	-0.0412	-0.211	0.134	-0.0379
Between €10 k and €25 k	-0.127	-0.117	0.178	0.0804
Between €25 k and €50 k	-0.137	-0.169	0.390*	-0.00205
Personal income unknown year before application	-0.152	0.556	0	3795
Personal income unknown 2 years before application	-0.104	0.0751	0.210*	0.0650
Household income below social minimum 2 years before application	-0.0250	-0.0617	0.0164	-0.0264
Household income below social minimum 1 year before application	-0.0711*	0.0374	-0.000500	-0.00172
Household income unknown year before application	-0.0729	-0.206*	-0.172*	-0.112
<i>Province (ref:Limburg)</i>				
Groningen	0.136	0.0162	-0.0747	-0.613***
Friesland	0.0599	-0.327*	-0.113	0.0320
Drenthe	0.129	0.101	0.242*	0.234**
Overijssel	0.0243	-0.167	-0.191	-0.283**
Flevoland	0.422***	0.0319	-0.0684	0.0721
Gelderland	0.237***	0.189**	0.120	0.0788
Utrecht	0.321***	0.198*	0.101	0.189*
North Holland	0.141*	0.130	0.186*	-0.0219
South Holland	0.259***	0.159*	0.116	0.156*
Zeeland	0.266*	0.188	0.218	0.266*
North Brabant	0.122	-0.0210	0.111	0.0836
<i>Urban–Rural (ref: most rural, 5)</i>				
1 (most urban)	-0.176*	-0.294***	-0.340***	-0.152*
2	-0.0139	-0.0842	-0.0311	-0.0911

Table 11 (continued)

	2007	2008	2009	2010
3	0.0334	-0.0819	-0.0592	-0.0772
4	0.139*	0.0750	0.0472	-0.140
<i>Employment history (number of months 2-4y prior to application)</i>				
Social welfare benefit recipient	-0.0687	-0.0929	-0.231**	-0.194**
Disability benefits	-0.262**	-0.385**	-0.283*	-0.149
Unemployment benefit	0.193*	0.223*	0.255	0.376***
Other benefits	0.0725	0.0101	-0.0185	0.0598
Salaries employed	-0.0801	0.00725	0.160	-0.0281
Employed	0.110	0.116	-0.177	-0.0277
Self-employed	0.509	0.609*	0.617	0.500
Parents are/were self-employed	0.180***	0.0343	0.128*	0.206***
Constant	-3.097***	-3.860***	-6.132	-6.163
N	316.522	286.945	258.618	277.481

Stars denote significance results on a * 10%, ** 5%, *** 1% level

Appendix C: Matching Quality

See Table 12, 13, 14, 15.

Table 12 Common support strategy (1)

	Total treatment group	Treatment group—on support	Treatment group—off support	Total control group	Control group—on support	Control group—off support
2007	328	328	0	312,013	312,013	0
2008	269	268	1	283,135	262,888	20,247
2009	172	170	2	258,591	209,537	49,054
2010	195	193	2	277,335	267,150	10,185
Total	964	959	5	1,131,074	1,051,588	79,486

Strategy (1): the comparison of accepted applicants and non-applicants

Table 13 Common support strategy (2)

Total treatment group	Treatment group—on support	Treatment group—off support	Total control group	Control group—on support	Control group—off support
Total 964	958	6	1133	1133	0

Strategy (2): the comparison of accepted applicants and rejected-applicants. For strategy (2) we match based on all years together. We can do this only for strategy (2) since we know the moment at which the control group applies, whereas we do not know this for strategy (1) and (3)

Table 14 Common support strategy (3)

	Total treatment group	Treatment group—on support	Treatment group—off support	Total control group	Control group—on support	Control group—off support
2007	681	681	0	315,841	315,841	0
2008	535	534	1	286,410	268,351	18,059
2009	395	395	0	258,223	247,050	11,173
2010	486	486	0	276,995	274,997	1998
Total	681	681	0	315,841	315,841	0

Strategy (3) compares the applicants to the non-applicants

Table 15 Matching quality

		Mean standardised bias			Pseudo R-squared		
		(1)	(2)	(3)	(1)	(2)	(3)
2007	Before matching	13.5		11.9	0.10		0.10
	After matching	8.8		7.8	0.11		0.09
2008	Before matching	15.0		14.0	0.11		0.11
	After matching	8.2		7.7	0.12		0.09
2009	Before matching	18.3		15.6	0.12		0.11
	After matching	9.0		8.3	0.11		0.09
2010	Before matching	15.6		14.7	0.10		0.10
	After matching	9.7		8.6	0.12		0.10
Overall	Before matching		7.5			0.10	
	After matching		10.8			0.13	

For strategy (1) accepted versus non-applicants, (2) accepted versus rejected applicants, (3) applicants versus non-applicants. For strategy (2) we match based on all years together. We can do this only for strategy (2) since we know the moment at which the control group applies, whereas we do not know this for strategy (1) and (3)

Appendix D: Detailed Results

See Table 16.

Table 16 Treatment effects of self-employment program

	Accepted applicants versus non-partici- pants	Accepted applicants versus rejected appli- cants	Applicants versus non- applicants
<i>Outcome: self-employed or salaried employed</i>			
After 4 years (in percentage points)	0.329*** (0.036)	0.177*** (0.024)	0.263*** (0.031)
After 8 years (in percentage points)	0.291*** (0.053)	0.150*** (0.025)	0.235*** (0.030)
<i>Outcome: self-employed</i>			
After 4 years (in percentage points)	0.454*** (0.053)	0.243*** (0.025)	0.335*** (0.041)
After 8 years (in percentage points)	0.367*** (0.043)	0.178*** (0.022)	0.287*** (0.028)
<i>Outcome: salaried employed</i>			
After 4 years (in percentage points)	-0.101** (0.047)	-0.054*** (0.017)	-0.049* (0.028)
After 8 years (in percentage points)	-0.065 (0.045)	-0.030 (0.019)	-0.035 (0.031)
<i>Outcome: social welfare</i>			
After 4 years (in percentage points)	-0.259*** (0.048)	-0.136*** (0.026)	-0.193*** (0.032)
After 8 years (in percentage points)	-0.162*** (0.050)	-0.057** (0.025)	-0.114*** (0.031)
<i>Outcome: labor income</i>			
After 4 years	€ 3.492 ** (1554)	€ 2.231 *** (751)	€ 2.865 *** (966)
After 8 years	€ 5.071 *** (1863)	€ 3.810 *** (840)	€ 4.224 *** (1408)
<i>Outcome: total income</i>			
After 4 years	€ 1.668 *** (1445)	€ 1.760 ** (710)	€ 1.367 (895)
After 8 years	€ 2.344 *** (1519)	€ 2.637 *** (852)	€ 2.471 ** (1240)

Differences in outcomes of the treatment and control group for different definitions. Standard errors are in parenthesis and are based on bootstrapping with 100 replications. 10%, ** 5%, *** 1% denote significance level of t-test based on bootstrapped standard errors

Appendix E Details Sensitivity Analysis

See Table 17.

Table 17 Bounding and simulation

Treatment effect strategy	Outcome variable 8 years after application	Γ^*
Accepted applicants versus non-participants	Salaried or self-employed	5.2
	Social welfare receipt	2.3
Accepted applicants versus rejected applicants	Salaried or self-employed	1.4
	Social welfare receipt	1.3
Applicants versus non-applicants	Salaried or self-employed	4.2
	Social welfare receipt	2.6

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