Catching up or Lagging Behind?
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Potential of Subsidized Start-Ups out of
Unemployment

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ABSTRACT

From an active labor market policy perspective, start-up subsidies for unemployed individuals are very effective in improving long-term labor market outcomes for participants. From a business perspective, however, the assessment of these public programs is less clear since they might attract individuals with low entrepreneurial abilities and produce businesses with low survival rates and little contribution to job creation, economic growth, and innovation. In this paper, we use a rich data set to compare participants of a German start-up subsidy program for unemployed individuals to a group of regular founders who started from nonunemployment and did not receive the subsidy. The data allows us to analyze their business performance up until 40 months after business formation. We find that formerly subsidized founders lag behind not only in survival and job creation, but especially also in innovation activities. The gaps in these business outcomes are relatively constant or even widening over time. Hence, we do not see any indication of catching up in the longer run. While the gap in survival can be entirely explained by initial differences in observable start-up characteristics, the gap in business development remains and seems to be the result of restricted access to capital as well as differential business strategies and dynamics. Considering these conflicting results for the assessment of the subsidy program from an ALMP and business perspective, policy makers need to carefully weigh the costs and benefits of such a strategy to find the right policy mix.

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1 Introduction

The current debate in the entrepreneurship literature questions the common wisdom that an increase in start-up activities automatically results in economic and employment growth (see, e.g., Colombelli *et al.*, 2016). It has been well documented that among those new businesses who start, many fail, and among those who survive, only a small fraction introduces new innovations and spurs sustainable employment growth. As a consequence, the academic as well as political discussion has shifted from the *quantity* to the *quality* of start-ups. In this context, the question arises as to whether existing policies promoting a broad entry into entrepreneurship are effective or should rather be targeted towards the stimulation of innovative start-ups (Acs *et al.*, 2016; Lerner, 2010; Shane, 2009). In this light, particularly the promotion of start-ups out of unemployment are suspected of producing only marginal businesses that do not have any significant contribution to productivity, innovation, and economic growth. The major concern with start-up subsidies in general is based on an occupational choice model predicting an adverse selection where the subsidy attracts less able individuals to entrepreneurship due to lower opportunity costs and reduced entry barriers (*self-selection view*, see Nanda, 2008; Hvide and Møen, 2007).[1] This might be even more pronounced if the subsidy is specifically targeted towards unemployed individuals who already face more severe restrictions with respect to the availability or access to human, social and financial capital (Agarwal and Shah, 2014; Autio *et al.*, 2014; Caliendo *et al.*, 2015). As a consequence, subsidized start-ups can be expected to underperform from a *business perspective*. This is particularly a concern if subsidized businesses additionally crowd out incumbent firms or regular start-ups due to their temporary artificial cost advantages (see, e.g., Santarelli and Vivarelli, 2007; Meager, 1996). Therefore, the entrepreneurship literature suggests a rethinking of the concept of start-up subsidies for the unemployed due to the high costs involved. For instance, financial resources might be used instead to support innovative start-ups or shaping local innovation systems triggering entrepreneurial activities with high growth potential (Colombelli *et al.*, 2016; Román *et al.*, 2013; Congregado *et al.*, 2010; Lerner, 2010; Santarelli and Vivarelli, 2007).

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[1]The competing *experimentation view* claims that individuals only have incomplete information about their entrepreneurial abilities ex ante and learn about them as they operate their businesses (Jovanovic, 1982; Hombert *et al.*, 2014). The subsidy thus lowers entry barriers for more constrained individuals but does not induce a negative selection.

Albeit this critical view of the entrepreneurship literature on start-up subsidies, many industrialized countries offer financial support to unemployed individuals encouraging them to start their own businesses, and hence to escape unemployment, as part of their active labor market policy (ALMP). The subsidies are expected to remove, reduce or compensate for disadvantages unemployed founders face in human, financial and/or social capital as compared to non-unemployed founders and act as a mechanism to insure them against the risk of low or no income during the initial start-up phase. A large body of empirical evidence shows the effectiveness of start-up subsidies to sustainably integrate formerly unemployed individuals into (self-)employment and improve their earning profiles (see Caliendo, 2016, for an overview). As a consequence, the policy can be considered highly effective on the individual level from an *ALMP perspective*, most likely explaining the intensive use of this policy by many industrialized countries.

While strong evidence exists supporting the ALMP perspective, empirical results for start-up subsidies for the unemployed on the business perspective are very scarce. Using aggregate data on public expenditures on start-up subsidies, Millán *et al.* (2012) and Román *et al.* (2013) show a positive impact on business survival and negative evidence with respect to employment growth among subsidized start-ups out of unemployment. Based on individual data, Andersson and Wadensjö (2007) and Caliendo *et al.* (2015) provide a comparison between subsidized and non-subsidized start-ups out of unemployment. Both studies find opposing results and face severe restrictions limiting the validity of the findings. On the one hand, Andersson and Wadensjö (2007) shows better performance of subsidized start-ups but it remains unclear whether this finding reflects a cream-skimming selection effect. On the other hand, Caliendo *et al.* (2015) provide indeed support for the low-growth hypothesis among subsidized start-ups out of unemployment but has the limitation that the result is likely to be influenced by the subsidy payment itself, which expired only a few months before measurement of the outcomes. Most importantly, neither of these studies was able to look at the innovative behaviour of start-ups out of unemployment in a long-term perspective.

To contribute to this debate and fill this research gap, our paper provides a comparison up to 40 months after business formation between subsidized start-ups out of unemployment and non-subsidized start-ups out of non-unemployment in Germany in terms of various business

outcomes, such as employment growth, business expansion and innovative behavior. Individuals in both groups started their businesses in the first quarter of 2009. The subsidized businesses were started out of unemployment and received the *"Gründungszuschuss,"* which consists of a monthly payment equivalent to the individual's last unemployment benefit plus a lump sum of €300 to cover social security costs for an initial period of 9 months and the possibility to extend the lump-sum payment for another six months. Germany is exceptionally suited for this analysis because policies promoting entrepreneurship among unemployed individuals have a long tradition going back to the introduction of the bridging allowance in 1986 (see Caliendo and Kritikos, 2010, for more details). Furthermore, the scale of such policies in Germany has been considerable, accounting for roughly between 40% and 60% of all full-time start-ups in Germany between 2006 and 2011 (Caliendo *et al.*, 2015).[2] In this sense, our study is also a contribution to the examination of "everyday entrepreneurship" in the spirit of Welter *et al.* (2017). The data set is a longitudinal extension of the data used by Caliendo *et al.* (2015) and contains not only detailed information on an extensive list of start-up characteristics but also includes business performance measures in various dimensions, thus allowing for an in-depth analysis of business development over time.

Based on this data set, we provide evidence on the following aspects: First, we investigate whether initially subsidized businesses can successfully survive and thrive in the market even when the subsidy had expired more than two years earlier. Second, we compare the business performance as reflected by income, job creation, and investment activity between formerly subsidized and regularly founded businesses 40 months after business formation. Third, we are the first to provide evidence on innovative behaviour of subsidized start-ups from unemployment in a long-term perspective and in comparison to regular start-ups. And fourth, we further investigate possible reasons for the persistent gaps in these outcomes between the two groups. We find that 40 months after start-up, formerly subsidized founders lag behind regular businesses in terms of all observed business outcomes. The gap in business survival can entirely be explained by initial differences in observable start-up characteristics (such as personal characteristics, business sector, and start-up capital), while the remaining gaps seem mainly to be driven by restricted access to capital and differences in business strategies and dynamics.

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[2]The importance of the start-up subsidy program in Germany has sharply declined as the result of a restrictive reform at the end of 2011 (see Bellmann *et al.*, 2016, for details).

The remainder of this paper is organized as follows: In Section 2, we provide a theoretical foundation for our empirical analysis. In Section 3, we present the institutional settings of the start-up subsidy, describe the data as well as the estimation sample, and discuss panel attrition. Following that, in the empirical part, we compare the business developments and performances between the two groups (Section 4) before we explore reasons for the revealed differences (Section 5). After that, we summarize our findings and discuss policy implications in Section 6.

2 Theoretical considerations

The aim of this Section is to provide a theoretical foundation for the paper. Therefore, we start with a discussion of start-up subsidies for the unemployed from an ALMP perspective. This includes the presentation of the main idea and reasoning behind such subsidies and also includes a brief summary on their effectiveness with respect to the integration of unemployed job seekers into the labor market. In a second step, we discuss expectations with respect to the development of the subsidized start-ups from a business perspective. We focus on economic considerations of potential mechanisms triggered by such a subsidy (adverse selection or moral hazard), address the key role of starting out of unemployment (knowledge context), and discuss how this potentially affects business development.

2.1 Start-up subsidies from an *ALMP perspective*

The main aim of ALMP is to assist unemployed individuals during job search by removing existing disadvantages in education, work experience or productivity preventing a transition to employment. In this context, a start-up subsidy is a financial support to unemployed job seekers in order to enable them to start their own business and hence escape unemployment. The existence of start-up subsidies for the unemployed relies on the assumption that nascent entrepreneurs among the unemployed face disadvantages compared to regular business founders. Such disadvantages might exist in different dimensions. First, the unemployed are likely to face financial constraints with respect to access to capital compared to the non-unemployed population: They tend to have lower financial means (personally and within family), and are likely

to face severe credit constraints[3] as well as being discriminated by capital markets (see Meager, 1996; Perry, 2006).[4] Second, unemployed individuals might face a knowledge shortage or a depreciation of their start-up specific human and social capital during unemployment (Pfeiffer and Reize, 2000). This particularly includes the lack of experience and knowledge with respect to markets, operations and technology, which are all driving innovation (Agarwal and Shah, 2014; Autio *et al.*, 2014). Moreover, the lack of employment experience also induces disadvantages in terms of business and social networks, i.e., contact to potential customers, business partners, or knowledge spillovers from colleagues (Niefert, 2010). Third, due to imperfect information, unemployed individuals primarily focus on dependent employment and tend to ignore self-employment (Storey, 2003, refers to it as "lack-of-awareness").[5] Finally, start-ups out of unemployment are more likely necessity start-ups. Unemployed individuals decide to become self-employed owing to missing employment alternatives. In this context, Shane (2003) argues that unemployed individuals have less access to information concerning business opportunities and lower opportunity costs, and consequently, they also realize less valuable business ideas, introduce less innovation and hence earn smaller profits.

The start-up subsidy aims at removing such barriers for the unemployed by providing financial assistance. Nascent unemployed entrepreneurs are expected to have fewer resources available – than regular business founders – to prepare the business start-up. The subsidy is expected to compensate for these disadvantages. Moreover, in a recent study Bianchi and Bobba (2013) show that insurance (instead of credit) constraints are mostly binding for nascent entrepreneurs, i.e., the (financial) risk of failure hinders nascent entrepreneurs. In this sense, the subsidy can be considered to act as a mechanism to insure the unemployed against the risk of low or no income during the start-up period, stimulating nascent entrepreneurs among the unemployed to start a business. However, paying a subsidy is also vulnerable to deadweight effects in the sense that it could be exploited by nascent entrepreneurs who would start a business even without the subsidy. Caliendo (2016) summarizes a large number of empirical studies on such schemes in

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[3]General evidence on how credit constraints restrict the start-up rate can be found in Evans and Jovanovic (1989), Holtz-Eakin *et al.* (1994) and Schäfer *et al.* (2011).

[4]For instance, unemployed individuals are more likely to have bad debt records, less wealth and less human capital, thus reducing their probability of receiving credit. Banks tend to screen individuals with respect to their human capital in the sense that it is negatively correlated with credit default risk, which renders individuals with higher human capital more capable and thus better access to credit.

[5]The experience of labor market failure due to job loss reduces individuals self-confidence, making them less likely to consider self-employment as an alternative to dependent employment (Bönte and Jarosch, 2011, show that personality influences the decision to become self-employed).

different countries such as Australia, Finland, France, Germany, New Zealand, Romania, Sweden, the UK and the US (based on Behrenz *et al.*, 2016; Wolff *et al.*, 2016; Caliendo *et al.*, 2016; Caliendo and Künn, 2011; Rodriguez-Planas and Jacob, 2010; Duhautois *et al.*, 2015; O'Leary, 1999, amongst others). While the key principle of the subsidies is very similar across countries, they differ in some institutional settings such as amount, duration, and eligibility criteria and also in the way how success is measured. The most common success measure is the survival rate; others include re-integration of unemployed workers into the labor market, income, the contribution to growth and job creation, and deadweight effects. Most studies focus only on a few dimensions, and most are descriptive rather than causal studies. Overall, the causal studies confirm the effectiveness of start-up subsidies to sustainably integrate formerly unemployed individuals into (self-)employment and improve their earning profiles. Moreover, it has been shown that deadweight effects occur, but at a much lower scale than generally expected (Caliendo and Kritikos, 2010). Hence, in total it can be concluded that start-up subsidies can be considered successful from an ALMP perspective.

2.2 Start-up subisides from a *business perspective*

However, offering a subsidy might trigger some negative externalities such as adverse selection and moral hazard. Adverse selection occurs because the subsidy reduces the costs for entering self-employment, allowing less able individuals to self-select into entrepreneurship. Nanda (2008) and Hvide and Møen (2007) show that reducing liquidity constraints drives adverse selection into entrepreneurship, and Millán *et al.* (2014a) and Millán *et al.* (2014b) show that starting self-employment from unemployment increases the risk of re-entering unemployment. They conclude that subsidies for unemployed job seekers might contribute to an adverse selection problem.[6] In addition to adverse selection, the subsidy payment might induce moral hazard, predicting that individuals reduce their effort during subsidy receipt as they – in contrast to non-subsidized businesses – do not have to take the cost, i.e., the risk of no or low income.[7] The negative externalities can be expected to be even more pronounced if the subsidy is specifically targeted

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[6]In a different context, Román *et al.* (2011) also show how the existence of public policies, i.e. employment protection, might lead to adverse selection into entrepreneurship.

[7]This relies on the existence of asymmetric information, i.e. individuals who apply for the subsidy have more information than the institution that pays the subsidy. Once the subsidy is approved, the institution has no influence on the effort of the applicant. See Paulson *et al.* (2006) as an example for how moral hazard induces financial constraints on start-ups.

towards unemployed individuals who already face more severe restrictions with respect to human, social and financial capital (as discussed above).

In addition, the entrepreneurship literature has recently began to discuss the importance of the "knowledge context", from which start-ups occur, for innovation and growth (see Agarwal and Shah, 2014; Autio *et al.*, 2014). The literature differentiates between employee, academic and user entrepreneurship. Employees can build on knowledge gained from firm environment on technology, markets and operations. This can be turned into innovative entrepreneurship. Academics rely on scientific knowledge to introduce product innovation, and users of existing commercial products exploit their user knowledge to innovate new features or functionalities. In any case, the context from which start-ups are realized plays a key role in determining innovative entrepreneurship and growth. In this regard, it can be argued that unemployed job seekers start, on average, from a weaker knowledge context – in contrast to non-subsidized business start-ups – because they are neither employed nor associated with an academic institution. The weaker context and the resulting lack of knowledge predicts lower innovation and growth trajectories.

Given the potential occurrence of negative externalities (adverse selection, moral hazard) as triggered by the subsidy payment, as well as the disadvantaged starting conditions faced by unemployed individuals (weaker knowledge context), it is likely that subsidized unemployed business founders start marginal businesses that do not have any significant contribution to productivity, innovation, or economic growth (Shane, 2009; Acs *et al.*, 2016).

Empirical support on this hypothesis is very scarce. Using data on EU-15 countries, Millán *et al.* (2012) find that higher national public expenditures on start-up subsidies for unemployed individuals decrease exit rates for self-employed individuals who had entered self-employment from unemployment. They conclude that overall the subsidies might not only increase entry into self-employment but also equalize business survival chances of formerly unemployed and formerly non-unemployed business founders. In a related study, Román *et al.* (2013) find that higher national subsidy expenditures increase transitions from unemployment to solopreneurship but do not affect transitions to new businesses with additional job creation, emphasizing the low growth potentials of subsidized businesses out of unemployment. Both of these studies are based on macro indicators for start-up subsidy expenditures on a national level and thus indirectly also reflect cross-country effects. The empirical evidence based on pure micro data

is even more scarce. Andersson and Wadensjö (2007) find that in Sweden individuals entering entrepreneurship from unemployment with a subsidy perform better than unemployed individuals not receiving the subsidy in terms of income and, to a lesser extent, with respect to hiring employees, conditional on a small set of basic controls. But they perform worse than formerly dependently employed founders. It remains unclear, however, whether this finding reflects the subsidy effect of additional help or a cream-skimming selection effect where case workers approve those candidates for subsidy receipt who display the highest entrepreneurial potential.

There is in principle so far only one study, by Caliendo *et al.* (2015), that directly compares subsidized start-ups out of unemployment with regular start-ups (non-subsidized out of non-unemployment) in various dimensions of success including two objective measures for innovative behaviour. They created a unique data set comprising representative samples of male participants in a German start-up subsidy and male regular founders that allows for a comprehensive and in-depth comparison. The empirical findings support the theoretical arguments above, i.e., subsidized businesses lag behind in business growth and innovation 19 months after business formation. However, the results have to be interpreted with caution as they are likely still influenced by the subsidy itself, which expired only a few months before the survey. Therefore, the question remains as to whether the initial differences in business outcomes compared to regular founders persist (or even grow), or whether subsidized businesses can catch up in the medium- and long-run. On the one hand, it can be argued that the initial disadvantages for subsidized business founders result in lower initial innovation and growth intentions and appropriate business strategies, which negatively affect long-term business outcomes, leading to persisting or widening gaps. On the other hand, it might be the case that *surviving* subsidized businesses catch up once the subsidy has fully expired and all businesses were equally exposed to full market mechanisms.

3 Institutional details and data

3.1 Institutional details

The subsidized founders in our sample received the *"Gründungszuschuss"* (start-up subsidy, SUS), which was initially introduced in August 2006 in Germany.[8] In order to be eligible for the sub-

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[8]This program replaced its two predecessor programs that essentially differed in terms of subsidy length and amount (see Caliendo and Kritikos, 2010; Caliendo *et al.*, 2012, for a description).

sidy, unemployed individuals had to have a minimum entitlement to *unemployment benefit I*[9] of at least 90 days at the time of program entry. Moreover, individuals applying for the SUS had to provide a business and financing plan to the Employment Agency that also had to be evaluated by a competent external institution.

If all requirements were fulfilled, SUS was paid for a maximum duration of 15 months, with the subsidy comprising of two parts: During the first nine months after business start-up, an amount equivalent to the individual's last unemployment benefit and a lump sum of €300 to cover social security costs was paid monthly.[10] After nine months, individuals could apply for an optional second period to receive the lump sum of €300 for another six months. While the first period of SUS could be legally claimed by all individuals who fulfilled all legal requirements, the founders had to apply for the second period by showing that their businesses are sufficiently economically active and having a sustainable plan for the following months. Therefore, founders had to submit formal proofs such as business reports including financial statements for the first six months, a detailed description of business activities and customer structure, and a preview on future profitability. The final assessment and decision was taken by the caseworker based on the submitted documents as well as contrasting the actual business development within the first six months with the initial business and financing plan (as submitted with the initial application for the subsidy).[11] Finally, it should be mentioned that subsidized start-ups out of unemployment constituted a large share of about 40% to 60% of all full-time start-ups in Germany between 2006 and 2011 (depending on the underlying data source, see Caliendo *et al.*, 2015).[12]

3.2 Data creation and estimation sample

The data set we use is a longitudinal extension of a telephone survey which was initially collected by Caliendo *et al.* (2015). They created a unique data set that allows a comprehensive and in-

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[9]In Germany, every individual who has been in employment subject to social security for at least one out of the last three years is eligible for unemployment benefit I. The amount of the benefit consists of 60% (67% with children) for the last net wage and is basically paid for a maximum period of 12 months, with the exception of older individuals (see Caliendo and Hogenacker, 2012).

[10]Without program participation, the individuals would lose their unemployment benefit entitlement given that they start their own business and hence work full-time. The subsidy receipt was offset against the remaining unemployment benefit I entitlement, however.

[11]We find that 61.7% of the subsidized business founders in our sample received the subsidy for 15 months. Out of those without subsidy prolongation, 9% reported that the application was rejected, 33% did not apply because the monthly amount of 300 Euro was not worth the administrative burden associated with the application process, 18% did not know about the prolongation and 40% reported other reasons.

[12]Meanwhile, a major restrictive reform of the SUS at the end of 2011 has reduced SUS entry numbers substantially (see Bellmann *et al.*, 2016, for details).

depth comparison between subsidized start-ups out of unemployment and non-subsidized start-ups out of non-unemployment. Based on different data sources, they drew representative random samples of subsidized and non-subsidized founders who started a full-time business in the first quarter of 2009 in Germany. The cohort of subsidized founders consists of initially unemployed individuals who received the start-up subsidy from the Federal Employment Agency, while non-subsidized start-ups consist of founders who were not unemployed directly prior to start-up and consequently did not receive the subsidy (see Caliendo *et al.*, 2015, for details on data construction).

[Insert Figure 1 about here]

The selected business founders were initially surveyed around 19 months after start-up (wave 1) on an extensive list of start-up characteristics, socio-demographics, previous labor market experiences, intergenerational transmissions, as well as their labor market status and, conditional on the ongoing business activity of their initial start-up from the first quarter in 2009, their business performance across various dimensions. Restricting the analysis to male founders, 1,478 (930) valid interviews could be completed with subsidized (regular) founders, see Figure 1. Based on this sample, Caliendo *et al.* (2015) show that subsidized founders significantly lag behind regular founders in terms of income, business growth, and innovation. We now have access to a second interview wave with the same individuals that extends the observation window to 40 months after start-up (wave 2). This allows us to analyze the persistence of initial differences in business outcomes between the subsidized and non-subsidized male founders up until 3.5 years after business formation. Figure 1 shows that we have 827 (453) panel observations on subsidized (regular) founders available in wave 2.

3.3 Examination of selective panel attrition

As in many other surveys, we find a positive panel selection (see Table B.1 in the Supplementary Appendix for details): Respondents participating in both interview waves (panel sample) are on average older, have a higher educational and professional background, had higher earnings in the past, and experienced less lifetime unemployment compared to the full sample in wave 1. More importantly, the panel attrition also induces a weak selective bias in our outcome variables. Table B.2 in the Supplementary Appendix shows a raw comparison of the outcome variables

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between the full and the panel sample for each subgroup of founders. It can be seen that wave 2 respondents are on average more likely to be self-employed and report higher earnings in wave 1 than the full sample.

Although only the difference in unemployment shares for regular founders is statistically significant, we nevertheless decided to precautionally use a weighting procedure in order to correct for selective panel attrition for two reasons: First, the low numbers of observations might reduce the power of these significance tests and lead us – incorrectly – not to reject the absence of significantly selective panel attrition. And second, while the estimated gaps in the empirical analysis are not sensitive to the weighting procedure, it nonetheless removes the small positive biases in the *absolute levels* of business outcomes and ensures their representativeness for the underlying populations. As the chosen correction procedure, we implement inverse probability weighting (see Wooldridge, 2002).[13] The weighting procedure removes almost all statistically significant differences in observable characteristics (see Table B.1) and reduces the differences in means for the outcome variables even further (see Table B.2). Therefore, the empirical analysis will rely on the weighted outcome variables.

4 Empirical results

In order to analyze whether formerly subsidized businesses still lag behind regular businesses, we compare their performances up to 40 months after start-up, i.e., more than two years after the subsidy has expired. In the following empirical analysis, we start with a descriptive comparison of business survival between formerly subsidized and regular founders (Section 4.1). After that, we restrict our analysis to founders who are still self-employed and actively operating the same business that was created in the first quarter of 2009 and compare the business performance between the two groups over time (Section 4.2).

4.1 Comparison of business survival and labor market status

We measure business survival at the time of the interview by creating a dummy variable which is equal to one if the individual's main employment activity is self-employment with the same business started in the first quarter of 2009, and zero otherwise.[14] Table 1 also reports the share

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[13]A detailed description of the weighting procedure is included in the Supplementary Appendix.

[14]We restrict the sample to founders operating the same business as at start-up because we are interested in the survival and business development of the initially subsidized businesses. Furthermore, detailed business outcomes

of initial founders who report their main activity to be dependent employment or unemployment at the time of interview.

[Insert Table 1 about here]

It can be seen that the survival rate significantly decreases for formerly subsidized founders from 79.7% in wave 1 to 71.1% in wave 2, while the share for regular founders increases over time from 71.7% to 77.9%.[15] These diverging developments result in a significant negative gap of 6.8%-points for subsidized founders compared to regular founders 40 months after start-up.

On the one hand, the decline in self-employment share for formerly subsidized founders might indicate that the subsidy artificially increased the survival rate of subsidized founders in wave 1, while in wave 2 market competition sorted out less profitable businesses in line with the survival-of-the-fittest mechanism (Fritsch and Schroeter, 2011). On the other hand, the share of necessity start-ups is generally more pronounced among formerly unemployed founders (Caliendo *et al.*, 2017, 2015), which might result in a substantial share of formerly subsidized founders preferring dependent employment over self-employment in the medium and long run. Taking a closer look at the shares of founders in dependent employment and unemployment reveals that in wave 2 close to 20% of formerly subsidized founders are dependently employed, while the unemployment share is relatively low at 3.3%.

In contrast, the slight increase in the survival rate of regular founders can be explained by individuals who temporarily ran their businesses only part-time in wave 1 (predominately due to parallel higher education) and return to their businesses as the main activity in wave 2. In fact, this is true for 11.2% of regular founders. Since 5% of self-employed regular founders from wave 1 quit their businesses as the main activity by wave 2, this results in a net increase in business survival of 6.2%-points, as reported in Table 1. The share of dependently employed (unemployed), at 13.2% (1.2%), is significantly lower than for subsidized founders.

Taken together, while labor market integration is comparable between the two groups, the descriptive shares indicate a lower business survival among formerly subsidized business founders

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are only observed for the original start-up cohort of businesses created in the first quarter of 2009. Restricting it to self-employment as main activity excludes businesses which are run only as secondary or part-time activities, e.g., in addition to another full-time job or attending university.

[15]Colombelli *et al.* (2016) report survival rates of business start-ups below 50% within the first five years. Bartelsmann *et al.* (2005) find for OECD countries that 20-40% fail within the first two years. Therefore, the survival rates in our sample are significantly higher, which can be explained (in part) by the construction of our sample, i.e., we consider only start-ups in full-time by male founders.

compared to regular founders 40 months after start-up.

4.2 Comparison of business performance and innovation activities

To assess the business performance, we restrict our sample to founders who are still self-employed and actively operating the same business as at start-up in the first quarter of 2009 at each interview. We consider four different sets of variables: (i) income, (ii) job creation, (iii) degree of innovation as outcome variables, and (iv) access to capital as an intermediate business indicator. Income is measured as monthly and as hourly net earned income from self-employment (in euros, inflation-adjusted to 2010 levels following the Federal Statistical Office, 2014). With respect to job creation, we consider both the extensive and intensive margin, i.e., the share of businesses with at least one employee as well as the number of full-time equivalent employees, both unconditionally and conditional on having at least one employee. The number of full-time equivalent employees is a weighted sum where full-time employees are assigned a weight of 1, part-time employees and apprentices are weighted by 0.5, and others by 0.25. Within the entrepreneurship literature, the degree of innovation is usually measured by patents (Coad and Rao, 2008; Griliches, 1990) or subjective perceptions of entrepreneurs on innovational activities (Colombelli *et al.*, 2016; Pellegrino *et al.*, 2012; Cefis and Marsili, 2006). While patents can be considered to be more objective, they are at the same also more narrow because not all innovations are patented (Moser, 2016; Hall *et al.*, 2001), leading potentially to an underestimation of the true degree of innovation. In contrast, subjective perceptions are much broader, but also face the risk to suffer measurement error. In our study, we have indicators for both objective and subjective measures available. As objective indicators, we observe the share of founders who filed at least one patent application or an application to protect corporate identity since start-up. The subjective measure is based on the question whether businesses generate new ideas, questioning existing processes. Finally, access to capital is reflected by the share of founders who have received a loan since start-up and the share of founders whose access to capital was constrained in that they wanted to borrow but did not receive a loan.[16]

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[16]As a limitation, we neither observe the total amount of the loan nor whether individuals who did not receive a loan but wanted to borrow actually applied for a loan.

4.2.1 Business performance

Focussing on business performance indicators, Figure 2 shows the results of a comparison of formerly subsidized and regular businesses with respect to income, job creation and access to capital measured at wave 1 (19 months after start-up) and wave 2 (40 months after start-up). The dark bars represent the average outcome of formerly subsidized founders, while the light bars depict the gaps to regular founders for a given point in time. The dashed lines connecting the bars between waves illustrate the intragroup development over time. Significant gaps between groups and significant changes over time are indicated by stars attached to the reported differences.

[Insert Figure 2 about here]

Income The development of the earnings profiles of subsidized founders in Figures 2a and 2b shows a significant increase over time in both monthly net income (from €2,400 to €2,800)[17] and hourly net earnings (from €11.7 to €14.4), which might be explained by market selection as well as increased productivity or profitability. In comparison, monthly earned net income for regular founders stagnates over time, yet on a significantly higher level around €3,100. In sum, this results in a reduced monthly income gap between both groups (from €700 to about €230). However, while monthly incomes are converging, the gap in hourly earnings grew from €4.10 in wave 1 to €6.60 in wave 2, indicating an increasing disparity with respect to productivity or profitability between the two groups.

Job creation Figures 2c, 2d and 2e report significantly increasing numbers for job creation among formerly subsidized and regular businesses on both the extensive as well as intensive margin over time. While the majority of formerly subsidized businesses still operate as solopreneurs in wave 2, 45% of this group employ on average 3.3 full-time equivalent employees (FTE), a significant increase on both margins compared to wave 1 by 10%-points and 0.4 FTE, respectively. Overall, this represents a significant increase in the average number of FTE from 1.0 in wave 1 to 1.4 per operating business by the end of our observation window. Combining these

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[17]To set these figures in perspective, the German Federal Statistical Office (2012, p. 106) reports average monthly gross earnings of €2,976 for a male full-time worker in dependent employment in Germany in the third quarter of 2012 (when income measures 40 months after start-up were surveyed). Applying a net-to-gross ratio of 70%, assuming a three-person household (married couple, one child) with one breadwinner and residence in West Germany (Federal Statistical Office, 2013, p. 10) and adjusting for inflation to 2010 levels, this translates into net monthly earnings of €2,001.

job creation numbers with the self-employment shares in each wave (see Table 1 again) yields the direct employment effects per subsidy granted, irrespective of business survival. On top of helping the founder to start a business and thus providing him with an employment opportunity, each subsidy in the initial start-up cohort results on average in an *additional* 0.8 FTE (0.797 × 1.0 FTE) after 19 months and in *additional* 1.0 FTE (0.711 × 1.4 FTE) after 40 months. This indicates a substantial "double dividend" of the subsidy.

In contrast, only one third of regular business founders are solopreneurs in wave 2 and the remaining businesses employ seven FTE on average. In total, the group differences between formerly subsidized and regular businesses on all job creation indicators in both waves are statistically significant. While there is some minor catching up on the extensive margin by wave 2, the employer rate is still 50% (or 22%-points in absolute terms) higher among regular founders. Furthermore, the gaps on the intensive margin are highly persistent and even widening over time. Among all employer businesses, the average number of FTE for regular founders is 7.2, more than twice as high compared to 3.3 for formerly subsidized businesses.[18] Compared to subsidized founders, the additional direct employment effects among regular businesses are higher and on average amount to 2.7 FTE (0.717 × 3.7 FTE) after 19 months and 3.7 FTE (0.779 × 4.8 FTE) after 40 months per newly founded business of the initial start-up cohort.

Capital constraints   As an additional intermediate business indicator, we investigate access to capital as a critical factor for business development and growth (Aghion *et al.*, 2007; Wiklund and Shepherd, 2003; Pissarides, 1999). Figure 2f shows that the (cumulative) share of formerly subsidized founders who have successfully received a loan since start-up increased from 21% in wave 1 to 29% in wave 2. The shares are 15%-points lower compared to regular founders in both waves. It is not directly clear, however, whether these gaps in take-up rates reflect differential access to capital or merely differences in the demand for capital. This is why Figure 2g reports the share of founders whose access to credit was constrained in the sense that they wanted to borrow but did not receive a loan. Credit constraints affect 13% of formerly subsidized founders in wave 1 and 16% in wave 2. For regular founders, the numbers decrease over time from 12% to

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[18]Based on the German Microcensus, an annual representative 1% survey of the German population, Petermann and Piorkowsky (2013, pp. 15, 177) find that in 2009 (parallel to the business start-ups in our sample), 72.2% of male business founders in main activity started as solopreneurs, while in 2012 (parallel to wave 2) 52.4% of all men with self-employment as their main activity have at least one employee.

11%, which represents a significant gap of 5%-points compared to formerly subsidized founders at the end of our observation window. This evidence is in line with unemployed founders facing more severe barriers to access loans (see, e.g., Perry, 2006). Taking both shares from Figures 2f and 2g together as a crude measure for total loan demand (satisfied and unsatisfied), we nevertheless find higher prevalence among regular founders by about 14%-points in wave 1 and 10%-points in wave 2. This result might also reflect less capital intensive business opportunities and lower growth oriented ambitions and strategies of formerly subsidized businesses.

4.2.2 Innovation activities

Figure 3 shows the results with respect to innovation activities. While information on patenting and protection of corporate identity is measured in wave 1 (19 months after start-up) and wave 2 (40 months after start-up), the subjective measure (development of new ideas) is only available in wave 2.

[Insert Figure 3 about here]

Figures 3a and 3b show that both types of business founders are increasingly involved in innovation over time. The application rates for patents as a common measure for innovative activity reaches 2.2% for formerly subsidized businesses, but is more than twice as high for regular businesses (5.9%) in wave 2.[19] As an alternative objective innovation indicator, we also analyze the shares of businesses that apply for protection of their corporate ID. We find a similar pattern as for patents, i.e., the rates are increasing over time but on a higher level. The rates are 9.1% for formerly subsidized businesses and 15.5% for regular ones. Regarding the subjective indicator, Figure 3c shows that 37.6% of subsidized businesses reporting development of new ideas in wave 2, which is 6.7%-points less than for the group of regular businesses. As expected and discussed above, measuring innovation based on patents (Figure 3a) leads to a much lower number compared to the subjective measure (Figure 3c). This is in line with other studies reporting 30-40% using subjective perceptions to measure innovation (see Colombelli *et al.*, 2016; Pellegrino *et al.*, 2012). However, independent of the absolute degree of innovation, the key finding

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[19]For comparison, Niefert (2005), using data from the ZEW Foundation Panel (Almus *et al.*, 2000), finds that 3.2% of a sample of German start-ups founded in the early 1990s applied for at least one patent by 1999/2000. However, these numbers are not conditional on survival and therefore underestimate patent applications for survivors. Engel and Keilbach (2007) report, based on a sample of 21,517 German businesses founded between 1995-1998 originating from the same data source, that at the time of business formation, 2.2% of all start-ups applied for at least one patent.

here is that formerly subsidized founders persistently lag behind in innovative activities. This is in line with the theoretical expectations in Section 2. Due to negative externalities induced by the subsidy and disadvantaged starting conditions (in particular with respect to knowledge context), subsidized businesses out of unemployment are expected to induce less innovation than non-subsidized business start-ups out of non-unemployment.

All in all, we can conclude that formerly subsidized businesses indeed grow and become more innovative over time. Compared to regular businesses, however, they still significantly lag behind 40 months after start-up, with decreasing differences in monthly incomes but persistently remaining or even growing gaps with respect to productivity, job creation, investments and innovation.

5 What explains the differences?

We now want to explore possible explanations for this finding. As discussed in the introduction, the groups of subsidized and regular founders differ in their individual and business-related start-up characteristics for several reasons. Besides the fact that the subsidy might induce an adverse selection, starting a business out of unemployment by itself might also lead to more severe disadvantages and restrictions compared to regular founders (see Section 2). This suggests that unemployed individuals who enter entrepreneurship might have lower human capital and entrepreneurial abilities and set up smaller businesses with less growth potential due to more restrictive access to resources like social networks or capital, less time to explore business opportunities and strategies, or lower growth ambitions. Caliendo *et al.* (2015) indeed find evidence indicating initial differences in observable characteristics at the time of business formation, showing that subsidized founders suffer from a shortage of employment- and industry-specific experience, more severe capital constraints, and fewer spillovers from intergenerational transmissions than regular founders.

Using the panel data, in a first step, we now look at whether these differences remain for the surviving businesses over time or whether the two groups converged once the subsidy has fully expired and both groups were equally exposed to full market mechanisms. Although one could assume that the surviving businesses in wave 2 are more similar in their characteristics

than the two full initial start-up cohorts, we will see in Section 5.1 that this is not the case, and significant differences in observable characteristics remain. Hence, in a subsequent step, we analyze in Section 5.2 to what extent these differences can explain the gap in business survival and business development.

5.1 Comparison of observable start-up characteristics

Table 2 shows a comparison of some selected observable characteristics at business formation for the start-up cohort in the first quarter of 2009 (columns 1 and 2) and for all self-employed individuals with the same business as at start-up in wave 2 (columns 3 and 4).[20] While subsidized founders at start-up do not lag behind in formal education, they show less intergenerational transmissions in terms of parental self-employment and business takeover from their parents, have lower employment experiences, operate under less favorable local market conditions and have less industry-specific experience and capital. In contrast to the general expectations that subsidized founders out of unemployment are primarily driven by necessity and regular founders by opportunity motives, we find that the opportunity motive – the desire to be one's own boss – is the dominating motive in both groups (38% and 41% for subsidized and regular founders respectively). However, we also see that higher shares of subsidized founders (23%) report a classical necessity motive – the unavailability of regular employment – compared to regular founders (10%). As reported in columns 3 and 4, initial differences, to a large degree, have not vanished once we restrict the comparison to formerly subsidized and regular founders who remain active with the same business up until wave 2. It can be seen that the distribution of observable characteristics changes slightly for both groups, reflecting the selection of surviving businesses over time. There is no clear pattern of the selection mechanism, though. While the two groups become more similar, e.g., with respect to nationality, university education, or sector choice, the differences between the groups get even more pronounced over time in other characteristics like parental self-employment, unemployment or industry-specific experience. Overall, the differences between the groups remain significant and substantial, in particular with respect to intergenerational transmissions, lifetime unemployment, start-up motives, industry-specific experience, and start-up capital.

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[20]The full list of observable characteristics at business formation is reported in Table A.1 in the Supplementary Appendix.

5.2 Decomposition analysis

Given that these differences still exist 40 months after start-up, the question arises as to what extent the structural differences in observable characteristics at start-up explain the gap in business development. To shed light on this question, we conduct a Blinder-Oaxaca decomposition analysis (Blinder, 1973; Oaxaca, 1973) and decompose the raw gaps in business performance Δ^{Raw} into an explained part due to differences in initial characteristics and an unexplained part:[21]

$$
\begin{aligned}
\Delta^{Raw} &= \overline{Y}_{Sub} - \overline{Y}_{Reg} = \overline{F(\beta_{sub}X_{i,sub})} - \overline{F(\beta_{reg}X_{i,reg})} \\
&= \underbrace{\{\overline{F(\beta_{sub}X_{i,sub})} - \overline{F(\beta_{sub}X_{i,reg})}\}}_{Explained} + \underbrace{\{\overline{F(\beta_{sub}X_{i,reg})} - \overline{F(\beta_{reg}X_{i,reg})}\}}_{Unexplained} \quad (1)
\end{aligned}
$$

More specifically, we arrange the full list of 70 observable characteristics at business formation into seven blocks of related variables on personal characteristics, human capital, intergenerational transmissions, labor market history, regional information, start-up motives, as well as business characteristics (further divided into business sector, industry-specific experience, and start capital for more detailed insight) and control for the blocks individually and jointly (X_i). Our two main outcome variables of interest are business survival and whether the business has created any employment.[22] Since both outcomes are binary, we choose a probit approach, setting $F(\cdot) = \Phi(\cdot)$, and use maximum likelihood for estimation.[23] Results are reported in Table 3.

[Insert Table 3 about here]

Start-up characteristics Panel A in Table 3 shows that, unconditionally, formerly subsidized founders have a negative raw gap in business survival of 6.8%-points in wave 2 compared to regular founders (as already reported in Table 1). Controlling for each of the covariate blocks reported in Panel C individually (specifications 1 to 7) reveals that this gap is mainly explained

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[21] For details on the implementation of the decomposition analysis, see Table A.2 in the Supplementary Appendix.

[22] In addition, we report the results of the decomposition analysis for the gaps in hourly income and number of full-time employees in Table A.3 in the Supplementary Appendix. The findings are very similar to those for the two main outcomes. Regarding innovation-related outcome variables, we cannot run the detailed decomposition analysis due to too small sample size. The information on innovation is only available for 50% of the sample, and only a small fraction reports such activities at all.

[23] Estimations are conducted in Stata using the *nldecompose*-package (Sinning *et al.*, 2008).

by differences in intergenerational transmissions (accounting for 53% of the survival gap, spec. 3) and labor market histories (104%, spec. 4).[24] Start-up motives (31%, spec. 6) and business sector choice (28%, spec. 7a) are also important, but to a lesser extent. Once we condition on all start-up characteristics available (spec. 8), the unexplained gap in business survival virtually vanishes, becomes positive but close to zero and insignificant.

Panel B repeats the exercises for the dummy variable indicating at least one employee in wave 2. This time, the control variables only explain a small fraction of the raw gap, with inter-generational transmissions (14%, spec. 3), start-up motives (12%, spec. 6) and business-related characteristics (22%, spec. 7) having the highest but, in absolute terms, very low explanatory power. The full list of variables reduces the unexplained performance gap by only 15% (spec. 8). This implies that the differences in job creation are driven by other factors that are not sufficiently captured by our list of available start-up characteristics.

As an interesting side note, if we conduct a decomposition analysis for the employment dummy in wave 1 (see Table A.4 in the Supplementary Appendix), start-up characteristics explain almost 50% of the employment gaps in wave 1, with start-up capital (25%), intergenerational transmissions (22%), and start-up motives (11%) providing the highest explanatory contributions. Thus, while start-up characteristics are strong determinants of short-term business performance, business growth in the longer run instead seems to be more affected by other factors.

Business strategies and dynamics To test alternative explanations for the gaps in employment growth in wave 2, we extend the list of control variables X_i in the decomposition analysis by adding factors that capture business strategies and dynamics. In a first step, we include two indicators on access to capital. As already reported in Section 4.2, while formerly subsidized founders have lower demand for capital and face more severe credit constraints than regular founders, access to capital is a crucial factor for business growth (Aghion *et al.*, 2007; Wiklund and Shepherd, 2003). In a second step, we aim to consider unobserved factors that can be summarized into two groups. On the one hand, there are unobserved variables at start-up that reflect the fundamental business strategy and access to innovation-specific knowledge,

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[24]An explained share of more than 100% indicates that the inclusion of the control variables changes the initially negative unconditional gap to a positive conditional gap. A negative explained share means that the control variables *increase* the absolute amount of the initial gap.

like the founder's intention, opportunity and ability to innovate and grow at business formation (see Section 2 for a discussion why we expect differences in this regard between subsidized and regular start-ups). On the other hand, there are business dynamics after start-up, where founders implement their initial strategies and adapt their decisions as a reaction to challenges and changes in their business environment. Since these variables are unobserved in our data, we instead include the intermediate wave 1 outcome on employment as a proxy variable. It can be seen as the *result* of all observable and unobservable factors in the early business phase up until wave 1 and thus should best incorporate the unobserved initial business strategies as well as early business dynamics that we do not capture in our previous analysis. Results are reported in Table 4.

[Insert Table 4 about here]

To recap our baseline results from above, the raw employment gap in wave 2 amounts to 22%-points (first column of Table 4), and only 15% (or 3%-points) of the gap can be explained once we control for all available start-up characteristics (spec. 8), as already reported in Table 3. If we additionally include the two indicators on access to capital (spec. 9), the explained part almost doubles to 28%, once again emphasizing the important role for business growth. Taken together with the results above, we thus find that while start-up capital explains a substantial part of short term growth, access to capital is increasingly important for business growth in the longer term.

Controlling for the wave 1 outcome as a proxy for initial business strategies and early business dynamics along with all available start-up characteristics (spec. 10) increases the explained share to more than 53%. The specification including all start-up characteristics, access to capital indicators as well as the wave 1 outcome (spec. 11) explains more than 60% of the employment gap in wave 2 between formerly subsidized founders and regular founders.

In summary, the decomposition analysis shows that differences in business survival disappear entirely once we control for the (observable) structural differences between the types of businesses and founder characteristics at start-up. Yet, only the short-run gap in job creation can be explained by initial endowment differences to a larger extent (49%). The long-run gap in business growth paths rather seems to be driven by unobserved factors like initial business strategies, differential access to capital, and post-start-up business dynamics.

6 Conclusion and policy implications

Policies encouraging and supporting unemployed individuals to start a business have become common instruments of ALMP in many developed countries. But despite this recent growth in popularity, they are increasingly becoming subject to criticism. From an *active labor market policy perspective*, start-up subsidies for unemployed individuals are very effective in improving long-term labor market outcomes for participants. From a *business perspective*, however, the assessment of these public programs is less clear and hard evidence is largely missing. Our paper provides first evidence on the longer term business *and* innovation potential of start-ups from unemployment. Although our results are generated based on Germany, it is likely that they also apply to other industrialized countries given the high similarity in terms of institutional settings of start-up subsidy programs for unemployed job seekers (see Caliendo, 2016). We therefore contribute to the ongoing critical debate about the benefits and concerns related to this type of public policy (Colombelli *et al.*, 2016; Lerner, 2010; Shane, 2009; Acs *et al.*, 2016).

The analysis is based on an extension of the dataset used in Caliendo *et al.* (2015) containing representative samples of businesses emerging from a German start-up subsidy program targeted at unemployed individuals and regular businesses that were started out of non-unemployment and did not receive the subsidy. A follow-up survey allows us a comparison up until 40 months after business formation and permits an in-depth assessment of the development, growth and innovation potential of subsidized start-ups (in comparison to regular start-ups).

In sum, we find that the subsidy attracts individuals who face more severe restrictions with respect to the availability of or access to human, social, and financial capital. These individuals also display lower ambitions, intentions, strategies, or capabilities for growth and innovation. Consequently, while survival rates are relatively high, initially subsidized founders persistently perform worse than regular founders from a *business perspective*, especially in terms of job creation and innovation activity. For instance, only 2.2% (9.1%) of formerly subsidized businesses filed a patent application (applied for protection of their corporate ID) within a time period of 40 months after start-up, compared to 5.9% (15.5%) among the regular business founders. Considering a more subjective assessment of innovation, 37.6% of formerly subsidized business owners and 44.3% of regular businesses report development of new ideas. The gaps are relatively constant or even widening over time. Hence, we do not see any indication of catching up in

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the longer run. Within the sample of founders who are still actively operating their businesses in wave 2, market selection did not lead to a substantial convergence of (observable) start-up characteristics between the two groups. While these differences can entirely explain the gap in business survival, they do not represent the major empirical reason for the shortcomings in business growth and innovation. Exploring this point further, we find suggestive evidence that particularly a restricted access to capital as well as fundamentally different business strategies and early business dynamics explain a large part of the persistent gap in business innovation and growth.

These findings are in stark contrast to the robust empirical evidence from an *ALMP perspective* showing that unemployed individuals are much better off participating than not participating in start-up subsidy programs (see Wolff *et al.*, 2016; Caliendo *et al.*, 2016; Caliendo and Künn, 2011, among others). Therefore, from a policy standpoint, start-up subsidies are seen as a highly effective tool to persistently reintegrate formerly unemployed individuals into the labor market and improve their income situations. On average, the program costs amount to €4,900 per participant,[25] which is relatively low compared to other major ALMP programs (e.g., €8,200 for public employment schemes and €4,150 for wage subsidies in 2009), and in particular, given the additional job creation of 1.0 FTE per participant after 40 months (as calculated above).

Considering these conflicting results for the assessment of the subsidy program, policy makers need to carefully weigh the costs and benefits of such an ALMP strategy to find the right policy mix. While these programs are highly effective in sustainably improving individual labor market prospects and stimulate some additional job creation, they fall short of succeeding as an entrepreneurship policy in that they do not spur the creation of high-growth or innovative new businesses, and the magnitude of additional job growth is rather limited. Direct changes to the subsidy program are likely to cause trade-off effects between effectiveness as an *active labor market policy* and as a *business policy*. For instance, to improve the average performance of subsidized businesses, acceptance into the subsidy program could be combined with better screening or more restrictive selection on certain (observable) founder and start-up characteristics to iden-

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[25]The subsidy consisted of an amount equivalent to the previous unemployment benefit averaging €1,093 and a lump sum of €300 paid for nine months and an optional six month lump sum payment extension of which 61.7% benefited, yielding average total costs of €13,650 (calculation is based on results in Caliendo *et al.*, 2016). Taking into account that the subsidy receipt was offset against the remaining unemployment benefit entitlement of on average 8 months, the "net" costs thus drop to €4,900.

tify and approve only the most promising business proposals. One downside of this approach is that while observable start-up characteristics entirely explain the survival gaps, they contribute little to the explanation of the shortcomings in business growth. Thus further investigations and a careful implementation would be necessary. Furthermore, this approach would likely result in higher rejection rates of those unemployed nascent entrepreneurs who need the subsidy the most, and thus it would likely yield increasing deadweight effects. Also, this approach implies lower access to the subsidy for disadvantaged individuals with less favorable characteristics, who, in turn, derive the highest labor market benefits from participation (Caliendo and Künn, 2011).

To spur job creation, economic growth, and innovation nascent founders and in particular unemployed nascent founders might need additional encouragement and advice during the pre or early start-up phase to improve and mature their business idea and plan for and factor in future business growth. In this sense, additional soft support measures like coaching, counseling, mentoring, or training (accompanying the subsidy) during the pre or early start-up phase might improve business potential and long-term development (see, e.g., Rotger *et al.*, 2012; Wren and Storey, 2002). An additional issue that might hinder business growth for formerly unemployed subsidized founders seems to be higher restrictions to access capital. Since we cannot clearly identify whether they are mainly supply- or demand-driven, further research to investigate this topic more closely is necessary.

On a final note, it should also be kept in mind that in micro level studies on an individual ALMP or business perspective, general equilibrium effects such as displacement or crowding out usually cannot be taken into account. Although evidence on these effects would be highly informative for policy makers as well, empirical analyses on the macro effects of start-up subsidy programs on aggregated (un)employment and growth are very rare due to severe data limitations. Nevertheless, potential displacement effects of any business support measure should also always be carefully considered in this context.

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Tables and Figures

Figure 1: Data generation and sample restrictions
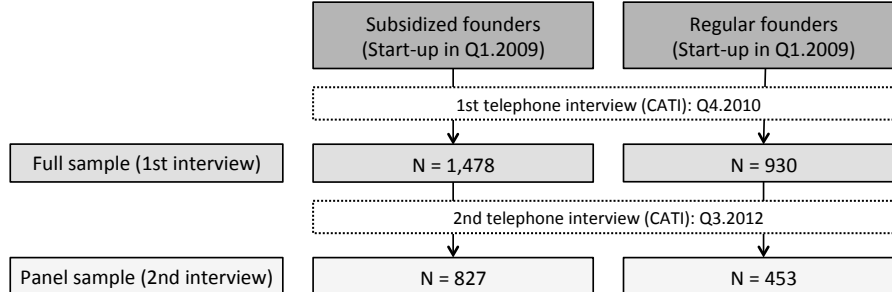
Table 1: Main labor market status

	Subsidized founders			Regular founders			Comp.: Sub. v. reg.	
	Wave 1	Wave 2	Change	Wave 1	Wave 2	Change	Wave 1	Wave 2
	(1)	(2)	(1) v. (2)	(3)	(4)	(3) v. (4)	(1) v. (3)	(2) v. (4)
Self-employed with								
same business[a]	0.797	0.711	-0.086***	0.717	0.779	0.062***	0.079***	-0.068***
Dep. employed	0.122	0.196	0.073***	0.104	0.132	0.027**	0.018	0.064***
Unemployed[b]	0.051	0.033	-0.018*	0.012	0.012	-0.000	0.038***	0.021***
Number of obs.	827	827		453	453		1,280	1,280

Note: Reported are shares for subsidized business founders (out of unemployment) and regular business founders (i.e., non-subsidized out of non-unemployment). Positive (negative) intergroup differences indicate a higher (lower) value among subsidized founders. Wave 1 (wave 2) values are measured 19 (40) months after start-up. Missing categories not reported here are marginal employment, higher education/vocational training, and other main activity. Outcomes are weighted for panel attrition. ***/**/* indicates significant difference at the 1/5/10% level.
[a] Self-employed with same business as at start-up.
[b] Unemployed or participation in active labor market program (ALMP).

Figure 2: Business development over time

a. Monthly earned
net income[a]

b. Hourly earned
net income[a]

c. At least
one employee

d. Unconditionally

e. Conditional on FTE>0

Full-time equivalent employees[b]

f. Loan received

g. Constrained[c]

Access to capital since start-up

Subsidized founders | Gap to regular founders
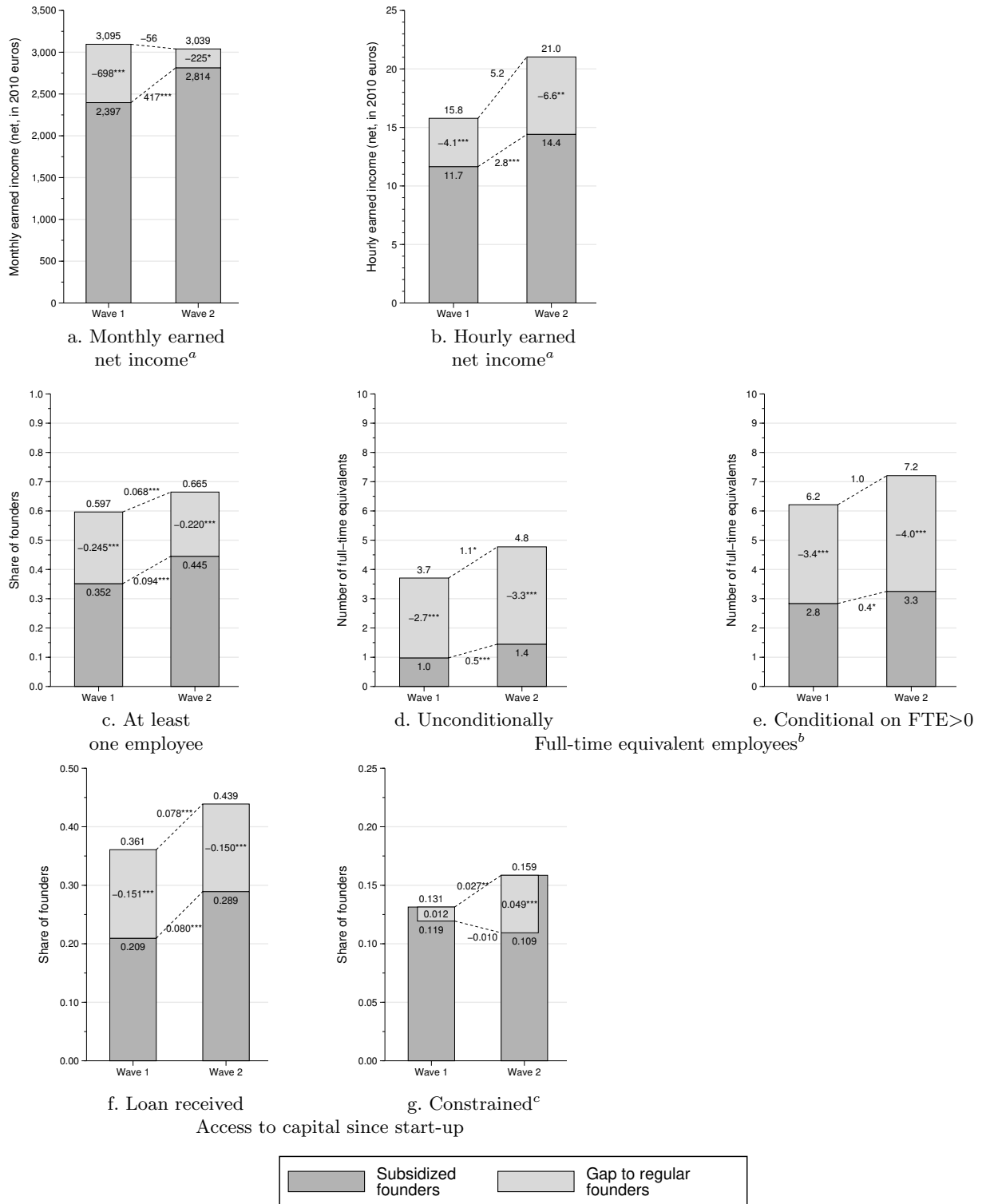
Note: Reported are shares and averages for subsidized business founders (out of unemployment) and regular business founders (i.e., non-subsidized out of non-unemployment) who are self-employed at the respective point in time with the same business as at start-up. Wave 1 (wave 2) values are measured 19 (40) months after start-up. Outcomes are weighted for panel attrition. ***/**/* indicates significant difference at the 1/5/10% level.

[a] Income measures are inflation-adjusted to 2010 levels (Federal Statistical Office, 2014). We excluded outliers who reported a monthly income from self-employment larger than €25,000.

[b] Number of full-time equivalent employees (FTE) is a weighted sum, where full-time employees are assigned a weight of 1, part-time employees and apprentices are weighted by 0.5, and others by 0.25. We excluded some outliers from the analysis who reported implausibly high values.

[c] Constrained access to capital indicates that founders wanted to borrow but did not receive a loan.

Figure 3: Innovation activities over time

a. Patent application[a]

b. Application to protect corporate ID[a]

c. Enterprise develops new ideas[b]

Subsidized founders

Gap to regular founders

Note: Reported are shares for subsidized business founders (out of unemployment) and regular business founders (i.e., non-subsidized out of non-unemployment) who are self-employed at the respective point in time with the same business as at start-up. Wave 1 (wave 2) values are measured 19 (40) months after start-up. Outcomes are weighted for panel attrition. ***/**/* indicates significant difference at the 1/5/10% level.

[a] Innovation was surveyed only for a random 50% subsample.

[b] The variable is based on respondents' judgement concerning the following statement: "My business aims to generate new ideas, questioning existing processes". Respondents answered on a scale from 1 - totally agree to 7 - totally disagree. We define a dummy indicator taking the value one for values 1 to 3, and zero otherwise. The question is not available in wave 1.

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Table 2: Comparison of selected start-up characteristics between subsidized and regular founders

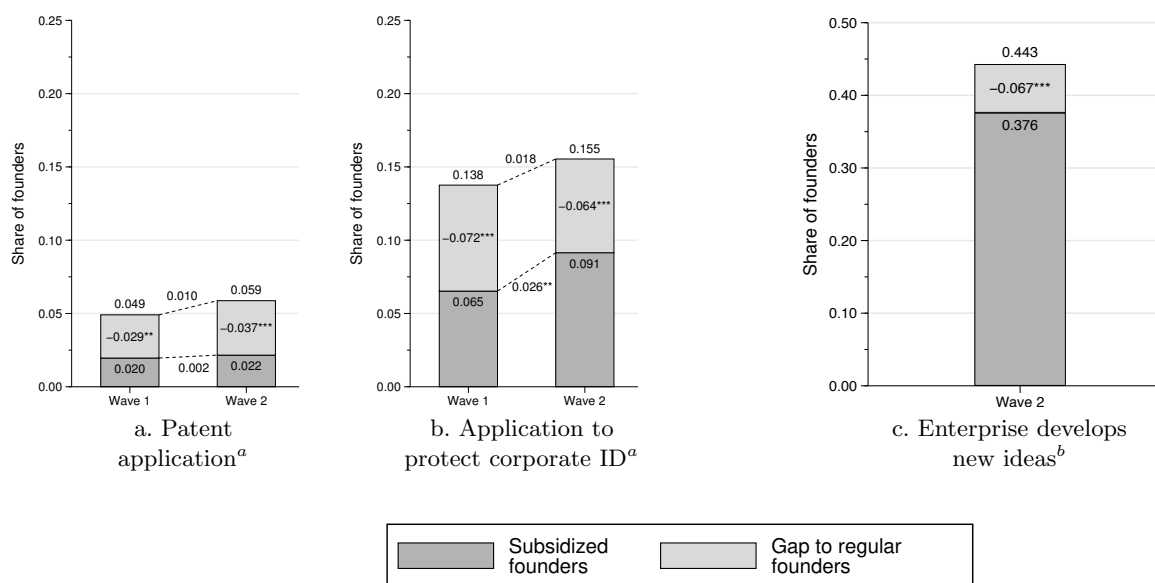|	Self-employed founders					
	at start-up			with same business in wave 2[a]		
Selected list[b] of start-up characteristics	Sub. founders (1)	Reg. founders (2)	Mean diff. (1) v. (2)	Sub. founders (3)	Reg. founders (4)	Mean diff. (3) v. (4)
A. *Personal characteristics*						
Age (in years)	42.0	45.2	-3.2***	41.8	45.3	-3.5***
Not German	0.076	0.044	0.032***	0.060	0.051	0.009
B. *Human capital*						
Upper secondary school	0.474	0.475	-0.001	0.479	0.494	-0.016
Technical college education						
(master craftsman)	0.173	0.252	-0.079***	0.190	0.280	-0.090***
University education	0.309	0.282	0.027	0.310	0.298	0.011
C. *Intergenerational transmission*						
Parents are/were self-employed	0.328	0.462	-0.134***	0.332	0.501	-0.169***
Business takeover from parents	0.034	0.170	-0.135***	0.047	0.214	-0.167***
Upper secondary schooling of father	0.253	0.249	0.004	0.236	0.239	-0.003
D. *Labor market history*						
Monthly net income from last dep. employment right before start-up						
€0−€1,000	0.094	0.050	0.045***	0.090	0.042	0.048***
>€2,500	0.206	0.164	0.042***	0.214	0.178	0.036*
No unemployment experience before start-up	0.051	0.542	-0.491***	0.062	0.581	-0.519***
E. *Regional information*						
Local macroeconomic conditions Vacancies related to						
stock of unemployed	14.9	15.6	-0.7**	15.0	15.6	-0.6*
Unemployment rate	8.6	7.5	1.0***	8.6	7.6	1.0***
F. *Start-up motives*[c]						
Desire to be one's own boss	0.376	0.412	-0.036*	0.389	0.461	-0.072***
Unavailability of regular job	0.227	0.101	0.126***	0.190	0.091	0.099***
G. *Business-related characteristics*						
Sectoral distribution of businesses						
Manufacturing, crafts	0.140	0.223	-0.083***	0.170	0.240	-0.070***
Other services	0.245	0.193	0.052***	0.220	0.186	0.034*
Industry-spec. experience before start-up to former self-employment	0.202	0.265	-0.063***	0.192	0.278	-0.085***
Capital invested at start-up						
None	0.193	0.178	0.016	0.162	0.150	0.012
≥€50,000	0.080	0.181	-0.101***	0.101	0.204	-0.104***
Number of obs.	827	453	1,280	614	360	974

Note: All reported numbers are shares (unless stated otherwise) for subsidized business founders (out of unemployment) and regular business founders (i.e., non-subsidized out of non-unemployment) and refer to start-up. Positive (negative) intergroup differences indicate a higher (lower) value among subsidized founders. Variables are weighted for panel attrition. ***/**/* indicate significantly different means between the two groups at the 1/5/10% level.

[a] Self-employed with same business in wave 2 as at start-up.

[b] A full list of start-up characteristics is reported in Table A.1 in the Supplementary Appendix.

[c] Reported are shares of individuals with values of 6 and 7 on a 7-point Likert-type scale from 1 "does not apply at all" to 7 "applies completely".

Table 3: Decomposition analysis of business performance gaps between formerly subsidized and regular founders

	Raw gap	Specification										
		(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(7c)	(7)	(8)
A. Outcome variable: Self-employed with same business in wave 2[a]												
Unexplained	-0.068***	-0.087***	-0.065**	-0.032	0.003	-0.066**	-0.047	-0.049*	-0.096***	-0.067**	-0.073**	0.006
Explained		0.019	-0.003	-0.036***	-0.071**	-0.002	-0.021**	-0.019**	0.028***	0.000	0.005	-0.075**
% Explained		-27.5	4.6	53.3	104.2	2.5	30.9	28.4	-41.1	-0.4	-8.0	109.2
Number of obs.	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
B. Outcome variable: At least one employee in wave 2												
Unexplained	-0.220***	-0.253***	-0.208***	-0.188***	-0.256***	-0.204***	-0.192***	-0.207***	-0.216***	-0.179***	-0.171***	-0.188***
Explained		0.034**	-0.011	-0.031	0.036	-0.016	-0.027**	-0.013	-0.004	-0.040**	-0.049**	-0.033
% Explained		-15.6	5.1	14.2	-16.3	7.4	12.3	5.9	1.7	18.3	22.2	15.1
Number of obs.	974	974	974	974	974	974	974	974	974	974	974	974
C. Control variables[b]:												
Start-up characteristics:												
(1) Personal charact.		✓									✓	✓
(2) Human capital			✓								✓	✓
(3) Intergen. transm.				✓							✓	✓
(4) Labor market hist.					✓						✓	✓
(5) Regional info.						✓					✓	✓
(6) Start-up motives							✓				✓	✓
(7) Business charact.												
(a) Business sector								✓			✓	✓
(b) Ind.-spec. exper.									✓		✓	✓
(c) Start capital										✓	✓	✓
Total number of control variables		9	5	7	16	6	7	7	6	7	20	70

Note: Reported are estimation results of a Blinder-Oaxaca probit decomposition for subsidized business founders (out of unemployment) as the base group using the Stata package *nldecompose* (Sinning *et al.*, 2008). For details, see Table A.2 in the Supplementary Appendix. Standard errors are bootstrapped using 499 replications. Outcomes are weighted for panel attrition. ***/**/* indicates statistical significance at the 1/5/10% level.

[a] Self-employed with same business as at start-up.

[b] A detailed list and summary descriptives of the underlying control variables are reported in Table A.1 in the Supplementary Appendix.

Table 4: Additional decomposition analysis of employment gaps between formerly subsidized and regular founders

	Raw gap	Specification (8)	(9)	(10)	(11)
A. *Outcome variable:* At least one employee in wave 2					
Unexplained	-0.220***	-0.188***	-0.161***	-0.102*	-0.083
Explained		-0.033	-0.061	-0.115**	-0.134***
% Explained		15.1	27.5	53.1	61.6
Number of obs.	974	974	974	974	974
B. *Control variables:*					
Start-up characteristics[a]:					
(1) *Personal characteristics*		√	√	√	√
(2) *Human capital*		√	√	√	√
(3) *Intergen. transmissions*		√	√	√	√
(4) *Labor market history*		√	√	√	√
(5) *Regional information*		√	√	√	√
(6) *Start-up motives*		√	√	√	√
(7) *Business characteristics*		√	√	√	√
Additional business indicators in wave 2:					
(9) *Access to capital since start-up*[b]			√		√
Wave 1 outcome:					
(10) *At least one employee*[c]				√	√
Total number of control variables		70	72	71	73

Note: Reported are estimation results of a Blinder-Oaxaca probit decomposition for subsidized business founders (out of unemployment) as the base group using the Stata package *nldecompose* (Sinning *et al.*, 2008). For details, see Table A.2 in the Supplementary Appendix. Standard errors are bootstrapped using 499 replications. Outcomes are weighted for panel attrition. ***/**/* indicates statistical significance at the 1/5/10% level.
[a] A detailed list and summary descriptives of the underlying control variables are reported in Table A.1 in the Supplementary Appendix.
[b] Access to capital includes two dummy variables indicating whether the founder received a loan since start-up and whether the founder wanted to borrow but did not receive a loan. Summary descriptive statistics are reported in Figures 2h and 2i.
[c] Summary descriptive statistics are reported in Figure 2c.

A Supplementary Appendix: Additional Tables

Table A.1: Full comparison of start-up characteristics between groups

	Self-employed founders					
	at start-up			with same business in wave 2[a]		
Full list of	Sub. founders	Reg. founders	Mean diff.	Sub. founders	Reg. founders	Mean diff.
start-up characteristics	(1)	(2)	(1) v. (2)	(3)	(4)	(3) v. (4)
A. *Personal characteristics*						
East Germany	0.213	0.116	0.098***	0.213	0.128	0.085***
Age distribution						
<25	0.033	0.052	-0.020**	0.025	0.044	-0.020**
25−<35	0.237	0.197	0.039**	0.232	0.189	0.042**
35−<45	0.318	0.261	0.056***	0.352	0.275	0.077***
45−<56	0.289	0.237	0.052***	0.292	0.244	0.048**
≥56	0.124	0.252	-0.128***	0.101	0.247	-0.147***
Children under six years in household	0.209	0.149	0.060***	0.235	0.164	0.070***
Children between six and						
14 years in household	0.232	0.212	0.019	0.253	0.219	0.034*
Married	0.572	0.629	-0.057***	0.597	0.631	-0.034
Not German	0.076	0.044	0.032***	0.060	0.051	0.009
B. *Human capital*						
School achievement						
None or lower secondary school	0.213	0.212	0.001	0.207	0.203	0.004
Middle secondary school	0.313	0.314	-0.000	0.314	0.303	0.012
Upper secondary school	0.474	0.475	-0.001	0.479	0.494	-0.016
Professional education						
Skilled workers (apprenticeship)	0.455	0.361	0.094***	0.446	0.326	0.120***
Technical college education						
(master craftsman)	0.173	0.252	-0.079***	0.190	0.280	-0.090***
University education	0.309	0.282	0.027	0.310	0.298	0.011
Unskilled workers/others	0.063	0.106	-0.043***	0.054	0.095	-0.041***
C. *Intergenerational transmission*						
Parents born abroad	0.201	0.157	0.044***	0.203	0.153	0.051***
Parents are/were self-employed	0.328	0.462	-0.134***	0.332	0.501	-0.169***
Business takeover from parents	0.034	0.170	-0.135***	0.047	0.214	-0.167***
School achievement of father						
None or lower secondary school	0.553	0.585	-0.032	0.560	0.607	-0.047**
Middle secondary school	0.176	0.162	0.014	0.194	0.148	0.046**
Upper secondary school	0.253	0.249	0.004	0.236	0.239	-0.003
Father unknown	0.019	0.005	0.014***	0.011	0.006	0.005
Father of respondent employed at age 15	0.888	0.883	0.004	0.901	0.896	0.006
D. *Labor market history*						
Duration of dependent employment						
right before start-up						
<1 year	0.067	0.043	0.024**	0.055	0.028	0.028***
5 or more years	0.550	0.495	0.054***	0.585	0.517	0.068***
Monthly net income from last dep.						
employment right before start-up						
Dependently employed and income						
not specified	0.039	0.069	-0.030***	0.034	0.085	-0.051***
€0−€1,000	0.094	0.050	0.045***	0.090	0.042	0.048***
>€1,000−€1,500	0.261	0.143	0.118***	0.247	0.143	0.104***
>€1,500−€2,500	0.318	0.218	0.099***	0.345	0.193	0.152***
>€2,500	0.206	0.164	0.042***	0.214	0.178	0.036*
In apprenticeship or						
marginal employment	0.045	0.134	-0.088***	0.039	0.129	-0.091***
In other status	0.036	0.222	-0.186***	0.032	0.230	-0.198***
Unemployment experience before						
start-up[b]						
Not specified	0.018	0.002	0.016***	0.019	0.003	0.017***
0	0.051	0.542	-0.491***	0.062	0.581	-0.519***
>0−≤2	0.340	0.234	0.106***	0.378	0.233	0.145***
>2−≤5	0.294	0.137	0.156***	0.297	0.124	0.173***
>5−≤15	0.251	0.071	0.180***	0.207	0.056	0.150***
>15	0.045	0.013	0.032***	0.037	0.002	0.035***

(Table A.1 continued on next page)

Full list of start-up characteristics	Self-employed founders					
	at start-up			with same business in wave 2[a]		
	Sub. founders (1)	Reg. founders (2)	Mean diff. (1) v. (2)	Sub. founders (3)	Reg. founders (4)	Mean diff. (3) v. (4)
Employment experience before start-up[b]						
Not specified	0.011	0.005	0.006	0.013	0.006	0.006
≤50	0.174	0.162	0.012	0.163	0.142	0.021
>50−≤70	0.202	0.143	0.060***	0.198	0.136	0.062***
>70−≤90	0.361	0.331	0.030	0.358	0.349	0.009
>90−≤99	0.123	0.149	-0.025*	0.140	0.144	-0.004
>99	0.129	0.211	-0.082***	0.129	0.222	-0.093***
E. *Regional information*						
Federal state (selected states)						
Baden-Wuerttemberg	0.123	0.145	-0.022	0.131	0.144	-0.013
Bavaria	0.173	0.242	-0.069***	0.179	0.260	-0.081***
Saxony	0.051	0.055	-0.003	0.057	0.061	-0.004
Local macroeconomic conditions						
Vacancies related to stock of unemployed	14.9	15.6	-0.7**	15.0	15.6	-0.6*
Unemployment rate	8.6	7.5	1.0***	8.6	7.6	1.0***
Real GDP per capita in 2008 (in €1,000)	36.3	32.2	4.1***	36.3	32.4	4.0***
F. *Start-up motives*[c]						
Realization of business idea	0.290	0.304	-0.014	0.299	0.303	-0.004
Discovery of a market niche	0.116	0.131	-0.014	0.121	0.136	-0.015
Desire to be one's own boss	0.376	0.412	-0.036*	0.389	0.461	-0.072***
Desire to earn more money	0.284	0.297	-0.013	0.270	0.279	-0.009
Discrimination at previous job	0.173	0.086	0.088***	0.174	0.089	0.086***
Unavailability of regular job	0.227	0.101	0.126***	0.190	0.091	0.099***
Recommendation by others	0.088	0.041	0.047***	0.075	0.041	0.033***
G. *Business-related characteristics*						
Sectoral distribution of businesses						
Agriculture, forestry, fishing	0.004	0.017	-0.012***	0.005	0.022	-0.017***
Manufacturing, crafts	0.140	0.223	-0.083***	0.170	0.240	-0.070***
Construction	0.115	0.103	0.013	0.130	0.107	0.024
Retail	0.128	0.168	-0.040***	0.114	0.164	-0.050***
Transport, logistics	0.053	0.025	0.028***	0.044	0.026	0.018**
Financial service, insurance industry	0.064	0.035	0.029***	0.055	0.038	0.017
IT	0.063	0.073	-0.010	0.072	0.059	0.013
Other services	0.245	0.193	0.052***	0.220	0.186	0.034*
Other sectors	0.188	0.163	0.024	0.190	0.159	0.031*
Industry-specific experience before start-up						
Due to dependent employment	0.725	0.620	0.104***	0.772	0.663	0.109***
Due to former self-employment	0.202	0.265	-0.063***	0.192	0.278	-0.085***
Due to secondary employment	0.221	0.172	0.048***	0.240	0.162	0.078***
Due to hobby	0.259	0.270	-0.011	0.271	0.223	0.048**
Due to honorary office	0.056	0.076	-0.020*	0.050	0.068	-0.018
None	0.095	0.110	-0.015	0.072	0.094	-0.022*
Capital invested at start-up						
None	0.193	0.178	0.016	0.162	0.150	0.012
<€1,000	0.047	0.092	-0.045***	0.033	0.057	-0.024**
€1,000−<€5,000	0.173	0.133	0.040***	0.163	0.117	0.047***
€5,000−<€10,000	0.158	0.074	0.084***	0.169	0.076	0.093***
€10,000−<€50,000	0.337	0.307	0.030	0.365	0.352	0.013
≥€50,000	0.080	0.181	-0.101***	0.101	0.204	-0.104***
Capital at start consisted entirely of own equity	0.470	0.456	0.014	0.483	0.493	-0.009
Number of obs.	827	453	1,280	614	360	974

Note: All reported numbers are shares (unless stated otherwise) for subsidized business founders (out of unemployment) and regular business founders (i.e., non-subsidized out of non-unemployment) and refer to start-up. Positive (negative) intergroup differences indicate a higher (lower) value among subsidized founders. Variables are weighted for panel attrition. ***/**/* indicate significantly different means between the two groups at the 1/5/10% level.

[a] Self-employed with same business in wave 2 as at start-up.

[b] Reported as the share of working time, standardized by age−15.

[c] Reported are shares of individuals with values of 6 and 7 on a 7-point Likert-type scale from 1 "does not apply at all" to 7 "applies completely".

Table A.2: Implementation of Non-Linear Blinder-Oaxaca Decomposition

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Non-Linear Blinder-Oaxaca Decomposition:

– Idea: The raw gaps are decomposed into an explained part due to differences in characteristics and an unexplained part due to differences in coefficients.

$$\Delta^{Raw} \quad = \quad \overline{Y}_{Sub} - \overline{Y}_{Reg} \quad = \quad \overline{F(\beta_{sub}X_{i,sub})} - \overline{F(\beta_{reg}X_{i,reg})}$$

$$= \quad \underbrace{\{\overline{F(\beta_{sub}X_{i,sub})} - \overline{F(\beta_{sub}X_{i,reg})}\}}_{Explained} \quad + \quad \underbrace{\{\overline{F(\beta_{sub}X_{i,reg})} - \overline{F(\beta_{reg}X_{i,reg})}\}}_{Unexplained}$$

– Probit estimation using weights to correct for panel attrition.

– Standard errors are bootstrapped using 499 replications.

– Control variables[a] (X_i):

Personal characteristics (East Germany, age distribution, children under six year in household, children between six and 14 years in household, married, not German)

Human capital (School achievement, professional education)

Intergenerational transmission (Parents born abroad, parents are/were self-employed, business takeover from parents, school achievement of father, father of respondent employed at age 15)

Labor market history (Duration of dependent employment right before start-up, monthly net income from last dependent employment right before start-up, unemployment experience before start-up, employment experience before start-up)

Regional information (Federal state, local macroeconomic conditions)

Start-up motives (Realization of business idea, discovery of market niche, being one's own boss, earn more money, discrimination at previous job, unavailability of regular job, recommendation by others)

Business-related characteristics (Sectoral distribution of businesses, industry-specific experience before start-up, capital invested at start-up, capital at start consisted entirely of own equity)

Note: The Blinder-Oaxaca probit decomposition was implemented using the Stata package *nldecompose* (Sinning et al., 2008).

[a] Descriptive statistics of all control variables are reported in Table A.1.

Table A.3: Decomposition analysis of business performance gaps between formerly subsidized and regular founders: Additional outcomes

	Raw gap	(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(7c)	(7)	(8)
							Specification					
A. Outcome variable: Hourly earned net income in wave 2[a]												
Unexplained	-6.614**	-5.853	-6.712*	-6.998*	-2.116	-6.588*	-6.076	-6.801*	-6.580*	-6.015	-6.354	-0.602
Explained		-0.760	0.099	0.384	-4.497***	-0.025	-0.538	0.188	-0.034	-0.599	-0.260	-6.011***
% Explained		11.5	-1.5	-5.8	68.0	0.4	8.1	-2.8	0.5	9.1	3.9	90.9
Number of obs.	868	868	868	868	868	868	868	868	868	868	868	868
B. Outcome variable: Full time equivalent employees in wave 2[b]												
Unexplained	-3.326***	-3.429***	-3.315***	-3.263***	-3.275***	-3.316***	-3.266***	-3.326***	-3.242***	-3.011***	-2.956***	-2.651***
Explained		0.103	-0.011	-0.063	-0.051	-0.010	-0.060	-0.000	-0.084	-0.315***	-0.370**	-0.675
% Explained		-3.1	0.3	1.9	1.5	0.3	1.8	0.0	2.5	9.5	11.1	20.3
Number of obs.	966	966	966	966	966	966	966	966	966	966	966	966
C. Control variables[c]:												
Start-up characteristics:												
(1) Personal charact.		√										√
(2) Human capital			√									√
(3) Intergen. transm.				√								√
(4) Labor market hist.					√							√
(5) Regional info.						√						√
(6) Start-up motives							√					√
(7) Business charact.												
(a) Business sector								√			√	√
(b) Ind.-spec. exper.									√		√	√
(c) Start capital										√	√	√
Total number of control variables		9	5	7	16	6	7	7	6	7	20	70

Note: Reported are estimation results of a Blinder-Oaxaca probit decomposition for subsidized business founders (out of unemployment) as the base group using the Stata package *nldecompose* (Sinning et al., 2008). For details, see Table A.2. Standard errors are bootstrapped using 499 replications. Outcomes are weighted for panel attrition. ***/**/* indicates statistical significance at the 1/5/10% level.
[a] Income measures are inflation-adjusted to 2010 levels (Federal Statistical Office, 2014). We excluded outliers who reported a monthly income from self-employment larger than €25,000.
[b] Number of full-time equivalent employees (FTE) is a weighted sum, where full-time employees are assigned a weight of 1, part-time employees and apprentices are weighted by 0.5, and others by 0.25. We excluded some outliers from the analysis who reported implausibly high values. Businesses without employees receive a zero.
[c] A detailed list and summary descriptives of the underlying control variables are reported in Table A.1.

Table A.4: Decomposition analysis of wave 1 employment gaps between formerly subsidized and regular founders

	Raw gap						Specification					
		(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(7c)	(7)	(8)
A. *Outcome variable*: At least one employee in wave 1												
Unexplained	-0.245***	-0.261***	-0.229***	-0.191***	-0.279***	-0.231***	-0.218***	-0.230***	-0.245***	-0.184***	-0.173***	-0.124***
Explained		0.016*	-0.016*	-0.054***	0.034	-0.014	-0.026***	-0.015*	-0.000	-0.061***	-0.075***	-0.123***
% Explained		-6.5	6.4	22.1	-13.7	5.8	10.8	5.9	0.1	24.9	30.2	49.8
Number of obs.	1,026	1,026	1,026	1,026	1,026	1,026	1,026	1,026	1,026	1,026	1,026	1,026
B. *Control variables*[a]:												
Start-up characteristics:												
(1) *Personal charact.*		✓										✓
(2) *Human capital*			✓									✓
(3) *Intergen. transm.*				✓								✓
(4) *Labor market hist.*					✓							✓
(5) *Regional info.*						✓						✓
(6) *Start-up motives*							✓					✓
(7) *Business charact.*												
(a) *Business sector*								✓			✓	✓
(b) *Ind.-spec. exper.*									✓		✓	✓
(c) *Start capital*										✓	✓	✓
Total number of control variables		9	5	7	16	6	7	7	6	7	20	70

Note: Reported are estimation results of a Blinder-Oaxaca probit decomposition for subsidized business founders (out of unemployment) as the base group using the Stata package *nldecompose* (Sinning et al., 2008). For details, see Table A.2. Standard errors are bootstrapped using 499 replications. Outcomes are weighted for panel attrition. ***/**/* indicates statistical significance at the 1/5/10% level.

[a] A detailed list and summary descriptives of the underlying control variables are reported in Table A.1.

B   Supplementary Appendix: Panel Attrition

Details on the weighting procedure to correct for selective panel attrition   As shown in the paper, the implementation of the panel survey in wave 2 introduced a weak selection bias due to panel attrition (see Section 3.3 in the manuscript and Tables B.1 and B.2 for details). To correct for this endogenous panel attrition, we apply a weighting procedure that is based on weighting panel observations with the inverse participation probability, i.e., the inverse of the individual probability to participate in the wave 2 survey. The participation probability is estimated using probit regression:

$$p_i = Prob(s_i = 1|x_{i1}), \tag{1}$$

where p_i is the probability to participate in the wave 2 interview and s_i is an individual response indicator, taking the value 1 if individual i participated in the wave 2 interview, and 0 otherwise. X_{i1} denotes a vector of observable characteristics available in wave 1, i.e., characteristics at start-up as well as outcome variables at the time of the wave 1 interview.

The inverse of the participation probability $\hat{p}_i$ is then used to correct the outcome variables in the second wave y_i:

$$\hat{y}_i = \frac{N\hat{w}_i}{\sum_{i=1}^{N}\hat{w}_i}(y_i|s_i = 1) \quad , \quad with \quad \hat{w}_i = \frac{s_i}{\hat{p}_i}. \tag{2}$$

This weighting method assumes that interview drop-outs are random, conditional on observable characteristics (x_i) included in the probit model. Therefore, it is important to have a large vector of observable characteristics available to make the weighting procedure a valid strategy. The data at hand allow us to control for both general characteristics such as age, education, and labor market history as well as outcome variables as collected during the first interview, see Table B.3 for details.[1] As mentioned in the paper, the inverse probability weighting procedure removes almost all significant differences in observable characteristics and reduces the (insignificant) differences in outcome variables even further, see columns 3 and 6 in Tables B.1 and B.2. Thus, the large set of variables used in the construction of the panel weights makes us confident that the conditional on observables assumption is fulfilled in our case.

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[1]Detailed probit estimation results are available from the authors upon request.

Table B.1: Selected descriptive statistics for full and panel sample

	Subsidized founders			Regular founders		
	Full sample	Panel sample		Full sample	Panel sample	
		Raw	Weighted		Raw	Weighted
	(1)	(2)	(3)	(4)	(5)	(6)
A. *Personal characteristics*						
East Germany	0.217	0.213	0.213	0.109	0.106	0.116
Age distribution						
<25	0.031	0.024	0.033	0.060	0.049	0.052
25−<35	0.243	0.207**	0.237	0.205	0.174	0.197
35−<45	0.325	0.322	0.318	0.269	0.272	0.261
45−<56	0.281	0.317*	0.289	0.242	0.260	0.237
≥56	0.120	0.131	0.124	0.224	0.245	0.252
Children under six years in household	0.206	0.202	0.209	0.154	0.143	0.149
Children between six and						
14 years in household	0.230	0.236	0.232	0.214	0.238	0.212
Married	0.572	0.602	0.572	0.611	0.667**	0.629
Not German	0.067	0.056	0.076	0.049	0.040	0.044
B. *Human capital*						
School achievement						
None or lower secondary school	0.210	0.170**	0.213	0.216	0.188	0.212
Middle secondary school	0.313	0.299	0.313	0.316	0.296	0.314
Upper secondary school	0.478	0.531**	0.474	0.468	0.517*	0.475
Professional education						
Skilled workers (apprenticeship)	0.459	0.423*	0.455	0.361	0.338	0.361
Technical college education						
(master craftsman)	0.171	0.163	0.173	0.249	0.252	0.252
University education	0.309	0.357**	0.309	0.276	0.311	0.282
Unskilled workers/others	0.062	0.057	0.063	0.113	0.099	0.106
C. *Intergenerational transmission*						
Parents born abroad	0.204	0.163**	0.201	0.159	0.148	0.157
Parents are/were self-employed	0.329	0.340	0.328	0.466	0.472	0.462
Business takeover from parents	0.028	0.036	0.034	0.144	0.172	0.170
School achievement of father						
None or lower secondary school	0.555	0.548	0.553	0.584	0.589	0.585
Middle secondary school	0.182	0.184	0.176	0.174	0.172	0.162
Upper secondary school	0.248	0.256	0.253	0.238	0.234	0.249
Father unknown	0.014	0.012	0.019	0.004	0.004	0.005
Father of respondent employed at age 15	0.873	0.897*	0.888	0.875	0.887	0.883
D. *Labor market history*						
Duration of dependent employment						
right before start-up						
<1 year	0.067	0.059	0.067	0.029	0.035	0.043
5 or more years	0.548	0.580	0.550	0.498	0.506	0.495
Monthly net income from last dep.						
employment right before start-up						
Dependently employed and income						
not specified	0.038	0.022**	0.039	0.072	0.046**	0.069
€0−€1,000	0.094	0.085	0.094	0.048	0.044	0.050
>€1,000−€1,500	0.253	0.238	0.261	0.143	0.143	0.143
>€1,500−€2,500	0.321	0.339	0.318	0.218	0.230	0.218
>€2,500	0.214	0.248*	0.206	0.159	0.177	0.164
In apprenticeship or						
marginal employment	0.044	0.039	0.045	0.144	0.128	0.134
In other status	0.036	0.030	0.036	0.215	0.232	0.222
Unemployment experience before						
start-up[a]						
Not specified	0.018	0.015	0.018	0.006	0.002	0.002
0	0.053	0.060	0.051	0.535	0.536	0.542
>0−≤2	0.333	0.360	0.340	0.235	0.249	0.234
>2−≤5	0.303	0.307	0.294	0.120	0.135	0.137
>5−≤15	0.250	0.216*	0.251	0.080	0.064	0.071
>15	0.043	0.041	0.045	0.023	0.013	0.013
Employment experience before						
start-up[a]						
Not specified	0.009	0.007	0.011	0.010	0.004	0.005
≤50	0.164	0.178	0.174	0.146	0.152	0.162
>50−≤70	0.214	0.218	0.202	0.165	0.146	0.143
>70−≤90	0.379	0.359	0.361	0.347	0.349	0.331
>90−≤99	0.110	0.120	0.123	0.125	0.141	0.149
>99	0.123	0.119	0.129	0.208	0.208	0.211

(Table B.1 continued on next page)

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(Table B.1 continued)

	Subsidized founders			Regular founders		
	Full sample	Panel sample		Full sample	Panel sample	
		Raw	Weighted		Raw	Weighted
	(1)	(2)	(3)	(4)	(5)	(6)
E. *Regional information*						
Federal state (selected states)						
Baden-Wuerttemberg	0.124	0.120	0.123	0.153	0.146	0.145
Bavaria	0.168	0.173	0.173	0.244	0.258	0.242
Saxony	0.055	0.053	0.051	0.047	0.046	0.055
Local macroeconomic conditions						
Vacancies related to						
stock of unemployed	15.0	14.9	14.9	15.4	15.8	15.6
Unemployment rate	8.6	8.6	8.6	7.5	7.4	7.5
Real GDP per capita in 2008						
(in €1,000)	35.7	36.7	36.3	32.5	32.2	32.2
F. *Start-up motives*[b]						
Realization of business idea	0.307	0.291	0.290	0.310	0.305	0.304
Discovery of a market niche	0.142	0.122	0.116**	0.155	0.126	0.131
Desire to be one's own boss	0.398	0.369	0.376	0.403	0.419	0.412
Desire to earn more money	0.315	0.265**	0.284*	0.310	0.298	0.297
Discrimination at previous job	0.173	0.179	0.173	0.086	0.082	0.086
Unavailability of regular job	0.234	0.236	0.227	0.111	0.104	0.101
Recommendation by others	0.089	0.086	0.088	0.052	0.049	0.041
G. *Business-related characteristics*						
Sectoral distribution of businesses						
Agriculture, forestry, fishing	0.009	0.006	0.004	0.023	0.018	0.017
Manufacturing, crafts	0.152	0.134	0.140	0.222	0.214	0.223
Construction	0.112	0.105	0.115	0.099	0.099	0.103
Retail	0.140	0.129	0.128	0.160	0.157	0.168
Transport, logistics	0.049	0.047	0.053	0.025	0.020	0.025
Financial service, insurance industry	0.058	0.065	0.064	0.039	0.040	0.035
IT	0.064	0.070	0.063	0.078	0.073	0.073
Other services	0.226	0.243	0.245	0.208	0.216	0.193
Other sectors	0.191	0.200	0.188	0.147	0.163	0.163
Industry-specific experience						
before start-up						
Due to dependent employment	0.717	0.734	0.725	0.613	0.618	0.620
Due to former self-employment	0.194	0.206	0.202	0.246	0.258	0.265
Due to secondary employment	0.211	0.219	0.221	0.170	0.172	0.172
Due to hobby	0.250	0.248	0.259	0.273	0.263	0.270
Due to honorary office	0.061	0.059	0.056	0.072	0.084	0.076
None	0.110	0.093	0.095	0.124	0.113	0.110
Capital invested at start-up						
None	0.179	0.185	0.193	0.173	0.168	0.178
<€1,000	0.044	0.044	0.047	0.087	0.095	0.092
€1,000−<€5,000	0.198	0.181	0.173*	0.124	0.119	0.133
€5,000−<€10,000	0.161	0.160	0.158	0.085	0.079	0.074
€10,000−<€50,000	0.317	0.336	0.337	0.329	0.318	0.307
≥€50,000	0.078	0.086	0.080	0.161	0.194	0.181
Capital at start consisted entirely						
of own equity	0.459	0.490	0.470	0.472	0.470	0.456
Number of obs.	1,478	827	827	930	453	453

Note: All numbers are shares (unless stated otherwise) and measured at start-up for subsidized business founders (out of unemployment) and regular business founders (i.e., non-subsidized out of non-unemployment). ***/**/* indicate significantly different means from the full sample at the 1/5/10% level.

[a] Reported as the share of working time, standardized by age−15.

[b] Reported are shares of individuals with values of 6 and 7 on a 7-point Likert-type scale from 1 "does not apply at all" to 7 "applies completely".

	Subsidized founders			Regular founders		
	Full sample	Panel sample		Full sample	Panel sample	
		Raw	Weighted		Raw	Weighted
	(1)	(2)	(3)	(4)	(5)	(6)
A. Main labor market status (unconditional)						
Self-employed with same business	0.805	0.830	0.797	0.717	0.751	0.717
Dep. employed	0.114	0.099	0.122	0.109	0.097	0.104
Unemployed (or ALMP)	0.049	0.045	0.051	0.016	0.007*	0.012
Conditional analysis: only self-employed individuals with same business at time of interview						
B. Income measures[a] (net, in 2010 euros)						
Monthly earned income	2,392	2,486	2,397	3,178	3,222	3,095
Hourly earned income	11.9	12.1	11.7	15.9	16.4	15.8
C. Employee structure						
At least one employee	0.361	0.359	0.352	0.630	0.615	0.597
Number of full-time equivalent employees (FTE)[b]						
Unconditionally	1.0	1.0	1.0	4.2	3.9	3.7
Conditional on FTE>0	2.9	2.9	2.8	6.8	6.3	6.2
D. Innovation implemented by businesses since start-up[c]						
Filed patent application	0.019	0.019	0.020	0.048	0.051	0.049
Filed application to legally protect corporate identity	0.066	0.066	0.065	0.130	0.132	0.138
E. Access to capital since start-up						
Loan received	0.215	0.210	0.209	0.352	0.356	0.361
Constrained[d]	0.153	0.127	0.131	0.115	0.115	0.119

Note: Reported are shares and averages measured for subsidized business founders (out of unemployment) and regular business founders (i.e., non-subsidized out of non-unemployment) in wave 1 (19 months after start-up). ***/**/* indicate significantly different means from the full sample at the 1/5/10% level.

[a] We excluded outliers who reported a monthly income from self-employment larger than € 25,000.

[b] Number of full-time equivalent employees (FTE) is a weighted sum, where full-time employees are assigned a weight of 1, part-time employees and apprentices are weighted by 0.5, and others by 0.25. We excluded some outliers from the analysis who reported implausibly high values.

[c] Innovation was surveyed only for a random 50% subsample.

[d] Constrained access to capital indicates that founders wanted to borrow but did not receive a loan.

Table B.3: Summary of the weighting procedure to correct for selective panel attrition

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Step 1: Probit estimation (separate for subsidized and regular founders)
− Maximum likelihood estimation of probit model with wave 2 participation dummy as dependent variable.
− Covariates (total number: 75):

  Personal characteristics (East Germany, age distribution, children under six year in household, children between six and 14 years in household, married, born in Germany)

  Human capital (School achievement, professional education)

  Intergenerational transmission (Parents born abroad, parents are/were self-employed, paternal schooling)

  Labor market history (Employment status right before start-up, duration of employment status right before start-up, monthly net income from last employment status right before start-up, unemployment experience before start-up)

  Wave 1 outcomes (Employment status, household income, satisfaction with life, satisfaction with health, satisfaction with employment status, reason for business exit, mode of business exit)

  Interview-related characteristics (Weekday of interview)

Step 2: Inverse probability weighting

− Based on probit estimation, we predict individual wave 2 participation probability $\hat{p}_i$ following eq. (1).
− Outcome variables are weighted using the inverse of $\hat{p}_i$ following eq. (2).