

What Makes an Employer-Entrepreneur?*

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Abstract:

Why do increasing numbers of entrepreneurs remain solo while less of them start hiring employees and grow? And which characteristics help entrepreneurs to remain an employer? A better understanding of what makes an employer-entrepreneur is of high interest as the policy debate on entrepreneurship centers on start-ups that create jobs and have growth potential. Using household panel data, we analyze the full dynamics of transitions between the labor-market states of solo- and employer-entrepreneurship, paid employment and non-employment, taking personality traits into explicit consideration. We distinguish between direct entry into employer-entrepreneurship and a stepwise entry via solo-entrepreneurship and find important differences. Using various proxies for entrepreneurial abilities, we observe that those who have better abilities are more likely to hire immediately. Concerning entrepreneurial survival, our results show that higher entrepreneurial abilities generally also have a positive influence, but very high levels of risk tolerance and trust in others have opposing effects. Overall, we reveal that personality traits matter more for survival than for entry into employer-entrepreneurship.

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1 Introduction

During the last two decades, in many industrialized economies the number of entrepreneurs grew substantially. In Germany for instance, we observe a steady increase from about 3 million self-employed individuals in 1991 to 4.4 million in 2011 when self-employment peaked (Mai and Marder-Puch, 2013). However, separating out the employer-entrepreneurs, those who hire others in their business (from here on also ‘employers’) from the solo-entrepreneurs (non-employers) shows that most of the increase went into solo-entrepreneurship. This group nearly doubled during this period (from about 1.35 to 2.5 million) while the number of employers grew by only 15 percent (from 1.65 to 1.9 million). Without doubt, it is important that so many individuals create jobs for themselves when they became non-employers. However, employers exhibit higher growth ambitions, are more likely to be innovators, and certainly have a stronger impact on the economy when they create jobs for others (Haltiwanger et al., 2013).

Recent research has started to discuss whether there are two paths of becoming an employer: some individuals create larger businesses from the beginning where they hire or plan to hire from day one. Others choose a different strategy and remain non-employers for a certain amount of time—for instance to experiment with entrepreneurship (Manso, 2016). After such an interim period, mostly within the first three years after start-up (Fairlie and Miranda, 2017), some of them decide to hire as well.

Three crucial questions arise from these recent developments: why do most entrepreneurs stay solo while only a minority hires employees and grows—what kind of characteristics help them to become an employer? Given the two paths of hiring, do those who start right away with larger entities differ substantially from those who make the detour as solo-entrepreneurs before they hire their first employee? And what kind of observable characteristics help entrepreneurs to remain in business? A better understanding of what makes an employer who successfully

remains in the market is of high interest, as the policy debate on entrepreneurship centers more and more on those who create jobs and have growth potential.

Recent research has been concentrating on the first question regarding the characteristics of those individuals who hire their first employees. Among the individual factors, entrepreneurial abilities (Burke et al., 2000, 2002), gender (Burke et al., 2002, Fairlie and Miranda, 2017), work experience (Cowling et al., 2004), the previous employment status (Andersson and Wadensjö, 2007), and financial assets (Henley, 2005) influence the probability of hiring first employees. Moreover, Fairlie and Miranda (2017) and Astebro and Tag (2016) show that there are high correlations between the legal form of the founded entity, namely incorporated versus unincorporated businesses (where the former could be interpreted as a further signal of entrepreneurial ability) and the hiring probability. Coad et al. (2017) demonstrate that non-employers realize increasing sales in the year before they start hiring.

While these papers have identified various relevant individual and business characteristics,¹ less evidence exists so far on the question whether and how the personality of these individuals influences the decision to hire a first employee. Earlier research emphasizes that the human personality systematically affects other entrepreneurial decisions (Zhao and Seibert, 2006), in particular entrepreneurial entry (see inter alia Vereshchagina and Hopenhayn 2009, Caliendo et al., 2009, 2014), survival in entrepreneurship (Ciavarella et al., 2004, Caliendo et al., 2010, 2014), and entrepreneurial income (Hamilton et al., 2014, Levine and Rubinstein, 2017). We build upon this literature to analyze whether the personality also matters in first hiring decisions.

Moreover, previous research remains silent so far regarding the question whether the path towards the first employee matters. Instead, the hiring decision is either analyzed by pooling all data (e.g., Henley, 2004) or by explicitly focusing on those who come from a non-employer

¹ Other papers investigate the influence of institutional factors on the hiring probability (see inter alia Carroll et al., 2000, or Millan et al., 2013).

position (e.g., Coad et al., 2017). However, as we will show in this paper, it is important to explicitly differentiate between direct transitions from paid employment to employer-entrepreneurship and indirect entries via solo-entrepreneurship.

Finally yet importantly, creating firms and hiring employees has a more lasting impact on the economy the longer employers are able to keep their salaried workers, or in other words, when the employer-business becomes sustainable. Therefore, we will identify—to the best of our knowledge for the first time—which individual characteristics influence the ability to survive as an employer.

This paper thus examines three research questions: How individual characteristics including personality traits influence the ability of entrepreneurs to hire workers, what differences exist between the two hiring paths, and which individual characteristics support employers to remain in their state. To answer these questions, we analyze the full dynamics of transitions between the potential labor-market states of solo- and employer-entrepreneurship, paid employment and non-employment. By making use of the German Socio-economic Panel (SOEP), a rich dataset that includes demographics, employment information and personality characteristics, we conduct a comprehensive analysis of individual factors important for employer-entrepreneurship that include—beside personality characteristics—human and financial capital, previous income, and unemployment experience.

Our results show that individuals who have more favorable abilities are more likely to hire immediately. Concerning entrepreneurial survival, our results show that higher entrepreneurial abilities generally also have a positive influence, but very high levels of risk tolerance and trust in others have opposing effects. Overall, we reveal that personality traits matter more for survival than for entry into employer-entrepreneurship.

The remainder of the paper is organized as follows. Section 2 reviews related research. Section 3 presents the data and summary statistics. In Section 4, we describe our empirical

strategy, and Section 5 provides the estimation results. Section 6 discusses the findings and concludes.

2 Literature and Contributions

2.1 Hiring First Employees

A large body of literature discusses individual determinants of entrepreneurial entry and survival from a more general point of view without distinguishing between employers and non-employers. From previous research, we know for instance that males, middle-aged individuals and individuals with higher levels of education, with more financial capital, more work experience in the same industry and with self-employed parents have a higher probability of entering entrepreneurship. We further know that personality traits play a crucial role on the entry decision. Among the so-called Big Five traits, high scores in openness and extraversion increase the probability of entry into entrepreneurship, and additionally, while having controlled for the Big Five, high scores in risk tolerance, locus of control, and trust (Caliendo et al., 2014). We also know what determines survival in entrepreneurship. Middle-aged, male individuals with higher education and prior work experience remain self-employed with a higher probability. It is helpful for them as well, when they have medium levels in risk tolerance and when they score low in the Big Five factor agreeableness and high in the Big Five factor conscientiousness (Ciavarella et al., 2004; Caliendo et al., 2014).

Far less is known about what makes an employer. Hurst and Pugsley (2011) document that most nascent entrepreneurs have no intention to grow, but policymakers are more interested in entrepreneurs who create jobs. It is also unclear which of the variables mentioned above unfold the same or a different influence when we differentiate between the two paths of becoming an employer.

Among the few papers that address this issue, three factors are highlighted of being important for becoming an employer: entrepreneurial abilities, capital constraints, and work experience.

Entrepreneurial abilities are one central factor that might lead to particular hiring patterns (Burke et al., 2002). Those who have better abilities are more likely to hire immediately when opening a business than those with lower entrepreneurial abilities, among them maybe also those who may experiment as non-employers with entrepreneurship at first play. Entrepreneurial abilities per se are unobservable, but there are some proxies that can be used to capture their effects on the hiring decision. Accordingly, the hiring decision should be positively related to the education level (Fairlie and Miranda, 2017), self-employed parents (Coad et al., 2017), as well as to non-cognitive traits (Zhao and Seibert, 2006). Moreover, as earlier research points to positive correlations between the previous income in an employed position and entrepreneurial ability (Hamilton, 2000, Astebro and Chen, 2014), this correlation further allows us to expect that entrepreneurial abilities, thus, the decision to hire immediately after start-up should also be positively correlated with previous income.

The empirical evidence is however not fully consistent with these hypotheses. Henley (2005), who uses British household data and presents a first comprehensive analysis, but without differentiating between entry paths, finds indeed that some of the above listed proxies for entrepreneurial abilities influence the hiring decision in the expected way: entrepreneurs whose parents were self-employed hire with higher probability,² as do individuals with higher education levels. Coad et al. (2017), who use Danish data and explicitly focus only on those who decide to make a transition from a non-employer to an employer, find such an influence only for higher education levels, while they cannot confirm the intergenerational link. Fairlie and Miranda (2017), who use US data and study the determinants of entrepreneurs hiring their

² Similarly Lechmann and Wunder (2017) report that having self-employed parents positively influences the probability of becoming an employer.

first employee from a non-employer position as well, do not even find any evidence that higher education levels positively influence the hiring decision.

As for non-cognitive traits, we are not aware of any empirical evidence with respect to their influence on the hiring decision. We may expect that the same personality traits that have been shown to affect the entrepreneurial entry in general should also influence the decision to hire immediately once businesses are opened. These traits are high scores in openness to experience and extraversion among the Big Five traits, as well as high scores in risk tolerance, internal locus of control and trust (see Caliendo et al., 2012, 2014). We expect extraversion to be similarly important for those who want to become employers as they have to interact with different kinds of other individuals, like employees, business partners, investors and others (Zhao and Seibert, 2006). Moreover, entrepreneurs who plan for larger units might more often explore novel ideas (Schumpeter, 1942) which again should be positively correlated with higher scores in the Big Five factor ‘openness in experience’.³ As for risk aversion and trust to others, it is intuitively clear that starting to run a larger entity with employees is much riskier than being a solo-entrepreneur, while at the same time this requires a minimum amount of trust in the willingness of the freshly hired employees to support the new venture. This is why higher risk tolerance and higher scores in trust should also increase the probability of an immediate hiring process. Similarly, a more internal locus of control, which means that individuals believe that their own actions will determine the later outcomes of their ventures (Rotter, 1966), may increase the probability of starting to hire immediately, as well.

Capital constraints: Holtz-Eakin et al. (1994) and Blanchflower and Oswald (1998) show that the access to capital positively influences the decision to become self-employed in general. The lack of capital may constrain those who aim to create larger businesses even further. Indeed Burke et al. (2000) as well as Henley (2004) find that having equity positively influences the

³ The combination of these two Big Five factors extraversion and openness for experience corresponds to the higher order personality trait or meta-trait plasticity (see Digman, 1997, and DeYoung et al., 2002).

generation of further jobs in a newly ventured firm. Outcomes again differ when the focus is turned to those who start hiring from a non-employer position. Coad et al. (2017) observe no significant influence of capital for this group while they reveal that the income in the previous year of a non-employer increases the hiring probability. The results of Fairlie and Miranda (2017), who focus on previous year's business assets and revenues, are consistent with the latter finding: Their business variables unfold the same positive influence on the probability of hiring the first employee as higher incomes in the previous year.

Work experience: the own work experience might affect hiring decisions as well. Individuals with more years of work experience may better know the markets they aim to enter when coming from an employed position. Therefore, they might make the decision of hiring right away with a higher probability than individuals with no or a limited amount of work experience and those coming out of unemployment. Hence, the decision to hire a first employee right at the beginning of an entrepreneurial career should be positively related to work experience and negatively to unemployment experience. Earlier research points in this direction for those who gathered a certain amount of work experience (Cowling et al., 2004). Concerning the previous labor market status, there is some evidence that individuals coming out of unemployment hire with lower probability (Caliendo et al., 2015; Coad et al., 2017). Another variable—the age of the entrepreneur—is a valuable proxy for work experience when controlling for time spent in unemployment. Results from using the age variable similarly show that middle-aged individuals do not only enter into entrepreneurship with higher probability, but also start the hiring process more often (Henley, 2004).

The entry paths into employer-entrepreneurship: The diverging empirical evidence in particular on entrepreneurial abilities and on capital constraints points to the importance of differentiating between the two paths of becoming an employer. We argue that the initial choice of starting as an employer hiring right away versus starting as solo-entrepreneur and potentially hiring later are largely driven by entrepreneurial abilities. Therefore, we expect that all variables

used as proxies to capture these abilities (such as education, self-employed parents or personality traits) unfold a stronger effect on those who transition directly to employer-entrepreneurship without using solo-entrepreneurship as a stepping-stone.

The wealth level may also influence the timing of the hiring decision in different ways. Provided that creating larger businesses and, thus, hiring from the start needs a minimum amount of own financial capital, either for using it as direct financing source or for providing collateral, we expect that access to capital might be instrumental for the decision of hiring right away. Those who aim to create larger businesses but face capital constraints may circumvent this limitation by starting as non-employers. After having earned a certain amount of income, they may then replace the missing access to capital by earning a sufficient amount of income as a non-employer and then become employers as well (see also Coad et al., 2017).

2.2 Surviving as Employer

Entrepreneurs unfold real impact on the economy when they remain employers and employ their salaried workers for a significant time. Therefore, in addition to the analysis of the hiring decision we will also investigate what characterizes a sustainable employer. We define higher sustainability as continuously being an employer for a larger number of years. We use the three factors that are considered important for becoming an employer, entrepreneurial abilities, capital constraints, and work experience, to form expectations about their relevance for survival in employer-entrepreneurship as well.

Entrepreneurial abilities: We expect that two of the proxies used for entrepreneurial abilities, i.e. higher educated individuals as well as individuals who had self-employed parents, should work in the same direction. Individuals holding these characteristics should not only be more likely to hire a first employee, but also be more able to run these larger businesses. Empirical evidence on survival in entrepreneurship in general (without the distinction between employers and non-employers) is consistent with these expectation (Caliendo et al., 2014).

In contrast, prior research analyzing how personality traits influence entrepreneurial decision making in general shows that different characteristics influence entrepreneurial survival in comparison to entrepreneurial entry (Caliendo et al., 2014). In line with this research, we expect that the Big Five factors that might influence entry into employer-entrepreneurship (i.e. extraversion and openness for experience) will not affect survival in employer-entrepreneurship. It can be argued that creativity might be essential for starting but not for running a business. Similarly, extraversion might be an important trait for employers in the beginning of an entrepreneurial venture when they have to assign tasks and responsibilities, build teams, and persuade investors, but its influence on entrepreneurial survival should fade away over time once the business is established. The three other factors could become key for survival. Low levels of agreeableness might improve bargaining abilities of entrepreneurs. High levels of conscientiousness may particularly help individuals to be well organized and methodical. Low levels of neuroticism may enable them to manage stress and uncertainty, when they act as employers in this unstructured environment with uncertain outcomes (Zhao and Seibert, 2006).⁴ As to the empirical evidence of the Big Five factors on entry and survival, Ciavarella et al. (2004) and Caliendo et al. (2014) confirm the diverging influences of the Big Five factors, at least when all kinds of entrepreneurs are jointly examined.

Further personality characteristics, namely risk tolerance, internal locus of control and trust, may also influence the decision making of employers, but may unfold diverging effects on entry and survival. A high level of trust in others should be vital for the decision to hire the first employee, but this variable is expected to unfold no further influence once employers have jumped this hurdle. With respect to risk attitude, previous research derived the hypotheses of

⁴ The three Big-Five factors agreeableness, conscientiousness and emotional stability (the reverse of neuroticism) nearly correspond to the second meta-trait stability, as defined by Digman (1997) and DeYoung et al. (2002). However, there is one inconsistency between the meta-trait stability and the influence of the Big Five traits on survival. The factor agreeableness positively enters into the meta-trait stability. However, it positively influences entrepreneurial survival in its negative attribute, i.e. low levels of agreeableness increase the probability of entrepreneurial survival.

an inverse U-shaped influence of risk tolerance on entrepreneurial survival (Caliendo et al., 2010). We expect that this relationship should hold in particular when entrepreneurs do employ others in their business. Very risk averse employers are likely to run projects that are too small to keep their employer businesses worthwhile, whereas very risk tolerant employers may risk with higher probability the failing of their businesses at a scale large enough to make recovery impossible (e.g., bankruptcy). As a consequence, among all employers, those with low or high risk tolerance may leave this status with higher probability than employers whose risk tolerance falls within the medium range. Last but not least, an internal locus of control is expected to be the only personality characteristic unfolding the same influence on entry into and survival in employer-entrepreneurship. The belief that the own actions will determine the future outcomes of the own venture is essential for employers who took on the responsibility to employ others to steer their employer businesses through changing business conditions.

Missing access to **financial capital** may constrain the decision to grow and thus to hire first employees. Once larger businesses have been established, capital constraints should not be a limiting factor anymore for survival.⁵ Empirical evidence about the survival of all entrepreneurs (employers and non-employers) at least shows that capital income does not unfold any influence on business survival (Caliendo et al., 2014).

In contrast, the **previous employment status** may well have an impact on survival as an employer. We expect a negative effect for those who were coming from unemployment and a positive effect for those coming from paid employment (Fairlie and Fossen, 2017). Entrepreneurs who gathered work experience in the same industry might better know the markets they enter, thus allowing them as employers to better adjust the size of their firms to the existing needs in the market. Individuals who experienced unemployment prior to their step into entrepreneurship might not only be less likely to hire workers, but also survive with lower

⁵ Nonetheless, when businesses aim to grow further, access to capital might again become a limiting factor.

probability as employers because they might lack this kind of market knowledge. While the empirical evidence on survival as employers is scarce with respect to prior unemployment as well, the negative influence of unemployment exposure and the positive influence of work experience find support when these variables are analyzed without a differentiation between the two classes of entrepreneurs (Caliendo et al., 2014).

2.3 Research Questions

The inconsistent empirical findings on what kind of characteristics influence the decision of individuals to start hiring others in their newly started businesses points to the issue that the path of becoming an employer matters. Therefore, in this paper we examine how the three factors, entrepreneurial abilities, capital constraints, and work experience, influence the hiring decision. We will further investigate whether there are significant differences when we compare employers who hire right at the start of their businesses with individuals hiring from prior solo-entrepreneurship. As we argue that individuals with high entrepreneurial abilities will more often hire immediately, we expect that entrepreneurial abilities will unfold a stronger influence on those who hire from the start. We add further characteristics measuring entrepreneurial abilities, which have not been analyzed so far, and examine how in particular non-cognitive characteristics such as personality traits influence the hiring decision of both types of entrepreneurs. We also explore to what extent capital constraints unfold differing influences on the two entry paths into employer-entrepreneurship. On top of that, we will investigate which of the three main factors influencing the decision of becoming an employer affect the sustainability of employer businesses. This is of crucial importance as the policy debate is revolving around the question of what kind of start-ups create sustainable jobs for others. While earlier studies only investigated entrepreneurial survival without differentiating between non-employers and employers, we aim to reveal which individual characteristics unfold positive or negative influences on survival in employer-entrepreneurship.

3 Data and Descriptive Results

3.1 Data

For our analysis we use the German Socio-economic Panel (SOEP), a representative annual household panel survey for Germany (Wagner et al., 2007). We use the waves of 2005-12 to estimate our transition models. The waves 2003-04 are additionally used to measure some of the personality variables, and 2013 to identify transitions between 2012 and 2013. Respondents who indicate that their primary labor activity is self-employment are asked whether they have no, 1-9, or 10 or more employees. We label respondents in the first category as solo-entrepreneurs and those with at least one employee as employer-entrepreneurs. In our sample we only include individuals aged between 19-59 and exclude individuals working for a self-employed family member, farmers, as well as persons in civil service, the military, or in education because these persons might be restricted in their occupational choices. Our final sample without missing values in the variables used in the main model consists of 42,099 person-year observations (32,472 paid employees, 5470 non-employed persons, 2108 solo-entrepreneurs and 2049 employer-entrepreneurs).

The SOEP includes short versions of established psychological inventories of personality characteristics in several waves. This allows us to analyze the influence of a comprehensive set of personality traits in a large representative sample. In inventories of the Big Five, locus of control and trust constructs, the respondents are asked how much they agree with different statements about themselves (on 7-point Likert scales). Fifteen items assess the Big Five personality traits (three items for each trait), ten items measure the locus of control, and three questions elicit how much one is inclined to trust others. The personality constructs are obtained by averaging the scores from the respective items; factor analysis confirms the validity of the constructs (see Caliendo et al. 2014, for details). Risk aversion is measured in repeated survey waves by a single question about the general willingness to take risks on an 11-point scale.

Alternatively, to the Big Five we also use the two meta-traits plasticity and stability. We compute the plasticity score by taking the average over the two Big Five traits openness to experience and extraversion and the stability score by averaging over the other three Big Five traits conscientiousness, agreeableness, and emotional stability, which is the reverse of neuroticism. As another alternative, we test the one-dimensional entrepreneurship-prone personality profile suggested by Obschonka et al. (2013). Following these authors, we construct each individual's distance from a statistical entrepreneurial reference profile, which is characterized by the highest possible value in openness, extraversion, and conscientiousness, and the lowest possible value in agreeableness and neuroticism.

Since the personality characteristics are not elicited every year, we use these variables for subsequent observation years of the same individual as well when no more recent measure is available. By only imputing forward, i.e., only using values measured in the past, we avoid potential reverse causality issues. For the regressions we standardize all personality variables to facilitate interpretation of the coefficients, except risk tolerance, because this variable enters our model in quadratic form. Table A1 in the Appendix offers descriptions of the socio-demographic variables used in this analysis.

3.2 Summary Statistics

Table 1 provides a transition matrix showing the numbers of observations that switch from one employment state to another between the survey interviews in two subsequent years. Individuals counted on the diagonal remain in their current state. The matrix reveals that year-to-year transitions occur between all states, including, for example, direct transitions from paid employment to employer-entrepreneurship. About 56% of all transitions to employer-entrepreneurship origin from solo-entrepreneurship, 37% from paid employment and 7% from non-employment. This highlights the importance of a joint analysis of all possible transitions.

Descriptive statistics by employment states appear in Table 2. We test for equal means in the subsamples of solo-entrepreneurs versus paid employees as well as employers versus solo-entrepreneurs. The groups of employers and paid employees differ significantly from solo-entrepreneurs in many characteristics.

Socio-economic variables and employment experience: The share of women among employers is only 27%, whereas gender is almost balanced among solo-entrepreneurs. Concerning human capital, employers have received more formal education than solo-entrepreneurs, who again are better educated than paid employees. The likelihood of having had an entrepreneurial father at the age of 15 years also decreases when we turn from employers to solo-entrepreneurs and then to paid employees. The parents of both types of entrepreneurs received as well more education than those of paid employees. Entrepreneurs are on average older than employees are. We should also point out that more employers are affected by disability than solo-entrepreneurs. Prior unemployment exposure in years is highest among solo-entrepreneurs and lowest among employers.

Personality: Employer-entrepreneurs have a more internal locus of control and exhibit a larger willingness to take risks than solo-entrepreneurs, who in turn score higher in these characteristics than employees. Interestingly, solo-entrepreneurs score higher than employers in Big-Five characteristics that are associated with a personality leaning towards entrepreneurial entry: Non-employer are more open to experience⁶ and more extraverted than employers (and both score higher than employees). In contrast, employers score lower in agreeableness and higher in conscientiousness than solo-employers, which indicates that employers have a personality that supports entrepreneurial survival. This is consistent with the observation that employers have been entrepreneurs for longer time than solo-entrepreneurs on average. Paid employees fall in between the two types of entrepreneurs concerning conscientiousness and

⁶ Solo-entrepreneurs score almost half a standard deviation higher in openness to experience than the full sample average.

agreeableness. Interestingly, non-employers score highest in the meta-trait plasticity, followed by employers and paid employees, while for the other meta trait, stability, employers score higher than the other employment groups.

Business and income characteristics: Employers differ from solo-entrepreneurs in their choice of industry. There are for instance significantly more employers in the trade sector while solo-entrepreneurs dominate the public and personal services. On average, employers have been continuously self-employed for 2.3 more years than solo-entrepreneurs, but paid employees have spent even more years in paid employment. Employers also have significantly higher capital and labor income in comparison to the other groups while solo-entrepreneurs realize higher capital but lower labor income than employees.

These descriptive associations might be partially due to feedback effects of the current employment status on the variables of interest. In our econometric estimations that are following, we avoid reverse causality by estimating the effects, *ceteris paribus*, of the individual characteristics measured *before* a transition occurs on the probability of switching to another labor market state.

4 Empirical Methodology

We model employment transitions in a random utility framework. We distinguish between four employment states: Solo-entrepreneurship (se), employer-entrepreneurship (ee), paid employment (pe), and non-employment (ne). We jointly estimate discrete time competing risk models of all possible transitions between these states with two types of unobserved entrepreneurial ability based on individual panel data.

We assume that a person i , who is currently in employment state $j \in J = \{se, ee, pe, ne\}$ in period t , perceives that he or she would derive the following utility U_{jk} in the state k in the future period $t+1$:

$$U_{jk}(x_{it}, d_{it}) = \beta'_{jk} x_{it} + \varphi_{jk}(d_{it}) + v_{ik} + \varepsilon_{itjk}, \quad (1)$$

where x_{it} is a vector of individual characteristics and $\varphi_{jk}(d_{it})$ is a flexible function of the duration d_{it} in the current state. We assume that the parameters β_{jk} of the characteristics x_{it} as well as the duration effects may vary both across the destination state and the current state. This means that the covariates may shift tastes for the alternatives, and these effects may be different depending on the current state.

The random part of utility consists of an individual and destination-state specific component v_{ik} and a remaining time-varying error term ε_{itjk} . Specifically, since we focus on entrepreneurship, we model two types of unobserved time-invariant individual entrepreneurial ability or preference. The random variable $v_{i,se}$ is relevant for any transitions into solo-entrepreneurship and $v_{i,ee}$ for any transitions into employer-entrepreneurship of individual i , regardless of the current state and time period. The two random effects are allowed to be correlated. We do not model further random effects in our main estimations (i.e., $v_{i,pe} = v_{i,ne} = 0$). In a robustness check, we included a third unrestricted and correlated random effect for transitions into paid employment ($v_{i,pe}$) and obtained very similar results, but the computation time was substantially longer.

The probability of transition from state j to k conditional on the duration in the current state d_{it} and the covariates x_{it} equals the probability that perceived utility in state k exceeds utility in all other states l including the current state j . Let $transition_{it} \in J$ denote a discrete variable indicating the choice of the destination state that is observed in $t+1$. If $transition_{it} = j$, there is no change in employment states between t and $t+1$, otherwise we observe a transition. With the standard assumption of type I extreme value disturbed error terms ε_{itjk} (McFadden, 1974), we obtain a mixed multinomial logit (MNL) model for each current state. The probability of a transition (or of staying) conditional on x_{it} and d_{it} , i.e. the hazard rate, is

$$\begin{aligned} Prob(transition_{it} = k | x_{it}, d_{it}, j) &= Prob(U_{jk}(x_{it}, d_{it}) > U_{jl}(x_{it}, d_{it}) \text{ for all } l \neq k) \\ &= \frac{e^{\beta_{jk}'x_{it} + \varphi_{jk}(d_{it}) + v_{ik}}}{\sum_{l \in J} e^{\beta_{jl}'x_{it} + \varphi_{jl}(d_{it}) + v_{il}}}. \end{aligned} \quad (2)$$

We choose the current state as the base category, i.e. we normalize $\beta_{jj} = 0$ and $\varphi_{jj}(d_{it}) = 0$, so we write for the transition probabilities

$$Prob(transition_{it} = k|x_{it}, d_{it}, j) = \frac{e^{\beta_{jk}x_{it} + \varphi_{jk}(d_{it}) + v_{ik}}}{1 + \sum_{l \neq j} e^{\beta_{jl}x_{it} + \varphi_{jl}(d_{it}) + v_{il}}} \text{ for } k \neq j \quad (3)$$

and for the probabilities of remaining in the current state

$$Prob(transition_{it} = j|x_{it}, d_{it}, j) = 1 - \sum_{l \neq j} Prob(transition_{it} = l|x_{it}, d_{it}, j). \quad (4)$$

The twelve transitions (four original states times three potential destination states) are estimated jointly using the Maximum Likelihood Method.

By modelling two types of potentially correlated unobserved entrepreneurial ability $v_{i,se}$ and $v_{i,ee}$, we achieve three desirable properties of our empirical model. First, we do not rely on the Independence of Irrelevant Alternatives Assumption necessary for the standard MNL model. Second, we link all transitions into solo-entrepreneurship and employer-entrepreneurship across the original states and thereby the four different MNL models that we estimate jointly. Third, we make use of the panel dimension and link observations of the same individual at different times, which is particularly relevant for serial entrepreneurship.

We model the baseline hazard functions $\varphi_{jk}(d_{it})$ flexibly as third degree polynomials of the duration in the current state. The rationale is that the probability of switching from one employment state to another may change with tenure in the current state. For example, the likelihood of a transition from solo-entrepreneurship to employer-entrepreneurship may decrease over time due to habituation of working alone, or it may increase due to the expansion of relevant experience and networks. By conditioning on our flexible specification of the baseline hazards, the model of the transition probabilities, estimated on the panel data in person-period format, can equivalently be written as a general survival model (cf. Jenkins, 1995; Caliendo et al., 2010). We use annual data because the covariates are not available at a higher frequency. By employing the discrete time competing hazards model, we account for state dependence and avoid survivorship bias. Our approach consistently accounts for right-censored

spells, as all survival models do, and also of left-censored spells, because retrospective employment history information in our data allow us to recover the duration of employment spells even in cases when the spell already started before the first survey interview of a person.

As explanatory variables, we include a rich set of socio-economic variables, in particular, gender, education levels, labor market histories, parental entrepreneurship, capital income as an indicator of wealth, and measures of personality characteristics. All the variables, including the personality scores, are measured *before* potential transitions occur, which prevents issues of reverse causality.⁷

5 Econometric Results

5.1 Entries into Employer-entrepreneurship

Table 3 provides the central results of our joint estimation of the transition model. Tables 4-5 present some important extensions of the estimated model. We report multiplicative effects on odds ratios. Thus, values larger (smaller) than 1 indicate that a higher value in an explanatory variable increases (decreases) the probability of the transition at hand (relative to not making any transition, the base category). Stars indicate that differences from 1 (no effect) are significant. Estimates for transitions from and to non-employment, which are not the focus of this paper, appear in Table A2 in the Appendix. For brevity, we also omit from Table 3 the polynomials of the duration in the current state, the year dummies, and variables insignificant in all columns.

In the discussion of our estimation results, we first focus on transitions from paid employment directly to employer-entrepreneurship (column 2) and compare with transitions from paid employment to solo-entrepreneurship (column 1). Starting with proxies for

⁷Nieß and Biemann (2014) emphasize the importance of using antecedent measures of risk propensity in predicting self-employment entry and survival.

entrepreneurial abilities, we observe that most variables influence the entry decision in the expected way. Primarily, education levels and self-employed parents are positively related to the hiring decision from day one. An additional year of education increases the probability of a transition from paid employment to employer-entrepreneurship relative to the probability of no transition by 13.8%.⁸ Moreover, the odds of moving from paid employment to employer-entrepreneurship are more than twice as large for a respondent whose father was self-employed when he or she was 15 years old. Among personality characteristics, the two most important variables are risk tolerance and trust, as higher scores in risk tolerance and in trust have a positive effect on becoming an employer.⁹ Since the model includes both a linear and a squared term of the willingness to take risk, the effects of risk tolerance is revealed from predicted probabilities in Figure 1. A different case can be made for locus of control, which is also deemed important for entrepreneurial entry. While an internal locus of control has a positive but insignificant influence on entries into employer-entrepreneurship, a different type of individual enters solo-entrepreneurship with higher probability, namely individuals with a more external locus of control. In contrast, the two Big-Five factors openness to experience and extraversion do not unfold a significant influence on entry into employer-entrepreneurship; only the meta-trait ‘plasticity’ combining the two Big-Five traits or the distance from the entrepreneurship-prone personality profile do (see Table 4). Different from all other variables related to entrepreneurial abilities, openness or the meta-traits plasticity influence entry into solo-entrepreneurship more strongly than entry into employer-entrepreneurship.

Next we focus on previous gross labor income that has been discussed as a proxy for entrepreneurial abilities (see Hamilton, 2000). In an additional specification (Table 6), we include real labor income before taxes in the month before the interview (and before potential

⁸ In other words, this is the semi-elasticity of the transition odds with respect to the years of schooling.

⁹ All these variables have a similar, but weaker influence on transitions from paid employer-entrepreneurship to solo-entrepreneurship.

transitions occur) in 1000 euro in prices of 2005. In case of paid employment, our income measure is gross wage and salary income; in case of entrepreneurship, business profits that accrue to the entrepreneur; in case of non-employment, labor income is zero.¹⁰ As Table 5 now reveals, we observe that this variable has a significantly positive effect on entries into employer-entrepreneurship while it is much smaller and insignificant for entries into solo-entrepreneurship, supporting the hypothesis that the more able entrepreneurs start hiring immediately during their start-up period.¹¹

Turning to capital constraints and work experience in Table 3, both influence entry into employer-entrepreneurship mostly as expected in Section 2.1. There is positive influence of capital income on starting larger entrepreneurial activities, i.e. hiring others in the firm from the beginning, while this variable does not influence entry into solo-entrepreneurship. As to work and unemployment experience, we observe employer-entrepreneurship is chosen with higher probability when the individuals had less unemployment exposure. Age can be interpreted as a proxy for work experience in our model (because we control for the time spent in unemployment) and reveals an important effect. Figure 4 shows an only slightly higher probability of middle-aged individuals to enter into employer-entrepreneurship, but individuals from all ages switch to employer-entrepreneurship with similar probabilities. In stark contrast, entry into solo-entrepreneurship is strongly dominated by younger and older individuals.

Finally, it is worth looking at the influence of typical socio-demographic characteristics. Men create larger businesses with employees with higher probability (confirming earlier findings), while entries into solo-entrepreneurship do not differ significantly by gender. The opposite is true for the number of children. This variable does not influence entries into employer-entrepreneurship while it positively affects entries into solo-entrepreneurship.

¹⁰ We do not include labor income in the main specification (Table 4) because of potential endogeneity concerns that might arise despite the fact that we measure income before transitions.

¹¹ Another interpretation is that higher income relaxes credit constraints that may be a barrier to hiring employees.

5.2 Differences in the Entry Path

To examine whether the path towards employer-entrepreneurship matters, we compare the estimation results for transitions from paid employment directly to employer-entrepreneurship discussed above with our results for transitions from solo- to employer-entrepreneurship. Table 3 (Columns 2 and 4) presents the main results and Tables 4-5 the extensions.

Most of the variables that influence the direct entry into employer-entrepreneurship unfold a weaker or no influence when analyzing the transitions from solo- to employer-entrepreneurship. For instance, nearly all proxies used to cover entrepreneurial abilities (i.e. education, self-employed parents, and most personality characteristics, such as the Big Five, the meta-trait plasticity, or the specific personality characteristics trust and locus of control) have no significant influence. Only for risk attitudes, we observe an effect: among all solo-entrepreneurs the more risk tolerant individuals have a higher probability of deciding to become employers (Figure 2), which is similar to the effect of risk tolerance on the transition from paid employment to employer-entrepreneurship.

This is not to say that employers coming from solo-entrepreneurship lack entrepreneurial abilities: for many of the ability variables we observe that they are already at work when the individuals self-select into solo-entrepreneurship (Table 3, Column 1). Still, those who make the transition to employer-entrepreneurship directly from paid employment have higher entrepreneurial abilities than those who become solo-entrepreneurs first. Proxies for these abilities with the exception of risk attitudes do not drive the selection out of solo- into employer-entrepreneurship.

Similarly, capital income also does not influence entry from solo- into employer-entrepreneurship. Instead, Table 5 reveals that income success as a solo-entrepreneur supports this selection, while non-employers with low incomes switch to paid employment with higher probability. Thus, confirming previous research (Coad et al., 2017; Fairlie and Miranda, 2017), we also observe that a higher income in the previous year as a non-employer increases the hiring

probability. Only unemployment exposure and work experience unfold similar effects among non-employers and paid employees: prior unemployment exposure decreases the probability of becoming an employer-entrepreneur for both groups. Concerning age (again interpreted as a proxy for work experience), Figure 5 shows a significantly higher probability of middle-aged individuals to enter into employer-entrepreneurship out of solo-entrepreneurship. Age effects on the transition from paid employment to employer-entrepreneurship are similar (Figure 4), although the age coefficients are not individually significant in this case. The age effects on becoming an employer are important to note as entry into solo-entrepreneurship from paid employment is strongly dominated by younger and older individuals (Figure 4). Last but not least, among solo-entrepreneurs, men still start hiring with higher probability than women.

5.3 Survival as Employer

In the final part of our analysis, we examine which of those factors that drive entry into employer-entrepreneurship also influence the survival as an employer (Columns 5 and 6 of Table 3, 4 and 5). We reveal that the two main measures of entrepreneurial abilities beyond personality characteristics, namely human capital (measured by years of formal education), and having self-employed parents also increase the probability of remaining an employer, i.e. they reduce the hazard of exiting from this state. An additional year of schooling for instance decreases the annual odds of losing all employees, while remaining an entrepreneur, by 11% ($=1-0.89$).

Regarding personality characteristics, we expected that Big Five factors different from those that influenced entry into employer-entrepreneurship affect survival in employer-entrepreneurship. Indeed, conscientiousness and agreeableness unfold the influences we expected, i.e. employer-entrepreneurs are more likely to remain in this state when they are more conscientious and less agreeable. Openness for experience and extraversion (which significantly influence entry only when combined to the meta-trait plasticity) remain

insignificant. When not controlling for further personality characteristics (Table 4), more emotionally stable individuals (those with low scores in neuroticism) remain employer-entrepreneurs with higher probability. Concerning the additional specific personality traits, most expectations find support as well. At least when not controlling for the Big Five, higher scores in internal locus of control increase the survival probability of employers (Table 3). More importantly, the transition from employer-entrepreneurship to paid employment is significantly more likely at both the low and high ends of the risk tolerance distribution (Figure 3), confirming previous findings (Caliendo et al., 2010, 2014), but revealing that this effect is particularly relevant for employers. Finally, against expectations, trust also unfolds an influence on survival: the more trustful individuals leave this employment form behind them with higher probability, returning more often to paid employment.

Access to financial capital is no limiting factor for remaining an employer, as expected; it does not unfold any influence on survival of employer businesses.¹² However, the previous year's income from the position as an employer affects the future firm size. Employers who have realized low incomes in this status more often decide to return to solo self-employment.

Turning to previous unemployment exposure and work experience and to the question whether these variables still affect survival as an employer, we observe two main results. Against expectations, those who had spent more time in unemployment do not shut down their businesses with higher probability. In contrast to this, the age variable (capturing previous labor market experience) impacts survival in employer-entrepreneurship: employers at a middle age are less likely to switch to paid employment than younger or older employers (Figure 6).

We also investigate the influence of demographic characteristics. Most importantly, while female individuals enter employer-entrepreneurship with lower probability, gender does not make any difference with regard to survival, i.e. female employers remain in this status with a

¹² Still, limited access to financial capital might inhibit business growth. However, this important question is beyond the scope of our analysis. See Evans and Jovanovic (1989) for research in this direction.

similar probability as their male counterparts. In contrast to this, the number of children unfolds an influence on survival. Employers with more children remain with higher probability in an employer position while those with less children more often return to solo-entrepreneurship. The effect of a migration background is interesting as well: If the employer or one of his/her parents were born outside Germany or do not have a German citizenship, the employer is less likely to switch to paid employment. A disability seems to make sustaining entrepreneurship more difficult: both solo- and employer-entrepreneurs with disabilities shut down their firms more often and return to an employed position.

Finally yet importantly, the entry path into employer-entrepreneurship also matters for survival. As Figure 6 shows, employers exhibit a strong tendency to revert to the employment status they had before becoming an employer. Those who came from paid employment return more often to a employment when they end their career as an employer, while those who started hiring as a solo-entrepreneur return more often to solo-entrepreneurship when they lay off their employees.

5.4 Further Specifications

One of our main variables capturing entrepreneurial abilities, namely education years, might be endogenous in our estimation model if unobserved ability is correlated with education and has a direct effect on the transition probabilities we investigate. To address this potential concern, we use an instrumental variables approach in a robustness check. We use parental education (two dummy variables indicating whether the father and the mother obtained the secondary school degree “Abitur” that qualifies for university entrance in Germany) as instruments for own education. Although the use of parental education as an instrument for education is not without critique, Hoogerheide et al. (2012) conclude from Bayesian analysis using the SOEP that the potential bias introduced by using father’s education as an instrument for schooling in a wage regression is typically within an acceptable range. We implement a control function

approach (Wooldridge, 2014), i.e., we first regress the years of education variable on mother's and father's education along with the explanatory variables and then include the residual as an additional explanatory variable in our competing risks model. The estimated effects of the education variable become larger, but remain qualitatively the same (see Table A3 in the Appendix). Given validity of the instruments, this indicates that the estimated education effects are not driven by omitted variable bias.

6 Discussion and Conclusion

We analyze individual factors that drive the decision of becoming an employer-entrepreneur and those that drive survival in employer-entrepreneurship. Our empirical results based on the German Socio-economic panel (SOEP) are consistent with the hypothesis that individuals who have better entrepreneurial abilities are more likely to hire and to remain an employer. Separating these abilities into a cognitive part (covered by education levels and parental experience as entrepreneurs) and a non-cognitive part (covered by personality traits), we observe that the cognitive part has straightforward effects on entry and survival. The two variables play a key positive role on both decisions, starting as an employer and remaining an employer.

In contrast to this, the influence of the non-cognitive part of entrepreneurial abilities on these two decisions is more nuanced. We reveal that, with the exception of an internal locus of control, no other personality trait affects the entry decision and survival in the same way. Among the Big Five traits, three of them (conscientiousness, agreeableness and neuroticism) influence survival, whereas the other two factors (extraversion and openness to experience), which combine to the meta-trait plasticity, influence entry.

The influence of two further more specific personality characteristics that particularly matter in employer dynamics is even more complicated. While entry into entrepreneurship becomes more probable the higher individuals score in risk tolerance and the propensity to trust

others, both variables unfold a differing influence on survival as an employer. Individuals exit from employer-entrepreneurship with higher probability when they have low or high risk tolerance, thus employers with a medium level of risk tolerance survive the longest time. Employers are also more likely to exit employer-entrepreneurship the higher they score in trust, which contrasts with the positive influence on entry. Overall, these results reveal that the personality of an individual not only plays a key role for the decision to become an employer, but even more importantly for the success as an employer.

Our results also clarify why many employers give up their employer-businesses after some time: among other reasons, some personality characteristics, such as very high scores in risk tolerance and trust that drive the selection into employer-entrepreneurship, later drive the same individuals out of employer-entrepreneurship. In this respect, we also reveal that personality, in particular when looking at its influence on survival in employer-entrepreneurship, plays a stronger role compared to its general influence on survival as an entrepreneur when we do not distinguish between non-employers and employers (see Caliendo et al., 2014).

Besides entrepreneurial abilities, we further reveal that other variables also play a crucial role for becoming an employer. Having access to financial capital is important for those who hire right away, and similarly higher earnings as a solo-entrepreneur for those who hire subsequently. We also show that prior exposure to unemployment has a negative influence on the entry probability, and work experience (measured by age while controlling for unemployment periods) affects survival in employer-entrepreneurship in that the middle-aged exit less frequently.

Finally, we compare the two most important entry paths into employer-entrepreneurship, those who transition from an employed position directly into employer-entrepreneurship, and those who start as solo-entrepreneurs before they make their first hire. On the one hand, we show that those with higher entrepreneurial abilities more often hire immediately. On the other hand, we reveal that almost none of the factors that drive the hiring decision of those who hire

right away influences the hiring decision of those hire out of solo-entrepreneurship. Most of these factors unfold either (a weaker) influence already when these individuals self-select into solo-entrepreneurship, thus partially explaining the inconsistent results of earlier research. For example, individuals with higher levels of education are more likely to become an entrepreneur, be it an employer or a solo-entrepreneur, but among all solo-entrepreneurs, education has no further bite in explaining a transition to an employer.

Overall, our empirical analysis produces four main conclusions:

1. Entrepreneurial abilities drive the decision to hire others.

2. The two entry paths into employer-entrepreneurship greatly differ. Those who have higher entrepreneurial abilities hire immediately, whereas those who aim to experiment with entrepreneurship, for instance because they are uncertain about their abilities, hire after spending a certain amount of time in solo-entrepreneurship.

3. Capital constraints play a role for the entry decision into employer-entrepreneurship. Those who lack financial capital at entry into entrepreneurship aim to realize a sufficient amount of income as a solo-entrepreneur before they start hiring.

4. Personality is an important factor in explaining the hiring decision. Personality traits play an even stronger role in their influence on survival in employer-entrepreneurship than in their influence on survival in entrepreneurship in general. In this respect, it is important to note that most personality traits unfold either a differing influence on hiring first employees and on keeping them or even an opposing influence. Some characteristics such as very high risk tolerance or trust in others are responsible for the selection into employer-entrepreneurship, but also for the selection out of this employment form.

This research raises further questions that future research should address. For example, comparisons with other countries could shed more light on how labor market and business regulations, social security and tax systems, and other institutions moderate the influence of individual characteristics on the dynamics of employer-entrepreneurship.

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Tables

Table 1: Matrix of transitions between employment and entrepreneurship states

| Rows: state in t | | Columns: state in $t+1$ | | | | Total |
|-------------------------------|------|-------------------------|--------|-------|-------|--------|
| | | (1) | (2) | (3) | (4) | |
| (1) Non-employment | Obs. | 4,043 | 1,280 | 121 | 26 | 5,470 |
| | % | 73.9 | 23.4 | 2.2 | 0.5 | 100.0 |
| (2) Paid employment | Obs. | 1,257 | 30,937 | 144 | 134 | 32,472 |
| | % | 3.9 | 95.3 | 0.4 | 0.4 | 100.0 |
| (3) Solo-entrepreneurship | Obs. | 83 | 149 | 1,670 | 206 | 2,108 |
| | % | 3.9 | 7.1 | 79.2 | 9.8 | 100.0 |
| (4) Employer-entrepreneurship | Obs. | 33 | 88 | 192 | 1,736 | 2,049 |
| | % | 1.6 | 4.3 | 9.4 | 84.7 | 100.0 |
| Total | Obs. | 5,416 | 32,454 | 2,127 | 2,102 | 42,099 |

Notes: The transition matrix shows the numbers of observations in our estimation sample that switch from one employment status to another one between the survey interviews in two subsequent years. Observations on the diagonal remain in the current state.

Source: Authors' calculations based on SOEP, 2005-2012.

Table 2: Sample means by employment state and equal means test by entrepreneur type

| | Non-employed | Paid employees | Solo-entrepreneurs | Employer-entrepreneurs | <i>t</i> -tests of equal means (<i>p</i> -values) | |
|--|--------------|----------------|--------------------|------------------------|--|-------------------------------|
| | | | | | Solo-entr. vs. paid employees | Employers vs. solo-entrepren. |
| <i>Socio-economic variables:</i> | | | | | | |
| female | 0.782 | 0.505 | 0.489 | 0.269 | 0.146 | 0.000 |
| education years | 12.018 | 12.689 | 13.797 | 14.307 | 0.000 | 0.000 |
| married | 0.774 | 0.694 | 0.667 | 0.708 | 0.009 | 0.005 |
| no. of children | 0.975 | 0.615 | 0.581 | 0.736 | 0.094 | 0.000 |
| age | 42.853 | 42.978 | 45.247 | 45.416 | 0.000 | 0.495 |
| unemploy. exp. | 2.058 | 0.568 | 0.819 | 0.289 | 0.000 | 0.000 |
| migration backgr. | 0.184 | 0.134 | 0.129 | 0.114 | 0.512 | 0.131 |
| disability degree | 3.801 | 2.828 | 1.008 | 1.980 | 0.000 | 0.000 |
| east | 0.245 | 0.246 | 0.243 | 0.208 | 0.761 | 0.007 |
| father's education | 0.109 | 0.114 | 0.237 | 0.209 | 0.000 | 0.032 |
| mother's education | 0.060 | 0.053 | 0.129 | 0.115 | 0.000 | 0.182 |
| father entrepreneur | 0.071 | 0.070 | 0.126 | 0.196 | 0.000 | 0.000 |
| <i>Personality:</i> | | | | | | |
| openness | 4.479 | 4.428 | 5.037 | 4.754 | 0.000 | 0.000 |
| conscientiousness | 5.862 | 5.971 | 5.908 | 6.028 | 0.001 | 0.000 |
| extraversion | 4.778 | 4.818 | 5.099 | 5.028 | 0.000 | 0.044 |
| agreeableness | 5.465 | 5.359 | 5.399 | 5.234 | 0.064 | 0.000 |
| neuroticism | 4.165 | 3.803 | 3.747 | 3.558 | 0.036 | 0.000 |
| risk tolerance | 4.236 | 4.581 | 5.393 | 5.663 | 0.000 | 0.000 |
| int. locus of control | 27.277 | 28.874 | 29.669 | 31.502 | 0.000 | 0.000 |
| trust | 2.263 | 2.353 | 2.501 | 2.426 | 0.000 | 0.000 |
| plasticity | 9.256 | 9.245 | 10.135 | 9.782 | 0.000 | 0.000 |
| stability | 15.164 | 15.527 | 15.558 | 15.703 | 0.488 | 0.022 |
| distance from entrep.-prone profile | 13.509 | 12.943 | 12.096 | 11.982 | 0.000 | 0.143 |
| <i>Industry:</i> | | | | | | |
| construction | 0.000 | 0.051 | 0.075 | 0.134 | 0.000 | 0.000 |
| trade | 0.000 | 0.126 | 0.094 | 0.165 | 0.000 | 0.000 |
| business services | 0.000 | 0.076 | 0.206 | 0.214 | 0.000 | 0.558 |
| public & pers. serv. | 0.000 | 0.290 | 0.315 | 0.213 | 0.014 | 0.000 |
| <i>Income and tenure:</i> | | | | | | |
| capital income | 0.000 | 2.554 | 2.298 | 5.558 | 0.000 | 0.000 |
| gross labor income | 2.711 | 2.569 | 7.020 | 17.221 | 0.000 | 0.000 |
| duration | 5.098 | 12.383 | 5.678 | 8.367 | 0.000 | 0.000 |
| Observation years | 5470 | 32,472 | 2108 | 2049 | | |

Notes: Unweighted means by employment state in the estimation sample. The personality variables (except risk tolerance) were standardized in the full sample. The last two columns shows *p*-values of tests of equal means between solo-entrepreneurs and paid employees or employer-entrepreneurs, respectively. Three variables not used in the main analysis (labor income, father's and mother's education) are based on fewer observations because of missing values. Section 3.1 defines the personality variables and Table A1 in the Appendix the socio-demographic variable.

Source: Authors' calculations based on SOEP, 2005-2012 (with some variable values from 2003/04).

Table 3: Effects on transition probabilities between employment and entrepreneurship states

| | Transition from | | | | | |
|----------------------------|-----------------------|-----------------------|--------------------------|-----------------------|----------------------|-----------------------|
| | paid employment to | | solo-entrepreneurship to | | employer-entrep. to | |
| | solo-entrep. | employer-entrep. | paid employm. | employer-entrep. | paid employm. | solo-entrep. |
| Female | 0.8510 (0.1874) | 0.3392*** (0.0826) | 1.2336 (0.2873) | 0.4191*** (0.1193) | 1.1958 (0.3751) | 0.7967 (0.2301) |
| education years | 1.1123*** (0.0431) | 1.1383*** (0.0541) | 1.0136 (0.0330) | 0.9882 (0.0426) | 0.9924 (0.0474) | 0.8917** (0.0436) |
| no. of children | 1.2923** (0.1431) | 0.8569 (0.1108) | 1.2294* (0.1305) | 0.8399 (0.1096) | 1.0957 (0.1696) | 0.7470** (0.0982) |
| age | 0.8401* (0.0779) | 1.0986 (0.1220) | 0.8262** (0.0774) | 1.2718* (0.1611) | 0.7431** (0.0924) | 1.0108 (0.1531) |
| age sq. | 1.0023** (0.0011) | 0.9989 (0.0013) | 1.0018 (0.0011) | 0.9968** (0.0015) | 1.0034** (0.0014) | 0.9999 (0.0017) |
| unemploy. exp. | 1.0766 (0.0742) | 0.8108** (0.0785) | 1.0724 (0.0624) | 0.6489*** (0.0938) | 0.7847 (0.1701) | 1.2522 (0.1992) |
| migration backgr. | 1.5061 (0.3775) | 0.6882 (0.2259) | 1.1098 (0.2735) | 0.8193 (0.2650) | 0.3759** (0.1792) | 0.5572 (0.2392) |
| disability degree | 0.9978 (0.0080) | 0.9996 (0.0098) | 1.0363*** (0.0093) | 1.0283 (0.0177) | 1.0201** (0.0082) | 0.9754 (0.0161) |
| father entrepreneur | 1.7934** (0.5136) | 2.3586*** (0.6436) | 0.7716 (0.2203) | 1.4215 (0.4673) | 0.4955* (0.2083) | 0.9779 (0.3083) |
| capital income | 1.0009 (0.0028) | 1.0082*** (0.0020) | 1.0000 (0.0027) | 1.0016 (0.0023) | 1.0010 (0.0007) | 0.9990 (0.0038) |
| openness | 1.6503*** (0.1817) | 1.1309 (0.1329) | 0.9879 (0.1041) | 0.9637 (0.1247) | 1.0515 (0.1595) | 1.1238 (0.1399) |
| conscientiousness | 0.8941 (0.0930) | 1.1407 (0.1385) | 0.9691 (0.0907) | 1.1721 (0.1388) | 0.7698* (0.1085) | 0.8847 (0.0972) |
| agreeableness | 0.9881 (0.1033) | 1.0439 (0.1152) | 0.9915 (0.0849) | 0.9444 (0.1068) | 1.2537 (0.1833) | 1.2432* (0.1529) |
| risk tolerance | 0.8493 (0.1441) | 0.7661 (0.1249) | 0.8651 (0.1323) | 0.7835 (0.1439) | 0.6740* (0.1413) | 1.1858 (0.2303) |
| risk tolerance sq. | 1.0339** (0.0165) | 1.0399** (0.0160) | 1.0118 (0.0151) | 1.0312* (0.0180) | 1.0401** (0.0194) | 0.9843 (0.0168) |
| int. locus of control | 0.8471* (0.0838) | 1.0931 (0.1310) | 0.8546 (0.0834) | 0.9066 (0.1066) | 1.1022 (0.1634) | 0.8252 (0.1009) |
| trust | 1.1186 (0.1180) | 1.2815** (0.1497) | 0.9454 (0.0786) | 1.1003 (0.1313) | 1.2577* (0.1643) | 1.1049 (0.1233) |
| construction | 2.1183* (0.8373) | 2.6891*** (0.9753) | 1.0168 (0.4179) | 2.7292** (1.2156) | 0.6211 (0.3419) | 0.8691 (0.3252) |
| trade | 1.5830 (0.4862) | 2.4017*** (0.7155) | 1.6014 (0.5456) | 1.8245* (0.6515) | 1.2752 (0.4686) | 0.5895 (0.2198) |
| business services | 1.8416** (0.5533) | 1.2875 (0.4480) | 1.1127 (0.3112) | 1.5266 (0.4445) | 0.6561 (0.2638) | 1.0417 (0.3674) |
| public & pers. serv. | 1.5355* (0.3651) | 0.8754 (0.2483) | 0.9489 (0.2550) | 0.8260 (0.2716) | 0.4147** (0.1698) | 1.1503 (0.3759) |
| Variance of latent ability | 10.249*** (4.6536) | 9.8641*** (6.1173) | | 9.8641*** (6.1173) | | 10.249*** (4.6536) |

Notes: Jointly estimated competing risk models of transition probabilities. Odds ratios reported. Values larger (smaller) than 1 indicate that a variable increases (decreases) the probability of the transition at hand in comparison to remaining in the current state. Transitions from and to non-employment are shown in Table A2 in the Appendix. Insignificant control variables not shown: married, eastern Germany, extraversion, neuroticism. Further controls not shown: duration in the current state (polynomial of third degree), year dummies. The model accounts for two types of latent entrepreneurial ability for solo-entrepreneurship and employer-entrepreneurship with estimated covariance 1.0404 (std.-err.: 0.2949). Log-likelihood=-11,713. N=42,099. ***/**: Odds ratio significantly different from 1 at the 10%/5%/1% level based on cluster robust standard errors. Source: Authors' calculations based on SOEP, 2005-2012 (with some variable values from 2003/04).

Table 4: Effects on transition probabilities—With alternative sets of personality variables

| | Transition from | | | | | |
|----------------------------------|-----------------------|-----------------------|--------------------------|---------------------|----------------------|---------------------|
| | paid employment to | | solo-entrepreneurship to | | employer-entrep. to | |
| | solo-entrep. | employer-entrep. | paid employm. | employer-entrep. | paid employm. | solo-entrep. |
| <i>Big 5 model:</i> | | | | | | |
| openness | 1.7324*** (0.1878) | 1.1942 (0.1442) | 0.9948 (0.1016) | 1.0145 (0.1304) | 1.0561 (0.1514) | 1.1326 (0.1373) |
| conscientiousness | 0.8813 (0.0903) | 1.1285 (0.1318) | 0.9670 (0.0847) | 1.1807 (0.1393) | 0.7535** (0.1032) | 0.8553 (0.0928) |
| extraversion | 1.1047 (0.1148) | 1.1220 (0.1228) | 0.8830 (0.0828) | 1.1839 (0.1571) | 1.0032 (0.1283) | 1.0286 (0.1182) |
| agreeableness | 0.9438 (0.0981) | 1.0476 (0.1162) | 0.9882 (0.0841) | 0.9160 (0.1048) | 1.3164* (0.1958) | 1.2294* (0.1503) |
| neuroticism | 0.9689 (0.0890) | 1.0584 (0.1005) | 1.0321 (0.0911) | 1.0463 (0.1207) | 1.0084 (0.1413) | 1.2196* (0.1382) |
| <i>2 meta-traits model:</i> | | | | | | |
| plasticity | 1.6970*** (0.1805) | 1.2799** (0.1427) | 0.8886 (0.0892) | 1.1563 (0.1554) | 1.0709 (0.1526) | 1.1571 (0.1406) |
| stability | 0.9018 (0.0872) | 1.0629 (0.1050) | 0.9500 (0.0886) | 1.0212 (0.1136) | 0.9789 (0.1212) | 0.8925 (0.0934) |
| <i>Profile model:</i> | | | | | | |
| dist. from entrep.-prone profile | 0.6989*** (0.0620) | 0.8177** (0.0814) | 1.1301 (0.1059) | 0.8377 (0.1044) | 1.1341 (0.1697) | 1.1364 (0.1452) |
| <i>Specific traits:</i> | | | | | | |
| risk tolerance | 0.8934 (0.1525) | 0.7649* (0.1238) | 0.8977 (0.1345) | 0.7814 (0.1413) | 0.6870* (0.1342) | 1.2524 (0.2465) |
| risk tolerance sq. | 1.0325** (0.0164) | 1.0400*** (0.0158) | 1.0079 (0.0147) | 1.0321* (0.0177) | 1.0378** (0.0184) | 0.9791 (0.0171) |
| int. locus of control | 0.8702 (0.0829) | 1.1191 (0.1325) | 0.8329** (0.0762) | 0.9443 (0.1065) | 1.0606 (0.1420) | 0.7973* (0.0932) |
| trust | 1.1257 (0.1189) | 1.2405* (0.1414) | 0.9500 (0.0792) | 1.0540 (0.1212) | 1.3145** (0.1773) | 1.0825 (0.1216) |

Notes: Competing risk models of transition probabilities. The Big 5 model, 2 meta-traits model, entrepreneurship-prone personality profile model, and specific traits model are estimated separately. The first three specifications do not include the more specific personality variables (willingness to take risks, locus of control, and trust) and the fourth only includes these, but not the more general traits. For each of the four specifications, all transitions are estimated jointly. Odds ratios reported. Transitions from and to non-employment are not shown for brevity. The control variables are the same as in the main estimation (Table 3). The models account for two types of latent entrepreneurial ability for solo-entrepreneurship and employer-entrepreneurship. N=42,099. */**/***: Odds ratio significantly different from 1 at the 10%/5%/1% level based on cluster robust standard errors. *Source:* Authors' calculations based on SOEP, 2005-2012 (with some variable values from 2003/04).

Table 5: Effects on transition probabilities—Including previous monthly labor income

| | Transition from | | | | | |
|----------------------------|-----------------------|-----------------------|--------------------------|-----------------------|---------------------|-----------------------|
| | paid employment to | | solo-entrepreneurship to | | employer-entrep. to | |
| | solo-entrep. | employer-entrep. | paid employm. | employer-entrep. | paid employm. | solo-entrep. |
| gross labor income | 1.0086 (0.0661) | 1.0684** (0.0347) | 0.8809** (0.0496) | 1.1708*** (0.0646) | 0.9533 (0.0383) | 0.8388** (0.0574) |
| Further control var. | Yes | Yes | Yes | Yes | Yes | Yes |
| Variance of latent ability | 11.815*** (6.0644) | 8.6837*** (5.6183) | | 8.6837*** (5.6183) | | 11.815*** (6.0644) |

Notes: Jointly estimated competing risk models of transition probabilities. This specification includes labor income in the month before the interview as an additional explanatory variable. Odds ratios reported. Transitions from and to non-employment are not shown for brevity. The other control variables are the same as in the main estimation (Table 3). The model accounts for two types of latent entrepreneurial ability for solo-entrepreneurship and employer-entrepreneurship with estimated covariance 0.7962 (std.-err.: 0.2338). Log-likelihood=-10,751. N=39,260. */**/*: Odds ratio significantly different from 1 at the 10%/5%/1% level based on cluster robust standard errors. *Source:* Authors' calculations based on SOEP, 2005-2012 (with some variable values from 2003/04).

Table 6: Effects on transition probabilities—Including the prior employment status

| | Transition from | | | | | |
|----------------------------|-----------------------|-----------------------|--------------------------|-----------------------|-----------------------|-----------------------|
| | paid employment to | | solo-entrepreneurship to | | employer-entrep. to | |
| | solo-entrep. | employer-entrep. | paid employm. | employer-entrep. | paid employm. | solo-entrep. |
| prev. non-employed | 0.7690 (0.1815) | 0.8371 (0.2550) | 0.8225 (0.2477) | 0.7135 (0.2566) | 4.5638** (2.9470) | 1.9344 (0.9330) |
| prev. paid employee | | | 1.4250 (0.4116) | 0.6959 (0.2263) | 7.1682*** (2.9701) | 0.5999 (0.1975) |
| prev. solo-entrep. | 5.8307*** (1.6332) | 3.8879*** (1.5038) | | | 1.1270 (0.6044) | 2.4054*** (0.7647) |
| prev. employer-ent. | 2.3036* (1.0959) | 24.892*** (6.7744) | 0.3754*** (0.1368) | 2.1545*** (0.6402) | | |
| Further control var. | Yes | Yes | Yes | Yes | Yes | Yes |
| Variance of latent Ability | 2.5315*** (0.7200) | 1.3273 (0.2733) | | 1.9874* (0.7619) | | 2.5315*** (0.7200) |

Notes: Jointly estimated competing risk models of transition probabilities. This specification includes dummy variables indicating the employment state before the current employment spell. Odds ratios reported. Transitions from and to non-employment are not shown for brevity. The control variables are the same as in the main estimation (Table 3). The model accounts for two types of latent entrepreneurial ability for solo-entrepreneurship and employer-entrepreneurship with estimated covariance 1.3273 (std.-err.: 0.2733). Log-likelihood=-11,450. N=42,099. */**/*: Odds ratio significantly different from 1 at the 10%/5%/1% level based on cluster robust standard errors. *Source:* Authors' calculations based on SOEP, 2005-2012 (with some variable values from 2003/04).

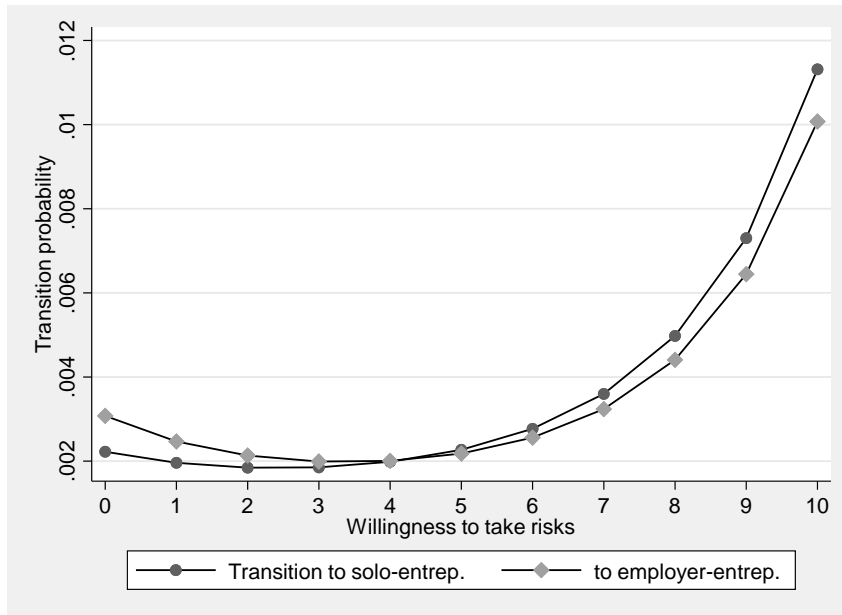
Table 7: Summary of hypotheses and estimation results concerning employers

| | Entry from paid employment | | Entry from solo-entrepreneurship | | Exit from employer-entrepreneurship | |
|---------------------------|----------------------------|----------------|----------------------------------|--------------|-------------------------------------|----------------|
| | Hypotheses | Results | Hypotheses | Results | Hypotheses | Result |
| Extraversion | + | (+) | <i>+0</i> | 0 | 0 | 0 |
| Openness to experience | + | (+) | <i>+0</i> | 0 | 0 | 0 |
| Conscientiousness | 0 | 0 | 0 | 0 | - | - |
| Agreeableness | 0 | 0 | 0 | 0 | + | + |
| Neuroticism | 0 | 0 | 0 | 0 | + | + |
| Internal locus of control | + | 0 | <i>+0</i> | 0 | - | - |
| Risk tolerance | + | + | <i>+0</i> | + | U-shape | U-shape |
| Trust | + | + | <i>+0</i> | 0 | 0 | + |
| Education levels | + | + | <i>+0</i> | <i>0</i> | - | - |
| Self-employed parents | + | + | <i>+0</i> | <i>0</i> | - | - |
| Age | Inv U | (Inv U) | Inv U | Inv U | U-shape | U-shape |
| Capital income | + | + | <i>0</i> | <i>0</i> | 0 | 0 |
| Unemployment exp. | - | - | - | - | + | 0 |
| Previous income | + | + | + | + | - | - |

Note: Hypotheses and Results in italics are consistent with previous research. The hypothesis on the positive influence of ‘extraversion’ and ‘openness for experience’ on entry into employer-entrepreneurship finds only support when jointly measured by the meta-trait ‘plasticity’.

Figures

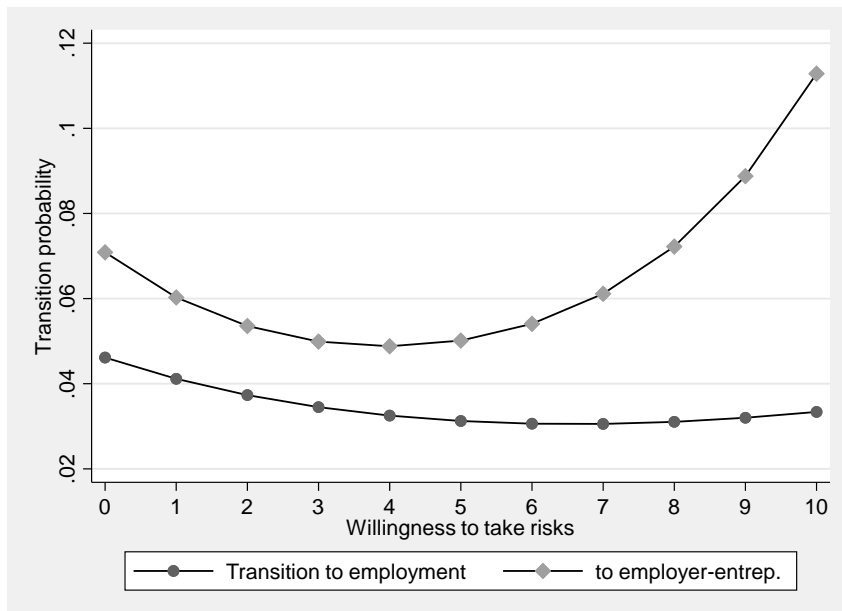
Figure 1: Effect of the willingness to take risks on the prob. of exit from paid employment



Note: Predicted mean annual transition probabilities from paid employment to solo-entrepreneurship and employer-entrepreneurship as functions of the willingness to take risks, evaluated at the mean values of the other explanatory variables in the sample of paid employees.

Source: Authors' calculations based on SOEPv29, 2005-2012.

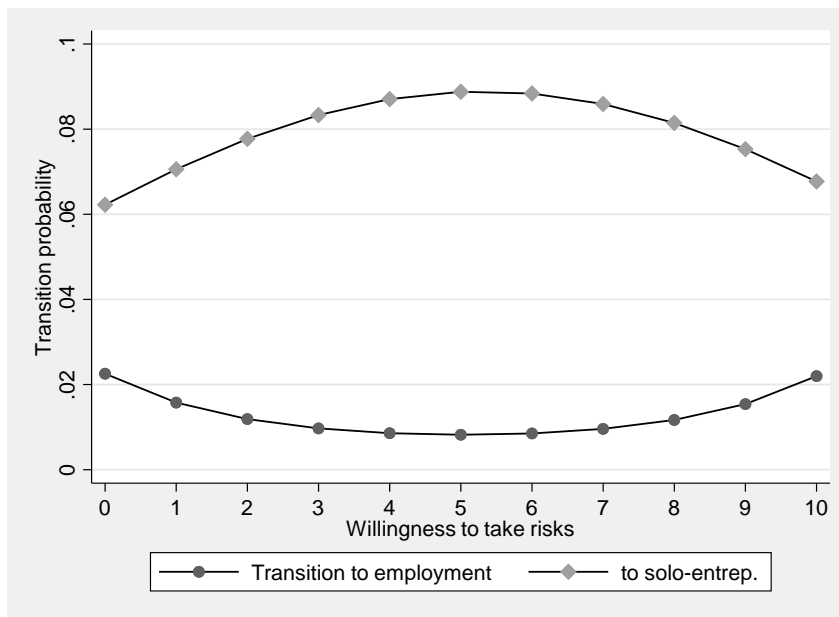
Figure 2: Effect of the willingness to take risks on the prob. of exit from solo-entrep.



Note: Predicted mean annual transition probabilities from solo-entrepreneurship to paid employment and employer-entrepreneurship as functions of the willingness to take risks, evaluated at the mean values of the other explanatory variables in the sample of solo-entrepreneurs.

Source: Authors' calculations based on SOEPv29, 2005-2012.

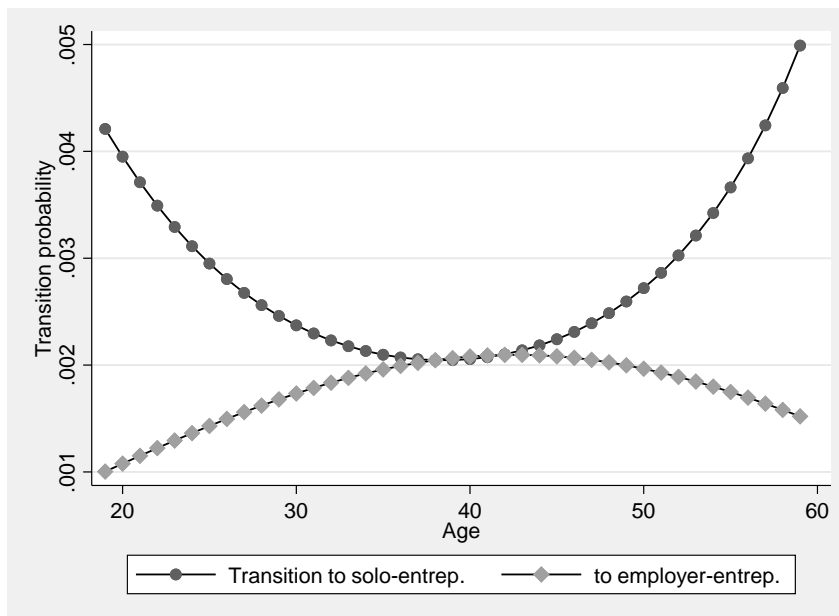
Figure 3: Effect of the willingness to take risks on the prob. of exit from employer-entrep.



Note: Predicted mean annual transition probabilities from employer-entrepreneurship to paid employment and solo-entrepreneurship as functions of the willingness to take risks, evaluated at the mean values of the other explanatory variables in the sample of employer-entrepreneurs.

Source: Authors' calculations based on SOEPv29, 2005-2012.

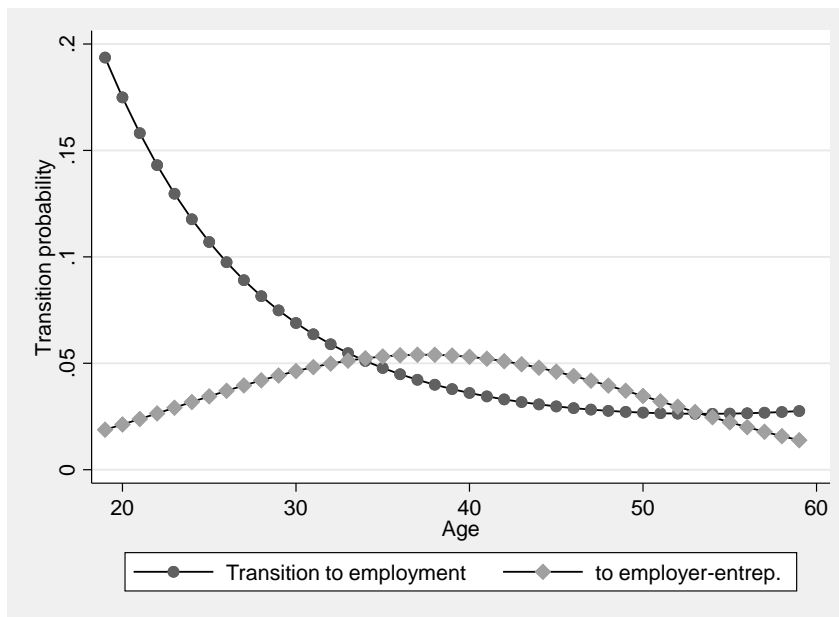
Figure 4: Effect of age on the probability of exit from paid employment



Note: Predicted mean annual transition probabilities from paid employment to solo-entrepreneurship and employer-entrepreneurship as functions of age, evaluated at the mean values of the other explanatory variables in the sample of paid employees.

Source: Authors' calculations based on SOEPv29, 2005-2012.

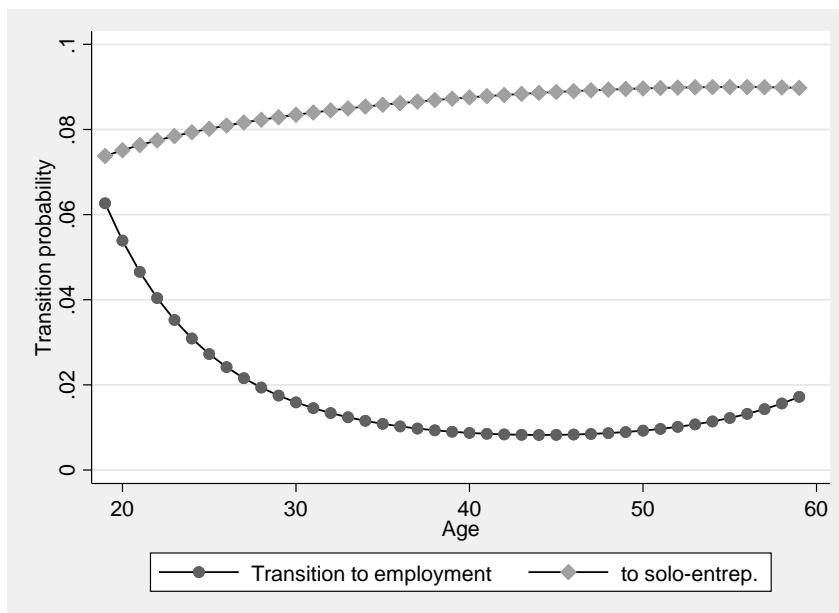
Figure 5: Effect of age on the probability of exit from solo-entrepreneurship



Note: Predicted mean annual transition probabilities from solo-entrepreneurship to paid employment and employer-entrepreneurship as functions of age, evaluated at the mean values of the other explanatory variables in the sample of solo-entrepreneurs.

Source: Authors' calculations based on SOEPv29, 2005-2012.

Figure 6: Effect of age on the probability of exit from employer-entrepreneurship



Note: Predicted mean annual transition probabilities from employer-entrepreneurship to paid employment and solo-entrepreneurship as functions of age, evaluated at the mean values of the other explanatory variables in the sample of employer-entrepreneurs.

Source: Authors' calculations based on SOEPv29, 2005-2012.

Appendix: Supplementary Tables

Table A1: Description of the socio-economic variables

| Variable | Definition |
|----------------------|---|
| education years | Calculated from the standard years of schooling required to obtain the highest degree obtained by the respondent. |
| married | Dummy for a married and not separated person. |
| no. of children | Number of children under 17 in the household. |
| unemployment exp. | Years of unemployment exposure. |
| migration background | Born outside Germany or without German citizenship, or at least one parent was born outside Germany or has no German citizenship. |
| disability degree | Officially assessed and certified degree of disability. |
| east | Dummy for a person living in the area of former East Germany or Berlin. |
| father's education | Dummy for a person whose father obtained a high school degree qualifying for university entrance. |
| mother's education | Dummy for a person whose mother obtained a high school degree qualifying for university entrance. |
| father entrepreneur | Dummy for a person whose father was self-employed when the respondent was 15 years old. |
| capital income | Real income from interest, dividends and property rents before taxes in the previous year in 1000 euro in prices of 2005. Some respondents report the exact amount of their financial income, while others only indicate a range. For the latter respondents, we impute the mean income of those who give the exact amount within this range. |
| gross labor income | Real labor income before taxes in the month before the interview in 1000 euro in prices of 2005. |
| duration | Tenure in the current employment state (solo-entrepreneurship, employer-entrepreneurship, paid employment, unemployment/non-participation). For left-censored spells, we use the retrospectively elicited duration since the last job change. |

Notes: Dummy variables equal 1 if the condition holds and 0 otherwise. The personality variables are explained in Section 3.1.

Table A2: Effects on transition probabilities from and to non-employment

| | Transition from non-employment to | | | Transition to non-employment from | | |
|-------------------------------|-----------------------------------|-----------------------|-----------------------|-----------------------------------|-----------------------|-----------------------|
| | paid employm. | solo- entrep. | employer- entrep. | paid employm. | solo- entrep. | employer- entrep. |
| female | 0.6599*** (0.0630) | 0.2849*** (0.0810) | 0.2503** (0.1499) | 1.9537*** (0.1482) | 3.5406*** (1.0131) | 6.6381*** (3.1584) |
| education years | 1.0211 (0.0166) | 1.1899*** (0.0550) | 0.9023 (0.0895) | 0.9786 (0.0143) | 0.9872 (0.0511) | 0.7687*** (0.0641) |
| married | 0.8705 (0.0808) | 0.6803 (0.1949) | 0.5923 (0.3490) | 1.2490*** (0.0997) | 1.0130 (0.3118) | 1.7350 (0.8118) |
| no. of children | 0.8711*** (0.0380) | 0.8425 (0.1016) | 0.6910 (0.2047) | 0.9217* (0.0415) | 1.2805 (0.1936) | 1.0289 (0.2540) |
| age | 1.1915*** (0.0415) | 1.6729*** (0.2026) | 1.9979** (0.5558) | 0.7634*** (0.0216) | 0.9645 (0.1347) | 0.8113 (0.1775) |
| age sq. | 0.9974*** (0.0004) | 0.9936*** (0.0014) | 0.9913*** (0.0033) | 1.0030*** (0.0003) | 1.0004 (0.0016) | 1.0022 (0.0026) |
| unemploy. exp. | 0.9671** (0.0150) | 0.8720** (0.0514) | 0.7481*** (0.0819) | 1.2172*** (0.0173) | 1.0079 (0.0593) | 1.8610*** (0.2772) |
| migration backgr. | 0.8703 (0.0876) | 0.6429 (0.2165) | 2.5577* (1.3087) | 1.1184 (0.0991) | 0.6454 (0.2795) | 0.5691 (0.3556) |
| disability degree | 0.9949 (0.0033) | 0.9919 (0.0090) | 0.9555** (0.0220) | 1.0027 (0.0023) | 1.0221* (0.0136) | 0.9690 (0.0210) |
| east | 1.3431*** (0.1215) | 1.0760 (0.3158) | 1.0714 (0.6764) | 1.1291* (0.0813) | 0.8812 (0.2512) | 0.4856 (0.2691) |
| father entrepreneur | 1.0625 (0.1703) | 0.8602 (0.3670) | 3.6682** (2.4028) | 0.8216 (0.1151) | 0.7729 (0.3188) | 1.6477 (0.9820) |
| openness | 0.9500 (0.0394) | 1.3444** (0.1872) | 0.9792 (0.2188) | 1.1154*** (0.0399) | 0.8466 (0.1224) | 1.3113 (0.2925) |
| conscientiousness | 1.1360*** (0.0469) | 0.9212 (0.1116) | 0.8820 (0.2302) | 0.9874 (0.0340) | 1.0951 (0.1353) | 1.1723 (0.2599) |
| agreeableness | 0.9602 (0.0399) | 1.2035 (0.1480) | 0.9024 (0.2120) | 1.0150 (0.0369) | 1.3319** (0.1673) | 1.0462 (0.2452) |
| neuroticism | 1.0166 (0.0416) | 1.0091 (0.1304) | 1.0638 (0.2165) | 1.0915*** (0.0364) | 0.9291 (0.1216) | 0.8331 (0.2011) |
| risk tolerance | 1.1858*** (0.0689) | 1.0474 (0.1934) | 0.9915 (0.2718) | 0.9465 (0.0463) | 0.8930 (0.1899) | 1.4549 (0.5009) |
| risk tolerance sq. | 0.9831*** (0.0063) | 1.0155 (0.0177) | 1.0136 (0.0265) | 1.0056 (0.0052) | 1.0219 (0.0207) | 0.9777 (0.0300) |
| int. locus of control | 1.0201 (0.0401) | 0.9485 (0.1140) | 1.4131 (0.3193) | 0.9357* (0.0324) | 0.8309 (0.1000) | 0.7331 (0.1682) |
| trust | 1.0343 (0.0415) | 1.1132 (0.1289) | 1.3251 (0.3763) | 0.9601 (0.0315) | 0.7656** (0.0841) | 0.6719** (0.1291) |
| construction | | | | 1.5440*** (0.2015) | 0.6762 (0.3324) | 0.7594 (0.5542) |
| business services | | | | 0.8066* (0.1008) | 0.4102** (0.1731) | 0.4222 (0.3040) |
| public & pers. serv. | | | | 0.8110*** (0.0633) | 0.3979*** (0.1234) | 0.8505 (0.5743) |
| Variance of latent ability | | 10.249*** (4.6536) | 9.8641*** (6.1173) | | | |

Notes: Jointly estimated competing risk models of transition probabilities. Odds ratios reported. All other transitions are shown in Table 3. Insignificant control variables not shown: capital income, extraversion, trade. Further controls not shown: duration in the current state (polynomial of third degree), year dummies. In the equation of transition from non-employment to employer-entrepreneurship we do not include year dummies because this would predict some transitions perfectly. The model accounts for two types of latent entrepreneurial ability for solo-entrepreneurship and employer-entrepreneurship with estimated covariance 1.0404 (std.-err.: 0.2949). Log-likelihood=-11,713. N=42,099. ***/**/*: Odds ratio significantly different from 1 at the 10%/5%/1% level based on cluster robust standard errors. *Source:* Authors' calculations based on SOEP, 2005-2012 (with some variables from 2003/04).

Table A3: Effects on transition prob. accounting for potential endogeneity of education

| | Transition from | | | | | |
|----------------------------|-----------------------|-----------------------|--------------------------|-----------------------|-----------------------|------------------------|
| | paid employment to | | solo-entrepreneurship to | | employer-entrep. to | |
| | solo-entrep. | employer-entrep. | paid employm. | employer-entrep. | paid employm. | solo-entrep. |
| reduced form resid. | 0.5844*** (0.1147) | 0.7197*** (0.0879) | 0.8700 (0.1099) | 1.1456 (0.1881) | 0.9062 (0.1067) | 1.5189** (0.2711) |
| female | 0.9914 (0.2244) | 0.3451*** (0.0898) | 1.3203 (0.3026) | 0.4738*** (0.1359) | 1.2294 (0.3963) | 0.7321 (0.2235) |
| education years | 1.7245*** (0.3350) | 1.5132*** (0.1720) | 1.1622 (0.1420) | 0.8750 (0.1375) | 1.0745 (0.0945) | 0.6662** (0.1058) |
| no. of children | 1.2577* (0.1504) | 0.8790 (0.1159) | 1.2646** (0.1416) | 0.8295 (0.1136) | 1.1403 (0.1802) | 0.7381** (0.1049) |
| age | 0.7869** (0.0780) | 1.0488 (0.1241) | 0.8344* (0.0802) | 1.3086** (0.1643) | 0.7723** (0.0966) | 1.0333 (0.1605) |
| age sq. | 1.0030** (0.0012) | 0.9994 (0.0014) | 1.0017 (0.0011) | 0.9966** (0.0015) | 1.0029** (0.0014) | 0.9997 (0.0018) |
| unemploy. exp. | 1.2319** (0.1110) | 0.8397 (0.0924) | 1.0324 (0.0694) | 0.6227*** (0.1006) | 0.8551 (0.1926) | 1.2067 (0.2040) |
| migration backgr. | 1.6546* (0.4340) | 0.7789 (0.2565) | 1.0730 (0.2752) | 0.5891 (0.1962) | 0.4141* (0.1982) | 0.6413 (0.2898) |
| disability degree | 1.0015 (0.0079) | 1.0046 (0.0097) | 1.0369*** (0.0093) | 1.0252 (0.0177) | 1.0218*** (0.0081) | 0.9777 (0.0164) |
| east | 0.5643* (0.1669) | 0.6796 (0.1877) | 0.7558 (0.1947) | 0.9319 (0.2728) | 0.7709 (0.2618) | 0.9176 (0.2860) |
| father entrepreneur | 1.3996 (0.4859) | 1.9582** (0.5541) | 0.7585 (0.2402) | 1.8513* (0.6539) | 0.4867* (0.2031) | 1.1321 (0.3785) |
| capital income | 0.9958 (0.0037) | 1.0056** (0.0022) | 0.9997 (0.0024) | 1.0005 (0.0020) | 1.0008 (0.0007) | 0.9987 (0.0042) |
| openness | 1.4204** (0.1985) | 0.9717 (0.1234) | 0.9712 (0.1131) | 0.9947 (0.1381) | 1.0439 (0.1613) | 1.1744 (0.1535) |
| conscientiousness | 1.0100 (0.1203) | 1.1956 (0.1547) | 1.0536 (0.1222) | 1.0941 (0.1647) | 0.8363 (0.1243) | 0.8710 (0.1021) |
| agreeableness | 0.9989 (0.1052) | 0.9998 (0.1136) | 0.9308 (0.0891) | 1.0265 (0.1267) | 1.1588 (0.1750) | 1.2267 (0.1567) |
| risk tolerance | 0.8110 (0.1400) | 0.7037** (0.1197) | 0.9474 (0.1577) | 0.7433 (0.1394) | 0.6768* (0.1462) | 1.2802 (0.2560) |
| risk tolerance sq. | 1.0386** (0.0169) | 1.0469*** (0.0169) | 1.0030 (0.0163) | 1.0367** (0.0184) | 1.0372* (0.0200) | 0.9737 (0.0180) |
| int. locus of control | 0.7608** (0.0818) | 0.9955 (0.1291) | 0.8482 (0.0864) | 0.9699 (0.1123) | 1.0568 (0.1584) | 0.8654 (0.1139) |
| construction | 3.0571*** (1.3150) | 2.5600** (1.0079) | 1.0262 (0.4490) | 2.6144** (1.2105) | 0.5206 (0.3149) | 0.8891 (0.3590) |
| trade | 2.1027** (0.7227) | 2.7133*** (0.8471) | 1.6036 (0.5734) | 1.8879* (0.6906) | 1.3316 (0.4898) | 0.4529* (0.1871) |
| business services | 1.0869 (0.4504) | 0.8341 (0.3170) | 0.8847 (0.2930) | 1.9409* (0.7720) | 0.4686* (0.2156) | 2.3310 (1.2905) |
| public & pers. serv. | 1.1673 (0.3062) | 0.6739 (0.2072) | 0.7988 (0.2391) | 1.0354 (0.3786) | 0.3362** (0.1541) | 2.0461 (0.9393) |
| Variance of latent ability | 12.412*** (7.4970) | 7.6490*** (4.8988) | | 7.6490*** (4.8988) | | 12.4122*** (7.4970) |

Notes: Jointly estimated competing risk models of transition probabilities. This specification accounts for potential endogeneity of education using a control function approach. The reduced form residuals are from a regression of education on the exogenous variables including father's and mother's secondary high school degree as excluded instruments. Odds ratios reported. Transitions from and to non-employment not shown for brevity. Insignificant control variables not shown: married, extraversion, neuroticism, trust. Further control variables not shown: duration in the current state (polynomial of third degree), year dummies. The model accounts for two types of latent entrepreneurial ability for solo-entrepreneurship and employer-entrepreneurship with estimated covariance 0.8051 (std.-err.: 0.2348). Log-likelihood=-10,981. N=39,559. This is less than in Table 3 due to missing values in parental education. ***/***: Odds ratio significantly different from 1 at the 10%/5%/1% level based on cluster robust standard errors. *Source:* Authors' calculations based on SOEP, 2005-2012 (with some variable values from 2003/04).

