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## Conference Paper

# The Evaluation of Start-Up Subsidies for the Unemployed and the Role of Unobserved Characteristics for Matching Estimators

Beiträge zur Jahrestagung des Vereins für Socialpolitik 2013: Wettbewerbspolitik und Regulierung in einer globalen Wirtschaftsordnung - Session: Entrepreneurship, No. C16-V2

### Provided in Cooperation with:

Verein für Socialpolitik / German Economic Association

*Suggested Citation:* Weißberger, Martin; Caliendo, Marco; Künn, Steffen (2013) : The Evaluation of Start-Up Subsidies for the Unemployed and the Role of Unobserved Characteristics for Matching Estimators, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2013: Wettbewerbspolitik und Regulierung in einer globalen Wirtschaftsordnung - Session: Entrepreneurship, No. C16-V2, ZBW - Deutsche Zentralbibliothek für Wirtschaftswissenschaften, Leibniz-Informationszentrum Wirtschaft, Kiel und Hamburg

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# The Evaluation of Start-Up Subsidies for the Unemployed and the Role of “Unobserved” Characteristics for Matching Estimators

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August 30, 2013

[Preliminary draft]

## Abstract

Start-up subsidies for the unemployed have become an important part of Active Labor Market Policy (ALMP) in many countries. Previous evaluation results show predominantly (very) positive results indicating that these programs are an effective way to increase employment probabilities and income of participants. Most of the studies are using matching estimators based on the conditional independence assumption (CIA) to estimate these effects and are prone to bias if there are unobserved factors affecting the selection process into the programs. From the entrepreneurship literature we know that “entrepreneurs are different”, e.g., with respect to personality traits, non-cognitive skills and risk preferences. Since most of the previous evaluation studies are based on administrative data, information on such variables is not available. This raises the question as to whether the effects are potentially over-estimated due to positive selection. We have access to data which allow us to model the selection process with and without usually unobserved personality characteristics and to examine the consequences for the estimated propensity scores and treatment effects. We show that openness to new experiences and internal/external locus of control have a significant influence on selection into treatment (and labor market outcomes). Our empirical findings also give some indication that neglecting personality traits in the program evaluation might lead to slight over-estimation of the average treatment effects on the treated. The difference in the estimated effect is modest in magnitude and statistically insignificant at usual levels, however.

**Keywords:** Start-up subsidies, self-employment, personality, evaluation

**JEL codes:** C14, H43, J68, L26

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# 1 Introduction

Start-up subsidies (SUS) for unemployed individuals as part of active labor market policy (ALMP) have gained interest in recent years. While the empirical evidence indicates that traditional instruments of ALMP such as wage subsidies, vocational training or job creation schemes have only moderate to no significant or even negative effects on labor market outcomes of participants (Lechner and Wunsch, 2008), previous evaluation studies of start-up subsidies find substantial positive impacts on employability and income. Caliendo and Künn (2011) examine the effects of two programs in Germany (bridging allowance and start-up subsidy) designed to help unemployed individuals start a new business. As control group, they use a group of individuals unemployed during the same time who were eligible to participate in the program but ultimately did not enter. They find significant and substantial positive long-term effects with respect to the probability of being self- or regular employed as well as working and household income for West-German men.

The international evidence on this topic is still rather scarce. Desiage, Duhautois, and Redor (2010, 2012) analyze the ACCRE program in France, a start-up subsidy for individuals receiving unemployment benefits or social income from the public administration. They find persistently higher survival rates for subsidized compared to non-subsidized firms in the medium and long run.

The mentioned studies are using propensity score matching estimators based on the conditional independence assumption (CIA) to estimate the causal effects of the programs. Usually, they use administrative records to control for variables known to be relevant in the decision to become self-employed and to succeed as an entrepreneur like socio-demographics, qualification and employment history. This information is sometimes complemented by survey data on additional factors like parental self-employment which has been shown to also play an important role (Dunn and Holtz-Eakin, 2000).

From the entrepreneurship literature, we know that “entrepreneurs are different”, e.g., with respect to personality traits, non-cognitive skills and risk preferences, even after controlling for socio-demographic, labor market history information and intergenerational

determinants of self-employment. Rauch and Frese (2007) stress the importance of personality with regard to entry into self-employment and subsequent success. In a recent study, Caliendo, Fossen, and Kritikos (2011) comprehensively analyze the impact of various personality characteristics on the probability of being self-employed and success as an entrepreneur. They find evidence that the *Big five* (Costa and McCrae, 1992) a broad five-factor measure for personality with its dimensions conscientiousness, extraversion, agreeableness, neuroticism and openness to new experiences, shows a significant correlation with entry into self-employment. In particular, the factor openness to new experience plays an important role. A personality characteristic that also showed to be highly relevant in the decision to become an entrepreneur is the *locus of control*. In general, the locus of control measures the generalized expectations about the internal and external control of reinforcement (Rotter, 1966). A high internal locus of control implies that individuals attribute their future success or failure in life to their own actions while persons with a high external locus of control believe that external factors including fate or luck have a major impact on their future outcomes. Multiple previous analyses have drawn a consistent picture with regard to the positive correlation between entry into entrepreneurship and a high internal/low external locus of control (van Praag, van Witteloostuijn, and van der Sluis, 2009; Caliendo, Fossen, and Kritikos, 2011). Furthermore, the literature emphasizes the role of *willingness to take risks* in the decision to become self-employed. It is argued that persons with a higher willingness to take risks are more likely to start a new business because it requires making risky decisions in uncertain environments (Caliendo, Fossen, and Kritikos, 2009). These theoretical considerations are in line with empirical results in the entrepreneurship literature (inter alia Cramer, Hartog, Jonker, and Van Praag, 2002; Caliendo, Fossen, and Kritikos, 2009).

Considering these findings, it is questionable whether the identifying assumptions of the propensity score matching estimator hold despite the neglect of personality characteristics. To address this issue, the aforementioned evaluation studies on start-up subsidies provide various sensitivity analyses to check the robustness of their results in light of the potential

deviations from the CIA.

We choose a new approach. In our paper, we analyze a start-up subsidy program in Germany and are in the rare position to have access to a combination of administrative data and survey data that contains a rich set of variables capturing personality characteristics and risk tolerance. This enables us to include these usually unobserved variables and examine their relevance in the evaluation while at the same time controlling for the conventional covariates with respect to socio-demographics, qualification, labor market history and information on parental self-employment. Our main goal is to examine the importance of including personality characteristics in the evaluation of the start-up subsidy program for the unemployed.

We focus on two aspects: First, we want to find out what role personality traits play in the selection into the program (i.e. becoming self-employed) and how the estimated propensity scores change with the inclusion of personality variables. Second, we want to analyze the difference for the estimated treatment effect between the inclusion and exclusion of these variables in the evaluation approach. The considered program is the new start-up subsidy (SUS) in Germany that replaced the two former programs (bridging allowance and start-up subsidy) in August 2006. Our treatment group is a random sample of SUS participants who started a new business out of unemployment in the first quarter of 2009. In addition, we have data on individuals who were also unemployed and eligible to participate but ultimately did not join the program during the same time period. The survey data originates from computer assisted telephone interviews in the last quarter of 2010 for both groups.

We find that openness to new experiences and internal/external locus of control play a significant role in the decision to participate in the program. We find that the inclusion of personality characteristics in the propensity score estimation leads to only small changes of the overall distribution of the estimated propensity scores whereas on an individual level, the changes are substantial but do not follow a clear pattern. While measures of correlation, rank correlation and concordance of the estimated scores with and without

personality variables indicate a relatively high and significant positive association, formal tests of equality of the distributions yield strong evidence that the distribution of the scores and ranks of the individuals changes significantly for both participants and non-participants.

Our empirical findings also indicate that neglecting personality traits in the program evaluation of the start-up subsidy leads to slight over-estimation of the average treatment effects on the treated. The differences in the estimated effect are only modest and not statistically significant at the usual significance levels, however.

The rest of the paper is organized as follows. In section 2 we present the characteristics of the program analyzed in the study at hand before outlining the estimation framework. Section 3 describes the data and presents some descriptive results while section 4 contains the findings of the propensity score estimation, propensity score comparison and the estimated treatment effects as well as some sensitivity analysis. Section 5 concludes.

## **2 Start-Up Subsidy Program and Empirical Strategy**

### **2.1 New Start-Up Subsidy for the Unemployed in Germany**

For our analysis, we use the evaluation of the new start-up subsidy (“Gründungszuschuss”, SUS, Social code book III, §§57, 58) in Germany that is in place since August 2006.<sup>1</sup> In 2009, the Federal Employment Agency spent 1.6 billion Euro on the program with 137,000 individuals entering the program while the numbers increased to 1.9 billion Euro and 147,000 entries in 2010 (Bundesagentur für Arbeit, 2010, 2011). Eligibility for the SUS depended on several requirements: At the start of the business, unemployed individuals had to have a remaining entitlement to at least 90 days of unemployment benefit I. Furthermore, a business and financing plan evaluated by an independent external institution had to be submitted to the Employment Agency. The subsidy was paid for a maximum period of 15 months. The first period of SUS was nine months long and could be legally claimed by all eligible individuals who fulfilled the legal requirements. The SUS consisted

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<sup>1</sup>The program has been subject to substantial reforms in December 2011, see Bundesministerium für Arbeit und Soziales (2011) for details.

of an amount equivalent to the person’s last unemployment benefit and a lump sum payment of 300 Euro per month for coverage of social security costs. The subsidy was offset against the remaining days of unemployment benefit I entitlement (Social code book III, §128 (1) 9). After these first nine months, participants could apply for a second period of additional six months which could not be legally claimed. The approval for the second period depended on a sufficiently high economic activity of the new business which was assessed entirely by the respective case worker.

## 2.2 Estimation Framework

For the estimation of the causal treatment effects, we follow the literature and base our analysis on the potential outcome framework, also known as the Roy (1951)-Rubin (1974) model. The two potential outcomes are denoted as  $Y^1$  (if the individual receives treatment,  $D = 1$ ) and  $Y^0$  (if the individual does not receive treatment,  $D = 0$ ). The actually observed outcome for an individual  $i$  can be written as:  $Y_i = D_i \cdot Y_i^1 + (1 - D_i) \cdot Y_i^0$ . The individual treatment effect is defined as the difference in potential outcomes:  $\Delta_i = Y_i^1 - Y_i^0$ .

However, *both* potential outcomes for the *same* individual at the *same* time can in fact never be observed because the individual can either receive the treatment or not (“fundamental evaluation problem”). In our analysis, we follow previous studies and focus on the most prominent evaluation parameter, the average treatment effect on the treated (ATT), which is given by:

$$\Delta_{ATT} = E(Y^1 | D = 1) - E(Y^0 | D = 1). \quad (1)$$

The last term of equation (1) describes the counterfactual, unobserved outcome without treatment for actually treated individuals. Since the condition  $E(Y^0 | D = 1) = E(Y^0 | D = 0)$  is usually not satisfied in absence of experimental data, estimating ATT by the difference in mean outcomes between participants  $E(Y^1 | D = 1)$  and non-participants  $E(Y^0 | D = 0)$  will lead to biased results. The bias arises due to selection into the treatment. Treated and control individuals are selected groups that would have different

outcomes even in the absence of the program due to observable or unobservable factors.<sup>2</sup>

We apply propensity score matching and thus rely on the conditional independence assumption (CIA), which states that conditional on the propensity score  $P(\cdot)$  as a function of observable characteristics  $X$ , the counterfactual outcome is independent of treatment:  $Y^0 \perp\!\!\!\perp D | P(X)$ , where  $\perp\!\!\!\perp$  denotes independence (Rosenbaum and Rubin, 1983). In addition to the CIA, we also assume overlap:  $Pr(D = 1 | P(X)) < 1$ , for all  $X$ . The ATT is then identified as:

$$\Delta_{ATT}^{MAT} = E(Y^1 | P(X), D = 1) - E_X[E(Y^0 | P(X), D = 0) | D = 1], \quad (2)$$

where the first term can be estimated from the treatment group and the second term from the mean outcomes of the matched control group. The outer expectation is taken over the distribution of  $P(X)$  in the treatment group.

The CIA is obviously a very strong assumption. In previous studies which evaluated start-up subsidy programs for the unemployed, it has been argued that controlling for individual socio-demographic and qualification factors along with information on labor market history and parental self-employment makes it plausible that the CIA holds (Caliendo and Künn, 2011). So far, this point was reassessed by conducting various sensitivity analyses. In our study, we are in the position to have access to multiple usually unobserved personality variables that are relevant in the decision to start a business. Thus, we can estimate ATT with and without including the personality traits and examine their relevance for the CIA.

## 3 Data and Descriptive Results

### 3.1 Data

We use a random sample of individuals who were unemployed and entered the SUS program in the first quarter of 2009 and compare them to other unemployed persons who were eligible to but did not participate during the same period. We combine information from administrative records provided by the Federal Employment Agency (FEA) with

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<sup>2</sup>See, for example Caliendo and Hujer (2006) for further discussion.



survey data obtained by computer-assisted telephone interviews. The administrative part contains detailed information on employment history, unemployment support reciepience and participation in active labor market programs prior to SUS. The interviews were conducted in the last quarter of 2010 so that the period between entry into the program and survey is between 19 and 24 months. They complement the administrative data with information on parental self-employment and post treatment outcomes.

In addition and central to our analysis, the questionnaire contained items that measured various personality characteristics. The respondents were given a series of different statements about themselves and were asked how much they agreed with them. The Big five personality dimensions were constructed using ten items and a seven-point Likert scale. For the measurement of the locus of control, the questionnaire contained six items. Two more items covered impulsiveness and patience again using a seven-point scale for respondents to self-assess their agreement with the given statement. Risk preferences were measured on a scale ranging from zero to ten where the lowest value indicated absolutely no willingness to take risks while the highest value represented a person with a high risk tolerance. The personality characteristics were surveyed during the interview in the last quarter of 2010 and thus recorded after the treatment. Following the literature (e.g., Dohmen, Falk, Huffman, Sunde, Schupp, and Wagner, 2007; Cobb-Clark and Schurer, 2011, 2012), we assume in our analysis that personality traits and risk attitudes are stable over time and are not related to labor market events, i.e. unaffected by the treatment.

### **3.2 Descriptive Results**

Our final sample consists of 403 participants in the SUS program and 516 control observations. Table A.1 in the Appendix presents descriptive statistics on socio-demographics, cognitive abilities, intergenerational information as well as information on regional labor markets and labor market history. Participants and non-participants show relatively well-balanced characteristics with respect to age, gender, family situation, and formal qualifica-

tion.<sup>3</sup> With respect to cognitive skills, individuals in the treatment group performed better in all three tasks surveyed during the interview. From the literature, we know that parental self-employment has an impact in the decision to start a business (Dunn and Holtz-Eakin, 2000). Our descriptive summary statistics are in line with this. Almost one third of SUS participants report that at least one parent is or was self-employed while the same is true for only 26% of non-participants. The administrative records of individuals in the treatment group consistently show a slightly higher average number of months in employment during the three years prior to entering unemployment compared to the control group but these differences are not statistically significant at the 10% level. The same is true for the average monthly unemployment benefit and the mean remaining unemployment benefit entitlement between treatment and control group.

Table 1 presents descriptive statistics for the variables on personality characteristics separately for participants and non-participants. The comparison of the average scores are in line with our expectations that participants are more entrepreneurial. With regard to the Big five, SUS participants rate themselves on average significantly less reserved, more confident and more open to new experiences. They report a significantly higher internal and lower external locus of control indicating that they believe more strongly that they can determine their future success by their own actions instead of being dependent on external factors. Not surprisingly, a significantly higher fraction of participants shows a high willingness to take risks. All in all, the descriptive analysis confirms that participants differ from non-participants with respect to key personality characteristics.

[Insert Table 1 about here]

Table 2 summarizes labor market outcomes at the time of the survey in the last quarter of 2010 for SUS participants who started their business in the first quarter of 2009 as well as for non-participants. Since the main goal of ALMP is re-integration of unemployed individuals into the labor market, we have a closer look at the fraction of people who report to be self- or regular employed. The descriptive evidence shows that the fraction

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<sup>3</sup>This fact is due to pre-matching of participants and non-participants with respect to key socio-demographic characteristics.

of SUS participants in self- or regular employment at the time of the survey is 91% while only two thirds of non-participants report to be employed. With respect to the second labor market status presented in Table 2, 94% (80%) are neither registered as unemployed nor in an active labor market program in the treatment (control) group.

[Insert Table 2 about here]

These differences only represent raw gaps as we did not yet control for the factors determining labor market success or selection into the program. The descriptive analysis shows, however, that participants and non-participants differ in many aspects and also reveals significant differences in personality traits between the two groups.

## 4 Estimation Results

### 4.1 Propensity Score Estimation

To estimate the causal effect and to examine the importance of these personality characteristics, we now conduct to propensity score matching. We estimate the propensity score for participating in the SUS program using a probit estimation. We follow economic theory and previous evaluation studies of start-up subsidies for the unemployed and include the variables containing information about socio-demographics, cognitive skills, intergenerational transmissions, regional labor markets, and employment history in our base specification. Then, we add the personality variables to examine whether these characteristics affect the selection into treatment, conditional on the conventional control variables. The estimation results are summarized in Table 3.<sup>4</sup>

[Insert Table 3 about here]

The base specification (Table 3, column (1)) does not contain any personality variables and works as our baseline in the following analyses. Next, we extend the basic model by the five personality dimensions known as the Big five (Table 3, column (2)). Confirming our

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<sup>4</sup>Detailed probit estimation results with the full set of coefficients can be found in the Appendix, Table A.2.

expectations, higher extraversion and more pronounced openness to new experiences positively affect selection into the program. In column (3), we present the results for the base specification extended by the internal and external locus of control variables. Unemployed individuals with a higher (lower) internal (external) locus of control are significantly more likely to participate in SUS, conditional on all other observed control variables. If we add to our base specification the willingness to take risks along with impulsiveness and patience indicators (Table 3, column (4)), we find that a high risk tolerance positively affects selection into the treatment. The last column shows the probit estimation results for the base specification extended by all personality variables at hand. We find that the positive effect of openness to new experiences on the likelihood of SUS participation remains highly significant. Also, our findings with respect to the internal and external locus of control are robust to the addition of other personality characteristics. Surprisingly, the impact of risk preference loses its significance in the full model. A look at the goodness of fit measures reveals that McFadden’s Pseudo- $R^2$  increases from 0.176 for the base specification to 0.210 for the full specification which is equivalent to a drop in the log-Likelihood from -519 to -498. The hitrate on the other hand only slightly increases from 71.2% to 72.7%.

To sum up, we find strong evidence that personality traits are highly relevant in the decision to start a (subsidized) new business out of unemployment.<sup>5</sup>

## 4.2 Propensity Score Comparison

Figure 1 shows the distributions of the propensity scores for participants and non-participants for the base specification without personality traits (cf. Table 3, column (1)) and the full specification additionally containing all available personality variables (cf. Table 3, column (5)). The distributions of the propensity scores is rather asymmetric between treated and control observations and skewed towards the tails for the base specification. This indicates that individuals in the treatment group have on average a higher probability of partici-

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<sup>5</sup>We checked for relevance of the personality characteristics in the outcome equation by regressing the outcome variables on a participation dummy, the personality traits and the other control variables of the full specification. The estimation results for outcome “self- or regular employed at time of survey” can be found in the Appendix, Table A.3 and indicate significant impacts by conscientiousness, external locus of control and willingness to take risks.

pating in the SUS than persons in the control group. Between both specifications, we do not find substantial differences between the distributions.

[Insert Figure 1 about here]

For a better comparison of the distributions of the estimated propensity scores of the two specifications, Figure 2 shows the estimated kernel densities. For the full sample, we observe that the distribution of the estimated propensity scores changes only marginally. If we examine the distributions separately for participants and non-participants, we find that the distribution for participants (non-participants) gets more accentuated towards the upper (lower) tail with the inclusion of the personality variables, although the changes seem not very large. The inclusion of personality characteristics thus slightly improves the model with regard to disentangling the two groups, again showing the important role of these variables.

[Insert Figure 2 about here]

To statistically test whether there are changes in the distributions, we conduct several tests. Table 4, Panel A shows the results of paired t-test that examine whether on average, the propensity score is significantly different between the two specifications. For the full sample, we cannot reject equality of the means but for the sub-samples, we find that the mean propensity score of participants has significantly increased by 2 points whereas non-participants have on average a 1.7 points lower estimated probability of entering the program.

Wilcoxon's (1945) signed-rank test checks whether the median propensity score differs significantly across base and full specification. It is commonly used to test for equality of the distributions of repeated measures where the null is that the distributions are equal. For the full sample, we cannot reject equal distributions of the propensity scores but again, for both sub-samples of participants and non-participants, we find that the inclusion of the personality variables has significantly altered the distribution of the estimated propensity scores.

As a final examination, we conduct a Friedman (1937; 1939; 1940) test. This test checks whether different ranking measures for one variable or individual have the same distribution. In our context, it evaluates whether the two propensity scores yield the same ranking of the individuals. The null is that the distribution of the ranks of each score is the same. Table 4, Panel B contains the test statistics and p values for the test conducted for the full sample and separately each sub-group. The low p values for the full sample along with the ones for the treatment and control group show strong support for rejection of the null. Thus, this test gives empirical evidence that the distribution of ranks with respect to the propensity score depends on the consideration of the personality traits.

[Insert Table 4 about here]

To investigate the changes in the propensity score on the individual level, we plot the estimated propensity scores from the full specification against the counterpart from the base specification. The upper part of Figure 3 reveals that there are substantial differences in the individual propensity scores for participants between the two specifications. The absolute amount of the change range from zero to 0.15 in the majority of cases and they seem to be randomly distributed in both the negative and positive area over the full distribution. The lower graph repeats the procedure for the control group. Again, the differences are distributed relatively symmetrically around zero. The range in absolute terms covers the area between 0 and 0.2 while the changes are less pronounced for non-participants at the lower tail of the distribution of the propensity score. Overall, there is no obvious relation between the individual estimated score and the change due to the inclusion of the personality variables.

[Insert Figure 3 about here]

In the next step, we quantify the strength of association between the individual propensity score of the base specification and the full specification. As measures, we choose Pearson's conventional correlation coefficient (Table 4, panel C) along with Spearman's (1904) *rho* (Table 4, panel D) that calculates the conventional correlation using the ranked values

of the variables. In addition, we provide results for Kendall’s (1938) *tau* (Table 4, panel E) which is a quantitative concordance indicator for the association between two ordinal variables. Kendall’s tau is computed by pairwise comparison of two observations at a time. If one individual has a lower score in both specifications than the other individual, it is called a concordant pair. In contrast, if one individual scores higher in one variable but lower in the other, we have a discordant couple. Kendall’s tau is the ratio of the difference between concordant and discordant pairs relative to all pairs. All three measures can take on values between +1 and −1 where these limits indicate a perfect positive/negative association.

Table 4 shows that all three correlation measures report a high and significant positive association for the scores derived from the specification without and with the personality variables. Pearson’s correlation coefficient yields a value of 0.92 in the full sample and 0.90 for the sub-samples of participants and non-participants alike. The same is true for Spearman’s measure. Kendall’s *tau* reduces from 0.75 in the full sample to 0.72/0.71 in the sub-samples. This means that the changes in ranks due to the differences in propensity score is higher among the separate sub-samples than in the full sample.

To sum up the results concerning the differences in propensity scores obtained so far, we find that the inclusion of personality characteristics in the propensity score estimation leads to a more pronounced accentuation towards the tails of the distribution while on an individual level, the changes are substantial and do not follow a clear pattern.

### 4.3 Treatment Effect Estimation

We now turn to the estimation of the treatment effects for the SUS program. Again, we focus on the comparison between the estimated effect in our base specification neglecting the personality traits and the full model. Table 5 shows the raw outcome gap, the estimated average treatment effect on the treated (ATT) for the base and full specification as well as the ATT difference between the two specifications. As outcome variables, we use the employment status of self- or regular employed (panel A) as well as not unemployed (panel B) at the time of the survey.

[Insert Table 5 about here]

Using the base specification, we estimate that the probability of being re-integrated into the labor market is significantly higher for SUS participants by 16.6 points whereas the number drops to 14.6 points with the inclusion of the personality variables. With respect to not being unemployed or in ALMP, the base specification yields a positive and significant 8.4 point advantage of participants over non-participants. As soon as we add the personality variables, the estimated effect is reduced by 1.8 points to 6.6 points but remains significant.

The estimated treatment effects for the two outcome variables show a consistent picture. The inclusion of usually unobserved personality traits and risk tolerance reduces the estimated ATTs slightly. If we take into account the standard errors, however, we observe that the confidence intervals for the estimated effects in base and full specification show a large overlap so we cannot rule out that the differences are insignificant. A formal test for equality of the effects shows highly insignificant results. A possible explanation for this modest change in the estimated effect is that personality traits and risk tolerance are relevant in the evaluation of start-up subsidy programs but are partly implicitly captured in pre-treatment outcomes controlled for by the labor market history. Variables like the occupational group before entering the unemployment spell or the amount of the monthly unemployment benefit which is determined relative to the pay preceding the unemployment spell represent earlier labor market outcomes which are already affected by personality traits and risk preferences.

To test the sensitivity<sup>6</sup> of our results, we restrict our sample to individuals equal to or older than 30 years of age because it has been shown that personality variables are subject to the biggest changes during early adulthood (Cobb-Clark and Schurer, 2011).<sup>7</sup> Table 6 reports the estimated treatment effect for the two outcome measures which confirm our findings of the full sample. The reduction of the effect with respect to self- or regular employment is less pronounced for the sub-sample (1.1 point compared to 2 points in the

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<sup>6</sup>Sensitivity analysis with respect to the choice of the kernel bandwidth shows robustness of the results and can be found in Table A.4 in the Appendix.

<sup>7</sup>93 individuals in our sample are younger than 30 of which 38 are participants in the SUS and the remaining 55 are non-participants.



full sample) while for being not unemployed, the drop in the effect is 2.7 points as opposed to 1.8 points in the full sample. Again, the confidence intervals of the effects between base and full specification show a large overlap and the formal test of effect equality yields insignificant results.

## 5 Conclusion

In this paper, we analyze the relevance of personality traits in the evaluation of start-up subsidy programs. From the entrepreneurship literature we know that “entrepreneurs are different”, e.g., with respect to personality traits, non-cognitive skills and risk preferences. Since most of the previous evaluation studies are based on administrative data, information on such variables is not available and thus results are prone to bias.

We analyze a start-up subsidy program in Germany and have access to a combination of administrative data and survey data that contains a rich set of variables capturing personality characteristics and risk tolerance in addition to the conventional covariates with respect to socio-demographics, labor market history, and information on parental self-employment. This allow us to model the selection process with and without these usually unobserved personality characteristics and compare the results.

In our analysis, we focus on two aspects: First, we want to find out what role personality traits play in the selection into the treatment. We find that openness to new experiences and internal/external locus of control play a significant role in the decision to participate in the subsidy program. A closer comparison of the propensities estimated with and without the traits reveals that due to the inclusion of personality characteristics the distributions of the scores gets more accentuated towards the tails but overall changes in the distribution are only small. On an individual level, we observe changes in the propensity score up to 0.2 in absolute terms for both participants and non-participants but these changes do not seem to follow a clear pattern. Measures of correlation, rank correlation and concordance of the estimated scores show a relatively high and significant positive association.

Second, we want to analyze the consequences for the estimated treatment effects. Our

empirical findings indicate that neglecting personality traits in the program evaluation of start-up subsidies might lead to a slight over-estimation of the ATTs with regard to the probability of being re-integrated into the labor market as well as the probability of not being unemployed or in an active labor market program. However, the drop in the effect is modest, the confidence intervals overlap to a large extent, and formal tests for equality of the effects do not yield significant results on the usual significance levels. These findings imply that in the usual case with no information on these personality characteristics available, the remaining bias after controlling for labor market history is likely to be small.

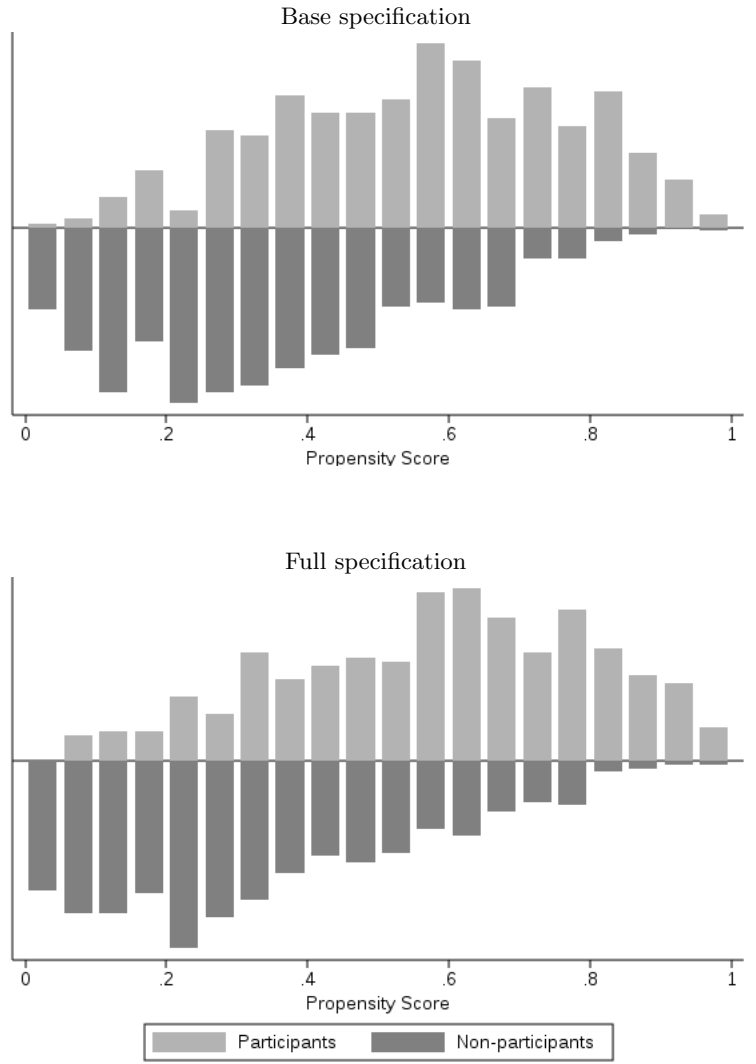
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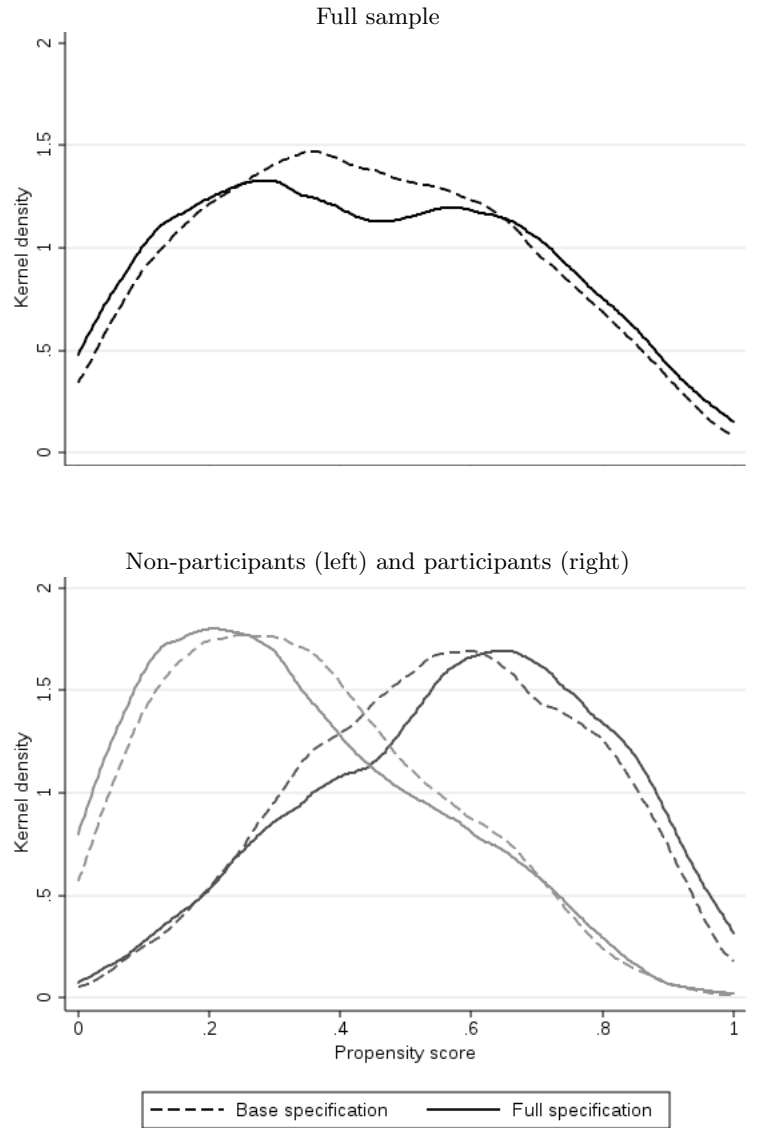
## Figures and Tables

Figure 1: Propensity score distributions



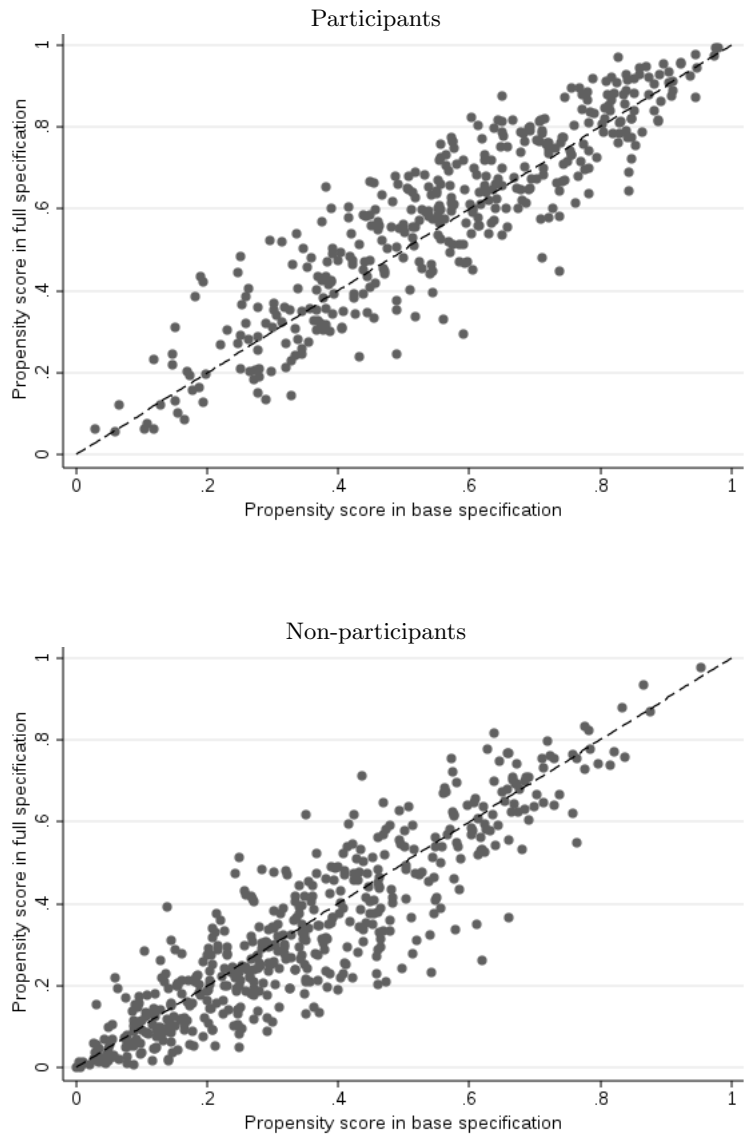
*Note:* Depicted are propensity score distributions for participants and non-participants based on the base specification including variables on socio-demographics, cognitive ability, intergenerational information, regional labor market, and labor market history (upper part) and the full specification additionally containing personality variables (lower part). The specifications are presented in more detail in Table A.2.

Figure 2: Estimated kernel density of the propensity scores



*Note:* Depicted are the estimated kernel density functions for the full sample (upper part) and sub-samples of non-participants (lower left part) and participants (lower right part) for the base specification including variables on socio-demographics, cognitive ability, intergenerational information, regional labor market, and labor market history, and full specification additionally containing personality variables. The specifications are presented in more detail in Table A.2. An epanechnikov kernel with bandwidth 0.06 is used for the estimation.

Figure 3: Changes in propensity score



*Note:* Depicted are the estimated propensity scores for participants (upper part) and non-participants (lower part) based on the full specification including variables on socio-demographics, cognitive ability, intergenerational information, regional labor market, labor market history, and personality variables plotted against the estimated propensity scores based on the base specification which does not contain the personality variables. The specifications are presented in more detail in Table A.2.

Table 1: Descriptive statistics for personality variables

	Participants	Non-participants	p value
Big five			
conscientiousness	6.14 (0.81)	6.06 (0.88)	0.16
extraversion	5.89 (1.01)	5.65 (1.07)	0.00
agreeableness	6.16 (1.01)	6.09 (1.08)	0.37
neuroticism	3.88 (1.42)	4.12 (1.35)	0.01
openness	5.02 (1.40)	4.76 (1.29)	0.00
Locus of control			
internal	6.11 (0.92)	5.86 (1.01)	0.00
external	2.72 (1.05)	3.16 (1.20)	0.00
Readiness to take risk $\geq 7$	0.50	0.42	0.03
Impulsiveness	4.33 (1.77)	4.45 (1.56)	0.31
Patience	5.11 (1.59)	5.00 (1.62)	0.30
Number of observations	403	516	

*Note:* Reported are sample averages (standard deviations) and p values for tests of equal means. All personality traits with the exception of readiness to take risk are measured on a scale from 1 to 7 where higher values indicate a stronger degree of the respective trait. Risk is initially measured on a scale from 0 to 10 where higher values indicate a higher willingness to take risk, reported is the fraction of observations with values greater or equal to 7.

Table 2: Descriptive statistics for outcome variables

	Participants	Non-participants	p value
Employment status at time of survey			
self- or regular employed	0.91	0.65	0.00
not unemployed or in ALMP	0.94	0.80	0.00
Number of observations	403	516	

*Note:* p values are reported for tests of equal means.



Table 3: Propensity score probit estimation

	Base	Specification			Full
		(2)	(3)	(4)	
<i>Personality traits</i>					
Big five					
conscientiousness (standardized)		-0.018			-.104*
extraversion (standardized)		0.12**			0.092
agreeableness (standardized)		-0.007			-.038
neuroticism (standardized)		-.082			0.018
openness (standardized)		0.116**			0.139**
Locus of control					
internal (standardized)			0.162***		0.176***
external (standardized)			-.187***		-.193***
Readiness to take risk $\geq 7$				0.192*	0.073
Impulsiveness (standardized)				-.040	-.094*
Patience (standardized)				0.019	0.012
<i>Socio-demographics</i>	yes	yes	yes	yes	yes
<i>Cognitive abilities</i>	yes	yes	yes	yes	yes
<i>Intergenerational information</i>	yes	yes	yes	yes	yes
<i>Regional labor market</i>	yes	yes	yes	yes	yes
<i>Labor market history</i>	yes	yes	yes	yes	yes
Constant	yes	yes	yes	yes	yes
Number of observations	919	919	919	919	919
log-Likelihood	-518.88	-510.987	-505.183	-516.796	-497.551
Hitrate	71.164	71.817	73.123	70.511	72.688
McFadden's Pseudo-R <sup>2</sup>	0.176	0.189	0.198	0.180	0.210

Note: Reported are probit coefficients. \*\*\* p<0.01/ \*\* p<0.05/ \* p<0.10 significance level. All personality traits with the exception of readiness to take risk are initially measured on a scale from 1 to 7 where higher values indicate a stronger degree of the respective trait and then standardized. Risk is initially measured on a scale from 0 to 10 where higher values indicate a higher willingness to take risk, reported is the fraction of observations with values greater or equal to 7. Full estimation results are presented in Table A.2.

Table 4: Propensity score comparison

	Full sample	Participants	Non-participants
A. Distribution comparison			
Paired $t$ -test	0.0001 {0.9631}	-0.0216*** {0.0000}	0.0171*** {0.0000}
Wilcoxon signed-ranks test	0.0120 {0.9900}	-4.385*** {0.0000}	4.067*** {0.0000}
B. Rank distribution comparison			
Friedman test	6.5067** {0.0107}	12.5087*** {0.0004}	15.6977*** {0.0001}
C. Propensity score correlation			
Pearson's $r$	0.9226*** {0.0000}	0.9013*** {0.0000}	0.8983*** {0.0000}
D. Rank correlation			
Spearman's $\rho$	0.9192*** {0.0000}	0.8958*** {0.0000}	0.8875*** {0.0000}
E. Concordance			
Kendall's $\tau$	0.7534*** {0.0000}	0.7186*** {0.0000}	0.7119*** {0.0000}

*Note:* Presented are measures comparing the propensity scores based on the base specification including variables on socio-demographics, cognitive ability, intergenerational information, regional labor market, and labor market history, and on the full specification additionally containing personality variables. The specifications are presented in more detail in Table A.2. \*\*\*  $p < 0.01$ / \*\*  $p < 0.05$ / \*  $p < 0.10$  significance level.  $p$  values are reported in {}.

Table 5: Treatment effect estimation

	Descriptive raw gap	Base specification	Full specification	Difference: base vs. full
A. Outcome: <i>Self- or regular employed</i>	0.2545*** (0.0270)	0.1662*** (0.0326)	0.1463*** (0.0344)	0.0199 (0.0233)
B. Outcome: <i>Not unemployed or in ALMP</i>	0.1395*** (0.0227)	0.0837*** (0.0258)	0.0658** (0.0265)	0.0179 (0.0172)
Off support		3	2	
Mean bias		4.7248	5.5574	
Median bias		4.1780	4.6466	

*Note:* Presented are estimated average treatment effects on the treated as the difference in mean outcomes between participants and matched non-participants for the base and full specification using epanechnikov kernel propensity score matching with bandwidth 0.06. Standard errors are in parentheses and based on bootstrapping with 200 replications. The base specification contains variables on socio-demographics, cognitive ability, intergenerational information, regional labor market, and labor market history while the full specification additionally includes personality variables. The specifications are presented in more detail in Table A.2. \*\*\*  $p < 0.01$ / \*\*  $p < 0.05$ / \*  $p < 0.10$  significance level. The number of participants outside the common support area is indicated as off support. Mean (median) bias reports the mean (median) standardized bias of the considered covariates after matching. The standard errors for the differences in treatment effects are based on bootstrapping with 200 replications. Sensitivity analysis with respect to the choice of the kernel bandwidth shows robustness of the results and can be found in Table A.4.

Table 6: Sensitivity analysis – sub-sample based on age

	Full sample			Sub-sample $\geq 30$		
	Base spec.	Full spec.	Base vs. full	Base spec.	Full spec.	Base vs. full
A. Outcome: <i>Self- or regular employed</i>	0.1662*** (0.0326)	0.1463*** (0.0344)	0.0199 (0.0233)	0.1645*** (0.0351)	0.1541*** (0.0374)	0.0104 (0.0206)
B. Outcome: <i>Not unemployed or in ALMP</i>	0.0837*** (0.0258)	0.0658** (0.0265)	0.0179 (0.0172)	0.0852*** (0.0269)	0.0584** (0.0279)	0.0268 (0.0200)
Number of observations	919			826		
Off support	3	2		4	4	
Mean bias	4.7248	5.5574		4.5863	5.4076	
Median bias	4.1780	4.6466		3.7626	4.5501	

*Note:* Presented are estimated average treatment effects on the treated as the difference in mean outcomes between participants and matched non-participants for the base and full specification using epanechnikov kernel propensity score matching with bandwidth 0.06. Standard errors are in parentheses and based on bootstrapping with 200 replications. The base specification contains variables on socio-demographics, cognitive ability, intergenerational information, regional labor market, and labor market history while the full specification additionally includes personality variables. The specifications are presented in more detail in Table A.2. \*\*\*  $p < 0.01$  / \*\*  $p < 0.05$  / \*  $p < 0.10$  significance level. The number of participants outside the common support area is indicated as off support. Mean (median) bias reports the mean (median) standardized bias of the considered covariates after matching. The standard errors for the differences in treatment effects are based on bootstrapping with 200 replications.

## Appendix

Table A.1: Descriptive statistics for control variables

	Participants	Non-participants	p value
<i>Socio-demographics</i>			
Age			
average age (years)	42.84	42.77	0.91
younger than 25 years	0.02	0.02	0.58
25 to less than 35 years	0.19	0.21	0.51
35 to less than 45 years	0.33	0.35	0.54
45 to less than 56 years	0.35	0.31	0.16
56 years and older	0.10	0.12	0.56
Male			
East Germany	0.24	0.22	0.48
German citizen	0.97	0.94	0.02
Health restrictions affecting job placement	0.06	0.11	0.00
Married	0.56	0.58	0.65
Number of children			
no children	0.61	0.63	0.50
one child	0.19	0.17	0.47
two children and above	0.20	0.20	0.90
Children under 10 present	0.21	0.25	0.19
Single parent	0.06	0.06	0.95
Highest schooling certificate			
lower secondary school	0.17	0.18	0.70
middle secondary school	0.34	0.30	0.16
upper secondary school	0.49	0.51	0.48
other/no degree	0.00	0.01	0.18
Professional education			
vocational training	0.49	0.47	0.67
professional/vocational academy	0.12	0.09	0.24
technical college/university degree	0.35	0.37	0.61
other/no training	0.04	0.06	0.15
Professional qualification			
unskilled workers	0.64	0.58	0.08
skilled workers	0.26	0.26	0.84
skilled workers with technical college education	0.02	0.02	0.92
top management	0.08	0.14	0.01
<i>Cognitive abilities</i>			
Remembering (number of correct words out of 10)	6.95	6.73	0.05
Calculating capacity I (correct answer)	0.77	0.76	0.70
Calculating capacity II (correct answer)	0.38	0.32	0.08
<i>Intergenerational information</i>			
One or both parents born abroad	0.16	0.21	0.05
Father and/or mother is/was self-employed	0.31	0.26	0.09
Father employed when respondent 15 years old	0.90	0.88	0.40
Highest schooling certificate of father			
lower secondary school	0.43	0.39	0.14
middle secondary school	0.16	0.19	0.20
upper secondary school	0.28	0.24	0.25
other/no degree	0.13	0.18	0.04

(Table continued on next page)

*(Table continued)*

	Participants	Non-participants	p value
<i>Regional labor market</i>			
Regional cluster			
type Ia	0.14	0.15	0.64
type Ib	0.10	0.08	0.20
type IIa	0.08	0.06	0.12
type IIb	0.09	0.10	0.65
type IIc	0.07	0.07	0.99
type IIIa	0.13	0.15	0.30
type IIIb	0.04	0.05	0.44
type IVa	0.06	0.08	0.34
type IVb	0.06	0.10	0.03
type IVc	0.03	0.03	0.63
type Va	0.03	0.04	0.60
type Vb	0.10	0.07	0.14
type Vc	0.06	0.03	0.02
<i>Labor market history</i>			
Second to last year before entering unemployment			
months employed	8.83	8.50	0.28
months in labor market program	0.31	0.50	0.06
Next to last year before entering unemployment			
months employed	9.57	9.53	0.89
months in labor market program	0.28	0.41	0.15
Last year before entering unemployment			
months employed	9.40	9.25	0.57
months in labor market program	0.55	0.66	0.29
Employment status before entering unemployment			
dependent employment	0.60	0.45	0.00
self-employment	0.13	0.03	0.00
vocational/educational training	0.02	0.02	0.88
disable to work/unemployable	0.02	0.11	0.00
others	0.22	0.39	0.00
Occupational group before entering unemployment			
manufacturing	0.17	0.17	0.96
technical profession	0.06	0.07	0.75
services	0.73	0.73	0.93
others	0.03	0.03	0.75
Daily income from last employment (Euro)	76.37	74.28	0.56
Duration of last unemployment spell			
average number (months)	4.63	4.73	0.78
less than 1 month	0.13	0.05	0.00
1 to less than 3 months	0.33	0.36	0.21
3 to less than 6 months	0.24	0.26	0.46
6 to less than 12 months	0.24	0.26	0.54
12 to less than 24 months	0.05	0.05	0.85
24 months and above	0.02	0.02	0.62
Monthly unemployment benefit			
average amount (Euro)	958.37	978.29	0.58
less than 300 Euros	0.11	0.07	0.08
300 to less than 600 Euros	0.15	0.14	0.49
600 to less than 900 Euros	0.22	0.30	0.01
900 to less than 1200 Euros	0.21	0.20	0.81
1200 to less than 1500 Euros	0.13	0.13	0.92
1500 Euros and above	0.18	0.16	0.49
Remaining unemployment benefit entitlement			
average number (months)	7.18	6.98	0.54
less than 3 months	0.21	0.24	0.23
3 to less than 6 months	0.21	0.14	0.00
6 to less than 9 months	0.09	0.20	0.00
9 to less than 12 months	0.23	0.21	0.54
12 months and above	0.27	0.21	0.05
Number of placement offers	1.81	2.48	0.08
Number of observations	403	516	

Note: p values are reported for tests of equal means.

Table A.2: Propensity score probit estimation

	Base	(2)	Specification (3)	(4)	Full
<i>Personality traits</i>					
Big five					
conscientiousness (standardized)		-0.018			-0.104*
extraversion (standardized)		0.12**			0.092
agreeableness (standardized)		-0.007			-0.038
neuroticism (standardized)		-0.082			0.018
openness (standardized)		0.116**			0.139**
Locus of control					
internal (standardized)			0.162***		0.176***
external (standardized)			-0.187***		-0.193***
Readiness to take risk $\geq 7$				0.192*	0.073
Impulsiveness (standardized)				-0.040	-0.094*
Patience (standardized)				0.019	0.012
<i>Socio-demographics</i>					
Age (ref.: younger than 25 years)					
25 to less than 35 years	0.208	0.286	0.177	0.25	0.273
35 to less than 45 years	0.141	0.217	0.147	0.173	0.226
45 to less than 56 years	0.282	0.333	0.281	0.33	0.344
56 years and older	0.167	0.224	0.238	0.213	0.284
Male					
East Germany	-0.004	-0.007	-0.045	-0.036	-0.070
German citizen	-0.524**	-0.530**	-0.585***	-0.518**	-0.608***
Health restrictions affecting job placement	0.349	0.396	0.232	0.36	0.287
Married	-0.473**	-0.439**	-0.451**	-0.463**	-0.443**
Number of children (ref.: no children)					
one child	-0.241**	-0.242**	-0.247**	-0.238**	-0.252**
two children and above	0.467***	0.497***	0.478***	0.466***	0.523***
Children under 10 present	0.465***	0.489***	0.475***	0.471***	0.504***
Single parent	-0.447***	-0.444***	-0.418**	-0.436***	-0.451***
<i>Qualification</i>					
Highest schooling certificate (ref.: other/no certificate)					
lower secondary school	-0.279	-0.262	-0.293	-0.269	-0.256
middle secondary school	0.731	0.821	0.582	0.717	0.638
upper secondary school	0.768	0.846	0.625	0.782	0.676
Professional education (ref.: other/no training)	0.48	0.547	0.369	0.5	0.403
vocational training	0.202	0.213	0.254	0.193	0.225
professional/vocational academy	0.18	0.206	0.243	0.17	0.248
technical college/university degree	0.21	0.233	0.293	0.19	0.258
Professional qualification (ref.: unskilled workers)					
skilled workers	-0.080	-0.084	-0.046	-0.098	-0.069
skilled workers with technical college education	0.189	0.119	0.141	0.177	0.043
top management	-0.462***	-0.462***	-0.443**	-0.473**	-0.461***
<i>Cognitive abilities</i>					
Remembering (number of correct words out of 10)	0.015	-0.003	-0.003	0.017	-0.010
Calculating capacity I (correct answer)	0.034	0.058	0.004	0.042	0.024
Calculating capacity II (correct answer)	0.134	0.176	0.141	0.134	0.173
<i>Intergenerational information</i>					
One or both parents born abroad					
Father and/or mother is/was self-employed	-0.035	-0.020	-0.024	-0.038	-0.026
Father employed when respondent 15 years old	0.093	0.093	0.091	0.106	0.111
Highest schooling certificate of father (ref.: other/no certificate)	0.177	0.147	0.132	0.158	0.116
lower secondary school	0.311**	0.336**	0.325**	0.305**	0.364**
middle secondary school	0.045	0.059	0.053	0.049	0.095
upper secondary school	0.279*	0.293*	0.309*	0.285*	0.31*
<i>Regional labor market</i>					
Regional cluster (ref.: type Ia)					
type Ib	0.009	0.128	0.008	0.004	0.075
type IIa	0.283	0.306	0.266	0.269	0.283
type IIb	0.259	0.307	0.33	0.228	0.359
type IIc	-0.070	0.005	-0.018	-0.063	0.009
type IIIa	-0.178	-0.135	-0.129	-0.174	-0.094
type IIIb	-0.029	0.044	0.054	-0.027	0.075
type IVa	-0.116	-0.093	-0.134	-0.153	-0.091
type IVb	-0.418**	-0.384*	-0.437**	-0.433**	-0.405*
type IVc	0.174	0.25	0.228	0.159	0.277
type Va	0.205	0.294	0.275	0.2	0.337
type Vb	0.703**	0.757***	0.711**	0.707**	0.786***
type Vc	0.86**	0.925***	0.841**	0.842**	0.917***

(Table continued on next page)

(Table continued)

	Base	(2)	Specification (3)	(4)	Full
<i>Labor market history</i>					
Second to last year before entering unemployment					
months employed	0.01	0.013	0.007	0.01	0.009
months in labor market program	-0.22	-0.13	-0.20	-0.21	-0.09
Next to last year before entering unemployment					
months employed	-0.14	-0.11	-0.08	-0.12	-0.06
months in labor market program	-0.40	-0.39	-0.31	-0.39	-0.34
Last year before entering unemployment					
months employed	-0.005	-0.004	-0.009	-0.005	-0.008
months in labor market program	0.01	0.014	0.002	0.012	0.006
Employment status before entering unemployment (ref.: other status)					
dependent employment	0.619***	0.61***	0.589***	0.619***	0.595***
self-employment	1.539***	1.506***	1.540***	1.522***	1.505***
vocational/educational training	0.562*	0.601*	0.529*	0.56*	0.561*
disable to work/unemployable	-0.475**	-0.421*	-0.468**	-0.468**	-0.452*
Occupational group before entering unemployment (ref.: other group)					
manufacturing	0.081	0.141	0.026	0.077	0.078
technical profession	0.068	0.145	0.016	0.058	0.074
services	0.122	0.147	0.05	0.104	0.078
Daily income from last employment (Euro)	-0.003**	-0.003**	-0.003**	-0.003**	-0.003**
Duration of last unemployment spell (ref.: less than 1 month)					
1 to less than 3 months	-0.549***	-0.537**	-0.588***	-0.531**	-0.605***
3 to less than 6 months	-0.258	-0.252	-0.282	-0.240	-0.297
6 to less than 12 months	-0.329	-0.340	-0.377*	-0.315	-0.398*
12 to less than 24 months	-0.238	-0.252	-0.256	-0.221	-0.290
24 months and above	-0.230	-0.264	-0.278	-0.247	-0.368
Monthly unemployment benefit (ref.: less than 300 Euros)					
300 to less than 600 Euros	-0.020	-0.062	-0.044	-0.029	-0.044
600 to less than 900 Euros	-0.271	-0.291	-0.273	-0.283	-0.263
900 to less than 1200 Euros	-0.016	-0.036	-0.059	-0.010	-0.034
1200 to less than 1500 Euros	-0.085	-0.106	-0.136	-0.091	-0.093
1500 Euros and above	0.139	0.08	0.067	0.128	0.103
Remaining unemployment benefit entitlement (ref.: less than 3 months)					
3 to less than 6 months	0.392**	0.375**	0.454***	0.381**	0.428**
6 to less than 9 months	-0.499***	-0.524***	-0.474**	-0.490***	-0.482***
9 to less than 12 months	0.163	0.175	0.155	0.171	0.176
12 months and above	-0.012	-0.023	-0.045	0.0002	-0.049
Number of placement offers	-0.021**	-0.021**	-0.022**	-0.021**	-0.022**
Const.	-1.624*	-1.858*	-1.132	-1.745*	-1.380
Number of observations	919	919	919	919	919
log-Likelihood	-518.88	-510.987	-505.183	-516.796	-497.551
Hitrate	71.164	71.817	73.123	70.511	72.688
McFadden's Pseudo-R <sup>2</sup>	0.176	0.189	0.198	0.180	0.210

Note: Reported are probit coefficients. \*\*\* p<0.01/ \*\* p<0.05/ \* p<0.10 significance level. All personality traits with the exception of readiness to take risk are initially measured on a scale from 1 to 7 where higher values indicate a stronger degree of the respective trait and then standardized. Risk is initially measured on a scale from 0 to 10 where higher values indicate a higher willingness to take risk, reported is the fraction of observations with values greater or equal to 7.

Table A.3: Probit estimation

Outcome variable: <i>Self- or regular employed at interview</i>	
Participation	1.031***
<i>Personality traits</i>	
Big five	
conscientiousness (standardized)	-0.200***
extraversion (standardized)	0.07
agreeableness (standardized)	0.038
neuroticism (standardized)	-0.088
openness (standardized)	0.019
Locus of control	
internal (standardized)	0.031
external (standardized)	-0.181***
Readiness to take risk $\geq 7$	0.297**
Impulsiveness (standardized)	-0.084
Patience (standardized)	-0.084
<i>Socio-demographics</i>	
Age (ref.: younger than 25 years)	
25 to less than 35 years	0.783**
35 to less than 45 years	0.921**
45 to less than 56 years	1.068***
56 years and older	0.453
Male	-0.079
East Germany	0.534**
German citizen	-0.313
Health restrictions affecting job placement	-0.498**
Married	0.401***
Number of children (ref.: no children)	
one child	-0.089
two children and above	-0.453**
Children under 10 present	0.039
Single parent	0.123
<i>Qualification</i>	
Highest schooling certificate (ref.: other/no certificate)	
lower secondary school	1.184*
middle secondary school	1.108
upper secondary school	1.125*
Professional education (ref.: other/no training)	
vocational training	0.541**
professional/vocational academy	0.429
technical college/university degree	0.478*
Professional qualification (ref.: unskilled workers)	
skilled workers	-0.047
skilled workers with technical college education	-0.135
top management	0.267
<i>Cognitive abilities</i>	
Remembering (number of correct words out of 10)	0.005
Calculating capacity I (correct answer)	-0.047
Calculating capacity II (correct answer)	0.037
<i>Intergenerational information</i>	
One or both parents born abroad	-0.109
Father and/or mother is/was self-employed	0.02
Father employed when respondent 15 years old	-0.030
Highest schooling certificate of father (ref.: other/no certificate)	
lower secondary school	-0.190
middle secondary school	0.337*
upper secondary school	0.147

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(Table continued)

Outcome variable: <i>Self- or regular employed at interview</i>	
<i>Regional labor market</i>	
Regional cluster (ref.: type Ia)	
type Ib	0.141
type IIa	0.285
type IIb	-.180
type IIc	-.078
type IIIa	0.068
type IIIb	-.349
type IVa	-.166
type IVb	0.16
type IVc	-.343
type Va	-.105
type Vb	-.342
type Vc	-.246
<i>Labor market history</i>	
Second to last year before entering unemployment	
months employed	0.048***
months in labor market program	0.015
Next to last year before entering unemployment	
months employed	-.018
months in labor market program	0.031
Last year before entering unemployment	
months employed	0.007
months in labor market program	0.034
Employment status before entering unemployment (ref.: other status)	
dependent employment	0.411***
self-employment	-.363
vocational/educational training	-.279
disable to work/unemployable	-.285
Occupational group before entering unemployment (ref.: other group)	
manufacturing	0.004
technical profession	0.478
services	0.074
Daily income from last employment (Euro)	-.0003
Duration of last unemployment spell (ref.: less than 1 month)	
1 to less than 3 months	-.056
3 to less than 6 months	0.123
6 to less than 12 months	-.295
12 to less than 24 months	-.398
24 months and above	-.276
Monthly unemployment benefit (ref.: less than 300 Euros)	
300 to less than 600 Euros	-.484*
600 to less than 900 Euros	-.410
900 to less than 1200 Euros	0.011
1200 to less than 1500 Euros	-.231
1500 Euros and above	-.160
Remaining unemployment benefit entitlement (ref.: less than 3 months)	
3 to less than 6 months	0.506**
6 to less than 9 months	0.72***
9 to less than 12 months	0.584***
12 months and above	0.345
Number of placement offers	-.005
Const.	-2.475**
Number of observations	919
log-Likelihood	-343.204
Pseudo-R <sup>2</sup>	0.318

*Note:* Reported are probit coefficients. \*\*\* p<0.01/ \*\* p<0.05/ \* p<0.10 significance level. All personality traits with the exception of readiness to take risk are initially measured on a scale from 1 to 7 where higher values indicate a stronger degree of the respective trait and then standardized. Risk is initially measured on a scale from 0 to 10 where higher values indicate a higher willingness to take risk, reported is the fraction of observations with values greater or equal to 7.

Table A.4: Sensitivity analysis – kernel bandwidth choice

	Bandwidth = 0.04			Bandwidth = 0.02		
	Base spec.	Full spec.	Base vs. full	Base spec.	Full spec.	Base vs. full
A. Outcome: <i>Self- or regular employed</i>	0.1652*** (0.0374)	0.1433*** (0.0368)	0.0219 (0.0257)	0.1718*** (0.0414)	0.1440*** (0.0430)	0.0278 (0.0319)
B. Outcome: <i>Not unemployed or in ALMP</i>	0.0842*** (0.0280)	0.0627** (0.0287)	0.0215 (0.0203)	0.0866*** (0.0326)	0.0601* (0.0337)	0.0265 (0.0252)
Off support	3	2		11	8	
Mean bias	4.7248	5.5574		4.1446	5.6364	
Median bias	4.1780	4.6466		3.7753	4.9456	

*Note:* Presented are estimated average treatment effects on the treated as the difference in mean outcomes between participants and matched non-participants for the base and full specification using epanechnikov kernel propensity score matching with bandwidth as indicated at the top of each column. Standard errors are in parentheses and based on bootstrapping with 200 replications. The base specification contains variables on socio-demographics, cognitive ability, intergenerational information, regional labor market, and labor market history while the full specification additionally includes personality variables. The specifications are presented in more detail in Table A.2. \*\*\* p<0.01/ \*\* p<0.05/ \* p<0.10 significance level. The number of participants outside the common support area is indicated as off support. Mean (median) bias reports the mean (median) standardized bias of the considered covariates after matching. The standard errors for the differences in treatment effects are based on bootstrapping with 200 replications.