Essays on Comparative Advantages in Self-Employment and on Formerly Unemployed Founders

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Zusammenfassung

Die vorliegende Dissertation basiert auf drei empirischen Arbeiten zum Themenfeld komparativer Vorteile in der Selbständigkeit und zu Gründungen aus der Arbeitslosigkeit. In der ersten Arbeit werden die Charaktereigenschaften von Personen untersucht, die eine große Erfahrungsbreite beruflicher Kompetenzen aufweisen. Im Besonderen wird untersucht inwieweit selbst berichtete Gründungskompetenz und das Einschätzen von beruflich selbständigen Tätigkeiten mit der Anzahl von erworbenen beruflichen Kompetenzen korrelieren. In bisherigen Arbeiten hatte sich herausgestellt, dass die Gründungsneigung mit der Erfahrungsbreite steigt. Jüngere Untersuchungen zeigen jedoch, dass hinter diesem Zusammenhang unterschiedliche Ursachen stecken können. Die Ergebnisse der vorliegenden Studie zeigen, dass sowohl Gründungkompetenz als auch Wertschätzung von selbständiger Tätigkeit mit der Anzahl beruflicher Kompetenzen zunehmen. Allerdings deuten die Analysen darauf hin, dass die Gründungskompetenz (Selbsteinschätzung) stärker korreliert ist und dass hinter der Selbsteinschätzung auch eine reale Zunahme an Qualifikation steckt. Zudem zeigt sich, dass die selbst eingeschätzte Gründungskompetenz marginal abnehmend mit der Anzahl beruflicher Kompetenzen steigt.

Die zweite Arbeit geht der Frage nach, inwieweit der berufliche Hintergrund und insbesondere die Berufs- und Erwerbserfahrung einer Person einen Einfluss auf die Dauer einer Selbständigkeitsperiode haben. Untersucht wird dies auf Grundlage von Befragungsdaten von Gründern, die sich aus der Arbeitslosigkeit heraus selbständig gemacht haben. Hintergrund ist die Überlegung, dass individuelle Merkmale produktiv in unterschiedlichen Erwerbsformen eingesetzt werden können und dass sich spezifische Kompetenzen und komparative Eigenschaften auf das zeitbedingte Beenden einer selbständigen Tätigkeit auswirken. Die Ergebnisse bestätigen zunächst bisherige Befunde, insbesondere dass Firmenmerkmale (Ausstattung) bei Gründungen aus der Arbeitslosigkeit keine sehr große Rolle spielen. Eine breite Qualifikation plus kaufmännische Kompetenz sowie ein hohes Maß an intrinsischer Motivation zur Selbständigkeit und nutzbare Berufserfahrung korrelieren stark positiv mit der Dauer in Selbständigkeit, was auf entsprechende komparative Vorteile für eine selbständige Tätigkeit hindeutet. Kaufmännische Kompetenz allein verringert allerdings die zeitbedingte Verbleibsdauer in Selbständigkeit und beschleunigt Austritte in ein abhängiges Beschäftigungsverhältnis.

In der dritten Untersuchung werden insbesondere Merkmale des lokalen Arbeitsmarktes in ihrem Einfluss auf die Verbleibsdauer in Selbständigkeit analysiert. Grundlage sind prozessproduzierte Daten der Bundesagentur für Arbeit zu Erwerbsbiografien von Personen, die bei Existenzgründungen aus der Arbeitslosigkeit gefördert wurden. Neben regionalen Determinanten werden auch individuelle Merkmale untersucht. Hintergrund der Studie ist die Überlegung, dass lokale Arbeitsmarktbedingungen unterschiedliche komparative Auswirkungen auf die Einkommensmög-

lichkeiten in abhängiger und selbständiger Beschäftigung haben können. Methodisch-analytisch wird das Beenden einer selbständigen Tätigkeit als Beschäftigungswechsel beschrieben, welcher sich als Folge einer Evaluation unterschiedlicher Einkommensmöglichkeiten ergibt. Die Ergebnisse zeigen, dass lokale Arbeitsmarktbedingungen einen erheblichen Einfluss auf die Verbleibsdauer in Selbständigkeit haben und dass der Effekt der lokalen Arbeitsmarktbedingungen sehr komplex ist. Die Ergebnisse lassen erwarten, dass ein eindimensionales Auffangen durch die lokale Arbeitslosenquote keine adäquate Kontrolle der ökonomischen Umfeldbedingungen ist. Zunehmende regionale Arbeitslosigkeit verkürzt die Verbleibsdauer in Selbständigkeit, während zunehmende Unsicherheit auf dem lokalen Arbeitsmarkt zu einer Verlängerung führen. Darüber hinaus zeigen alle lokalen Merkmale abnehmende bis sich umkehrende Grenzeffekte. Tests individueller Charakteristika zeigen, dass Personen aus Kleinbetrieben sowie Meister und Poliere als auch Personen mit hohen Einkommensprämien in ihren letzten Beschäftigungsverhältnissen länger selbständig sind als ihre Vergleichspersonen. Offensichtlich sind mit diesen Merkmalen komparative Vorteile für eine Selbständigkeit verbunden. Bestätigt wird das Bild, das Personen mit einem kaufmännischen Hintergrund schneller wieder in ein abhängiges Beschäftigungsverhältnis wechseln.

Abstract

This dissertation is based on three empirical studies on the thematic complex of the comparative advantages of self-employment and business start-ups out of unemployment. The first study examines the characteristics of persons who present a broad range of experience in terms of professional competencies. The extent to which self-reported entrepreneurial competence and the assessment of professionally self-employed activities correlate with the number of professional competencies acquired is examined in particular. It emerged from previous studies that the tendency to establish new businesses increases with the variety of experience. More recent studies show, however, that different causes may lie behind this correlation. The results of this study show that both entrepreneurial competence and the estimation of self-employment increase with the number of professional competencies. However, the analyses would indicate that entrepreneurial competence (self-assessment) is more strongly correlated and that an actual increase in qualifications lies behind the self-assessed entrepreneurial competence. Moreover, it emerges that self-assessed entrepreneurial competence increases at decreasing marginal rates with the number of professional competencies.

The second study examines the extent to which professional background and, in particular, the professional and employment experience of an individual influence the duration he or she remains in self-employment. This is studied on the basis of data from a survey of founders who become self-employed out of unemployment. The study is based on the idea that individual characteristics can be used productively in different forms of employment and that specific competence and comparative characteristics affect the time-dependent exit from self-employment. The results initially confirm previous findings, in particular that firm characteristics do not play a very significant role in the decision to start up a business from a position of unemployment. Broad-based qualifications plus business skills, a high level of intrinsic motivation for self-employment and exploitable professional experience display a strong positive correlation with the duration in self-employment; this would suggest corresponding comparative advantages for self-employment. However, business skills alone reduce the time-dependent probability of survival in self-employment and accelerate exits into employment.

The third study analyzes features of local labor markets in terms of their influence on the duration of self-employment. The basis of the study is provided by process-produced data generated by the German Federal Employment Agency on the employment biographies of individuals who received support in establishing businesses with a view to exiting unemployment. Individual characteristics were examined in addition to regional determinants. The idea behind the study is that local labor market conditions can have different comparative effects on income possibilities in both positions of employment and self-employment. The exit from self-

employment is described as a change in work activity which arises following the evaluation of different income options. The results show that local labor market conditions have a considerable influence on the duration of self-employment and that the effect of local labor market conditions is very complex. The results would prompt the expectation that a one-dimensional perspective based on the local unemployment rate does not provide an adequate measure of general economic conditions. Increasing regional unemployment reduces the duration of self-employment while increasing uncertainty on the local labor market results in its extension. Moreover, all local characteristics display reducing to reversing marginal effects. Tests of individual characteristics show that persons from small businesses, master craftsmen and foremen, and persons with high income premiums remain longer in their last employment situation than the controls. These characteristics are clearly associated with comparative advantages for self-employment. The study also corroborates the impression that people with business backgrounds quickly leave self-employment for employed positions.

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Chapter 1

Introduction

1.1 Overview and motivation

Even if they remain rather small and most of them tend to fail at an early stage, new businesses are an important engine for firm dynamics, competition, and technological progress. Self-employment is one part of this process and, in addition, is an important issue of employment in general (e.g., Audretsch and Feldman 1996). In the German working population alone, almost one in ten people are self-employed. On average 300,000 to 800,000 new self-employment entries are registered each year in Germany.[1] Furthermore, the fostering of self-employment activities has become a substantial political issue, which has led to the provision of various types of public support including financial subsidies, subsidized bank loans, job training courses, and job coaching schemes.

In labor economics, the dominant framework used to explain self-employment is that of comparative advantage. The basic idea behind this framework comes from job choice models which argue that individuals choose the employment position that offers the highest relative net present value in utility (Arias and Khamis 2008). This means that individuals choose the employment position that best suits their talents, characteristics, attitudes, and competencies. In consequence, attributes that positively correlate with self-employment entries and also positively determine self-employment longevity can be interpreted as being associated with the comparative advantages of being self-employed.

A rich body of research now exists which directly or indirectly refers to this framework (for an overview: e.g., Santarelli and Vivarelli 2007), and in which points to the importance of individual characteristics, such as socio-demographic information, qualification, and experience (e.g., Lucas 1978; Kihlstrom and Laffont 1979; Evans and Leighton 1989 and 1990; Bates 1990; Taylor 1999 and 1996; Cressy 1996; Gimeno et al. 1997; Lazear 2005). In particular, it has been shown that males, mid-aged individuals, highly qualified people, unemployed individuals, people with experience in small businesses or in different fields of competence, and those with no capital constraints are more likely to become self-employed and also expect longer self-employment durations. However, in some cases, the literature cannot make credible claims about true

[1] The actual figure is not known and depends on the statistical measurement of business registrations or the statistical calculation of main employment.

causations, which - in turn - are important to know as a basis for contributions on political interventions.

Chapter Two presents just such a study - which aims to provide a greater understanding of the true causation behind correlations. The question addressed in this study concerns with the effect of experience in various fields on the transition to self-employment. Following Lazear (2005), individuals who have a greater balance of skills and experience should have a comparative advantage in self-employment, as opposed to individuals with a (specialized) wage work background (also known as the 'Jack-of-all-Trades' hypotheses). However, the empirical evidence presented hitherto shows mixed results and indicates that two dimensions may be inherent to the balancing property. While Lazear (2005) implies that the balancing property operates from skill-enhancement, recent research indicates that the balancing property may also operate from individual specific traits (Silva 2007; Hyytinen and Ilmakunnas 2007). Up to now, the research presents two distinct dimensions that are related to the balancing property, which we may differentiate into taste for variety and competence.[2] Both dimensions are difficult to measure. The use of representative survey data covering the German adult population allows for a simple approximation of both dimensions. The individual's statements of competence for setting up a business and the desire to become self-employed are used as proxies for ability and taste. However, the identifying assumption in this paper is that individuals must know that the handling of multiple fields of competence is inherent to self-employment activities. In addition, the study also examines descriptive findings for the profile of individuals with high and low numbers of distinct fields of experience. The core contribution of this study is that it provides a more in-depth insight into the comparative advantage of a broad range of employment experience.

Most studies that have used the comparative advantage framework concentrate on self-employment entries (e.g., Rees and Shah 1986; Evans and Leighton 1989; Taylor 1996; Cressy 1996; for exceptions see: Taylor 1999; Gimeno et al. 1997). For example, a critical issue with respect to self-employment entries is that individuals do not know their potential earnings because they also do not know the value of non-pecuniary employment characteristics. Therefore, in the entry situation, the evaluation of income alternatives is not truly affected by comparative advantage itself but by the expectation of comparative advantages. Individuals have a more or less accurate sense of their potential earnings and employment conditions based on their own characteristics, but due to the limited information available to them, they are unable to make precise estimates. Becoming self-employed and running a business is the only way they can obtain better information in this regard. Therefore, attributes that increase duration should provide a more accurate identification of comparative advantages.

[2] It should be noted that, from a perspective of comparative advantages, it remains unimportant whether taste or ability cause a positive difference in the utility of self-employment. This is different to the political perspective because taste would not offer much working surface in promoting self-employment and would more or less emphasize the need for better screening devices.

Chapters Three and Four address this issue and concentrate on the study of self-employment durations. However, two aspects arise in this context that raise complexity. First, self-employment is a twofold entity: on the one hand, it is an income option and it also constitutes a firm that must operate based on capital constraints, market competition, marketing strategies, and risk in sales, on the other. Therefore, comparative advantage results from the interaction between firm characteristics, employee characteristics, and external conditions. Second, investigating duration patterns requires the accounting of the time-dependency of the exit event that defines the duration. Technically, this is less critical. However, the major concern addresses the theoretical setting of time dependency.

Previous theoretical work mainly focused on firm survival, in which duration is explained as a heterogeneous – and *ex ante* unknown – element in a firm's production function that is uncovered during a learning process (Jovanovic 1982) or can be adjusted due to risky investments (Ericson and Pakes 1995). On an individual level, self-employment can be considered similarly, that is as a situation, in which the true productivity of the individual's characteristics and the working conditions are unknown. Learning emerges as a Bayesian updating process and therefore is correlated with time.[3] Likewise, each start-up project may allow different business concepts that relate to specific investments with fixed rewards drawn from a known distribution (Ericson and Pakes 1995). However, focusing on the individual level also necessitates accounting for the time dependency of external employment options; this was usually underreported in previous theoretical work.[4] The studies in *Chapters Three and Four* make different contributions to how the overall time-dependency of self-employment may be viewed given the presence of external options.

Of special interest are founders who start their business from a position of unemployment and who were supported by a subsidy (the 'bridging allowance'). This focus has two different motivations. First, it allows for the use of unique data and, second, it contributes to a growing share of self-employment activity. This population has received increasing political attention over the past decade in Germany. Following a scheme established in the mid-1990s which offered financial support to bridge a period of six months, a second scheme was introduced in 2003.[5] Since the mid-1990s, the number of promoted self-employment entries arising from unemployment increased from around 80,000 per year to over 200,000 in 2005, which shows the relative importance of this population. Various studies have already addressed this population in

[3] Individuals know that a parameter of interest is a random draw of known a priori distribution. Realizations allow for the estimation of a parameter. A sequence of estimations will allow the updating of the (time-dependent) a priori distribution and therefore provide 'better' estimates of the interested parameter.

[4] The underlying framework can be found in a simple job-worker matching model (e.g., Jovanovic 1979).

[5] This second program offered coverage of the social contributions for a period of one to three years (for details and information about the differences between the programs, see Caliendo and Kritikos 2009). Both schemes were part of the active labor market policy of the unemployment insurance system and were replaced in 2006 with a program that incorporates elements of both schemes.

Germany.[6] However, most studies focus on the evaluation of promotion schemes and present no clear results for the causal effect of promoted and non-promoted entries (Pfeiffer and Reize 2000; Caliendo and Kritikos 2007 and 2009; Baumgartner and Caliendo 2008). Pfeiffer and Reize (2000), for example, studied the difference in firm survival for firms that received a subsidy for a two-year period and firms that did not receive any subsidy and found few differences. Baumgartner and Caliendo (2008) analyzed the outcome of the two subsidies provided by the German Federal Employment Agency in relation to the difference between founders and those who did not start a venture, and observed a positive effect in terms of employment and income. Hinz and Jungbauer-Gans (1999) used regional survey data and compared new businesses of former unemployed and employed individuals. The difference they found between these populations were limited to lower monthly income, less invested capital, and lower growth intentions for unemployed founders. Wießner (2001) also studied several outcome measures for founders who received support in the form of a bridging allowance and found relatively high survival chances. Reize (2004) showed that unemployed founders (with or without a bridging allowance) do relatively well in terms of employment opportunities compared with those who remained unemployed or those who re-entered wage work instead of starting a business..

Chapter Three analyzes the importance of individual and firm characteristics for self-employment duration with respect to this population. The focus of this study is an investigation of the initial experience of a founder and its relevance for the exiting of self-employment. Accounting for competing risks makes it possible to control for different exit states and, therefore, for different reasons for quitting self-employment. From a theoretical viewpoint, time dependency emerges from Bayesian learning and depreciation of the individual's skills for alternative employment positions while the individual runs his business. As a result, it is argued that the comparative advantage of being self-employed is time-dependent in nature and that the pattern is conditioned on the initial resources of the start-up project. Among other things, the theoretical underpinning implies that founders tend to exit earlier and return to wage work rather than becoming unemployed. The theory also predicts that previously unemployed founders will compose a higher share of the exits back into unemployment compared with founders who do not start from a position of unemployment. A special focus in this study is an analysis of the 'Jack-of-all-Trades' hypothesis in support of self-employment longevity. Previous research on related measures is limited to the entry choice (e.g., Wagner 2003 and 2006; Lazear 2005; Silva 2007). The data used for this analysis comes from a regional survey and covers almost 650 individuals who received a bridging allowance between 1998 and 2000, giving a total observation period of 55 months.

[6] For international research on start-ups with and without subsidies emerging from a position of unemployment see Evans and Leighton 1989; Storey 1991; Meager 1996; Carrasco 1999; Cueto and Mato 2006; Anderson and Wadensjö 2007.

Chapter Four presents a study that investigates the joint role of the local labor market and individual information for self-employment duration. The analysis refers to the idea that variation of local labor market conditions measures the change in external and internal income options, and that difference in external conditions matter for the evaluation of continuing self-employment. Similar to the investigation in *Chapter Three*, this is carried out using a competing risk duration model for which we tested different model specifications to assess the complexity of the correlation between external conditions and the duration of self-employment. The analysis draws upon a unique dataset based on administrative data, which has several advantages, including non-selectivity, high numbers of observations, a long observation period, and detailed micro-data with deep regional stratification. Altogether, the study analyzes over 160,000 individuals for a maximum period of observation of 83 months. The data allows for the use of multiple measures to capture local labor market information. This is an important contrast to previous studies. In addition to the level of unemployment and its relative change over time, the study uses proxies for regional employment risk and expected economic prosperity. In addition, several new and recently discussed variables are used to mirror comparative advantage in self-employment on the individual level – for instance, experience in small businesses ('hot-house' hypothesis; see Wagner 2004; Parker 2007 and 2009) and employment experience in different jobs (Lazear, 2005; Hyytinen and Ilmakunnas 2007).

Finally, *Chapter Five* summarizes the results of the three empirical studies and presents conclusions and suggestions for further research.

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Chapter 2

What makes a 'Jack-of-all-Trades'? The two dimensions of broad experience

Abstract:[1] *This paper addresses the 'Jack-of-all-Trades' hypothesis, which presumes that entrepreneurship is driven by an individual's variety of competencies/experience (Lazear 2005). The analysis focuses on two related dimensions of this argument: taste for variety and ability. First, the results show that it is important to distinguish between discrete and high level investments. For instance, a high level of investment is less correlated with formal schooling than discrete investment. Second, the results indicate that both taste and ability correlate with the variety of experience, but the nature of the correlation differs. The 'Jack-of-all-Trades'-hypothesis predominately relates to competence in the case of males.*

Keywords: entrepreneurship, 'Jack-of-all-Trades', competence, desire, human capital
JEL-Classification: M13, J23, J24

2.1 Introduction

From an economist's point of view comparative advantages in the labor productivity of individuals are the most important determinant of occupational choices. Lazear recently (2005) presented such a comparative advantage model for entrepreneurship, in which he emphasizes the importance of being multi-skilled for the ability to successfully run and manage a business (e.g., Brüderl et al. 1992; Chandler and Hanks 1998).

Empirical investigations support this 'Jack-of-all-Trades' hypothesis (Lazear 2005; Wagner 2003 and 2006; Astebro and Thomson 2008). However, recent investigations also present ambiguous findings that question the skill dimension related to the increasing number of distinct fields of experience. While Lazear (2005) focuses on the comparative advantage dimension of

[1] An earlier version of this paper was published in 2009 as Discussion Paper No 10/2009 of the Institute for Employment Research (IAB) under the title "What makes a 'jack-of-all-trades'?". The study uses data collected within the research project "Regional Entrepreneurship Monitor (DFG STE 628/7-2 und WA 610/2-2)" which was funded by the Deutsche Forschungsgemeinschaft (German Research Foundation). Stata 10.1 was used in all calculations. Do-files and results that are discussed but not reported are available from the author. Helpful comments on a previous version of this paper presented at the 2009 "Interdisciplinary Conference on Entrepreneurship Research (IECER)" in Lisbon (Portugal) and on related research discussed at the 2007 "10. Personalökonomisches Kolloqium (POEK)" in Tübingen (Germany) are grateful acknowledged. All remaining errors are my own.

labor market productivity (ability), Hyytinen and Ilmakunnas (2007) and Silva (2007) demonstrate the importance of unsteadiness, taste for variety, or innate characteristics that associate with the 'Jack-of-all-Trades' hypothesis.

With respect to these conflicting results, a more in-depth knowledge of the 'Jack-of-all-Trades' phenomenon is crucial to the understanding of the driving force behind self-employment activities as it addresses the causation of comparative advantages. This also relates to political attempts to foster entrepreneurship as training schemes will be less supportive of entrepreneurship if the dominant dimension of the 'Jack-of-all-Trades' hypothesis relates to taste for variety.

The analysis at hand focuses precisely on this topic by investigating the two dimensions (taste for variety and investment in ability) of the 'Jack-of-all-Trades' hypothesis. The analysis is structured in two distinct parts: first, the study explores the determinants of high level ('Jack-of-all-Trades') and discrete investments in variety of experience. Second, the study investigates the importance of the number of distinct fields of experience for self-employment competence (ability dimension) and the desire for a self-employment position (approximately capturing the taste dimension). The data used for the empirical analysis were specifically collected for the analysis of nascent entrepreneurship activities and allow the simple identification of the relevant dimensions.

The discussion of the investigation is organized as follows: Section 2.2 reports on the underlying framework and the previous findings related to the 'Jack-of-all-Trades' hypothesis. Section 2.3 presents the data and briefly introduces the variables used. The empirical section is provided in section 2.4 and contains a bivariate analysis of the profile of the 'Jack-of-all-Trades' as well as the multivariate estimations of the determinants of the variety of experience, entrepreneurship competence, and the desire for self-employment. Finally, section 2.5 summarizes the results of the investigation and draws preliminary conclusions.

2.2 Framework

2.2.1 The 'Jack-of-all-Trades' hypothesis

The basic idea of the 'Jack-of-all-Trades' hypothesis stresses how important it is for entrepreneurs to have a broad skill set (Lazear 2004 and 2005). An idea that is also emphasized by the o-ring theory of production (Kremer 1993). The practical implications of both concepts mean that entrepreneurs and managers must be competent in a broad range of fields: e.g., entrepreneurs must be able to evaluate business opportunities, challenges, and the capabilities of employees; they must be able to organize processes, choose marketing strategies, and ensure financing. This is a complex set of tasks that require a broad range of competences.

In the model discussed by Lazear (2005), self-employment activities offer an external market premium that works as a multiplying factor to the productivity of an entrepreneur. The liability of broad competencies in running a business is that entrepreneurs will suffer in their productivity from a deficit in any skill that is necessary to run their business. This leads to an income function that depends on their most limited capability. In contrast, the market value (income) of wage workers will be related to their 'specialized' productivity. In this context Lazear (2005) shows that an individual's occupational choice is exclusively determined by the balancing property of his skill set rather than the absolute level of his productivity.

Lazear (2005) assumes that the current skill balance should be related to the individuals' investment in multiple fields of competence in the past. Investing in a variety of experiences will be rational as long as the marginal costs of increasing the balancing property remain lower than the potential self-employment premium.[2] Any investment in a distinctive skill will relate to an increase in the variety of experience and will thus enhance the balancing property. Empirically, this can be observed in the number of distinct courses completed as a part of formal schooling, the number of fields of competence, or the distinct number of company departments an individual has worked in.

To summarize, the 'Jack-of-all-Trades' hypothesis has two major implications: first, independent of their level of productivity, people with a more balanced skill set (reflected by their number of distinct competencies) are more likely to become self-employed; and, second, the more balanced an entrepreneur's skill set and the higher his or her level of productivity, the higher his or her level of income will be.[3] However, apart from the fact that it should be related to the marginal cost argument, precisely what motivates an individual to invest in variety of experience remains unspecified.

2.2.2 The two dimensions - related empirical evidence

A number of studies have already addressed the 'Jack-of-all-Trades' hypothesis in its relevance for self-employment entries, and that also provide insights into its underlying dimensions. In this context we will focus on two explanations that have been found to follow the marginal cost argument as emphasized by Lazear (2005): taste for variety and competence.

Astebro et al. (2008), for example, make use of different data sets, including cross-sectional and panel data. As found previously by Lazear (2005) and Wagner (2003 and 2006), the

[2] The starting points of the skill set composition and the taste for independence are not taken into account. This is important as neither taste-driven nor ability-driven causation of investing in the variety of experience is favored.

[3] The model proposed by Lazear (2005) also incorporates more detailed implications for the income distribution related to the individual's skill set. However, this subject is not discussed in this paper. For an application of the balanced and weighted skill set approach for income distribution, see, for example, Lee (2005).

cross-sectional analysis presents evidence for the 'Jack-of-all-Trades' hypothesis, whereas the findings arising from results based on panel data are ambiguous. In particular, they do not find a positive relationship between the number of employers or occupations and the level of income which they interpret as a predominance of non-pecuniary benefits that correlate with the investment in the variety of experience.

Astebro and Thompson (2008) found a positive correlation between experience in a variety of fields (occupations or industries) and the probability of successful business commercialization, which supports the existence of the skill dimension of the variety argument. However, they found that a high diversity of experience is related to a decrease in household income, which also supports the findings of Astebro et al. (2008).

Hyytinen and Ilmakunnas (2007) referred to the 'Jack-of-all-Trades' hypothesis in analyzing the aspiration for occupational switches, which is more or less focused on the taste dimension. The aspiration to become self-employed is measured by a specific question ('often thought about setting up a business') that is asked in reference to job search aspirations (defined as 'having searched for another job'). The results indicate that varying experience causes not only greater self-employment aspirations, but also greater job search activities, and therefore stronger job-switching intentions in general.

Finally, Silva (2007) made use of Italian panel data (Longitudinal Survey of Italian Families; ILFI) that allow the identification of the labor market transitions of household members. As in Lazear (2005) and Wagner (2003 and 2006), the 'Jack-of-all-Trades' dimension here corresponds to the total number of task roles held by an individual measured at the start of each employment observation. The results show that the number of roles becomes insignificant in explaining a self-employment spell when controlling for individual unobserved heterogeneity. Silva (2007) concluded that the relationship between the probability of becoming self-employed and the number of roles may be driven by innate abilities or characteristics rather than skill acquisition.

2.3 Data

2.3.1 Database

The data set used for the analysis is based on a computer-assisted telephone survey of individuals aged 18 to 64 years. The survey was conducted between June and August 2003 and addressed 12,000 adults in 10 selected regions in Germany (Lückgen and Oberschachtsiek 2004). The focus of the survey was an analysis of regional differences in entrepreneurship activities (Regional Entrepreneurship Monitor). However, the selection of the regions accounted for

population density, industrial structure, and east-west assignment in order to mirror the structure of the population in the German regions.[4] In particular, the survey was linked to the concept of the Global Entrepreneurship Monitor (GEM, see Reynolds et al. 2004).

In addition to information about the interviewee's educational and professional backgrounds and standard biographical characteristics, the survey also requested information about different aspects of entrepreneurship activities, attitudes, and dispositions: i.e. the type of entrepreneurial activity engaged in, the current employment status, the interviewee's attitudes to self-employment, valuation of business opportunities and of the competencies required to set up a business, and an assessment of the prestige of entrepreneurship.

Most important, the questionnaire also asked for the number of different fields of job experience. This enables the identification of the role model related to the 'Jack-of-all-Trades' hypothesis suggested by Lazear (2004 and 2005).[5]

2.3.2 Data sampling and variables

Students, retired people, and individuals who are engaged in civil or military service (n = 2,026) are not of interest and were excluded from the analysis. Furthermore, in order to ensure robust estimates (for an overview of the distribution, see Figure A.2.1 in the Appendix), following Wagner (2006), we eliminated individuals who reported more than 13 distinct task roles (99th percentile, n = 352). Finally, the analysis was focused on the full-time working population[6] and on individuals who were not already running a firm (n = 1,112). The final sample size consists of 5,027 observations with full information.[7]

Similar to Lazear (2005) and Wagner (2006), we used the number of different task roles (used equally: number of distinct task roles; number of fields of experiences or competences) to capture the 'Jack-of-all-Trades' dimension. In contrast to other studies, we also constructed a classification that enables the simple identification of individuals who can be described as 'Jack-of-all-Trades'. Technically, we used the upper quartile for this classification, which means that 'Jack-of-all-Trades' must be experienced in more than three fields of competence.[8]

The analysis below relies on the identification of the ability and taste dimensions - attributes that are hardly observable. What we observe in the data is an interviewee's statement of

[4] This data set was also used in Wagner (2006).

[5] The exact question: 'In how many distinct fields of competence have you ever worked?' Note that this is different to the number of job switches or changes of occupation (for details, see Table A.2.1 in the Appendix).

[6] Excluding part-time workers (n = 1,852) mainly excludes individuals with a lower disposition to entrepreneurship, females and individuals with lower human capital.

[7] This excludes mainly individuals with a higher disposition to entrepreneurship.

[8] Since there is no theoretical judgment for a valid identification of that threshold, sensitivity analysis is performed based on different definitions (see below).

competence (‘You have the knowledge, the competence, and the experience that is needed to start a business’) and a self-reported desire for self-employment (‘From a personal perspective, becoming self-employed is a worthwhile thing’) that we used as proxies to identify the ability and taste dimensions. However, this strongly assumes that individuals expect entrepreneurs to face complex working conditions and that entrepreneurs must challenge a broad set of distinct tasks. Furthermore, it is assumed that the interviewees refer to this perception when they state that they are competent or desire self-employment activities.

The study also controlled for socio-demographic information, qualifications, family background, and a set of issues related to self-employment activities. Detailed information can be found in Table A.2.1 (Appendix). For descriptive information, see Table A.2.2 (Appendix).

2.4 Empirical investigation

The analysis was carried out in two parts: first, we used the set of covariates on hand to describe the profile of ‘Jack-of-all-Trades’. This was done by using mean t-tests of the characteristics of individuals who are classified as ‘Jack-of-all-Trades’ and those who are not, supplemented with a probit model that enables controlling for potential correlations of the explanatory attributes. In addition, we used a count data model that fits with the basic setup of the ‘Jack-of-all-Trades’ assignment (number of task roles). The comparison of the probit and the count data analyses made it possible to differentiate between discrete investments and very high level investments in the variety of experience. Finally, the second part of the analysis focused on the testing of the two dimensions of the ‘Jack-of-all-Trades’ hypothesis (ability and taste) and was based on a regression of two dichotomous indicators on the number of task roles and a set of covariates.

2.4.1 Bivariate profile

Table 2.1 presents the results of the t-tests, which provide an initial impression of the nature of a ‘Jack-of-all-Trades’. The analysis shows that individuals with a high number of different fields of experience differ from those who are less experienced. A ‘Jack-of-all-Trades’ is more often male, older, better educated (as indicated by the completion of an apprenticeship, qualification as a master craftsman, or the combination of apprenticeship and a university degree), and has a family background characterized by greater experience in self-employment.

Table 2.1: Means tests of the covariates

	'Jack-of-all-Trades' no (n = 3,432)	'Jack-of-all-Trades' yes (n = 1,595)	test of difference
variable	Mean	Mean	| t |-value
gender (male) [d]	0.48	0.58	6.907***
age [n]	39.73	41.46	5.310***
years of schooling [n]	10.51	10.49	0.443
apprenticeship training [d]	0.68	0.74	3.845***
master craftsman [d]	0.06	0.10	5.755***
university degree [d]	0.26	0.28	1.330
training & university [d]	0.09	0.14	5.498***
household size > 2 [d]	0.52	0.48	2.767***
self-employed family [d]	0.42	0.48	4.369***
business opportunities [d]	0.14	0.16	1.555
fear [d]	0.55	0.48	4.818***
competence [d]	0.39	0.57	12.413***
desire [d]	0.46	0.50	2.591***
prestige [d]	0.56	0.57	0.921

table reports mean values; note that the mean reflects shares in cases of a dummy variable
d stands for a discrete change of dummy variable from 0 to 1; n stands for a numeric variable (metric)
level of statistical significance: * p<0.10, ** p<0.05, *** p<0.01
source: REM, 2003; own calculations

Interesting results can be observed for the variables that are usually thought to be associated with entrepreneurship disposition (Bergmann 2002). 'Jacks-of-all-Trades' are less afraid to start a business and see self-employment as more desirable. Furthermore, a 'Jack-of-all-Trades' appears to be much more confident at mastering the challenges presented by a business start-up. In contrast, great breadth of experience does not correlate with the valuation of setting up a business (business opportunities) with entrepreneurship prestige and formal qualifications (schooling and the holding of a university degree).[9]

However, the differences found in a bivariate test do not control for the influences of other covariates. In particular, it may be assumed that the subjective measures related to entrepreneurship activities (business opportunities, fear, competence, desire, prestige) tend to be inter-correlated. We tested this using a factor analysis, which does not support the hypothesis that these attributes belong to one latent dimension. Most importantly, the correlation between the competence assignment and the view of self-employment as a desirable type of employment indicate orthogonality of both attributes (see also Table A.2.3 in the appendix).

[9] To test the sensibility of the results, different definitions of a 'Jack-of-all-Trades' are used based on more than two (lower bound) and more than six/eight (upper bound) distinct task roles. Referring to the discussed definition (using the upper quartile) only few differences emerge. For the lower bound the difference in holding a master craftsman qualification becomes insignificant. For the upper bound we find stronger differences between males and females and lower differences in age.

2.4.2 Determinants of the variety of experience

Table 2.2 shows two statistical models covering probit[10] and poisson regressions.[11] Since these models try to explain investments in variety of experience, for reasons of endogeneity, we do not account for the importance of desire, prestige, competence, fear, and business opportunities. The explanatory variables are simply linked to the universe of attributes on hand. For both estimation strategies, Table 2.2 reports marginal effects (fixed at the median of all other covariates).

The first column focuses on the assignment of individuals as 'Jacks-of-all-Trades' based on an above average number of different task roles. Males have an 8.5% higher probability of being a 'Jack-of-all-Trades' than females. This may reflect the fact that males are usually more likely to invest in careers and have a greater likelihood of changing employers or occupations, which certainly correlates with the number of competencies. Likewise, the age effect is not surprising since one could expect that the breadth of experience increases with the extension of the individual's work history, also displaying an inverse u-shaped pattern reaching a maximum around the age of 46.[12] As already found in the bivariate analysis, formal schooling (years of schooling, apprenticeship, and university qualification) is not correlated with 'Jack-of-all-Trades' assignment. Moreover, the multivariate analysis reveals an insignificant effect of apprenticeship training. This highlights the fact that formal qualification alone appear to be a poor predictor of a broad variety of experience. In contrast, the holding of a master craftsman qualification or being trained and holding a university qualification (interaction term) raise the likelihood of being a 'Jack-of-all-Trades'. Both reflect combined practical and formal training and are related per se to a broader set of capabilities and skills.

The estimations show that combined practical and academic training increases the likelihood of being a 'Jack-of-all-Trades' by 12.2% whereas a master craftsman qualification raises the probability by 9.7%. These are the two most important explanatory characteristics for the variety of experience. Moreover, individuals who grew up with self-employed relatives also reported a high variety of experience. This is not surprising if one assumes that many such individuals have participated in training that will potentially ensure the successful takeover of the family business. In contrast, the likelihood of broad experience decreases with household size.

[10] The probit model allows an estimation of the covariate effects on a dichotomous variable where the probit function relates to the cumulative distribution function of the standard normal distribution, which follows a sigmoid function ranging from zero to one.

[11] Note that the poisson regression is sensitive to the assumption of the mean–variance equality. If the mean is lower than the variance, the model predicts an underdispersion of the number of counts compared to the observed situation. We also tested a negative binomial distribution, which is usually used in cases of overdispersion. However, the results did not change very much. Moreover, the poisson model shows the best fit to the data in terms of the BIC (Rodriquez 2005).

[12] The presence of an u-shaped pattern for the likelihood of being a 'Jack-of-all-Trades' in age is supported by the Sasabuchi test (Sasabuchi 1980).

This may not be surprising if one considers that adults with families (more than two people in the household) usually claim stable career paths.

Table 2.2: Estimation results for the variety of experience

variable	'Jack-of-all-Trades' [d] probit regression	task roles [n] poisson regression	median values
	marginal effects (se)	marginal effects (se)	
gender (male) [d]	0.085***	0.483***	1.000
	(0.012)	(0.05)	
age [n]	0.030***	0.173***	40.000
	(0.006)	(0.02)	
age (squared)	-0.000***	-0.002***	1600.000
	(0.000)	(0.000)	
years of schooling [n]	-0.004	0.003	10.000
	(0.007)	(0.027)	
apprenticeship training [d]	0.027	0.144**	1.000
	(0.017)	(0.07)	
master craftsman [d]	0.097***	0.289***	0.000
	(0.023)	(0.108)	
university degree [d]	-0.035	-0.196*	0.000
	(0.026)	(0.108)	
training & university [d]	0.122***	0.518***	0.000
	(0.04)	(0.181)	
household size > 2 [d]	-0.053***	-0.336***	1.000
	(0.016)	(0.064)	
self-empl. family [d]	0.071***	0.370***	0.000
	(0.015)	(0.056)	
observations	5,027	5,027	
chi2	241.594	300.699	
BIC	6183.816	19963.2	

table reports marginal effects based on a probit and a poisson regressions
d stands for a discrete change of dummy variable from 0 to 1; n stands for a numeric variable (metric)
(se) standard errors in parentheses; standard errors are cluster adjusted (regional districts; see Moulton 1990)
level of statistical significance: * p<0.10, ** p<0.05, *** p<0.01
source: REM, 2003; own calculations

The second estimation strategy (presented in column two) uses a count data model that makes use of the discrete number of incidents. Technically, this regression model assumes that the response variable has a poisson distribution with independent incidents. The marginal effects in a count data model reflect a unit change of the counts, conditional on a discrete change in the covariate and holding all other variables constant.

Being male increases the difference in the log of expected count by 0.16 relative to being female, which is a 48.3% increase in the probability that the number of task roles increases by one. The intuition behind this rise remains the same as it is for the probit model. However, the magnitude of the effect is much larger in the count data model. We also find a similar pattern for

age in raising the number of task roles as found for the 'Jack-of-all-Trades' classification. Similar results are found for a self-employed family background and a master craftsman qualification.[13]

Further interesting findings relate to the variables that capture formal training. For example, apprenticeship training becomes statistically significant in the count data model, whereas it is insignificant in the probit model. This highlights the fact that that apprenticeship training indeed increases discrete investments but not high level investments in the variety of experience. In contrast, a university qualification causes a decrease in the expected number of task roles, which indicates a disposition among the holders of university qualifications to seek more specialized types of occupation.

2.4.3 The variety of experience, self-employment competence, and non-pecuniary benefits

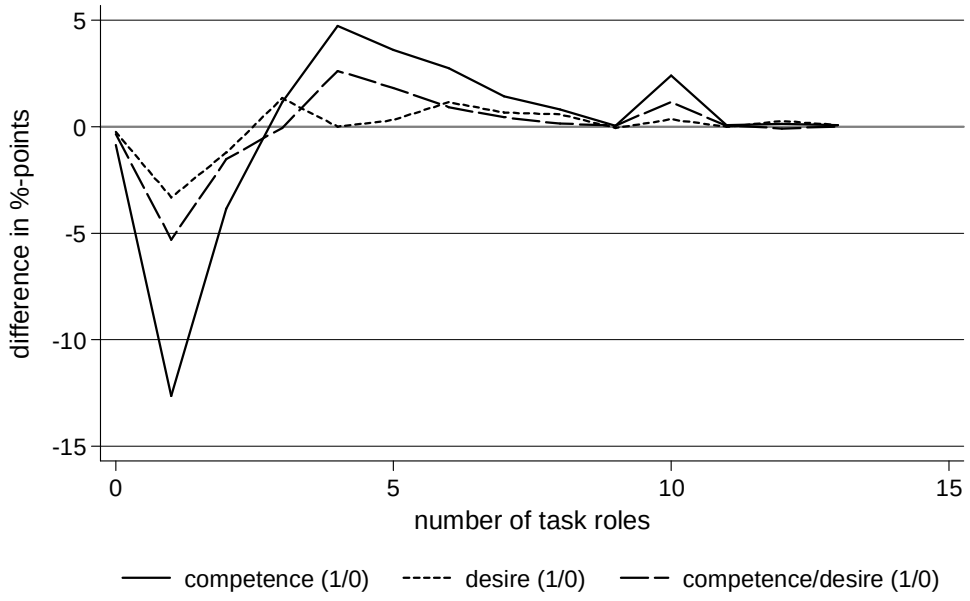
Whereas the previous section studies the nature of the 'Jack-of-all-Trades', the following section focuses on the two dimensions that relate to the variety of experience. An initial graphical assessment of the differences in the distribution of the reported number of task roles for the populations under consideration can be found in Figure 2.1. The solid line (short dashed line) informs about the relative importance of the number of task roles for those who state self-employment competence (desire) compared to those who did not while the long dashed line refers to the difference between those who state competence compared to those who state desire. Two important results emerge from Figure 2.1. First, it shows that the relative share of higher numbers of reported task roles increases for both populations (i.e. for those with desire and for those with competence - compared to those who did not). And, second, there are relatively more individuals with higher numbers of reported task roles in the population that states self-employment competence than in the population that states desire. We can interpret this finding as a first indication for the fact that the number of task roles dominates the competence dimension to a larger extent than the desire dimension.

In order to investigate this pattern in a multivariate regression analysis, Table 2.3 reports the results of a probit model specification and considers the same explanatory variables as before.[14] In addition, the number of task roles is added as an explanatory factor using the linear and non-linear term. Again, the estimation results are presented in terms of marginal effects.

[13] Note that the estimates based on the probit and the poisson regressions are not directly comparable. Nevertheless, differences in the relative magnitudes of the coefficients – even if not tested – may be used to study differences in the effects of the variables for a 'very broad investment in skills' and for 'discrete investments'.

[14] Note that a value of one indicates an affirmation of competence or of valuing self-employment as a desirable type of employment.

Figure 2.1: Differences in the distribution of the number task roles



source: REM, 2003; own calculations

Competence and the variety of experience

The results in Table 2.3 show that gender plays an important role in self-assessed competence. However, some studies state that males are more confident than females and may tend to over-assess their capabilities (e.g., Bengtsson et al. 2005) and this may cause a higher likelihood of self-reported competence in self-employment. In contrast, the importance of formal qualifications appears to reject this one-way perspective. A discrete change in years of schooling raises the probability of competence assignment by 2%, a master craftsman qualification by 21.7%, and the holding of a university degree by 6.7%. Competence only correlates marginally (and linearly) with age.[15]

The breadth of formal qualifications can be used as an initial indicator of the importance of variety of skills for self-employment competence. Individuals who are trained practically and academically (interaction term) report more often that they are competent in starting a business (+8.5%). Second, a family business background also increases self-employment competence (+13.6%), which may reflect the fact that a self-employed family background relates to training in a sufficient range of capabilities to ensure a successful transfer of the family business from one generation to the next.

[15] Table 2.3 only reports results, in which age is taken into account with its linear effect. The introduction of age squared reveals insignificant results for age and age squared.

Table 2.3: Estimation results for self-employment competence and desire

variable	competence [d] probit-regression)[1]	desire [d] probit-regression	median values
	Δy/Δx (se)	Δy/Δx (se)	
gender (male) [d]	0.125***	0.088***	1.000
	(-0.015)	(0.016)	
age [n]	0.004***	-0.032***	40.000
	(0.001)	(0.005)	
age (squared)	-	0.000***	1600.000
	-	(0.000)	
years of schooling [n]	0.020***	0.009	10.000
	(0.007)	(0.007)	
apprenticeship training [d]	0.007	0.017	1.000
	(0.019)	(0.019)	
masters craftsman [d]	0.217***	-0.016	0.000
	(0.033)	(0.029)	
university degree [d]	0.067**	0.039	0.000
	(0.028)	(0.029)	
training & university [d]	0.085***	-0.047	0.000
	(0.031)	(0.031)	
household size > 2 [d]	-0.001	-0.001	1.000
	(0.014)	(0.013)	
self-empl. family [d]	0.136***	0.113***	0.000
	(0.016)	(0.013)	
number (no.) of task roles [n]	0.071***	0.021**	3.000
	(0.011)	(0.009)	
no. of task roles (squared)	-0.003***	-0.001	9.000
	(0.001)	(0.001)	
observations	5,027	5,027	
chi2	673.564	240.75	
BIC	6418.378	6844.558	

table reports marginal effects (Δy/Δx) based on probit regressions conditional for the median population
d stands for a discrete change of dummy variable from 0 to 1; n stands for a numeric variable (metric)
(se) standard errors in parentheses, standard errors are cluster adjusted (regional districts; see Moulton 1990)
level of statistical significance: * p<0.10, ** p<0.05, *** p<0.01
)[1] the model only includes the linear term of age. Introducing the non-linear term makes age statistically insignificant
source: REM, 2003; own calculations

The coefficients related to the number of task roles clearly support the relationship between the breadth of skills and self-employment competence. An increase in the number of task roles by one raises the probability of reporting self-employment competence by 7.1%. The negative term of the squared number of task roles indicates that competence assessment becomes less likely for a very broad set of experiences. An inverted u-shaped pattern can be rejected using the Sasabuchi test (Sasabuchi 1980). Therefore, it appears that it is not only the variety of experience per se, but having a sufficient breadth of experience and skills that prompts people to state that they have self-employment competence.

Desire and the variety of experience

As found for variety and competence, males are more likely to be affected by non-pecuniary benefits than females (8.8% higher probability). More interesting results can be found for the relationship between age and desire. The likelihood of stating 'desire' shows a u-shaped pattern in age, which indicates high desire for self-employment at younger and older ages. Thus, middle-aged individuals appear to perceive lower non-pecuniary benefits in starting a business. This may also reflect the higher opportunity costs associated with becoming self-employed for middle aged individuals. However, the meaning of 'middle-aged' must be scaled with reference to the extremum found around an age of 48.

Furthermore, desire also increases with an entrepreneurial background (self-employed relatives) and the number of task roles. Having self-employed relatives increases the likelihood of self-employment becoming a desirable employment option by a factor of 11.3%. In terms of the number of task roles, a marginal effect of 2.1% was found for a unit change of desire. Moreover, the effect of the number of distinct task roles is limited to a linear relationship,

2.4.4 Gender-specific effects

In order to verify the robustness of the results, we separated the estimates presented above by gender (see Table 2.4). This was mainly motivated by previous findings that emphasized large differences between males and females in explaining entrepreneurial behavior or self-employment activities (e.g., Wagner 2007). In addition, this also provides a deeper insight into the phenomenon of potential overconfidence as it is discussed as being gender-biased (e.g., Bengtsson et al. 2005).

To facilitate comparability, the results are reported in terms of marginal effects fixed at the median of the (overall) population attributes (see above). First, a Chow test only supports statistically significant (95% confidence level) differences across gender for the task roles model and the desire estimation (see Chow 1960 for details).[16] For example, as reported in Table 2.4 the household context is much more important for females in terms of investments in experience than it is for males (see the `Jack-of-all-Trades' and 'task roles' estimations).

As stated above, apprenticeship training, the holding of a master craftsman qualification and the interaction of apprenticeship training and a university qualification are significantly correlated with a marginal increase in the variety of experience (negatively: university qualification; others: positively). As we can see from columns three and four (poisson regression) the qualification attributes matter most for the female population (a master craftsman qualification and apprenticeship training are insignificant for males). Furthermore, we find a negative effect of a university qualification for men whereas this attribute is insignificant for the female population.

[16] The null hypothesis is tested that the parameter values of two distinct estimations are equal.

In summary, these findings indicate that females tend to make broader investments in human capital whereas males are more specialized in terms of human capital investments.

Table 2.4: Gender differences

	'Jack-of-all-Trades' d probit regression		task roles [n] poisson regression		competence [d] probit-regression		desire [d] probit-regression	
variable	male	female	male	female	male	female)[1]	male	female
	Δy/Δx (se)	Δy/Δx (se)	Δy/Δx (se)	Δy/Δx (se)	Δy/Δx (se)	Δy/Δx (se)	Δy/Δxv	Δy/Δx (se)
age [n]	0.027***	0.029***	0.128***	0.189***	0.014***	0.003***	-0.025***	-0.037***
	(0.007)	(0.006)	(0.027)	(0.026)	(0.005)	(0.001)	(0.006)	(0.005)
age (squared)	-0.000***	-0.000***	-0.001***	-0.002***	-0.000*	-	0.000***	0.000***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	-	(0.00)	(0.00)
years of schooling [n]	-0.013	0.007	-0.049	0.063	0.025***	0.012	0.004	0.015*
	(0.009)	(0.01)	(0.031)	(0.039)	(0.008)	(0.01)	(0.008)	(0.008)
apprenticeship training [d]	0.021	0.025	0.037	0.213***	0.002	0.009	0.018	0.016
	(0.026)	(0.021)	(0.112)	(0.066)	(0.028)	(0.027)	(0.028)	(0.024)
master craftsman [d]	0.086***	0.106*	0.139	0.590***	0.145***	0.242***	-0.045	0.067
	(0.03)	(0.057)	(0.12)	(0.209)	(0.049)	(0.037)	(0.034)	(0.056)
university degree [d]	-0.037	-0.036	-0.281*	-0.096	0.032	0.093**	0.054	0.025
	(0.045)	(0.031)	(0.164)	(0.119)	(0.044)	(0.045)	(0.036)	(0.039)
training & university [d]	0.115**	0.126**	0.646***	0.330*	0.073	0.094*	-0.051	-0.039
	(0.051)	(0.052)	(0.241)	(0.174)	(0.051)	(0.053)	(0.036)	(0.041)
household size > 2 [d]	-0.027	-0.078***	-0.184*	-0.459***	-0.007	0.002	-0.004	0.011
	(0.022)	(0.021)	(0.098)	(0.088)	(0.022)	(0.02)	(0.02)	(0.021)
self-empl. family [d]	0.077***	0.057***	0.394***	0.288***	0.132***	0.131***	0.116***	0.106***
	(0.022)	(0.02)	(0.095)	(0.072)	(0.022)	(0.019)	(0.016)	(0.017)
number of task roles [n]					0.072***	0.058***	0.001	0.036**
					(0.018)	(0.014)	(0.012)	(0.015)
no. of task roles (squared)					-0.003**	-0.002*	0.001	-0.002
					(0.002)	(0.001)	(0.001)	(0.002)
observations	2,561	2,466	2,561	2,466	2,561	2,466	2,561	2,466
chi2	171.523	64.969	141.056	145.338	330.387	209.805	164.876	124.18
BIC	3352.94	2882.281	10521.72	9469.66	3399.66	3083.638	3533.988	3367.677

table reports marginal effects (Δy/Δx) based on probit and poisson regressions conditional for the media population
d stands for a discrete change of dummy variable from 0 to 1; n stands for a numeric variable (metric)
(se) standard errors in parentheses, standard errors are cluster adjusted (regional districts; see Moulton 1990)
level of statistical significance: * p<0.10, ** p<0.05, *** p<0.01
)[1] the model only includes the linear term of age; introducing the non-linear term makes age statistically insignificant
source: REM, 2003; own calculations

In addition, the lower correlation of qualification attributes with the self-reported competence for males also supports the overconfidence argument found in the literature. This may also explain the statistical insignificance of age and schooling for competence and desire. However, the holding of a university qualification or being trained and holding a university qualification (interaction term) only matters for males in reporting competence.

Finally, while it differs by gender for 'desire', the effect of task roles for competence remains the same for males and females. The variety of experience does not correlate with taste for variety for males in terms of statistical significance. This clearly indicates a stronger correlation of broad experience with the competence dimension for males than for females.

2.5 Summary and conclusions

Previous studies relating to the 'Jack-of-all-Trades' hypothesis presented evidence for two different underlying types of causality for the correlation between the variety of experience and the likelihood of becoming self-employed. This mainly leads to the question as to whether the 'Jack-of-all-Trades' hypothesis is ability driven or taste driven.

This paper contributes, first, to this causality dilemma and uses different strategies to investigate the nature of the 'Jack-of-all-Trades' and the effect of broad experience for competence and self-employment desire.

The results show that there are large differences between high numbers of task roles (identified as 'Jack-of-all-Trades') and marginal increases in the number of task roles. Most importantly, formal qualifications show limited correlations with the 'Jack-of-all-Trades' assignment, while experience-related human capital attributes correlate strongly with this assignment. We found similar effects for 'incremental' investments. Most of these findings are robust for both genders. However, formal qualifications differ in explaining marginal investments in the variety of experience. Males appear to be more likely to invest in the variety of experience irrespective of their level of formal qualifications.

Second, this paper investigates the correlations between competence, taste for variety, and the number of task roles. The ability dimension is captured by self-reported competence in setting up and running a firm. Taste for variety is measured by the interviewee's responses to the statement that he or she values self-employment as a desirable type of employment. The results show that both competence and taste for variety are positively influenced by the number of task roles. However, the results highlight the fact that the number of task roles is more related to competence than to taste for variety. Moreover, the variety of experience is uncorrelated with desire (which proxies taste) for males. Most importantly, we found an inverse u-shaped relationship between competence and the number of task roles, which indicates that it is not the variety itself but having a sufficient set of different skills that enhances self-employment competence. In contrast, taste is linearly correlated with the number of task roles.

The results of this study highlight the fact that the competence dimension appears to assume a predominant role in the 'Jack-of-all-Trades' issue - particularly in the case of males. This may support political attempts to make use of the balanced skill set approach in fostering

entrepreneurship. However, further research requires longitudinal data for a better understanding of the causalities. In particular, nothing is known about the quality of the observed variety of experience. Furthermore, it is worth investigating whether the 'Jack-of-all-Trades' hypothesis also correlates with opportunity creation, opportunity recognition, and success.

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2.7 Appendix

Table A.2.1: Definitions of the variables

gender (male)
: equals one if the individual is male

age
: age at the time of the interview, measured in years

years of schooling
: years of schooling (graduation with access to university equals 12 or 13 years of schooling)

apprenticeship training
: equals one if the individual has graduated from apprenticeship training

master craftsman
: equals one if the individual holds a master craftsman qualification

university degree
: equals one if the individual holds a university degree

training & university (short for apprenticeship training X university degree)
: equals one if the apprenticeship training x university degree (interaction term)

household size n > 2
: equals one if more than two individuals live in the same household

self-employed (s-e) family
: equals one if someone form the family is or was self-employed

chance
: equals one if the individual states a positive valuation of the local macroeconomic situation to start a business

fear
: equals one if the individual states that fear of failure is an obstacle to starting a business

competence
: equals one if the individual states having the competence that is necessary to start and run a business.
(statement: 'You have the knowledge, the competence and the experience that is needed to start and to run a business.')

desire
: equals one if the individual states that he/she values self-employment as a desirable type of employment.
(statement: 'From a personal perspective, becoming self-employed is a worthwhile thing.')

number (no.) of task roles
: the number of distinct task roles related to previous periods of employment. The questionnaire asked for 'the number of distinct fields of competence' (question: 'In how many distinct fields of competence have you ever worked?' This question is supplemented with the note that this does not mean different employers, but different fields of activity).

'Jack-of-All-Trades'
: equals one if the individual states having experience in more than 3 distinct fields of competence (4 equals the 75^{th} percentile)

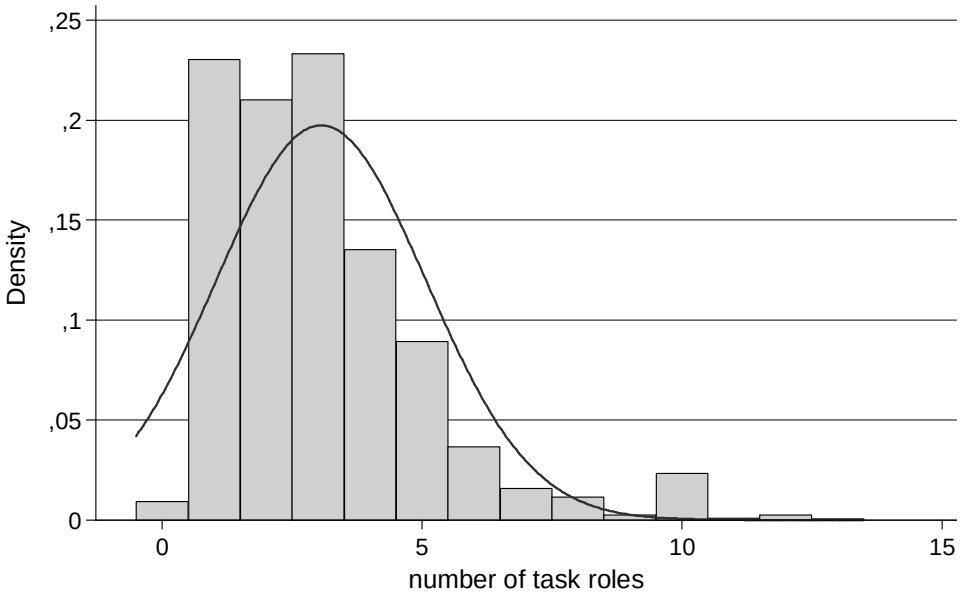
Table A.2.2 Descriptive statistics

variable	obs.	mean	stdv.	min	max
gender (male)	5,027	0.51	0.500	0	1
age	5,027	40.28	10.785	18	64
years of schooling	5,027	10.50	1.364	0	12
apprenticeship training	5,027	0.70	0.458	0	1
master craftsman	5,027	0.07	0.255	0	1
university degree	5,027	0.26	0.441	0	1
training & university	5,027	0.11	0.309	0	1
household n > 2	5,027	0.50	0.50	0	1
self-employed (s-e) family	5,027	0.44	0.496	0	1
chance	5,027	0.15	0.354	0	1
fear	5,027	0.53	0.499	0	1
competence	5,027	0.44	0.497	0	1
desire	5,027	0.48	0.499	0	1
prestige	5,027	0.56	0.496	0	1
no. of task roles	5,027	3.05	2.02	0	13
‘Jack-of-All-Trades’	5,027	0.32	0.46	0	1

Table A.2.3: Table of correlations

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
gender (male)	1	1.00															
age	2	0.02	1.00														
years of schooling	3	0.03	-0.10	1.00													
appr. training	4	-0.04	-0.04	-0.22	1.00												
master craftsman	5	0.13	0.06	-0.01	0.06	1.00											
university degree	6	0.08	0.09	0.57	-0.39	-0.06	1.00										
training & university	7	0.04	0.07	0.29	0.23	0.03	0.58	1.00									
household n > 2	8	-0.01	-0.04	-0.03	0.01	0.04	-0.03	-0.02	1.00								
(s-e) family	9	-0.05	-0.04	0.10	-0.02	0.03	0.07	0.02	-0.01	1.00							
chance	10	0.04	-0.03	0.08	-0.06	-0.01	0.07	0.01	-0.04	0.06	1.00						
fear	11	-0.11	0.00	-0.07	0.01	-0.05	-0.07	-0.07	0.00	-0.07	-0.07	1.00					
competence	12	0.16	0.11	0.10	-0.01	0.14	0.13	0.13	-0.01	0.14	0.09	-0.17	1.00				
desire	13	0.09	-0.11	0.05	-0.01	0.00	0.02	0.00	-0.03	0.12	0.13	-0.13	0.16	1.00			
prestige	14	0.10	0.05	0.10	-0.06	0.01	0.12	0.06	-0.02	0.13	0.10	-0.03	0.09	0.17	1.00		
no. of task roles	15	0.13	0.10	0.00	0.06	0.07	0.02	0.08	-0.06	0.07	0.02	-0.08	0.20	0.06	0.02	1.00	
‘Jack-of-All-Trades’	16	0.10	0.07	-0.01	0.05	0.08	0.02	0.08	-0.04	0.06	0.02	-0.07	0.17	0.04	0.01	0.78	1.00

Figure A.2.1: Distribution of the number of task roles



source: REM, 2003; own calculations

Chapter 3

The experience of the founder and self-employment duration

Abstract:[1] *This paper investigates how the initial experience of a founder affects self-employment duration in a competing risks setting. The analysis uses survey data that provide new perspectives on the role of the founder's experience. The analysis concentrates, in particular, on the importance of a balanced skill set for self-employment duration. The results show that most self-employed individuals find themselves unemployed on ending their self-employment. Firm level characteristics are less significant in explaining self-employment duration while experience and motivation appear to be driving forces for self-employment longevity. The findings support the importance of combined practical experience and adequate skills. Having broad experience combined with competence in sales/business is one of the most important factors for self-employment duration. Contrary to most other studies, the results show that previous self-employment experience is associated with early exits.*

Keywords: self-employment, human capital, duration, balanced skill set, competing risk
JEL-Classification: C41, J24, J44, J62, J64

3.1 Introduction

The human capital of business founders is one of the most important resources in entrepreneurship as it is proofed to be associated with entry choices into self-employment, marketing strategies, financing, the exploitation of business opportunities, self-employment duration, and firm survival (e.g., Brüderl et al. 1992; Cressy 1996; Gimeno et al 1997; Chandler and Hanks 1998; Parker and van Praag 2006). However, the concepts of human capital as well as empirical findings remain imprecise in terms of the quality of the qualifications that drive the

[1] An earlier version of this paper was published in 2008 as Discussion Paper No 40/2008 of the Institute for Employment Research (IAB) under the title "The Founders' Experience and Self-employment Duration - The Importance of being a 'Jack-of-all-trades'. An Analysis based on Competing Risks." The study uses data collected within the research project "New Business Start Ups from Unemployment - Success Factors and Evaluating the Support Program implemented in accordance with Section 75 of the German Social Code III", which was funded by the Ministry of Culture and Science in Lower Saxony. Stata 10.1 was used in all calculations. Do-files and results that are discussed but not reported are available from the author. Helpful comments on a previous version of this paper presented at the 2008 "31st Institute for Small Business & Entrepreneurship Conference (ISBE)" in Belfast (Northern Ireland) are grateful acknowledged. All remaining errors are my own.

success of a new venture. A general concern related to the mechanism that underlies the human capital approach is that higher qualifications will cause higher productivity in all types of employment and not only in entrepreneurship. Therefore, it is not the level of productivity that drives occupational choices, but the comparative advantages of the founder's skill set.

Up to now, too little is known about the comparative net gains of different types of founder's human capital (or equally, qualifications) as captured in schooling, training, and experience. Previous research that accounts for the comparative advantage perspective on entrepreneurship is more or less limited to the entry decision (e.g., Evans and Jovanovic 1989; Taylor 1996; Lazear 2005; Wagner 2003 and 2006). Evans and Leighton (1989), Holtz- Eakin et al. (1994), Cressy (1996), Gimeno et al. (1997), and Taylor (1999) also use this concept in describing the mechanism of quitting self-employment. However, to the best of my knowledge, no theoretical framework has been developed that accounts for the time dependency of the exit choice as empirically emphasized by Taylor (1999) and Johansson (2000).[2] The effect of time on comparative advantages and related changes in the potential income are unknown, in particular.

This paper contributes to this literature and adds a framework that allows for the simple identification of the time dependency of comparative advantages. The core idea of the framework highlights two main subjects: first, the updating of information (Bayesian learning) allows better estimates of the expected income and, second, experience for the alternative occupation (wage work) will be depreciated. As a result, we obtain a time dependency of comparative advantages that cause the duration of self-employment. The founder's human capital will then simply operate as a shifting factor in scaling that time dependency. This framework adds to the static learning model of Jovanovic (1982) and concentrates on the occupation choice situation instead of focusing on firm formation.

Based on this setting, the empirical analysis tests the importance of different dimensions of the founder's experience. In particular, the study focuses on the balancing property of the founder's qualifications as suggested by Lazear (2005), who states that a balanced skill set should be associated with comparative advantages for self-employment. This has not previously been investigated for the exit situation. The application of Lazear's role concept for self-employment success constitute be a tougher test for the existence of the comparative advantage than the entry decision (see Lazear 2005; Wagner 2003 and 2006; Hyytinen and Ilmakunnas 2007; Silva 2007). The major point is that running the business yields better information in relation to the individual's entrepreneurial abilities than can be available to an individual when choosing to enter a position of self-employment. In addition, the study also controls for sales background and previous self-employment experience as well as motivation.

[2] An exception can be found in Jovanovic (1979 and 1982).

The data used in this study focuses on people who were unemployed before setting up their businesses. This population represented a growing share of self-employment entries in Germany in the past decade (Caliendo and Kritikos 2007) and has been underrepresented in the investigation of factors that determine self-employment duration (for some exceptions see: Carrasco 1999; Cueto and Mato 2006; Reize 2004; Andersson and Wadensjö 2007). We use survey data that concentrates on this population in a selected region in northern Germany and which allows the use of detailed information on the founder's qualifications.

The discussion of the investigation is structured as follows: Section 3.2 presents the analytical framework, which focuses on the identification of the time dependency of exits, and presents the role of the founder's attributes in scaling this time dependency. Section 3.3 describes the dataset. This is followed by a description of the start-up projects and the nature of the exits in Section 3.4. Section 3.5 presents the parametric duration model used for the investigation and contains the results of the analysis. Finally, the last section summarizes and discusses the results.

3.2 Framework

3.2.1 Theoretical description

The basic idea behind the current investigation refers to a simple occupational choice model. Individuals will switch employment positions if the net gain from their current employment position becomes negative compared to a set of alternatives. Therefore, becoming self-employed can be described as a situation with comparative advantages for a self-employment situation, in which the expected net gain is higher for self-employment than for other states. Given this basic setting, the following section demonstrates the time dependency of expected net gains.

Let us consider rational agents who periodically adjust their expectations of the potential incomes (more generally: gains) of a set of existing employment options. Switching is possible at any time and is costless. The agents are currently self-employed and will face a (relative) depreciation of the human capital that is useful for wage work (Lazear 2004 and 2005; for empirical evidence, see Williams 2000; Bruce and Schütze 2004; Hyytienen and Rouvinen 2008)[3]

[3] Skills may degenerate due to a lack of practice in working conditions characterized by a high division of labor or they may simply become redundant if the opportunity to participate in (highly specialized) technological change is missed. Bruce and Schütze (2004) show that experience in self-employment has a limited value with respect to wages and Hyytienen and Rouvinen (2008) argue that self-employment in this context tend to be unemployment in disguise. However, Price (1988) notes that human capital decay mainly addresses high skilled individuals. In fact, on average people that enter self-employment are usually better qualified than the average which is also true for the population of formerly unemployed founders observed here (see below). Bruce and Schütze (2004), show that experience in self-employment has a limited value with respect to wages.

and they periodically adjust their income expectations (Jovanovic 1982). Being self-employed mainly improves a broader set of skills. Bayesian learning and depreciation of wage-work-specific human capital will completely determine the time–dependent nature of exits.

Technically, we will observe an individual *i* with *j* alternative occupations where *i* chooses the option with the highest discounted income, Y_j. Each self-employment project (j=s) offers a variety of potential (but unknown) incomes that may vary across time.[4] This will lead to the expression $E^{\sigma}(Y_j)$, which is the mean of the ex ante distribution of $f^{j}(\mathrm{Y_j})$, and σ_j as the indicator of the variance. σ_j captures the risk associated with the distribution of the expected potential income. *i* chooses the occupation with the highest $E^{\sigma}(Y_j)$ (hereafter written as $E(Y_j)$), which is the risk-weighted potential income.

However, $f^{j}(\mathrm{Y_j})$ varies across time (updating the ex ante distribution) as new information allows better estimates of Y_j. As a result, *i* sequentially evaluates $E(Y_{j=s})$ and $E(Y_{j\neq s})$, which leads to a periodic adjustment of σ_{tj} and changes of $\mathrm{E_t(Y_j)}$.

The information about $f^{\mathrm{j}}_{\mathrm{t}}(\mathrm{Y_{j=s}})$ improves over time [$f^{\mathrm{j}}_{\mathrm{t}}(\mathrm{Y_{j\neq s}})$ worsens] so that the risk decreases ($\sigma_{t=0;\,j=s} > \sigma_{t>0;\,j=s}$) [and $\sigma_{\mathrm{tj\neq s}}$ increases]. Furthermore, $\mathrm{E_t(Y_{j\neq s})}$ periodically decreases as a result of the depreciation process. The latter issue can be described by delta ($\delta = f^{\delta}(\mathrm{t})$; $0 < \delta < 1$), which is an unspecified function of time that represents the time-dependent depreciation process.[5] The comparative advantage is then defined as:

$$\lambda_t = E_t(Y_{j=s}) - E_t(Y_{j\neq s} \times \delta), \quad \text{with } \lambda_t < 0 \text{ , given } x \tag{3.1}$$

Lambda (λ_t) is an unspecified factor that captures a positive difference between the expected potential incomes of the self-employment position and other employment options. X is a set of observable characteristics. The likelihood that *i* quits self-employment or that *i* remains self-employed is now completely described by the distribution of λ_t. Consequently, the duration of the self-employment (τ) is a function of λ_t.

However, lambda (λ_t) captures two aspects: first, the (initial) difference of the expected potential incomes between $j = s$ and $j \neq s$ and, second, it is a function of *t* where *t* represents the

[4] For example, the variation may be induced on the basis of changes in the price policy or production technology.

[5] Müller (2009), for example, suggests an inverse sigmoid pattern of the individuals' human capital development for academic knowledge following entry into the employment market, which implies a sigmoid depreciation function.

time-dependent risk weighting scheme (the level of information) and the depreciation of the wage-work-specific human capital:

$$\tau = f(\lambda; t) \quad \text{resp.} \quad \tau = f(\beta x_0; \mathrm{t}) \tag{3.2}$$

At the beginning of the self-employment period, λ is solely related to the initial resources x_0, therefore λ_t may be rewritten as $\beta x_0(t)$. β will represent the scale factor of the comparative advantages that are associated with x_0 as time elapses. Learning and human capital depreciation can be described by a time-dependent link function of the initial resources:

$$\tau = f(\lambda; \mathrm{t}) = f((\beta \mathrm{x}_0(\mathrm{t})) \tag{3.3}$$

Positive values of β will reflect a comparative advantage of self-employment and are associated with a longer duration in self-employment. In contrast, negative values of β reflect comparative disadvantages for self-employment.

However, quitting self-employment may be followed by different employment states, which could be unemployment, a new business, retirement, or new wage work. β may be different for exits into unemployment and into wage work. A distinct perspective on β_j for different exit states will allow the precise identification of the comparative advantage. If not, β is reduced to an overall identification of the comparative advantage for a self-employment position compared to all other employment states.

We may account for the distinct nature of comparative advantages with $j = \in \{s, w, a\}$, where $j = a$ captures unemployment benefits and $j = w$ represents a wage or salary job. This also allows the following further implications:

1. If we assume that the income in $j = a$ is lower than the income in $j = w$, we may expect $E_t(Y_{j=a}) < E_t(Y_{j=w})$. This will correspond to earlier exits into wage work than exits into unemployment, conditional to $E_t(Y_{j=s}) < E_t(Y_{j\neq s})$.

2. We will observe a higher share of exits into unemployment for previously unemployed founders than for start-ups out of a position of employment because of a higher ratio of $\frac{E_t(Y_{j=a})}{E_t(Y_{j=w})}$ for those who start a business out of unemployment.

3.2.2 The focus of interest

The framework presented above relates the comparative advantage to a time-dependent link function of the initial resources but it does not emphasize specific attributes in their relevance for quitting self-employment. Major characteristics that are exposed to human capital depreciation and that influence learning capacities are qualification and experience. In this context several characteristics have already been discussed as being of substantial relevance for firm survival or self-employment longevity (Brüderl et al. 1992; Gimeno et al. 1997; Taylor 1999 and Johansson 2000) but others have been concentrated on the entry situation. We will focus on some of these characteristics to test whether they are associated with time-dependent comparative advantages.

Recently, Lazear (2005) suggested a theoretical and empirical identification of comparative advantages for self-employment activities. He assumes that individuals must be multi-skilled to be successful as entrepreneurs or managers (see also Chandler and Hanks 1998). Wage workers will be better off if they are specialized. The core finding of the related model shows that it is not the level of productivity that affects comparative advantages, but the balancing property of the individual's skills. To some extent, this transfers Kremer's (1993) 'o-ring-theory' of production to self-employment longevity, which states that the weakest part of the production process limits the output. Thus, we may expect that a broad set of skills (e.g., due to training or experience) enhances self-employment duration – in particular, it should be related to a high positive impact on self-employment duration for exits into employment. Lazear (2005) and Wagner (2003, 2006), for example, provide evidence for the empirical relevance of this idea in relation to self-employment entries.

Furthermore, the findings of Gimeno et al. (1997) and Wießner (2001) support the idea that comparative advantages correlate with the amount of applicable experience, such as knowledge of the same industry or the similarity of the service or product offered by the start-up firm (see also Bates 1990; Gimeno et al. 1997; Chandler and Hanks 1998). Likewise, a self-employment position may be a better match for individuals who are already experienced in self-employment or have experience or training in the field of sales.

In addition, taste is an often discussed but underreported issue of comparative advantage (for exceptions see, Arias and Khamis 2008; Benz and Frey 2008). In particular, the motivation of a founder has been part of many investigations showing that this is crucial for the entry choice because it determines the relative non-pecuniary benefits associated with employment positions (e.g., Benz and Frey 2008, Rauch and Frese 2000). Rauch and Frese (2000) argue, for example, that taste will operate as a mediator in affecting non-pecuniary benefits. However, a deficit remains that also controls for the comparative advantage nature of founder's motivation for survival (Block and Sandner 2009).

3.3 Data and variables

The analysis presented below uses a data set based on a survey of individuals who applied for bridging allowances in the northern region of the German federal state of Lower Saxony (administrative district of Lueneburg) between 1995 and 2000.[6] The bridging allowance was a program from the active labor market policy in Germany and was launched in 1986.[7] For the survey, which was conducted in fall 2003, we identified 7,418 official applications for the bridging allowance between 1995 and 2000, from which 2,504 addresses were used in the survey (including 326 rejections). Of these, 964 people participated, which gives a gross participation rate of 39%.[8]

The advantage of using this data is that it provided detailed information on start-up projects and the founder's human capital setting as captured in relation to schooling, training and different types of experience. The questionnaire asked for details about the type of start-up, the point in time at which the business was set up, the firm characteristics (legal form, investments, number of employees at the beginning), the founder's professional background, and information concerning the education and vocational training of the founder. In addition, the questionnaire asked about the motivation for setting up the business, the development of the firm's performance, and the founder's employment status after quitting self-employment.

The duration of the observation of the self-employment is defined as the difference between the start-up date and the point in time at which the self-employment ended. To control for the status after quitting self-employment, the investigation differentiates roughly between exits into unemployment and exits into periods of employment. Other states are summarized as 'others' (covering maternity leave, retirement, and periods out of the labor force) and are not included in the investigation. The set of explanatory variables covers the founder's professional background, education, details of the start-up project, and the firm's characteristics as well as information about the year of the start-up to control for environmental variation. More detailed information can be found in Table A.3.1 in the Appendix.

[6] Note that the results presented by Hinz and Jungbauer-Gans (1999) and Pfeiffer and Reize (2000) indicate only a few differences between those start-ups that received support in the form of bridging allowances as compared with ordinary self-employment entries.

[7] The bridging allowance was part of active labor market policy until 2006. During the time span under observation the program provided a six-month payment of unemployment benefits during the setting up of a business. It was only granted if the business concept passed an evaluation by a competent authority. For further details, see Caliendo and Kritikos (2009).

[8] The survey consists of two waves with a reminder on the improvement of the participation rate. In 500 cases, we were unable to find a valid mailing address. The applications were identified on the basis of a document research in six regional employment offices of the administrative district of Lueneburg in summer 2001. The survey was conducted in fall 2002. We also conducted a database inquiry to proof the accuracy of the initially collected data and to update mailing addresses.

Survey data usually provides potentially biased information. For this reason, the analysis is limited to self-employment periods beginning between 1998 and 2000.[9] In addition, this procedure also ensures a lower variation of the economic conditions that may mediate the importance of the covariates (addressing the problem of omitted variables). The final sample size consists of 645 self-employment observations (1998: n = 184, 1999: n = 292, 2000: n = 169) with a maximum observation period of 55 months.[10]

3.4 Descriptive results

3.4.1 The profile of the founders

Consistent with other studies (e.g., Reize 2004; Lückgen et al. 2006; see Table 3.1), most of the surveyed founders were males (70%), aged between 30 and 45 (almost 62%) and well educated. On average, 35% had obtained upper secondary school results qualifying them for university admission, around 26% held a university degree, and 34% had been unemployed for less than four months before starting the business.

Wießner (2001) points out that those who are self-employed out of unemployment may suffer from a deficit of competence in sales or commercial affairs. However, this was not found for the current population. Overall, 22% of the founders were experienced in sales/business and 20% were experienced in business management; at least 7% held a master craftsman qualification and were thus trained in their specialized area and in management. Moreover, according to Lazear's (2005) role model, around 12% of the population can be characterized as having a multi-experience background (experience in three or more fields of operation).[11] Around 32% of the founders had experience from previous employment that was of direct relevance to the service or product provided by the new business and 20% of the founders had experience in self-employment.

In the case of self-employed individuals out of unemployment, unemployment is usually discussed as the primary reason for beginning self-employment. This was true for about 65% of the observed founders (ending or bridging unemployment is the major motive). However, 46% of

[9] In particular, based on these restrictions, we expect to reduce for biases related to retrospective answers and to reduce problems concerning selectivity in survey participation.

[10] Please note that, due to data confidentiality concerns, it was not possible to carry out a more in-depth analysis to investigate issues of sample selection and representation. As far as possible, descriptive analyses show that males have a lower participation rate than females and that the participation probability increases slightly with age and income. We do not find a bias concerning the spatial representation of the region.

[11] For previous results concerning the balancing profile of nascent entrepreneurs, see Wagner (2003 and 2006). In the 2003 study, Wagner shows that about 31% (12%) of the nascent entrepreneurs had changed their occupations once (twice or more). Wagner (2006) reports that, on average, nascent entrepreneurs are experienced in about 3.6 (distinct) occupational fields/types of competence.

the founders responded that they are highly motivated due to the level of freedom and self-fulfillment self-employment can provide. In addition, approximately 50% of the founders stated that they are strongly or very strongly motivated by the opportunity to end or bridge their period of unemployment (push motives) but, at the same time, are also motivated by the level of freedom and self-fulfillment provided by self-employment (pull motives). Caliendo and Kritikos (2007) obtained similar results based on more recent data.

Table 3.1: Profile of the founders in previous studies

study	Hinz,Jungbauer-Gans (1999)	Wießner (2001)	Reize (2004)	Caliendo, and Kritikos (2007)	this study
dataset	survey: 229 registrations of businesses in Greater Munich; founded in 1995 (78 promoted with bridging allowance)	survey: 3,846 formations of companies promoted with bridging allowance in selected regions in Germany (1994/1995)	GSOEP: 239 self-employment observations started by previously unemployed people between 1983 and 1999	survey: 1,585 founded businesses promoted with bridging allowance in 2003	survey: 645 founded businesses promoted with bridging allowance during 1998 and 2000
variable					
gender (male)	70%	~74%	68%	76%	69%
age (in years)	39	~39	~35	~39	~39
upper graduation	50%	28.2%	/	46%	35%
university degree	39%	14.7%	22%	-	26%
> 0 to 2,500 euro	-	15.6%	-	8.7%	
< 5,000	-	-	-	-	38%
< 10,000 euro	17%	/	-	20.6%	
> 25,000 euro	20%	27.6%	-	-	26%
motive: self-fulfillment	~36%)1	-	-	53.7%)2	
start-up with employees	~24%	-	-	-	27,6%

table reports selected descriptive findings of previous research about self-employment duration of formerly unemployed founders in Germany (and allows a brief comparison with the population analyzed in this study)
)1 captures the motive 'self-realization' as a major reason to become self-employed
)2 refers to the statement 'I always wanted to be my own boss' as a reason to become self-employed

Unlike other studies that focus on self-employed individuals out of unemployment, a large proportion of those interviewed here started with (relatively) good financial endowments. Indeed, their capital structure tended to be comparable to that of founders who did not start out of unemployment (see Table 3.1).[12] To some extent this may increase comparability to other studies, but it may also be a bias compared to studies that focus on self-employed individuals out of

[12] The share of founders who started their business with higher assets (over 25,000 euro) was less than 24%, and around 38% started with less than 5,000 euro. Almost 28% started with employees (28%). Wießner (2001) and Hinz and Jungbauer-Gans (1999) reported a higher proportion of founders who started with low assets (<5,000 euro) (Wießner: 52%; Hinz and Jungbauer-Gans: 45%).

unemployment. More detailed descriptive information can be found in the Appendix (Table A.3.2 and Table A.3.3).

3.4.2 Exits and self-employment duration

Table 3.2 and Figure 3.1 present information about the pattern of quitting self-employment. As Table 3.2 shows, 158 founders from the sample (24.5%) quitted self-employment. In 93 cases, these founders stated that insufficient economic success was the main reason for leaving self-employment. Alternative job offers appear to be less significant (27 observations). Consequently, half of the founders who quit self-employment can be observed with a sequential unemployment observation, and 31.6% re-entered salary work. It should be noted that this contradicts the findings of Taylor (1999) and Johansson (2000), who found the opposite effect.[13] However, these studies did not focus on founders coming from a position of unemployment, Similar to van Praag (2003) on young males in the US, the results indicate that self-employment (ignoring right censoring of the exit events) also varies in duration depending on the status that follows the period of self-employment. Exits into employment periods (average: 16.55 months) were observed 2 months earlier than exits into unemployment (average: 18.6 months). It may be noted that these descriptive findings support the implications derived from the theoretical discussion in section 3.2.

Table 3.2: Exit and the duration until exit

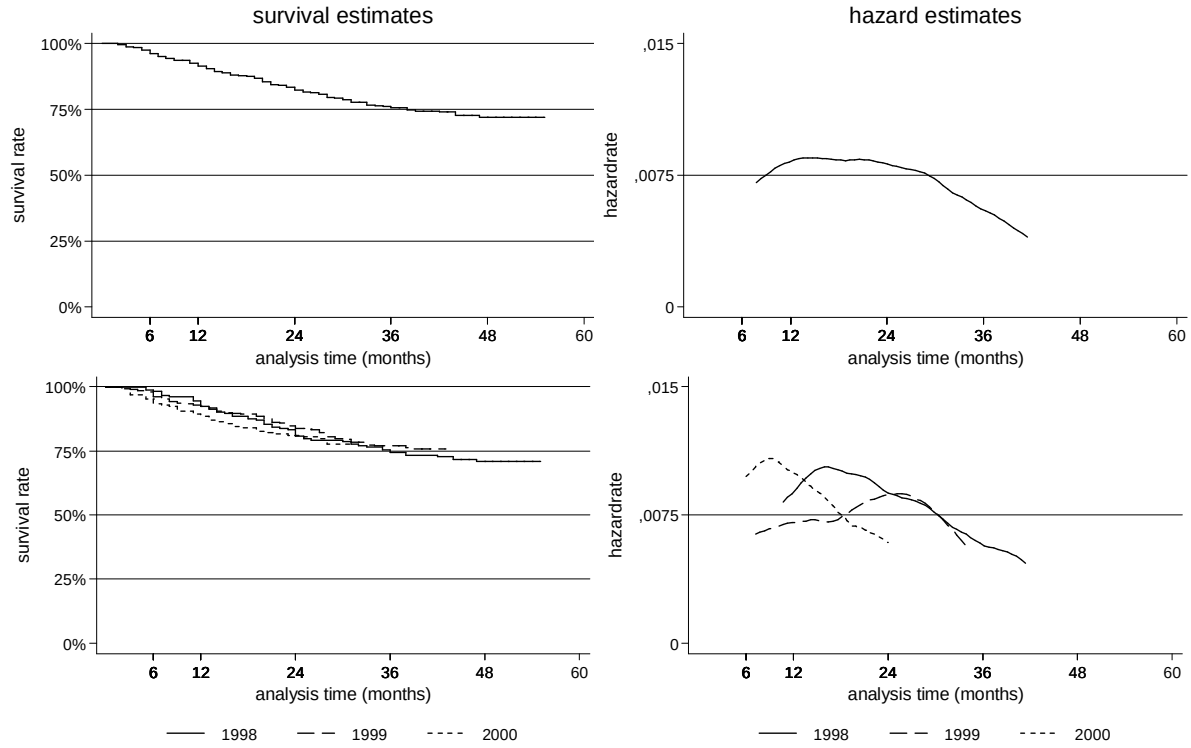
	exit		duration until exit
	n	%	∅ (months)
exits total	158	24.5	18.51
exits to			
wage work	50	31.6	16.55
unemployment or participation in measures	77	48.7	18.60
other	31	19.66	21.41

table reports selected descriptive findings
source: Survey Data; own calculations

[13] Taylor (1999) found a share of 48% for exits into wage work (male, 79-cohort); Johansson (2000) found a share of 39%. Cueto and Mato (2007) did not report the shares of exits by type. In fact, their reported results allow no clear interpretation: 10% finished their self-employment period with a transition into wage work and 52.5% terminated the self-employment voluntarily. Andersson and Wadensjö (2007) only report the share of exits into wage work and other types of exits. They found the second-lowest share of exits into wage work for the unemployed population.

Figure 3.1 gives an impression of the time dependency of the exit events. It shows the estimated Kaplan-Meier (1958) survival function and the related (smoothed) hazard function.[14] As can be seen in the upper left graph, 92% of the founders were still active after a period of 12 months. The survival rates decreased to 83% at the end of the second year (76% after three years) and declined in the fourth year to a survival rate of 72%.[15] In line with previous findings (see upper right graph), the hazard rate shows a 'sickle shaped' pattern (Brüderl and Schüssler 1990, Wagner 1994 and Strotmann 2007).

Figure 3.1: Survival and hazard functions



source: Survey Data; own calculations

However, as can also be seen from the two lower graphs in Figure 3.1, (entry) cohort effects may be present. The lower right graph indicates earlier hazards for the younger ('2000') entry cohort and a right-left shifting of the extremum across the cohorts. Nevertheless, based on a log-rank test the equality of the survivor functions across the entry cohorts can not be rejected on the common level of statistical confidence (Harrington 2005).

[14] The survival and hazard functions account for right censoring of the interesting event. In detail, the survival function estimates for each time interval the probability that those who have survived to the beginning will survive to the end. Therefore it defines as the product of the conditional probabilities of surviving each time interval. Accordingly, the hazard function defines as the risk of a failure event in a given time interval conditional to the population that is at risk of failure in that given time interval.

[15] Reize (2004): 75% after two years; Wießner (2001): 85% after two years; Caliendo and Kritikos (2007): 68% after two years.

3.5 Self-employment duration and human capital

3.5.1 Econometric setting

To study the determination of self-employment duration we use duration models, in which the time dependency of the exit events and right censoring are taken into account.[16] In duration models, the expected self-employment duration τ_i will be described as a function of the time t_i and a set of k covariates, x_i^k, that scale the time dependency:

$$\tau_i = \exp(-x_i\beta_x)t_i, \tag{3.4}$$

τ is an increasing function of t, and the set of x_i accelerate or decelerate this relationship. This allows an empirical specification that is in line with section 3.2, whereby the duration of self-employment will be exclusively explained by the initial characteristics of the start-up project and time.

The regression model given $\log(\tau) = Z$ derives as $Z_i = \beta_0 + x_i\beta_i + \varepsilon_i$ (see Guiterrez 2002). The properties of the error term (with mean 0 and standard deviation σ) determine the systematic misspecification of the regression function. The setting of ε defines a specific baseline distribution of the hazards that is assumed to be homogenous for all observations. We tested different specifications to find the best parameterization according to the underlying data. The lognormal distribution [$\tau \sim$ lognormal (β_0, σ)] performs best using the BIC criteria for the model selection (Rodriquez 2005). This parameterization also supports the distributional shape of the hazard functions found in Figure 3.1.[17]

In order to control for the nature of exits, a duration model also allows for a competing risk setting (Lancaster 1990). Technically, τ_i is then assumed to be specific for each destination state, which yields separate parameter estimates for each state *j* (τ_{ij}, given that the alternatives captured in *j* are uncorrelated conditional on *x*). All non-exit observations will be treated as censored (Thomas 1996).

[16] We also used hazard model specifications which use a different logic to describe time-dependent events. The most flexible form is the Cox-proportional hazard function (Cox 1972). However, the proportionality assumption does not hold for the data used here (Schoenfeld 1981).

[17] We also tested other model specifications (loglogistic, gamma distributions). The lognormal performs best using the BIC criteria for the model selection (Rodriquez 2005). In addition, we also used a flexible specification of the sigma parameter and tested for the existence of unobserved heterogeneity (Guiterrez 2002). However, the test statistics do not reveal statistical significance for unobserved heterogeneity or a superiority of the flexible sigma specification.

The interpretation of the parameter estimates β corresponds to that in section 3.2, where positive values of β mean a prolonging effect of the covariate for the duration of the self-employment period. Moreover, within a log-normal duration model, these beta coefficients represent scale parameters for the log duration and approximately describe a percentage change of the expected duration by a unit change in the covariate (Cleves et al. 2004, p. 209). Correspondingly, the exp(βk) identifies the time ratio, which is the ratio between two expected durations with a (unit) difference in x^k.

3.5.2 Determinants of the self-employment duration

In this section different characteristics are tested in accordance with the discussion presented in section 3.2 (see Table 3.3; for some graphical assessments see Figure A.3.1 in the appendix). Attributes that are expected to contribute to the comparative advantages framework are included in the empirical investigation. As specified above, we will distinguish experience and motivation; firm characteristics and formal qualification are discussed as control variables.[18] The discussion will be concentrated on exit in general and the two competing exits risks (i.e. into employment and unemployment). It is important to note that competing risk framework must be interpreted with care as nothing is said about the stability of these states.[19]

Experience

Founders who are experienced or have training in sales/business have a (β = -0.6; e^{β} = -0.54 times) shorter expected self-employment duration than founders who are not qualified in sales/business (insignificant for exits in general and exits into wage work). This demonstrates the comparative advantages of commercial competence for dependent employment as opposed to self-employment. Furthermore, it emerges that a commercial background combined with broad experience is insignificant for this type of exit. However, it prolongs the self-employment duration for exits into unemployment. Moreover, it is important to note that this is one of the

[18] Results of other model specifications (e.g., including the field of occupation and position and models with reduced sets of attributes) are not displayed. However, the results of the displayed models are quite comparable to those not displayed. It may be noted that introducing the attributes (en block) 'master craftsman', 'manager', and 'high pull motivation' yields a statistically significant model improvement based on the likelihood ratio test statistics (the basic model includes all standard individual characteristics like 'age', 'gender', 'formal', 'schooling' and controls for firm specific information). Finally, including 'commercial competence', 'broad skills', 'self-employment experience', and 'product experience' also yields significant model improvements on the common level of statistical significance. More detailed information on these estimation results and on alternative model specifications is available from the author.

[19] For example, problems may arise in cases in which exits into unemployment increase the individual's re-employment chances because this increases their chance of becoming subject to potential interventions on the part of active labor market policy. Therefore, the observed exits risks (employment and unemployment) may be less valid for the identification of distinct exit states which harm the interpretation related to the competing risk setting.

strongest correlations found in the empirical investigation (β = +1.87; time ratio: 6.48) and is even stronger than the effect found for the holding of a qualification as a master craftsman (β = +1.45; time ratio: 4.26). Management experience does not have a significant impact on exits. No comparative advantage is found that associates solely with a broad set of experiences.

Relevant industry and product-related experience were also found to be important for self-employment longevity. This is also supported by Brüderl et al. (1992), Gimeno et al. (1997), and Wießner (2001). Furthermore, founders who are prepared to run a business due to their previous employment experience a 1.35 times longer expected self-employment duration in general and a 1.6 times longer duration in the competing risk setting for the exit into unemployment. Obviously, industry experience and service/product similarity play an important role in survival chances. Moreover, the insignificant effect of the covariate for exits into wage work emphasizes a low importance for opportunity costs.

Being experienced in self-employment reduces the duration in self-employment (by a time ratio of 0.57; β = -0.561). This is consistent with the findings of Jørgensen (2005) Tervo and Haapanen (2009) and van Praag (2003) but contrary to those of Brüderl et al. (1992) and Taylor (1999). However, the effect of self-employment experience is complex and may be dominated by the nature of the experience (e.g., whether it is failure driven or relates to commercialization; see Metzger 2007). In addition, founders with self-employment experience tend to exit into unemployment sooner (β = -0.715; time ratio: 0.49) which indicates that these founders may simply be less successful.[20]

Unemployment and motivation

The fact of being unemployed before starting a business is usually taken as an indicator of founder's motivation (van Praag 2003; Addison, Centeno and Portugal 2004 – particularly, reflecting higher opportunity costs when starting the self-employment period for short periods of unemployment). Thus, more motivated founders should expect a longer duration in self-employment. The empirical findings support this hypothesis. Complementarily, a short duration of unemployment before starting the business prolongs the expected self-employment duration by a factor of 1.34 (β = 0.294). Hinz and Jungbauer-Gans (1999), Wießner (2001), and Cueto and Mato (2006) also find positive correlations.[21]

For the direct measurement of start-up motivation, we also used a cluster analysis to identify high pull-motivated founders (whose attributes include independence, high expected

[20] This may also include the ability to identify unsuccessful projects at an earlier point in time.

[21] It is interesting to note that studies that are not focused on start-ups from a position of unemployment report a negative effect of an unemployment spell on the expected self-employment duration (Taylor 1999; Johansson 2000).

income, and fewer push-oriented motives; see Table A.3.1). Founders who are highly pull-motivated expect a 1.49 times longer (β = 0.400) self-employment duration than those who are not (for exits into unemployment: 2.19 times longer; β = 0.785). This demonstrates the importance of non-pecuniary income from a self-employment position (Benz and Frey 2008). However, this finding contradicts the results obtained by Block and Sandner (2009), who did not find a significant effect of the motivation.

Table 3.3: Determinants of self-employment duration

model	exits		exits into			
variable	all		wage work		unemployment	
	β	(se)	β	(se)	β	(se)
cohort (ref: year 1998)						
year 1999 [d]	-0.037	(0.178)	-0.147	(0.330)	-0.115	(0.257)
year 2000 [d]	-0.221	(0.206)	-0.37	(0.385)	-0.297	(0.298)
investment > € 25,000 [d]	0.474**	(0.206)	0.422	(0.380)	0.282	(0.288)
start-up with employees [d]	-0.015	(0.186)	0.423	(0.362)	-0.111	(0.266)
takeover [d]	-0.15	(0.245)	0.427	(0.556)	-0.183	(0.334)
gender (male) [d]	0.039	(0.166)	-0.123	(0.315)	-0.01	(0.241)
age [n]	-0.013	(0.009)	-0.004	(0.017)	-0.022*	(0.013)
higher education [d]	0.243	(0.167)	-0.115	(0.297)	0.616**	(0.260)
short unemployment duration [d]	0.294*	(0.176)	0.349	(0.323)	0.394	(0.262)
master craftsman /foreman [d]	1.108**	(0.445)	0.596	(0.691)	1.452*	(0.746)
management [d]	-0.106	(0.234)	-0.373	(0.401)	-0.046	(0.340)
experienced in sales/business [d]	-0.258	(0.195)	-0.613*	(0.365)	-0.082	(0.277)
broad experience [d]	-0.159	(0.285)	-0.539	(0.484)	-0.179	(0.403)
broad & sales competence [d]	0.869	(0.532)	1.091	(0.901)	1.867*	(1.016)
exp. with the service/product [d]	0.301*	(0.163)	-0.043	(0.307)	0.478**	(0.233)
prior self-employment [d]	-0.561***	(0.162)	-0.429	(0.300)	-0.715***	(0.232)
high pull motivation [d]	0.400*	(0.219)	-0.017	(0.365)	0.785**	(0.365)
constant	4.840***	(0.430)	6.682***	(0.865)	5.974***	(0.652)
ln_sigma	0.361***	(0.066)	0.631***	(0.122)	0.497***	(0.095)
observations	645		645		645	
exits	158		50		77	
chi2	59.213		17.258		54.687	
BIC	1066.208		543.472		674.849	

table reports beta-coefficients based on a lognormal duration model
d stands for a discrete change of dummy variable from 0 to 1; n stands for a numeric variable (metric)
(se) standard errors in parentheses
level of statistical significance: *: p < 0.05, **: p < 0.01; ***: p < 0.001
source: Survey Data; own calculations

Firm characteristics and formal qualifications

Firm characteristics and formal schooling are discussed as being among the most important success factors for firm survival (e.g., Brüderl and Schüssler 1990; Wagner 1994; Strotmann 2007). However, this picture is not completely borne out in this study.

The results presented in Table 3.3 indicate that, irrespective of the exit status, firm resources do not appear to have a significant influence on the duration of self-employment. For example, setting up a business with employees or starting from a takeover position does not have a significant effect on the self-employment duration. Statistical evidence is limited to the importance of a higher amount of start-up capital (over 25,000 euro), which prolongs the expected self-employment duration by a factor of 1.6 compared to the outcome for founders with less capital ($\beta = 0.474$).

However, the moderate significance of the firm characteristics for the self-employment duration of the formerly unemployed is unsurprising for a population that generally experiences low capital endowment (see Hinz and Jungbauer-Gans 1999). Alternatively, the moderate significance may also reflect the substitutable relationship between capital and the founder's qualifications, as discussed by Chandler and Hanks (1998)[22], or simply show the inferior role of the capital endowment as compared with the founder's personal resources (Parker and van Praag 2006).

In keeping with previous findings (e.g., Bates 1990; Brüderl et al. 1992; Cooper et al. 1994; Gimeno et al. 1997), the results show that more educated founders (i.e. those with higher education) have a longer expected self-employment period. However, this is only the case for exits into unemployment – formal education appears to be unimportant for exits in general and exits into wage work.

3.6 Summary and conclusion

This study analyzes the importance of founder's experience for self-employment duration using a population of formerly unemployed people who received assistance in setting up a business. Most importantly, this study explicitly motivates the self-employment duration as a time-dependent process that is scaled by the initial setup of the start-up project and the founder's human capital. Time is assumed to be crucial since it affects opportunity costs and the level of information that controls the Bayesian learning process in estimating the expected utility differentials.

First, it may be observed that most self-employment spells end in an unemployment period. This is in keeping with the findings of Andersson and Wadensjö (2007) while Taylor (1999) and Johansson (2000) present different results. However, this structural difference is supported by the first implication of the model, which states that the share of exits into unemployment should be higher for those who start from a position of unemployment.

[22] See Brüderl et al. (1992), Cressy (1996) and Parker and van Praag (2006) for the nexus between the financial endowment and the founder's qualification.

Additionally, and, moreover, consistently with previous research (e.g., van Praag 2003) and the theoretical model (implication 2), we find that exits into employment occur earlier than exits into unemployment.

The econometric investigation shows that firm characteristics (legal form and start-up size – significant results were only obtained for high start-up capital) and the founder's formal qualifications (education and training) appear to be of lesser significance for self-employment longevity. In contrast, the results indicate that self-employment duration strongly (positively) relates to experience (e.g., experience with the service or product provided), higher occupational position, work experience as a master craftsman or foreman, and a pull-motivated start-up. Comparative disadvantages appear to be associated with prior experience in self-employment. This is important as it indicates that there is little evidence for entrepreneurial learning and the fact that those who did badly in the past certainly do not do better when starting again.

Moreover, the competing risk setting presents interesting results concerning the balanced skill hypothesis based on Lazear (2005). We found that a commercial background (knowledge in sales/business) alone is associated with a comparative advantage for wage work. Although statistically insignificant on the common level, broad experience (identified by a high number of fields of operation) appears to be negatively related to self-employment duration. Combining both attributes, we find a strong positive correlation with self-employment duration. Comparable results can be found for experience as a master craftsman or foreman. These findings highlight the fact that to increase self-employment duration, it appears to be important to combine both types of qualifications, that is, knowledge in sales/business and a broad set of skills (experience).

Finally, the limitations of this study may provide orientation for further research. First, our study observed relatively few founders in a limited regional area in Germany. This may harm the survival analysis. Second, even if the profiles of the founders appear to be fairly comparable with the profiles found in other studies, whether the data set suffers from a selection bias remains unclear. Third, it is important to note that the results show that previously unemployed founders differ in the way they exit self-employment as compared to founders who did not start their businesses from a position of unemployment.

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3.8 Appendix

Table A.3.1: Definition of the variables

gender (male)
: equals one if the founder is a male

age
: age of the founders at the time the company was founded

higher education
: equals one if the founder left school with a qualification for university admission

job position
: The questionnaire asked for the position in which the founder was last employed before setting up the business. The classification distinguishes four positions: blue collar or employee with simple duties, qualified worker or employee, master or foreman, middle or higher management.

master craftsman /foreman
: equals one if the founder is experienced (has worked) as a master craftsman or foreman.

management
: equals one if the founder declared him/herself to be experienced (has worked) in a management position (middle or higher management)

short unemployment
: equals one if the founder had been unemployed less than four months before setting up the business

experienced in sales/business
: equals one if the founder is trained and experienced in a commercial field of activity (apprenticeship in sales/business or law and experience in marketing, sales, purchase, administration)

number of different fields of occupation
: number of different fields in which the founder has been employed. The questionnaire distinguishes: purchase, services, production, trade/installation, marketing/sales, and administration

broad experience
: equals one if the founder is experienced in more than three different fields of occupation (75th percentile)

broad & sales competence
: equals one if the founder has broad experience and is trained or experienced in sales/business

exp with the service/product
: equals one if the founder is experienced with the product or the service he provides due to prior employment

prior self-employment
: equals one if the founder has been self-employed previously

high pull motivation
: equals one if the founder is considered to be highly pull motivated. The assignment strategy uses a hierarchical cluster analysis based on the mahalanobis distance. The cluster centroids were identified by a k-means cluster analysis before setting up the hierarchical cluster analysis. Founders who were classified as high pull motivated are less motivated by the threat of unemployment but are highly motivated by self-fulfillment or potential improvements in income.

exit
: equals one if the person declares not to be self-employed in the founded company at the time of the interview

duration
: difference between the start-up and the date of quitting self-employment – measured in months

exit to (state following the self-employment period)
: identifies the individual's employment state after leaving self-employment: I. wage work (independent employment); II. unemployment, participation in measure; and III. maternity leave, retirement, other

start-up with employees
: equals one if the founder started the business with employees

(investment) start-up capital > 25,000 euro
: equals one if the amount of start-up capital exceeded 25,000 euro. The amount of capital invested to set up the business. The questionnaire uses seven categories to capture variation between 'less than 2,500 euro' up to 'over 125,000 euro'.

takeover
: equals one if the start-up was a takeover

Table A.3.2: Descriptive statistics

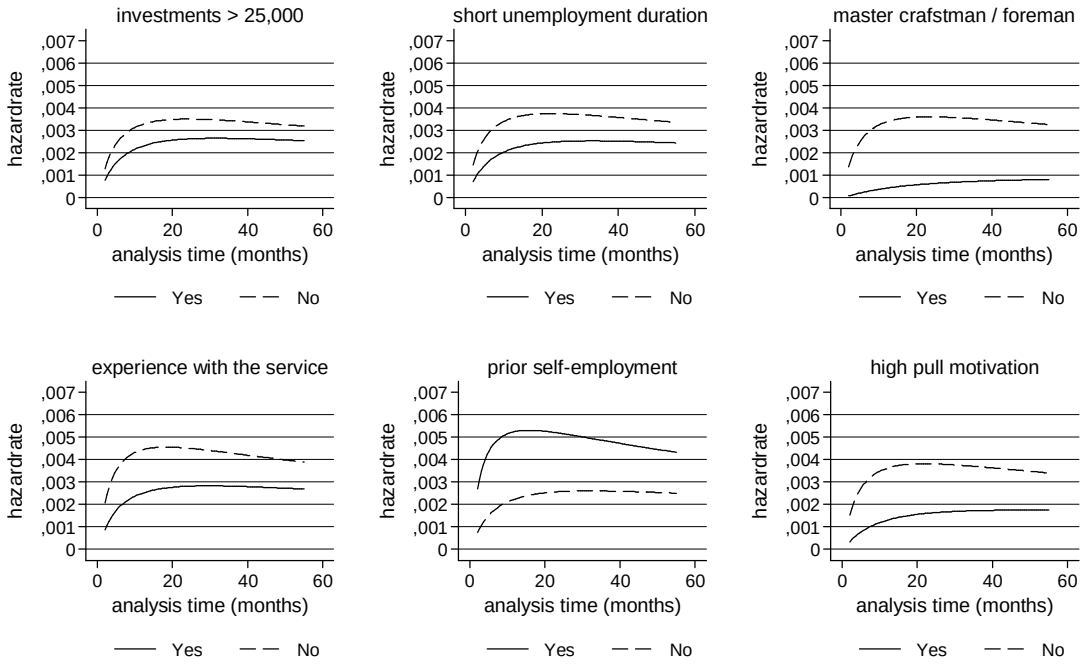
	entries		exits							
			all		into employment		into unemployment		into unknown status	
n	645		158		50		77		23	
variable										
	mean	stdv	mean	stdv	mean	stdv	mean	stdv	mean	stdv
cohort										
1998 [d]	0.29	0.452	0.34	0.474	0.28	0.454	0.32	0.471	0.48	0.511
1999 [d]	0.45	0.498	0.44	0.498	0.48	0.505	0.45	0.501	0.35	0.487
2000 [d]	0.26	0.440	0.23	0.421	0.24	0.431	0.22	0.417	0.17	0.388
firm characteristics										
investment > € 25,000 [d]	0.24	0.429	0.18	0.383	0.18	0.388	0.19	0.399	0.17	0.388
start-up with employees [d]	0.28	0.447	0.25	0.436	0.18	0.388	0.27	0.448	0.35	0.487
takeover [d]	0.12	0.326	0.13	0.341	0.06	0.240	0.14	0.352	0.26	0.449
individual characteristics										
male [d]	0.69	0.461	0.66	0.476	0.70	0.463	0.70	0.461	0.39	0.499
age [n]	39.01	8.697	40.22	9.196	39.72	8.892	41.23	9.176	38.39	10.590
higher education [d]	0.35	0.478	0.28	0.450	0.38	0.490	0.19	0.399	0.35	0.487
short unemployment [d]	0.34	0.475	0.23	0.425	0.24	0.431	0.21	0.408	0.30	0.470
master craftsman /foreman [d]	0.07	0.250	0.02	0.137	0.04	0.198	0.01	0.114	0.00	0.000
management [d]	0.13	0.337	0.15	0.360	0.22	0.418	0.14	0.352	0.09	0.288
experienced in sales/business[d]	0.22	0.411	0.27	0.446	0.30	0.463	0.25	0.434	0.35	0.487
broad experience [d]	0.12	0.328	0.11	0.319	0.16	0.370	0.10	0.307	0.09	0.288
broad & sales competence [d]	0.04	0.193	0.03	0.176	0.04	0.198	0.01	0.114	0.09	0.288
exp. with the service/product	0.69	0.462	0.59	0.492	0.68	0.471	0.56	0.500	0.61	0.499
prior self-employment [d]	0.32	0.468	0.44	0.498	0.40	0.495	0.48	0.503	0.43	0.507
high pull motivation [d]	0.20	0.397	0.12	0.326	0.18	0.388	0.08	0.270	0.13	0.344

table reports mean values and standard deviation (stdv); note that the mean reflects shares in cases of a dummy variable
d stands for a discrete change of dummy variable from 0 to 1; n stands for a numeric variable (metric); r = regional information, t = time varying attribute;
source: Survey Data; own calculations

Table A.3.3: Table of correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) year 1998	1.00																	
(2) year 1999	-0.57	1.00																
(3) year 2000 [d]	-0.38	-0.54	1.00															
(4) investment > € 5,000	0.06	-0.06	0.00	1.00														
(5) start-up with employees	0.05	-0.04	-0.01	0.28	1.00													
(6) takeover	0.05	-0.06	0.02	0.29	0.27	1.00												
(7) male (ref: female)	-0.01	0.04	-0.03	0.02	0.03	-0.09	1.00											
(8) age	0.00	-0.03	0.03	-0.03	-0.05	-0.03	0.03	1.00										
(9) higher education	-0.01	0.00	0.00	0.05	0.04	-0.04	-0.05	-0.06	1.00									
(10) short unemployment duration	-0.05	0.03	0.02	0.09	0.10	0.02	0.04	-0.13	0.08	1.00								
(11) master craftsman /foreman	-0.03	0.11	-0.09	0.05	0.07	0.03	0.15	-0.06	-0.11	0.02	1.00							
(12) management	0.00	-0.01	0.01	0.06	0.08	-0.06	0.11	0.20	0.16	-0.03	-0.10	1.00						
(13) experienced in sales/business	0.05	-0.02	-0.03	0.01	0.06	-0.02	-0.09	0.08	-0.04	-0.06	-0.11	0.21	1.00					
(14) broad experience	-0.05	0.05	-0.01	0.07	0.02	-0.04	0.01	-0.02	0.01	0.01	0.11	0.07	0.09	1.00				
(15) broad & sales competence	0.02	-0.04	0.03	0.04	0.04	-0.03	-0.04	-0.04	-0.01	-0.04	-0.02	0.11	0.38	0.54	1.00			
(16) exp. with the service/product	-0.03	-0.03	0.06	0.09	0.12	-0.01	0.07	-0.03	0.02	0.13	0.14	-0.02	-0.13	-0.01	-0.02	1.00		
(17) prior self-employment	-0.02	0.04	-0.02	0.05	0.03	0.10	-0.03	0.01	-0.06	-0.12	0.02	0.05	0.06	0.14	0.14	0.03	1.00	
(18) high pull motivation	-0.02	0.06	-0.05	0.02	0.06	-0.03	0.07	-0.18	0.06	0.21	0.07	-0.04	-0.07	0.03	0.00	0.07	0.00	1.00

Figure A.3.1: Selected covariate effects on estimated hazard functions



Survey Data; own calculations

Chapter 4

How do local labor market conditions and individual characteristics affect quitting self-employment?

Abstract:[1] *This paper investigates the joint effect of local labor market conditions and individual differences on the duration of self-employment periods. Using register based, data the study focuses on previously unemployed business founders who have received public support to realize their entrepreneurial activities. Local labor market conditions account for a high level of complexity while personal characteristics are related to the founder's employment background. Using accelerated failure time models, controlling for unobserved heterogeneity and allowing for competing exit risk we find that higher and increasing local labor market pressure decreases the duration in self-employment whereas higher perceived (re-unemployment) risk and lower economic prosperity for incumbent firms reduce exit risks. The results reveal that the effect of external conditions is multidimensional and non-linear. On the individual level, we find strong support for the 'hot-house' hypothesis for gaining comparative advantages.*

Keywords: self-employment, duration, competing risk, local labor market situation
JEL-Classification: C41, J62, J64, L26, M13, R23

4.1 Introduction

In the last decade, self-employment has become a well-established subject in labor market research and has substantially contributed to the field of entrepreneurship. In part, this reflects the growing share of individuals who consider self-employment as an alternative income option as it is discussed to offer flexible (re)employment options for migrants and the chance to avoid or to quit unemployment (Blanchflower 2000). Public promotion in this field also has increased in the last decade. For example we observed 90,000 financially supported transitions from unemployed into self-employment in Germany per year in the late 1990s, which increased to more than 250,000 per year in 2003.

[1] This version of the paper is published in 2010 as Discussion Paper P 2010-001 of the Social Science Research Centre Berlin (WZB) under the title "How do local labor market conditions and individual characteristics affect quitting self-employment". Stata 10.1 was used in all calculations. Do-files and results that are discussed but not reported in detail are available from the author. Helpful comments on a previous version of this paper at the 2009 "Annual Meeting of the 'Verein für Socialpolitik'" are grateful acknowledged. All remaining errors are my own.

However, reviewing recent literature shows that most research in this context has been focused on individual attributes showing that socio-demographic characteristics, formal qualification and experience are driving forces for sustainable self-employment periods (e.g., Bates 1990; Cooper et al. 1994; Robinson and Sexton 1994; Gimeno et al. 1997; Cressy 1996). Little is known about the external economic conditions that determine the duration of self-employment and how individual differences interact with labor market conditions. This is surprising since related fields of research show substantial importance of economic conditions related to job choice, firm survival and unemployment duration (e.g., Acs and Armington 2004a and 2004b; Fritsch et al. 2006; Blau 1990 and 1992; Arntz and Wilke 2009). Furthermore, several contributions have been made that explicitly emphasize the importance of regional differences for the initiation of self-employment (Georgillis and Wall 2005; Parker 1996; Bergmann and Sternberg 2006; Wagner and Sternberg 2004 and 2005; Falck 2007).

Only few studies also include information relating to economic conditions in studying self-employment durations (Taylor 1999; Carrasco 1999; Johansson 2000; Andersson 2006; Cueto and Mato 2006). In particular, little attention has been spent on the potential effects of individual differences across economic settings and on a systematic examination of the role of local labor market conditions. Hence, we use multiple local labor market characteristics and include information about absolute and relative economic pressure, control for the instability of labor market conditions and account for potential non-linear effects. Furthermore, on the individual level, we also study the relevance of characteristics related to the individual's (biographical) employment background and we include interaction effects between individual and regional characteristics.

We use register based data from the German Federal Employment Service (Integrated Employment Biographies, IEB) and focus on individuals who were unemployed before entering self-employment and who received public support ('bridging allowance') for making this transition.[2] The IEB has been recently compiled to study individual employment biographies and allows the observing of detailed information of the founder's employment history as well as for a valid identification of local labor markets. The data, moreover, does not suffer from any types of survey bias and it covers a period of almost seven years of observation. To account for the time depending nature and right censoring of quits in self-employment we use accelerated failure time models. In the empirical investigation we also control for the presence of unobserved individual

[2] This promotion scheme ran until Fall 2006 and was mainly a financial subsidy of the Federal Employment Office to encourage self-employment activities among the unemployed (for other studies that also focus on this population in Germany, see Hinz and Jungbauer-Gans 1999, Pfeiffer and Reize 2000, Wießner 2001, Reize 2004, Caliendo and Kritikos 2007, Oberschachtsiek 2008). Note that the amount of start-ups funded with bridging allowance in 2003 equals at least 50% of the total number of self-employed people out of unemployment (Lehnert 2004). For the international relevance of this population, see, for example: Evans and Leighton (1990), Meager (1996), Carrasco (1999), Böheim and Taylor (2002), Cueto and Mato (2006) or Andersson and Wadensjö (2007).

heterogeneity and we study the determination of duration for competing exit risks to gain deeper insights about the economic motivation to quit self-employment.

For the structure of this study, the investigation is performed in seven sections. Section 4.2 introduces the framework of the analysis and discusses some related findings. Section 4.3 describes the data and the variables used, followed by a brief overview of the econometric setting of the empirical investigation (4.4). Section 4.5 contains descriptive findings. Finally, the last two sections (4.6 and 4.7) present and discuss the results.

4.2 Framework

4.2.1 Theoretical underpinning

To assess the role of local labor market conditions and individual characteristics in exits from self-employment, we shall consider a situation in which a self-employed person *i* has two options: i.e. remaining self-employed and earning *y* or switching to another position of employment and receiving a wage of *w*. The values for *y* and *w* are assumed to be random draws from distributions of potential incomes (including pecuniary and non-pecuniary income) which will be determined by external labor market conditions π and the individual's characteristics *x*. The distributions $f(y|\ \pi,\ x)$ and $f(w|\ \pi,\ x)$ shall define the potential income. *i* is a rational agent and will switch if the income changes to $y < w$.[3] Assessments in this context will be associated with benefits in terms of option values related to optimal points of exits and are not costless.

Therefore, factors that determine the relative income position will influence self-employment longevity. However, the basic idea is that in all cases new information about $f(y|\ \pi,\ x)$ and $f(w|\ \pi,\ x)$ comes into light, new assessments are made, and this and only this prompts exits. Accordingly, we assume that two sources exist that determine this evaluation process: time and external changes while individual characteristics are assumed to operate as general shifting factors (e.g. due to accelerating learning).

From the perspective of *i*, *y* and *w* are time-dependent parameters. The start-up of a new venture initially bases on imperfect information due to the limited knowledge of the relevant market structure and of the founder's own (initial) ability to run the business. Bayesian learning produces adjusted information regarding the distribution of *y*. Over time, the variance of *y* decreases (better estimates of *y*), which reduces the cost/benefit ratio of adjusting $f(y|\ \pi,\ x)$. Consequently, the exit probability will be higher at the beginning of a new venture and will decrease over time.

[3] A critical objection could be made to the effect that rational behavior may be less valid in the context of unemployed founders. However, for the sake of simplicity, we will not account for this in the theoretical discussion.

Time not only associates with changes in $f(y|\ \pi, x)$ but also produces new information in relation to the distribution of $f(w|\ \pi, x)$. In particular, the value of human capital that is applicable for wage employment will decrease (relatively). For example, we may observe a declining arrival rate of better job offers across time (Pissarides 1994; Bruce and Schütze 2004; Hyytienen and Rouvinen 2008). This corresponds to a reduction of the option value of quitting self-employment. However, the way this affects the evaluation and, therefore, the exit probability depends on the time-dependent pattern of the job offer function, which is simultaneously influenced by labor market conditions and individual characteristics (e.g., Mortensen and Pissarides 1994; Blanchard and Diamond 1994).

Finally, new information also arises if external conditions change. In this case, external changes have a direct influence on the distributions of y and w. On the one hand, changes in π affect the level of demand and the costs of external resources. Simultaneously, external changes also determine the distribution of $f(w|\ \pi, x)$ as it influences the level of wages, the job arrival rate, and/or job security. Accordingly, if changes in π occur, the densities of assessing $y_t > w_t$ start to increase because of greater variances in the estimates of y and w. Again, the likelihood of switching (potentially) increases. However, the net effect of external changes on exiting self-employment is complex. Deriving clear-cut expectations regarding the effect of external changes on the exit choice depends on which income option is affected to a greater extent.

4.2.2 Selected findings for regional and individual characteristics

Given this setup only few studies actually allow a deeper insight on potentially relevant attributes on the regional level. In particular, the empirical evidence of how variance in external conditions affects relative income position in wage work and self-employment is ambiguous (for an overview, see Table A4.1 in the Appendix). Taylor (1999), Carrasco (1999), and Andersson (2006), for example, find that the hazard rate rises with an increase in the unemployment rate. This implies that self-employment incomes are relatively more affected by an economic downturn than incomes in the wage work sector. In contrast, Johansson (2000) and Cueto and Mato (2006) find a negative correlation, indicating a greater reduction in external income options than in self-employment incomes. This finding reflects that high levels of unemployment associated with low-quality wage offers (Pissarides 1994). Returning to wage work will thus be more costly under the condition of high unemployment and this, in turn, reduces hazards arising from self-employment.

Tervo and Haapanen (2009) consider indicators for the development of local labor market conditions. They find that the ratio of the unemployment rate of the current and lagged periods dominates the effect of the level of unemployment. This finding suggests that it is not the level of

local labor market pressure per se but the change in external economic conditions that causes exits. Moreover, this result is also in line with the argument of a higher density in evaluating *y* and *w* due to external changes.

Kangasharju and Pekkala (2002) suggest that the effect of economic changes for different income options may differ along qualifications. They show that across qualification, individuals differ in their reactions to economic conditions and in the way in which they quit self-employment. In a period of an economic upturn, they find an increased likelihood of quitting for the highly qualified self-employed individuals while an economic downturn is correlated with a lower exit probability. This result implies that income elasticity is higher for highly qualified wage workers than for highly-qualified self-employed persons. In addition, this finding may also reflect the presence of differences in the job offer rate between different types of wage work, conditional on qualification and external conditions (Pissarides 1994). As a result, the highly qualified will face higher opportunity costs if market conditions improve.

Previous empirical studies have also emphasized that external conditions have varying effects on self-employment hazards that occur for different reasons (e.g., Taylor 1999; Carrasco 1999; Johansson 2000). In particular, the newly self-employed evaluate the internal income *y* not only to *w* but also to *u* (denoting alternative post-exit positions). For example, exits may be followed by a period of unemployment, retirement, parental leave or concentration on household tasks. Previous studies do not reveal consistent findings as to how involuntary (e.g., bankruptcy or unemployment) and voluntary exits (e.g., wage work) relate to external changes (see Table 4.1). However, previous research suggests that the importance of external conditions appear to be more important for exits into wage work than for involuntary exits. This implies greater elasticity in the sales functions than in the job offer rate conditional on the variation of external conditions.

On the individual level gender, age, educational attainment, and professional background are the most prominent discussed attributes in having impact on the stability of self-employment periods (for an overview, see Santarelli and Vivarelli 2007; Giannetti and Simonov 2004). In this context qualification is often expected to have direct effects on the entrepreneurial and managerial capabilities (e.g., Brüderl et al. 1992; Bates 1990). Furthermore, qualification also has indirect correlations with success since it reflects past income options. Research shows that males, middle-aged people and higher qualified business founders are also less capital constrained when starting a business (Brüderl et al. 1992; Cressy 1996; Chandler and Hanks 1998; Parker and van Praag 2006). In addition, research also shows that the composition of the individual's qualification correlates with motivation or/and individual personally traits (e.g., Rauch and Frese 2000; Silva 2007).

However, the net effects of individual characteristics for self-employment duration are ambiguous. Evans and Leighton (1989) for example show that returns to human capital are lower in self-employment than in wage work. Van der Sluis et al. (2005) support this and show that the

returns to wage work are higher for the wage workers than for the self-employed. This would imply, in part, a negative correlation between the duration of self-employment and qualification as reported, for example, in Johansson (2000) and Andersson (2006). However, other studies report insignificant or positive correlations between qualification and survival (Brüderl et al. 1992; Taylor 1999; Bates 1990). In addition, results also depend on the observed exit state. Johansson (2000) for example finds that education decreases the risk to quit into unemployment while it is insignificant for exits in general. Likewise, Cueto and Mato (2006) find that individuals with a management background are more likely to have failure exits while it is irrelevant for exits into wage work.

4.3 Data and variables

4.3.1 The data sources

The data used for this analysis come from the Integrated Employment Biographies (IEB), which is a merged dataset compiled by the Institute for Employment Research (see Jacobebbinghaus and Seth 2007).[4] The IEB consists of four distinct sources of register data originating from the registers of the Federal Employment Agency. These registers cover employment and benefit histories dating back to 1990 and official registrations for job searches, unemployment periods, and participation in active labor market programs dating back to 1999. The information on employment episodes covers at least the period up to the end of 2005 and is updated on a daily basis.

Each record in the dataset is linked with socio-economic characteristics and source-specific information[5] taken from the most current information available when the record was generated. This provides convenient time-dependent information combined with detailed information on an individual's employment history. In addition, the data uses secondary information taken from the Establishment History Panel[6] (EHP; for details see Spengler 2008) and regional labor market information from the official statistics of the Federal Employment Agency. This regional information is merged with the individual data at three-monthly intervals.[7]

[4] Note that access to this data (IEB) is usually limited to a 2.2% random sample (named IEBS) offered by the research data centre of the Federal Employment Agency (see http://fdz-iab.de).

[5] The employment register adds information on wages, type of employment, job characteristics, and qualifications. Benefit histories cover information on the type and amount of benefits received. The participation-in-measure register mainly contains information on measures and only includes approximate personal characteristics. Finally, the job search register adds detailed attributes on individuals' qualifications and job search profiles.

[6] The Establishment History Panel (EHP) contains information on employment notifications valid on 30 June each year, which are aggregated at the establishment level.

[7] Due to computing restrictions, the merging is not performed on a monthly basis.

Individual characteristics cover socio-demographic information, qualifications, prior duration of unemployment, job characteristics of past employment history (e.g., income, firm size, occupation; within the last five years), and information on the founding year and main profession practiced during previous employment periods. The study also uses the official statistics of the Federal Employment Agency to supplement the data with detailed characteristics of the local labor market situation. Furthermore, the EHP enables the identification of movements of establishments at local level. This information is incorporated on an annual basis.

4.3.2 Preparation of the data

A shortcomming of the IEB is its lack of (direct) information about self-employment projects. However, the data includes information about periods of participation in self-employment promotion programs funded by the Federal Employment Agency which - in combination with the regulation of the funding - allows the valid identification of self-employment observations.[8]

Specifically, the legal system requires that the start of a self-employment period be close to the start date of the subsidy. This enables the use of the start date of participation as the starting point of the observation of the self-employment. Any observation in the data after the initiation of the participation is then used to identify the point at which an individual quits self-employment (excluding additional promotional periods in self-employment). An exit event is thus defined according to the change of an employment position and differentiates between exits into unemployment, (full time) wage work positions, and other states. Finally, the duration of the self-employment period is measured as the difference between the start date of participation and the date of the first observation thereafter. However, it should be noted that the true date of the termination of the self-employment period and the reason for it is not observed in the data.[9]

Local labor markets are identified using the Federal Employment Agency's labor market district classification. This follows Arntz and Wilke (2009) and allows for an appropriate approximation of a labor markets context that is (on average) relevant to the individual's behavior. To account for the spatial effects, the study also uses an alternative identification that

[8] The bridging allowance is a nationwide program which dates back to 1995 in its most latest form and ran until fall 2006. This program offered the full payment of unemployment benefits during the start-up period of a new business. Applications were approved if an applicant's unemployment period ended with the self-employment and if an independent authority evaluated the business concept as potentially successful (for details, see Caliendo and Kritikos 2009).

[9] Self-employment activities may have been terminated at an earlier or later point in time than observed in the data. It is also possible that exits will never be observed in the data, e.g., if the individual retires or in cases of full-time household production. For the interpretation it is also important to keep in mind that 'other states' include minor employment and official job search periods. It should also be noted that entitlements to unemployment benefit will end after a certain period and that this reduces the likelihood of observing exits into unemployment following long periods of self-employment and increases the likelihood of observing 'other' exits.

defines local labor markets on the basis of their commuter structures (see Section 4.6.6 for details).

Finally, for methodological reasons, the population is limited to participations between 1999 and 2002[10] and also excludes individuals with implausible[11] periods of participation. Due to computing restrictions, the final data set uses a 50% random draw of the constructed data. This results in a data set based on 161,086 founders, of whom 89,529 quit self-employment within the observation period (maximum: 83 months). Further data processing mainly relates to single variables and is reported Table A.4.2 in the Appendix.

4.3.3 Relevant attributes and hypothesis

Local characteristics

In keeping with previous studies (e.g., Taylor 1999), we will use the unemployment rate as an overall measure of regional economic pressure. In particular, the unemployment rate can be considered as an indicator of the mismatch between the demand for and supply of labor on the labor market. To overcome concerns of endogeneity, we use the first monthly regional unemployment rate for the entire split time interval. In keeping with previous findings, we may expect different correlations between the unemployment rate and the self-employment duration of individuals. An increasing unemployment rate may promote exits from self-employment due to deteriorating economic conditions and raises the relative income position in favor of wage work and unemployment positions. However, the structure may also be inversed if we expect that good jobs become rare, a development that reduces the option value of potential wage work positions.

In addition, we also control for a running unemployment index which standardizes the local unemployment rate to 100 in t_0. This adopts the concept developed by Tervo and Haapanen (2009) and Cueto and Mato (2006) and enables the direct measurement of changes in external conditions since the individual has entered self-employment. As in the case of the unemployment rate, without further assumptions, previous findings and theoretical considerations do not enable the formulation of precise expectations in relation to the correlation between this attribute and the individual's self-employment longevity.

[10] In 2003 and 2004, several changes were made that relate to the promotion of self-employment by the Federal Employment Agency in Germany (see Caliendo and Kritikos 2009). This restriction ensures that the population is most similar to founders who did not start from a position out of unemployment (see Hinz and Jungbauer-Gans 1999).

[11] These are observations with less than 60 days of participation (which is a likely indicator of terminations) and periods of participation in excess of 740 days (too long, incorrect notifications). Accordingly, we also dropped individuals with more than three notifications of self-employment promotions within the time span under observation.

Furthermore, the proportion of vanishing establishments (exits and movements; firm hazard) per year and region is used as an inverse measure of regional economic prosperity. To address endogeneity concerns we use one-year lagged information. The intuition behind this attribute is that firm mobility and firm deaths reflect a decrease in the degree of expected economic prosperity for a local market. However, firm hazard may also characterize reduced competition, which opens greater market shares for new firms or which simply forces individuals to remain self-employed due to the lack of alternative employment options in wage work. Therefore, the effect on the determination of the individual's self-employment duration remains unclear.

In line with Parker (1996), we will also test the (re-)unemployment risk in each region in relation to its relevance for an individual's exit probability. Risk will be defined in terms of local employment instability. Employment instability is defined as the error variance of a time-series estimation (root mean squared error) of the local monthly unemployment rate covering the period between 1999 and 2004.[12] We expect that returning to wage work is more costly in regions with high variance because of greater re-unemployment risks. The option value of wage work will decrease in the context of high unemployment risks. Therefore, increased variance should be related to a prolongation of durations in self-employment.

Finally, we distinguish between east and west Germany to take into account the general economic differences between the regions in east and west Germany. As is the case for the measurement of other local labor market conditions, the expected findings remain ambiguous.

Individual characteristics and interaction effects

Besides traditionally studied characteristics we also investigate some new factors that have recently been discussed in the light of self-employment entry choices and comparative advantages. Blanchflower and Meyer (1994), Wagner (2004), and Parker (2009), for example, provide evidence to the effect that, for reasons of self-selection, individuals starting a new venture mainly come from small firms (the so called 'hot-house'-hypothesis). The argument behind this finding is that small firms may provide more applicable knowledge and networks and may also foster diversity in an individual's skill set (see Lazear 2005; Wagner 2003 and 2006). To approximate the individual's working background we will use the latest employer's median firm size (within a five-year period). Overall, we expect to find a positive correlation between a small-firm background and self-employment duration.

[12] The root mean squared error (rmse) is the difference between an estimated quantity and the true value of the quantity that is estimated. Using the rmse instead of the variance has two major advantages: first, this measure is less sensitive to seasonal employment fluctuations than variance (the correlation between rmse and variance is 0.82), because it does not measure the difference from an inflexible reference point (the mean). Second, and accordingly, the rmse allows the inclusion of some types of 'unexpected' development and appears, therefore, to be more accurate in addressing the underlying intention of the measure.

Lazear (2005) and Parker (2007) emphasize the importance of applicable knowledge provided by previous job experience; this has also been accentuated for formerly unemployed founders by Wießner (2001). To follow up on this idea, the study includes information about the last position held (manager and master craftsman) and information as to whether an individual has worked in a commercial profession. Moreover, the data enables controlling for the level of unobserved productivity in terms of a wage premium in the last employment position before the start-up (Andersson and Wadensjö 2007).[13] Overall, these attributes are assumed to reflect increased productivity, which should cause a prolongation in self-employment. However, they also reflect high opportunity costs which may increase exit probabilities. Accordingly, we may expect shorter durations in relation to exits into wage work positions.

Following previous research, information about the individual's motivation is derived from the founder's biographical employment information (e.g., Taylor 1999; Johansson 2000; van Praag 2003). The unemployment duration and 'minor employment position' ('*geringfügige Beschäftigung*') before entering self-employment approximately address 'push motives'. We expect shorter self-employment durations in relation to these attributes. In addition, the number of different jobs held (in the past two years) operates as an indicator for an individual's (voluntary and involuntary) disposition towards changing jobs (Hyytinen and Ilmakunnas 2007; the switching disposition'-hypothesis).[14]

Finally, we test the importance of the founder's human capital in the context of the local labor market situation using the interaction of individual attributes and local labor market characteristics. However, the local labor market is multi-dimensional. In this study we concentrate on the development of the local labor markets. Therefore, the investigation uses the unemployment index as the regional component for the identification of interaction effects. According to the findings of Kangasharju and Pekkala (2002) and in keeping with those of Pissarides (1994), we will expect more qualified founders to show greater elasticity in their reactions to external changes.

[13] More precisely, we use the difference between the realized and predicted monthly gross income based on a selected set of covariates (e.g., age, schooling, job changes, gender, job position, size of the establishment; conditional on the type of profession and part-time or full-time status). In cases, in which the realized income is 1.66 (3rd quartile) times larger than the expected (predicted) income, we define this as a wage premium. We used this threshold to emphasize the notion of a 'high' wage premium and to overcome potential measurement errors.

[14] In accordance with Lazear (2005), job changes may also operate as an indicator for the balance of an individual's skill set. However, we will not pursue this perspective based on the number of job changes.

4.4 Econometric setting

To conduct the empirical investigation we use accelerated failure time models which define an episode τ as a result of the time *t* that is scaled by a set of attributes (*x*) given a certain time-scaling function. Technically, this is

$$\tau_i = \exp(-x_i\beta_x)t_i, \tag{4.1}$$

where τ denotes a random variable in *t* and β_x is a vector that describes the average (scaling) impact of a covariate on the expected length of an episode. In the current setting, this is the time elapsed until the quitting of self-employment is observed and its correlation with the explanatory attributes. In the basic form the model is based on a linear model of the natural logarithm of survival time (Cleves et al. 2004):

$$\begin{aligned} \ln(t_i) &= x_i\beta_x + \ln(\tau_i) \\ &= \beta_0 + x_i\beta_x + \upsilon_i \end{aligned} \tag{4.2}$$

where the logarithm of the process time $\ln(t_i)$ is a linear function of an individual's characteristics x. The error term υ is assumed to follow a certain distribution and captures the properties of τ. For example, if υ follows the standard normal distribution, the corresponding survival time τ is subject to the log-normal distribution.

In the modeling approach, we will allow for unobserved heterogeneity. Absent information will be treated as a (systematic) misspecification of the model, which we control for by assuming that it can be captured due to a certain specification of a random effect (Guiterrez 2002).[15] Technically, we separate the error υ_i term into a random component (ε) and an individual systemic component (α):

$$\ln(t_i) = \beta_0 + x_i\beta_x + \varepsilon_i + \alpha_i, \tag{4.3}$$

where α captures an additional time dependency in the error term. Taking frailty into account, we specify the unobserved heterogeneity to follow a gamma distribution with a mean of one and a

[15] Missing information may lead to a misspecification of the duration model, causing an inadequate representation of the timing of exits. Limited information may be related to the characteristics of the start-up project or to limited individual (e.g., individual risk aversion or the household context) and regional information (e.g., competition).

variance of Θ (see Cleves et al. 2004). [16] Given the set of observed information as well as frailty, we obtain

$$\ln(t_i) = \beta_0 + x_i\beta_x + x_r\beta_x + x_{rt}\beta_x + x_{rt,i}\beta_x + \varepsilon_i + \alpha_i . \quad (4.4)$$

All information referring to the individual level is time-invariant ($x_{i,}$, capturing t_0). Regional attributes address both fixed and time-varying covariates (x_r and $x_{r,t}$). $x_{rt,i}$ represents interaction effects between the local labor market situation and individual characteristics.

To account for different economic reasons for leaving self-employment, we will specify formula (4.4) for different exit events:

$$\ln(t_i^j) = f(x_i^j, x_{rt}^j, x_r^j, x_{rt,i}^j, \beta_x^j, \sigma, g(\alpha_i^j)) \text{, with j = 1,….,j and } \tau_j = \min\{\tau_1,\ldots,\tau_J\}. \quad (4.5)$$

For the investigation we will focus on a distinction between exits into employment and exits into unemployment. Observations that exit into a different destination than those of interest are treated as censored. Competing exit risks must be mutually exclusive. That means that the considered exits must describe distinct transition states (j=1 is not a subset of $j\neq1$). Furthermore, for a consistent interpretation, we must assume conditional independency of the competing risks (see Thomas 1996 and Cleves et al. 2004).

4.5 Descriptive findings: profile, exits, and post-exit status

4.5.1 The profile of self-employment out of unemployment and the macroeconomic situation

As Table 4.1 shows, the population consists mainly of males, middle-aged individuals around the age of 38, and highly qualified people (see Table A.4.3 in the appendix for correlations). Almost 50% came from a small-firm background. Compared to Wagner's (2004) findings, this is slightly higher than the proportion found among German nascent entrepreneurs (44%).

In addition, with reference to Lazear's 'Jack-of-all-Trades' hypothesis (Lazear 2005), the average total number of job changes within the two-year period prior to starting the business is

[16] Gauss or gamma distributions are usually used to control for unobserved heterogeneity in duration models (Guiterrez 2002). We chose the gamma distribution because it is more flexible. Heckman and Singer (1984) have expressed the criticism that the choice of the parameterization may be sensitive to estimates of ß. However, following Manton et al. (1986), we assume that the better the parameterization of the baseline function, the lower the sensitivity.

around 1.3.[17] 73% of the founders had experienced a longer spell of unemployment (> 4 months) before entering self-employment. In accordance with Bögenhold and Staber (1991) and van Praag (2003), this is indicative of a sample population that appears to be more likely to be pushed into self-employment.

Note that the period under observation (1999 to 2005) is characterized by an economic downturn.[18] The non-weighted average unemployment rate across all regions increased from 10.4% in 2000 to 13.03% in 2005. This picture shows strong variation at regional level. The spread (min-max-distance) of the local unemployment rates rose from a span of 24 percentage points to 26 percentage points. In addition, between 1999 and 2005, the unemployment index varied between 40 and 142 points. Likewise, the share of vanishing firms (firm hazard) ranges from 6% to 13.8% in 2000 and increases to between 8.7% and 15.5% in 2005.

4.5.2 Exits and exit status

Table 4.1 also displays the distributions of the covariates conditioned for different types of exits from self-employment (exits in general, exits into wage work, exits into unemployment, and exits into other states). Males, founders with higher qualifications (high school diploma, college or university degree, master craftsman qualification with premium income and short unemployment duration), and founders who have an employment background associated with small business tend to be less likely to exit. Focusing on the post-exit states the results show that individuals with higher qualifications tend to be more likely to switch to wage work positions. In addition, exits into unemployment appear to be relatively more likely in east Germany.

[17] Silva (2007) reports an average of almost 1.8 jobs held by Spanish adults before setting up a business. Wagner (2006) finds a higher figure for the number of fields of experience (3.6) among German nascent entrepreneurs. Both studies use definitions that differ from the one used here and will systematically lead to higher figures.

[18] Note that the economic situation in Germany changed in 2006 with an improvement of the macro-economic conditions.

Table 4.1: Descriptive statistics for entries and exits

	entries		exits							
			all		into employment		into unemployment		into unknown status	
n	161,086		89,529		24,901		53,598		11,030	
variable	mean	stdv	mean	stdv	mean	stdv	mean	stdv	mean	stdv
individual characteristics										
gender (male) [d]	0.71	0.452	0.69	0.461	0.68	0.465	0.74	0.441	0.52	0.500
age [n]	37.79	8.637	37.90	8.922	36.73	8.088	38.55	9.350	37.37	8.262
motivation										
short unemployment (< 4 months) [d]	0.27	0.444	0.23	0.424	0.26	0.437	0.23	0.421	0.21	0.406
minor employment [d]	0.05	0.212	0.05	0.222	0.04	0.201	0.05	0.207	0.11	0.309
number of job changes [n]	1.34	0.691	1.38	0.736	1.42	0.730	1.38	0.746	1.31	0.691
qualification										
schooling (>= high school) [d]	0.28	0.449	0.27	0.444	0.32	0.466	0.23	0.419	0.38	0.484
academic degree [d]	0.16	0.371	0.16	0.362	0.18	0.383	0.13	0.339	0.21	0.410
master craftsman / foreman [d]	0.03	0.168	0.02	0.126	0.02	0.136	0.02	0.123	0.01	0.111
management [d]	0.06	0.228	0.05	0.225	0.07	0.250	0.05	0.217	0.04	0.199
commercial background [d]	0.17	0.371	0.18	0.386	0.20	0.399	0.17	0.378	0.19	0.389
wage premium [d]	0.26	0.441	0.25	0.431	0.30	0.457	0.22	0.417	0.24	0.427
small business (< 20) [d]	0.51	0.500	0.47	0.499	0.48	0.500	0.46	0.498	0.49	0.500
local labor market										
unemployment rate [n,t,r]	12.30	5.365	12.57	5.439	11.39	5.122	13.30	5.541	11.72	5.031
unemployment index [n, r,t]	100.00	0.000	103.38	13.375	102.40	14.551	103.22	12.370	106.42	14.802
variation index [n, r]	0.41	0.193	0.41	0.189	0.39	0.181	0.42	0.192	0.38	0.185
% vanishing establishments [n, r,t-1]	9.81	2.056	10.53	2.070	10.13	2.069	10.70	2.063	10.61	1.983
east Germany [d]	0.29	0.456	0.28	0.448	0.20	0.397	0.34	0.472	0.19	0.391
cohort										
1999 [d]	0.21	0.411	0.22	0.415	0.27	0.445	0.20	0.400	0.20	0.403
2000 [d]	0.24	0.429	0.25	0.431	0.28	0.447	0.23	0.423	0.24	0.429
2001 [d]	0.25	0.432	0.25	0.431	0.23	0.418	0.26	0.437	0.24	0.427
2002 [d]	0.29	0.456	0.29	0.452	0.23	0.418	0.31	0.462	0.31	0.463
profession										
1 (primary sector)[d]	0.02	0.133	0.02	0.128	0.01	0.115	0.02	0.134	0.02	0.124
2 (trade/manufacturing)[d]	0.39	0.488	0.36	0.479	0.32	0.468	0.39	0.489	0.24	0.429
3 (commercial/administration)[d]	0.34	0.474	0.37	0.482	0.39	0.488	0.35	0.478	0.38	0.485
4 (transport/security/post)[d]	0.08	0.269	0.09	0.287	0.09	0.283	0.10	0.295	0.07	0.252
5 (medical/care)[d]	0.04	0.186	0.02	0.153	0.03	0.181	0.02	0.128	0.04	0.191
6 (education/social welfare)[d]	0.05	0.215	0.05	0.218	0.06	0.240	0.04	0.195	0.07	0.263
7 (else profession)[d]	0.09	0.280	0.10	0.293	0.09	0.280	0.08	0.274	0.18	0.384

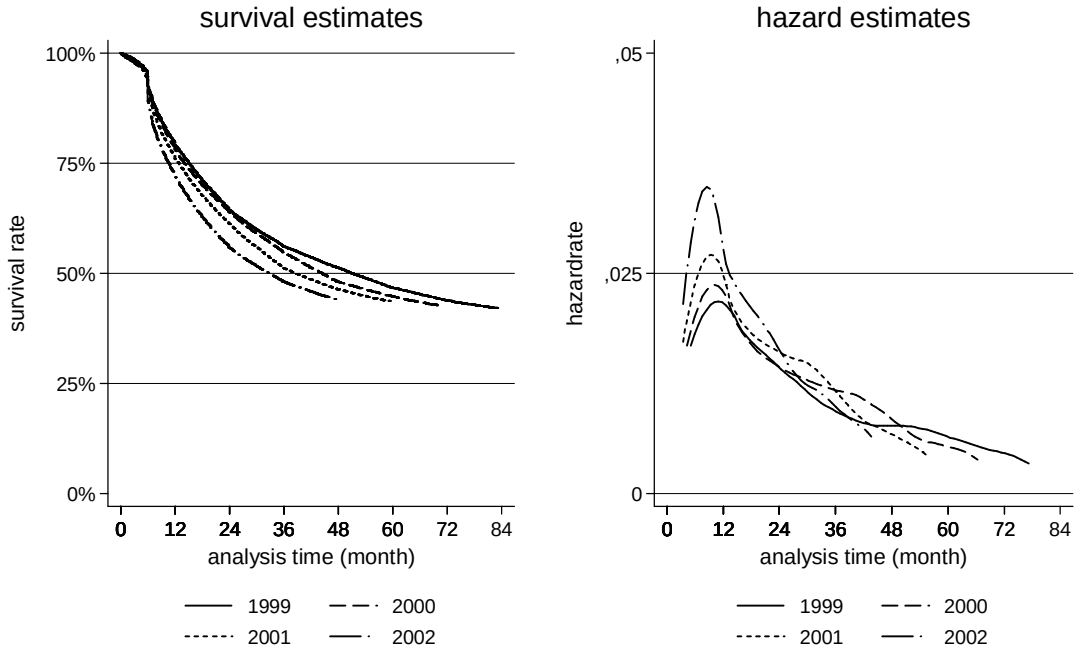
The table reports mean values and standard deviation (stdv); note that the mean reflects shares in cases of a dummy variable
d stands for a discrete change of dummy variable from 0 to 1; n stands for a numeric variable (metric); r = regional information, t = indicates time varying attributes (monthly information changing on a quarterly basis; in the case of vanishing establishments annual information is used);
source: IEB; own calculations

Information related to the time-dependent nature of exit is displayed in Figure 4.1. Specifically, it shows the survival function (left graph) and the related hazard function (right

graph) based on the Kaplan-Meier (1958) procedure.[19] For information purposes, both functions are displayed separately for each entry cohort.

As can be seen on the graph, time survival is high at the beginning of the process (above 95%) and rapidly decreases after a period of six months (end of the promotions period). After a period of 36 (24) months, almost 55% (60%) of all entries are still self-employed. This decreases to a share of 46% until the end of the observation period (83 months). This indicates much lower survival rates than those found in previous research.[20] In keeping with the survival function, the hazard rates (see right graph) increase during the first months and then decrease before the twelfth month of activity. In conclusion, the hazard rate follows a 'sickle-shaped' function which is also reported in earlier research (Brüderl et al. 1992; Taylor 1999; Wießner 2001; Oberschachtsiek 2008).

Figure 4.1: Time dependency of self-employment exits



source: IEB; own calculations

[19] The survival function estimates for each time interval the probability that those who have survived the beginning of the interval will survive to the end. Therefore, it defines as the product of the conditional probabilities of surviving each time interval. Accordingly, the hazard function defines as the risk of a failure event in a given time interval conditional to the population that is at risk of failing in that given time interval.

[20] Wießner (2001), for example, reports survival rates of almost 70% after a period of three years. Hinz and Gungbauer-Gans (1999) find survival rates of 80% after two years, and Caliendo and Kritikos (2007) report survival rates of between 65% and 70% after a period of two years. However, variances may arise from different observations periods and from different data sources. In particular, previous research focuses on survey data which may suffer from a participation bias.

Returning to Table 4.1, we also find that almost 60% quit self-employment by exiting into unemployment and that only 28% entered into new employment; this is similar to the findings in Oberschachtsiek (2008).[21] However, focusing on the post-exit state does not answer the question as to whether the observed state remains stable. The data show that almost 45% of all exits into employment fall back into unemployment and around 36% of those who have quit self-employment by starting a period of unemployment re-enter a wage work position. In addition, we find that 50% of all post-exit states change within the first six months and that 75% change within one year.

4.6 Determinants of duration

4.6.1 Model selection and the value of local information

Since accelerated failure time models allow different underlying time-scaling functions, we tested different specifications for capturing the most adequate parameterization of the model. We use likelihood-ratio tests (LR) and the Bayesian information criteria (BIC; see Raftery 1986 and Burnham and Anderson 2004). According to the hazard rate function displayed in Figure 4.1, we tested gamma, log-normal, and log-logistic distributions, of which the log-normal duration model shows the best fit to the data.[22] Tests for unobserved individual heterogeneity indicate that individual frailty can not be rejected while controlling for individual and regional characteristics.[23] Therefore, all model specifications used for the empirical investigation below control for an individual gamma distributed frailty.[24] For a graphical assessment of the model selection, see Figure A.4.1 in the appendix.

Before starting the investigation of single attributes, we will first examine the relative importance of local information in explaining self-employment longevity. Using likelihood ratio tests different model specifications are studied which include different sets of covariates. We use

[21] Note that for the population of business founders who were not unemployed before becoming self-employed, Taylor (1999) and Johansson (2000) find an inverse picture in which most self-employed people end their period of self-employment by entering a new job or quitting self-employment voluntarily.

[22] In addition, we also tested the shape parameter of the gamma-distribution in its support for a log-normal distribution of the self-employment durations (see Cleves et al. 2004) which also supports this choice. Conditional on all exits, the shape parameter Kappa is not significantly different to zero, which supports the choice of a log-normal distributed duration model. However, conditioning on exits into employment and unemployment does not prefer a specific model.

[23] The null hypothesis is tested that the variance parameter theta equals zero (see Guiterrez 2002).

[24] In keeping with the objections stated by Heckman and Singer (1984), we do not find strong differences related to the inclusion and the specification of the frailty term.

the development of the likelihood ratio and the BIC as indicators for the improvement of the entropy (see Table 4.2).[25]

Table 4.2: LR-test and the entropy of nested models

	exits		
	all	into	
		employment	unemployment
specification			
reference (model 1)	LR: 3,163*	LR: 2,722*	LR: 2,381*
(introducing b1)	BIC: 436,000	BIC: 184,658	BIC: 312,585
human capital (model 2)	LR: 4,440*	LR: 970*	LR: 3,269*
(adding b2 to model1)	BIC: 431,719	BIC: 183,875	BIC: 309,475
labor market I (model 3a)	LR: 56*	LR: 136*	LR: 370
(adding b3a to model2	BIC: 431,669	BIC: 183,753	BIC: 300,121
labor market II (model 3b)	LR: 24*	LR: >1	LR: 54*
(adding b3b to model2	BIC: 431,658	BIC: 183,767	BIC: 309,082
labor market III (model 3)	LR: 1,015*	LR: 494*	LR: 1,315*
(adding b3 to model2)	BIC: 430,820	BIC: 183,496	BIC: 308,276
H*R (model 4)	LR: 90*	LR: 16*	LR: 73*
(adding b4 to model3)	BIC: 430,831	BIC: 183,582	BIC: 308,305

table reports Likelihood Ratios (LR) and the Bayesian Information Criteria (BIC)
explanation: * indicates a significant rejection of the null-hypothesis of the Likelihood Ratio test;
the tests sequentially relates to the less complex model
content of the blocks: b1 (gender, age (+sq), cohort, profession, east/west); b2 (short unemployment, minor employment, number of job changes, schooling, academic degree, crafts master, management, commercial background, wage premium, small business); b3a (unemployment rate); b3b (unemployment rate squared); b3 (unemployment rate (+sq), unemployment index (+sq), variation index (+sq), vanishing establishments (+sq)); b4 (interaction effects as displayed in Table 4.5)
source, IEB; own calculations

As Table 4.2 also shows, the equality of the models can be rejected for all steps and for all types of exits. Concerning the regional attributes that are introduced in model 3, this indicates that controlling for regional characteristics statistically improves the modeling of self-employment durations. However, the sequential introduction of new attributes also shows a decrease in the relative informational contribution of the included covariates. Testing different orders for the inclusion of attributes reveals that the highest net gain relates to the introduction of individual characteristics. Furthermore, Table 4.2 also reports that the relative importance of different sets of covariates in explaining self-employment duration differs depending on the type of exit. Unlike previous findings, our results suggest that external conditions predominantly correlate with exits

[25] The profession, the start-up cohort, gender, age, and the East/West classification are used to conduct the reference model (model 1). The second set of attributes adds further individual characteristics (e.g., motivation, qualification, model 2). Model 3 and model 4 incorporate regional characteristics, in which the latter also includes the interaction between individual characteristics and the (linear) unemployment index.

into unemployment. In sum, the highest entropy relates to the model specification that adds individual and regional characteristics (model 3).[26]

Second, in accordance with section 4.2, we also test the net gain of a higher complexity in addressing local labor market conditions. Again, we use likelihood ratio tests for model specifications that include different sets of regional characteristics. As can be seen from Table 4.2 (see specification 'labor market II'), introducing a squared term yields a statistical significant improvement of the entropy for all type of exits.[27] Furthermore, the sequential inclusion of further local information (linear and squared term of the unemployment index and firm hazard; not displayed) also rejects the equality of the models for all types of exits with the exception of the variation index.[28] Therefore, there is strong support for the use of multiple measures in addressing local labor market conditions. Also notice that concerning the entropy of the statistical modeling greatest improvements result from controlling for the unemployment index and firm hazards, which – in the case of the unemployment index – support the high relevance of external changes as discussed earlier and also reported in Tervo and Haapanen (2009).[29]

4.6.2 Testing single attributes

Two model specifications are differentiated for the investigation. First, results concerning local and individual characteristics are based on the model specification with the highest entropy (model 3) and are reported in Table 4.3. Second, the specification as described in model 4 is used for the investigation of the interaction effects. The results are displayed in Table 4.4.

Note that the interpretation of the coefficients in log-normal duration models is very close to a percentage change in t related to a change in x ($\ln(t_i)/\Delta x$), in which the natural exponent of the coefficients represents the time ratio. Negative values of β_x ($e^{\beta} < 1$) are associated with shorter expected durations and therefore accelerated exits. It should also be noted that the results concerning the competing exit risks must be interpreted with care due to data limitations (see section 4.3) and due to the high dynamics of the post-exit employment states. In particular, the latter point may limit the validity of a distinct identification of the considered exit risks.

[26] The BIC supports this pattern. However, the BIC also shows a negative improvement of the entropy relating to the introduction of the interaction between local characteristics and individual attributes.

[27] We also tested cubic effects of the unemployment rate. However, returns to this inclusion are not satisfying in terms of statistical significance and model improvement.

[28] The inclusion of the variation index only showed a robust significant model improvement for exits into unemployment. Significant contributions related to the LR tests depend on the order of the included set of covariates.

[29] We also tested the entropy of the model specification based on model 2 plus the linear and squared effect of the unemployment rate in comparison to the same specification based on the unemployment index. The BIC indicates higher entropy for the latter specification which also supports this interpretation. More detailed information is available from the author.

Furthermore, it may be questionable as to whether exits into wage work and unemployment are independent in a very narrow sense when focusing on local labor markets. Therefore, results are reported for exits in general and for the two types of competing exit risks.

Local labor market characteristics

As it can be seen from Table 4.3 the results show that a one percentage-point increase in the local unemployment rate causes a reduction of the self-employment period by a factor of 0.91 (=e^{β}; β=-0.095). This effect diminishes for very high unemployment rates and turns negative for very high values (peaking around 23% - note that the range varies from to 2.6% to 30%). The Sasabuchi test supports this inversely u-shaped pattern (Sasabuchi 1980).[30] Accounting for competing exits shows a similar pattern. Furthermore, we also see that exits into wage work are less affected by an increase in the unemployment rate than exits into unemployment.

We also tested the traditional implementation in which we studied the effect of the local unemployment rate without controlling non-linear effects and without controlling further regional information (not displayed in Table 4.3, estimations base on model 2). Not controlling for other local characteristics reveals a lower correlation between the local unemployment rate and duration in self-employment; and, for exits into wage work the effect even turns its direction. In detail, leaving all other local covariates out and only focusing on the linear effect reveals that duration are shorten by a factor of e^{β}=0.993 according to a percentage change of the unemployment rate (exits into unemployment: e^{β}=0.98). The effect found for durations until exits into wage work even turns positive (e^{β}=1.03) which would indicate an extension of the self-employment period with an increase of the unemployment rate.

For the time-varying unemployment we also find that as labor market conditions worsen, the expected self-employment duration decreases. However, according to the estimates displayed in Table 4.3 (model 3, controlling for other local attributes) the unemployment index is only of a moderate importance for duration. Furthermore, there is no support for an inversely u-shaped correlation between duration and the unemployment index (Sasabuchi test). Exits into wage work are statistically unaffected by changes in the unemployment index. However, this picture of a moderate impact depends on the additional inclusion of the attribute in model 3. Testing linear and non-linear effects related to the unemployment index as the only local information (based on model 2) reveals that the net scaling effect related to a change of one standard deviation in the unemployment index is much higher (-0.41) than the corresponding effect found for the unemployment rate (-0.12).

[30] The null hypothesis was tested that the relationship of a variable to another increases at low values of an interval and/or decreases at high values.

Table 4.3: Scale effects of self-employment duration (without interaction effects)

variable	all exits		exits into employment		exits into unemployment	
	β	(se)	β	(se)	β	(se)
individual characteristics						
gender (male) [d]	0.127***	(0.01)	0.176***	(0.018)	-0.018	(0.012)
age [n]	0.082***	(0.003	0.012*	(0.007)	0.096***	(0.004)
age (squared)	-0.001***	(0.00)	0.00	(0.00)	-0.001***	(0.00)
motivation						
short unemployment (< 4 months) [d]	0.284***	(0.009)	0.192***	(0.017)	0.304***	(0.011)
minor employment [d]	-0.264***	(0.019)	-0.119***	(0.037)	0.094***	(0.023)
number of job changes [n]	-0.119***	(0.018)	-0.349***	(0.035)	-0.039*	(0.021)
number of job changes (squared) [n]	-0.016***	(0.005)	0.026***	(0.009)	-0.029***	(0.006)
qualification						
schooling (>= high school) [d]	0.111***	(0.01)	-0.077***	(0.02)	0.240***	(0.013)
academic degree [d]	0.051***	(0.013)	-0.084***	(0.024)	0.136***	(0.016)
master craftsman / foreman [d]	0.682***	(0.025)	0.514***	(0.048)	0.730***	(0.031)
management [d]	0.108***	(0.018)	-0.113***	(0.034)	0.172***	(0.022)
commercial background [d]	-0.040***	(0.013)	-0.104***	(0.024)	-0.016	(0.015)
wage premium [d]	0.177***	(0.009)	0.040**	(0.017)	0.183***	(0.011)
small business (< 20) [d]	0.259***	(0.008)	0.207***	(0.015)	0.279***	(0.01)
local labor market						
unemployment rate [n,t,r]	-0.095***	(0.005)	-0.033***	(0.009)	-0.151***	(0.006)
unemployment rate [n,t,r] (squared)	0.002***	(0.00)	0.001***	(0.00)	0.003***	(0.00)
unemployment index [n, r,t]	-0.033***	(0.002)	0.00	(0.004)	-0.040***	(0.003)
unemployment index [n, r,t] (squared)	0.000***	(0.00)	0.00	(0.00)	0.000***	(0.00)
variation index [n, r]	1.100***	(0.097)	1.533***	(0.182)	1.228***	(0.119)
variation index [n, r] (squared)	-0.603***	(0.077)	-0.744***	(0.145)	-0.697***	(0.094)
% vanishing establishments [n, r,t-1]	0.349***	(0.021)	0.309***	(0.04)	0.489***	(0.026)
% vanishing establishments [n, r,t-1] (squared)	-0.011***	(0.001)	-0.009***	(0.002)	-0.016***	(0.001)
east Germany [d]	0.123***	(0.018)	0.237***	(0.035)	0.012	(0.021)
cohort (ref: year 1999)						
three dummy variables[)x]			not reported			
profession (ref: trade/manufacturing)						
seven dummy variables			not reported			
constant	1.808***	(0.177)	2.152***	(0.329)	1.943***	(0.212)
ln_sigma	0.211***	(0.005)	0.532***	(0.009)	0.177***	(0.006)
ln_theta	-0.513***	(0.03)	0.572***	(0.064)	0.561***	(0.024)
observations	2,040,855		2,040,855		2,040,855	
exits	89.529		24.901		53.598	
chi2	8980.863		4285.711		7645.934	
BIC	430458.77		183398.74		307596.26	

table reports beta-coefficients based on a lognormal duration model
d stands for a discrete change of dummy variable from 0 to 1; n stands for a numeric variable (metric); r = regional information, t = time varying attribute ; (se) standard errors in parentheses
level of statistical significance: * p<0.10, ** p<0.05, *** p<0.01
[)x] Using 1999 as the reference year, we find that younger start-ups are associated with a higher likelihood of exiting, particularly exiting into unemployment. Note that the cohort has a very strong effect on scaling the time function (see also Figure 4.1)
source, IEB; own calculations

While the above findings suggest that deteriorating economic conditions reduce self-employment duration, increasing instability (variation) and lower economic prosperity (firm

hazard) have the opposite effect. Again, the results show non-monotonic correlations. In the case of unemployment variation, our findings provide support for the hypothesis of reduced option values for quitting self-employment. Based on the squared effect, we expect a negative marginal effect relating to local instability in duration for values above 0.9 (max=1.32). Unfortunately, the interpretation of this covariate is not a simple procedure. By way of illustration of this complexity, one standard deviation (0.193) similarly prolongs the expected self-employment duration to less than a one year increase in age (equals 1/8 of the standard deviation; not taking into account non-linear correlations). The level of local firm hazard is associated with a diminishing effect in prolonging self-employment duration (taking into account a calculated extremum at 16% and an upper bound of 15.5%). In particular, the high decelerating effect found for exits into unemployment supports the fact that the level of firm hazard in a region strongly associates with reduced competition and/or lower wage work options.

Accounting for the differences of the local labor market conditions in east and west Germany enables controlling for structural macro-economic disparities in Germany. In general, east Germany has higher unemployment rates, lower economic dynamics, and higher proportions of people who receive social transfer payments than west Germany (e.g., Blien and Hirschenauer 2005). As observed by the instability measure (variation index) and the prosperity measure (firm hazard), worse macroeconomic conditions cause an increase in self-employment durations. All else being equal, a shift to east Germany from west Germany causes an increase in duration by a factor of 1.13 ($=e^{\beta}$; β=0.123). Note that this reveals a different picture than found in the descriptive findings.

Individual characteristics

Results concerning socio-demographic characteristics and formal qualification are moderately in line with previous findings (e.g., Andersson 2006; Brüderl et al. 1992; Georgellis and Wall 2005). As Table 4.3 shows, men can be observed as remaining longer in self-employment than women (almost e^{β}=1.13 times longer; β=0.127), self-employment duration in age (peaking around an age of 38) displays an inverse u-shaped pattern, and there is support for the opportunity cost structure of qualification (overall positive effects but negative effects for exits into wage work).

Interesting findings may be observed for individuals who are experienced in a commercial line of work. As discussed above, we expect comparative advantages here for the management of a business which implies a prolongation of self-employment durations. However, the results in Table 4.3 show a negative correlation with longevity. Exits in general and into employment accelerate in conjunction with a background in a commercial line of work by a time factor of 0.96 (β=-0.04) and 0.35 (β=-1.04), respectively. Two explanations can corroborate with this finding:

founders with such a background appear to experience disadvantages in being self-employed and they may face high opportunity costs. However, a focus on the insignificant coefficient for exits into unemployment predominately supports the second interpretation whereby people with an employment background in a commercial field will be pulled out of self-employment.

As can also be seen from Table 4.3, we find strong decelerating effects for all types of exits related to 'master craftsmen' and 'employment background in small firms'. Specifically, the fact of being a master craftsman[31] or foreman almost doubles the expected duration of exits, in general, and exits into unemployment, in particular, whereas having an employment background in a small firm increases the expected self-employment duration by a factor of between 1.23 and 1.32 (all exits: e^{β}=1.29; β=0.259). These findings strongly support the 'hot-house'-hypothesis, including in the context of self-employment duration as argued above (see also Parker 2009 and 2007). Low division of labor obviously fosters (and/or selects) specific capabilities which are associated with comparative advantages for self-employment positions.

Furthermore, we also find an overall decelerating effect for the attribute 'wage premium' (e.g., for all types of exits e^{β}=1.19; β=0.177). In accordance with the discussion in section 4.3.3, we should expect high associated opportunity costs related to this attribute. This should result in decreased durations in the case of exits into wage work which is not found here. However, our findings may reflect the fact that wage premiums tend to disappear on the return to the wage sector (Bruce and Schütze 2004 and Hyytinen and Rouvinen 2008) and/or that the related 'extra' productivity is also likely to be transferred to self-employment.

The final set of individual attributes captures motivational characteristics. For the most part the results found here are in line with previous findings and support the observation that pushed individuals (longer unemployment, marginal employment, and increasing job changes) tend to display a shorter duration in self-employment than non-pushed founders. As indicated by the results presented in Table 4.3 (second panel of attributes), we find very strong effects for the unemployment duration and minor employment positions, which are some of the strongest effects in the scaling of the time function of exits. However, it is worth noting that the included 'push attributes' (minor employment and the inverse of short unemployment) not only reduce duration but also accelerate exits into employment. This indicates that individuals who may be pushed into self-employment do not experience much difficulty in re-entering wage work. In addition, given the accelerating effect of job changes on exits (including marginal effects for exits into wage work), our findings provides support for the 'switching disposition hypothesis' (Hyytinen and Ilmakunnas 2007).

[31] Note that master craftsmen (and foremen) in Germany are highly qualified in technical and commercial competencies and are specifically trained to become self-employed. Moreover, master craftsmen in Germany usually operate on markets with high entry barriers.

Table 4.4: Scale effects of self-employment duration (including interaction effects)

variable	all exits		exits into employment		exits into unemployment	
	β	(se)	β	(se)	β	(se)
individual characteristics						
gender (male) [d]	-0.292***	(0.075)	0.2	(0.134)	-0.041	(0.088)
motivation						
short unemployment (< 4 months) [d]	0.319***	(0.073)	0.206	(0.131)	0.443***	(0.085)
Number of job changes [n]	0.263***	(0.052)	-0.08	(0.094)	0.351***	(0.061)
Number of job changes (squared) [n]	-0.015***	(0.005)	0.026***	(0.009)	-0.028***	(0.006)
qualification						
schooling (>= high school) [d]	0.054	(0.075)	-0.422***	(0.133)	-0.065	(0.088)
master craftsman / foreman [d]	0.451***	(0.168)	0.678**	(0.31)	0.304	(0.202)
wage premium [d]	0.123*	(0.07)	0.154	(0.125)	-0.001	(0.083)
small business (< 20) [d]	-0.096	(0.067)	0.003	(0.119)	-0.164**	(0.078)
local labor market						
unemployment index [n, r,t]	-0.033***	(0.002)	0.002	(0.004)	-0.038***	(0.003)
unemployment index [n, r,t] (squared)	0.000***	(0.00)	0.000*	(0.00)	0.000***	(0.00)
interaction terms						
male * unemployment index (ue index)	0.004***	(0.001)	0.00	(0.001)	0.00	(0.001)
schooling (>= hs) * ue index	0.001	(0.001)	0.003***	(0.001)	0.003***	(0.001)
masters' degree / foreman * ue index	0.002	(0.002)	-0.002	(0.003)	0.004**	(0.002)
short unemployment * ue index	0.00	(0.001)	0.00	(0.001)	-0.001*	(0.001)
number of job changes * ue index	-0.004***	(0.00)	-0.003***	(0.001)	-0.004***	(0.001)
wage premium * ue index	0.001	(0.00)1	-0.001	(0.001)	0.002**	(0.001)
small business * ue index	0.003***	(0.001)	0.002*	(0.001)	0.004***	(0.001)
note: attributes that are not related to interaction effects are suppressed (see Table 4.4)						
constant	1.830***	(0.199)	1.934***	(0.365)	1.759***	(0.237)
ln_sigma	0.209***	(0.005)	0.530***	(0.009)	0.174***	(0.006)
ln_theta	-0.490***	(0.03)	0.588***	(0.063)	0.575***	(0.024)
observations	2,040,855		2,040,855		2,040,855	
exits	89,529		24,901		53,598	
chi2	9097.881		4306.051		7748.337	
BIC	430443.46		183480.1		307595.55	

table reports beta-coefficients based on a lognormal duration model
d stands for a discrete change of dummy variable from 0 to 1; n stands for a numeric variable (metric); r = regional information, t = time varying attribute; (se) standard errors in parentheses
level of statistical significance: * p<0.10, ** p<0.05, *** p<0.01
source, IEB; own calculations

Interaction effects (qualification and labor market conditions)

Table 4.4 presents the results obtained by controlling for interaction effects. As the results show, males display greater elasticity in reacting to a negative economic development than females (prolonging self-employment duration). Similar effects also appear for people with an employment background in small firms. As already argued, the results show that the higher the qualifications (higher education, master craftsman, premium earnings) in conjunction with an (relative) increase in labor-market pressure, the longer the expected self-employment duration. However, the statistical significance of the coefficients concentrates on exits into unemployment

while exits in general and exits into employment are less likely to be affected by the interaction of local characteristics and individual attributes.

We also tested whether this picture changes if we also control the interaction for the nonlinearity of the unemployment index (not displayed). Overall, the results do not change substantially but we find that higher education and wage premium have a decreasing marginal negative correlation with duration (insignificant for exits into wage work).

4.6.3 Survival estimates

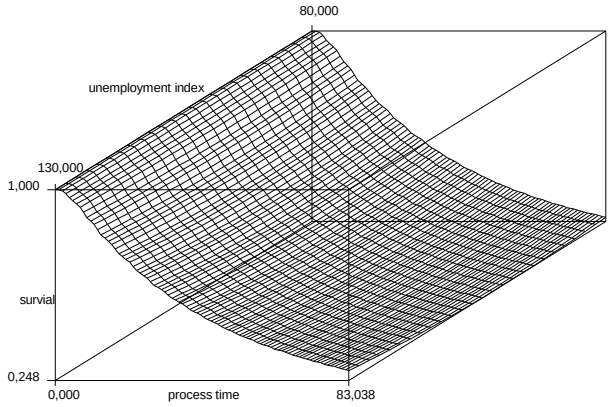
Combined linear and non-linear effects are not easy to interpret in terms of accumulated net effects. In addition, what we do not see from the results reported in Tables 4.3 and 4.4 are concrete estimates for expected durations or for survival. Therefore, Figure 4.2 enables the more tangible understanding of the results: the graphs show the cumulative linear and non-linear effects of changes in the local labor market for the survival function. The graphical assessment covers different measures of the local labor market conditions and is based on the estimates reported in Table 4.4 (holding all other covariates fixed at their mean). All graphs reflect the interaction between time dependency and the scaling effect of the covariate.[32] It should be noted that for technical reasons, the survival axes differ in displaying the range of the survival functions.

The picture of a (relatively) low correlation between external conditions and survival chances found for the unemployment index and the variation changes for the unemployment rate and local firm hazard, where we see much stronger accumulated net effects (lower graphs). In particular, survival decreases with local unemployment (graph three) whereas the net correlation between firm hazard and survival does the opposite (graph four). For both measures, we find a predominant marginal decrease of changes in survival instead of an inflexion. In terms of specific figures, an unemployment rate of 5% (which is at the lower end of the measure) is associated with a survival of 89.2% in t=12 and 64.0% in t=36. For higher values of the unemployment rate (e.g., 17%, equals the upper quartile of the measure), we expect survival chances of around 77.2% in t=12 and 44.6% in t=36.

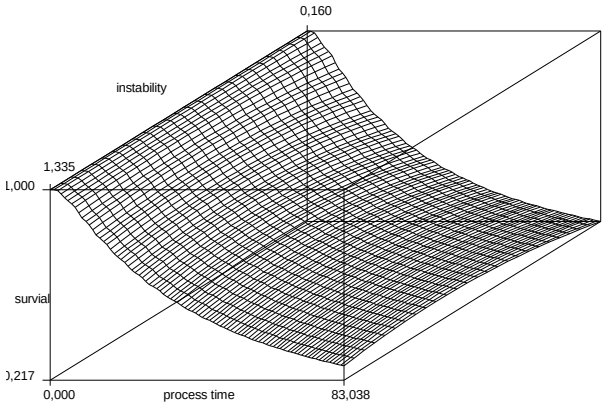
[32] Unfortunately, the reported estimates do not accurately account for the time-varying nature of the measures because the simulation assumes fixed values until *t*.

Figure 4.2: Survival estimates

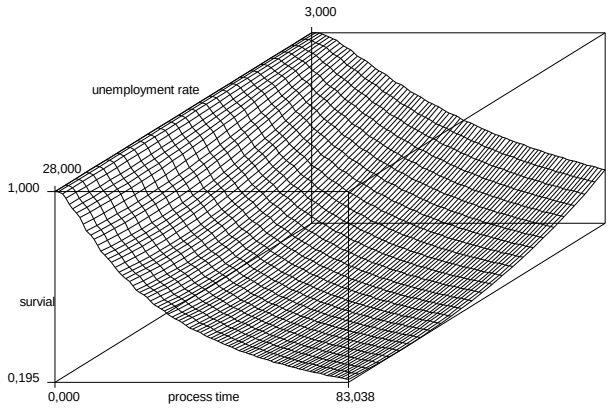
1) Survival and change of local unemployment (index)



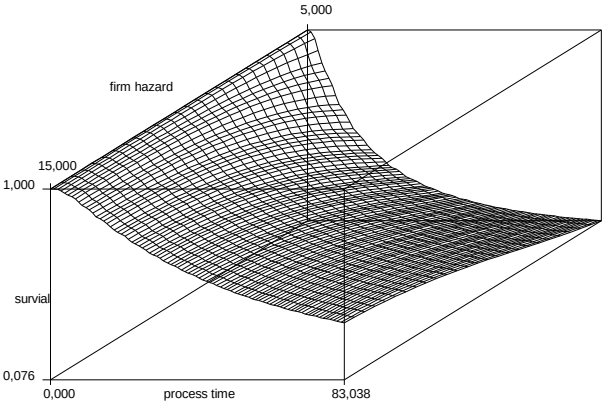
2) Survival and local employment instability (unemployment variation)



3) Survival the level of local employment (unemployment rate)



4) Survival and local economic prosperity (firm hazard)



source: IEB; own calculations

The first graph (top left) informs about the effect of the unemployment index on survival. What we find is only a slight difference between high and low values of the unemployment index in scaling the time function of survival. For example, in t=48, we observe a survival rate of almost 42.6% for an index value of 80 and a survival rate of 45.3% for an index value of 130. The accumulation of both effects shows that the unemployment index plays only a minor role in explaining survival. Similar results can be found for the accumulated net effect of local employment instability (see second graph, top right). The related survival chances vary between 46% and 57% in t=36 and between 22.7% and 31.8% in t=80.

The most significant effect is detected for the measure of local firm hazards (share of vanishing establishments) where we find a strong difference between the low and high values of firm hazard for survival. A linear decrease can almost be observed for high values of firm hazard and a strong compressed time dependency for low values. In t=12 we expect survival chances of almost 68.6% conditional on a share of vanishing firms of 7%. This decreases to 34.6% in t=36 and 26.1% in t=48. In a local market with 13% firm hazard, survival increases to 86.7% in t= 12; 59.3% in t=36 and 49.7% in t=48.

4.6.4 Robustness checks

Spatial structures, which have not been considered up to now, may harm the estimates because of clustered observations and spatial correlation. First, in addition to the results reported in Tables 4.3 and 4.4, we also used cluster-adjusted standard errors to account for the potential correlation between observations within the same local labor market (see Moulton 1990).[33] However, the results do not substantially differ from the reported results (not displayed). Second, spatial correlation cause neighborhood effects which means that measuring labor market conditions in Region 1 adjoined to Regions 2 to 4 does not precisely reflect labor market conditions relevant for the individuals in Region 1. Taking such neighborhood effects into account, all estimates were also carried out using weighted regional information. We used the commuter matrix to weight local information.[34] Again, the reported results in Table 4.3 and 4.4 do not substantially differ from those related to the weighted regional information (not displayed).

Finally, several studies report strong gender differences and thus investigate the determinants of self-employment duration separately for males and females (Williams 2000; Georgellis and Wall 2005; Wagner 2007). A Chow test supports that the coefficients of the whole population vary statistically significant across gender for all types of exit (Chow 1960). However, related to single attributes differences between males and females are less pronounced in terms of the relative magnitudes of the coefficients. We found that higher education seems to be relevant for females concerning exits in general and into unemployment while it has a higher impact on quitting into wage work for males. Similar effects are found for a college degree. Moreover, being experienced in a management position matters to larger extend for males in quitting self-employment than for females. Obviously, opportunity costs seem to be more important for males than for a female. This indicates different findings than those reported in William (2000).

4.7 Summary and conclusions

This study focuses on examining local labor market conditions and individual attributes in determining the stability of new self-employment entries. In particular, we concentrate our investigation on how external changes interact with individual differences in scaling the duration in self-employment. The data used for this inquiry was gathered from the Federal Employment Service

[33] The identification of regional clusters refers to Eckey et al. (2007 and 2006) – see also Table A.4.2 in the Appendix. The use of regional data usually causes problems in relation to spatial inter-correlation.

[34] The commuter matrix is used to construct a weighted regional measure according to the interdependence of the local labor force. Therefore, the more important the labor market of a neighboring region, the higher the weight of its (e.g.) local unemployment rate for the calculation of the weighted unemployment rate for the region in question.

(register based data) and capture a population of promoted founders, who were unemployed before starting their business, entering self-employment between 1999 and 2002.

While most of the descriptive findings support previous results, our findings show that almost 56% of all individuals quit self-employment during the observation period of 83 months, indicating a lower share of survivors than found in previous studies. Furthermore, we find that 60% quit self-employment by exiting into unemployment and 28% who entered into new employment directly following their self-employment state. This is in line with Oberschachtsiek (2008) but contradicts the findings of Cueto and Mato (2006), Johansson (2000) and Taylor (1999) which show an inverse relation between exits into wage work and into unemployment. In addition, our results show great dynamics in the post-exit employment positions, which has been unreported in previous studies.

The first part of our multivariate investigation focuses on the importance of including local labor market conditions. We find that the effect of local labor market conditions on duration in self-employment is only roughly captured by the local unemployment rate. In particular, most improvements of the entropy relate to information that captures economic changes. This is in line with previous findings (Tervo and Haapanen 2009) and supports the theoretical discussion. We also find that controlling for human capital attributes reveals the greatest improvement in describing self-employment longevity while the interaction of local information and individual characteristics is only of lower importance.

In a second part, we tested single attributes. Theoretically, potential effects will be ambiguous concerning direction and magnitude of the correlation with duration in self-employment for most of the included characteristics.

Our results show that local labor market conditions have a rather complex impact on self-employment longevity. All local labor market attributes reveal a diminishing correlation with duration in self-employment - and partly inverse marginal effects. We also find that not controlling for squared effects partly reveals contrary findings for the effect of the unemployment rate on duration. In particular, this may explain ambiguous findings in previous studies (Johansson 2000; Taylor 2000). We also find that high or increasing local unemployment rates cause more unstable self-employment periods. In contrast, increasing local firm hazard or local instability in wage work positions extend self-employment episodes. Therefore, our findings indicate that local unemployment is associated with a higher reduction in self-employment income than in the potential income in wage work. Simultaneously, the results show that a reduction of the option value of wage work (if wages become more risky) relatively favors income position in self-employment.

On the individual level, we find that qualification enhances duration in general but it also accelerates exits into wage work positions. We interpret this as the effect of opportunity costs. Furthermore, we find that ‘short periods of unemployment’, ‘employment experience in small

firms', 'being a master craftsman' and 'having received a wage premium' are related to an overall extension of self-employment periods. Therefore, these attributes seem to be associated with comparative advantages in self-employment. In particular, our finding that 'employment experience in small firms' enhances duration in self-employment is the first sign for evidence to support the theory that the 'hot-house' hypothesis also applies in the context of self-employment success (see Blanchflower and Meyer 1994; Wagner 2004; Parker 2007). Obviously, low division of labor fosters (and/or selects) specific qualities which are of higher advantages for self-employment than for wage work. Furthermore, our results show that a commercial background relates to comparative disadvantages for self-employment positions mainly affected by high opportunity costs. We find that re-employment risks mainly increase due to high numbers of job changes which support the 'switching disposition' hypothesis as suggested by Hyytinen and Ilmakunnas (2007).

In addition, even if less pronounced our results reveal that individuals significantly differ in reaction to changes of external conditions. Males and qualified people seem to face a higher decrease of option values for wage work in the increasing absence of external employment options and remain self-employed longer than their counterparts. However, statistical significance is concentrated on exits into unemployment. Accordingly, robustness checks show that qualification are less important for females in quitting into wage work, which indicates that the exit behavior of females is less affected due to opportunity costs. Partly, this is in conflict to the findings of William (2000) who argued that penalties due to self-employment in returns due to experience mainly arise for women.

Based on these findings several implications can be derived. First of all, political attempts to promote self-employment out of unemployment may gain traction if regional agents consider local economic conditions. In particular, in regions with unemployment rates below 20% changes in the economic conditions matter for survival and these changes mainly reduce survival chances of the less qualified. However, the study shows a quite complex pattern of the importance of external economic conditions. Therefore, further research that points to the importance of regional conditions in self-employment exits is needed. On the individual level our results suggest that fostering self-employment may gain efficiency when focusing on training broad skills or when focusing on individuals with such competencies. However, it would be interesting if this finding differs across other populations of self-employed individuals (e.g. migrants, people not starting out of a position of unemployment).

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4.9 Appendix

Table A.4.1: Macro-economic conditions and self-employment hazard - selected findings

study	data	macro-economic variables	
		labor market	other
Taylor (1999)	British Household Panel Survey; two cohorts: entries in 1979 and 1991; n = 1,361 (910 male, 451 female) covering a period with high unemployment following an inversely u-shaped pattern	national unemployment rate at start-up: all exits: + voluntary exits: + involuntary exits: :n.s.	/
Carrasco (1999)	Spanish Family Expenditure Survey (ECPF); changes between 1998 und 1991; n = 821 covering a period with consistently very high unemployment	national unemployment rate at start-up: all exits: + voluntary exits: + involuntary exits: n.s.	/
Johansson (2000)	micro data of the 'Labor Employment Statistics' (LES) Finland; entries between 1987 and 2000; n = 4,192 Spells covering a period with increasing unemployment, coming from a low level	regional annual unemployment rate all exits: - voluntary exits: - involuntary exits: + (f)	/
Van Praag (2003)	US National Longitudinal Survey of Youth (NLSY); entries between 1985 and 1989; n = 271 covering a period with moderate unemployment following a declining trend	national unemployment rate at start-up: n.s.	business failure rate each year and industry: +
Tervo and Haapanen (2009)	micro data of the LES, Finland; entries in between 1987 and 2000; n (random sample) = 12,661 individuals see Johansson (2001)	regional annual unemployment rate: n.s. annual changes of the ue-rate: +	/
Andersson (2006)	process generated data, Sweden; entries in 1991; annual panel; n = 20,217 covering a period with moderate unemployment, with a decreasing trend	regional unemployment rate: all exits: + voluntary exits: n.s. involuntary exits: +	self-employment density: all exits: - voluntary exits: - involuntary exits: -
Cueto and Mato (2006)	survey data; promoted entries out of unemployment between 1996 and 2000; Spain; n = 848 covering a period with very high unemployment, strongly decreasing but still high	national quarterly unemployment rates in the year of the start up: all exits: - (f) voluntary exits: - involuntary exits: n.s.	/

explanation: + (-) indicates a positive (negative) correlation between the attribute and the exit probability
(f) indicates significance only fort he female population
n.s. stands for not significant

Table A.4.2: Definition of the variables

gender (male)

Sex is male. Source: Employment History.

age

Age of the founder at the beginning of the self-employment episode. Source: Employment History.

schooling (>= high school)

Schooling equals high school degree or higher (Germany: 'Abitur' or 'Fachabitur'). Source: Job Search Register.

academic degree

The founder holds an academic diploma (university or college). Source: Job Search Register.

master craftsman / foreman

The founder has worked as a crafts master or foreman (job position) in his or her last employment episode before starting the business. Excluded are employment episodes with a daily income lower than 5 Euro or lasting less than 60 days (valid employment episode). Source: Employment History.

management

The founder worked in a management position in the last employment episode before starting the business. Source: Job Search Register.

commercial background

The founder is experienced and (formally) trained in a commercial profession. Source: Job Search Register (apprenticeship information); Employment History (using the two digit classification of a selected set of professions; experience).

short unemployment

The unemployment duration before setting up the business is less than 3.5 months (difference between last employment and beginning of the promoted self-employment episode; missing values are imputed). Source: Employment History

number job changes

Number of distinct two-digit classified professions during the last two years before starting the business. Source: Employment History.

minor employment

Founder worked in a minor employment during the last valid employment episode before setting up the business. Source: Employment History.

wage-premium

Identifies if a founder earned 1.66 times more than the expected monthly wage income in the last valid employment episode. The expected income is a regressed function of the income and a selected set of covariates (e.g., age, schooling, job changes, gender, job position, size of the establishment) conditional on the type of profession and part- or full-time status. Source: Employment History.

size of establishment / small business

Size of the Establishment: modus of the number of employees of the establishments during the last five years before setting up the business. Only those employment records are included that last for more than 3 month with an income greater than zero. Source: Establishment History Panel.

Small Business: The founder has usually worked (modus of the last five years) in establishments with less than 20 employees. Source: Establishment History Panel.

unemployment rate (UER)

Monthly unemployment rate of the local labor market district. This information is merged with the micro data after splitting the dataset into three-month periods. Berlin is treated as one region (un-weighted average). Source: Employment Statistics.

unemployment index

Time-varying covariate that covers a normalized unemployment rate relative to the starting point (index = UER*100/UER). Source: Employment Statistics.

variation index

Captures the variation of the monthly unemployment rate for each local labor market district. The index relates to the square root of the squared mean error of a time series estimation. Source: Employment Statistics.

share (%) of vanishing establishments (local firm hazard)

Identifies the share of establishments that are found in t-1 but do not exist in t in the local labor market district. Source: Establishment History Panel.

cohort

Represents the year in which the founder set up the business. Source: Participation in Measure Register.

profession

Distinguishes seven clusters of professions based on a two-digit job classification related to the last valid employment episode. Source: Employment History.

exit

Equals one if there is a non-self-employment episode after starting the business (beginning of the promotion). Source: all sources of the IEB. The identification distinguishes between a) employment (wage work with notification to the social security system), b) unemployment (with and without unemployment benefits) or participation in measure, and c) other (e.g. minor employment). Before identifying these spells, the data set was reorganized to summarize different types of spells.

duration of self-employment

The duration of self-employment is the difference between the beginning date of the promotion (start-up of the business) and the date of the first non-self-employment episode after starting the business. Censoring refers to 31 Dec. 2005.

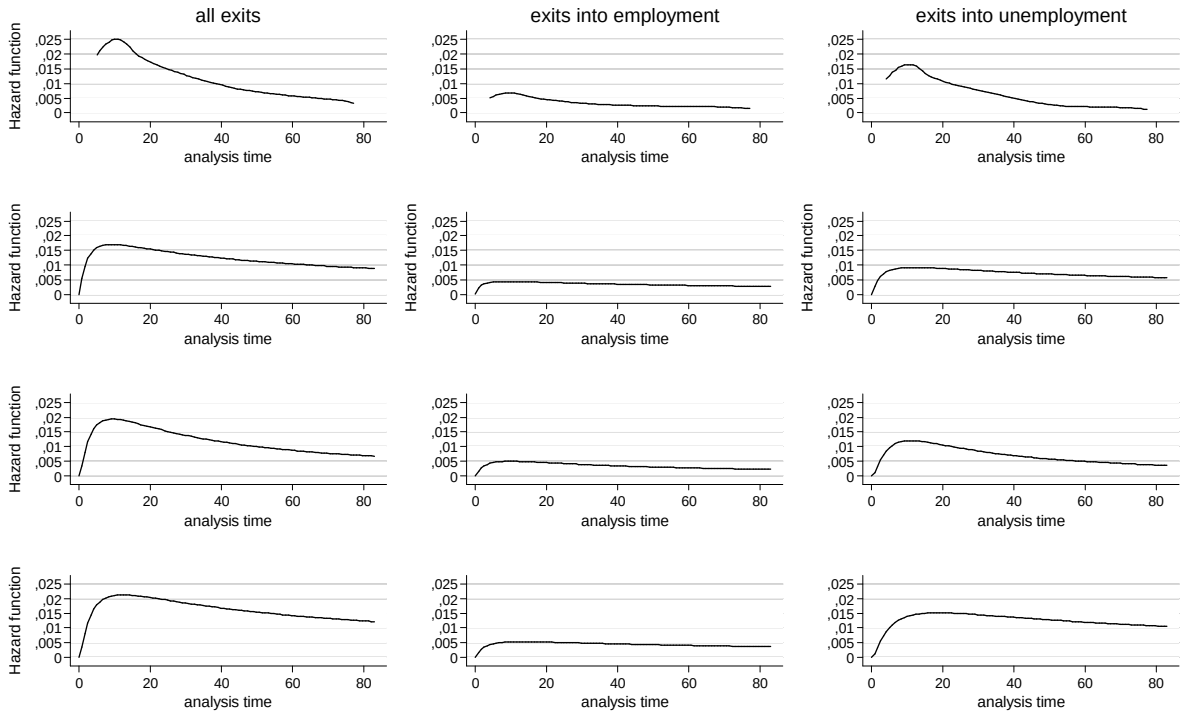
Table A.4.3: Tables of correlations

	(1 a)	(2 a)	(3 a)	(4 a)	(5 a)	(6 a)	(7 a)	(8 a)	(9 a)	(10 a)	(11 a)
(1 a) age	1										
(2 a) schooling (>= high school)	0.1123	1									
(3 a) short unemployment (< 4 months)	-0.075	0.0058	1								
(4 a) commercial background	0.0022	-0.0442	-0.1108	1							
(5 a) number of job changes	-0.077	-0.0201	0.1179	-0.0436	1						
(6 a) minor employment	0.1503	0.4889	-0.0023	-0.0334	-0.0219	1					
(7 a) academic degree	0.0101	-0.0553	0.0587	-0.0169	-0.0144	-0.018	1				
(8 a) master craftsman / foreman	0.1325	0.1325	0.0062	-0.0167	0.0462	0.0913	-0.0154	1			
(9 a) management	0.0543	-0.0172	0.0043	0.0053	-0.0042	-0.107	-0.0707	0.1067	1		
(10 a) wage premium	0.0488	0.0597	0.017	-0.0384	0.0467	0.0391	0.0196	0.054	0.0548	1	
(11 a) small business (< 20)	-0.0809	-0.0831	0.0853	0.0093	0.0475	-0.0677	0.038	-0.0252	-0.0347	0.0206	1

	(1 b)	(2 b)	(3 b)	(4 b)	(5 b)	(6 b)	(7 b)	(8 b)	(9 b)	(10 b)
(1 b) male	1									
(2 b) schooling (>= high school)	-0.0713	1								
(3 b) wage premium	0.0221	0.0597	1							
(4 b) primary sector	-0.0146	-0.0284	-0.0159	1						
(5 b) trade/manufacturing	0.3436	-0.1924	-0.0342	-0.1089	1					
(6 b) commercial/ administration	-0.2067	0.1401	0.0655	-0.098	-0.5785	1				
(7 b) transport/security/post	0.1199	-0.1	-0.0294	-0.0396	-0.2341	-0.2105	1			
(8 b) medical/care	-0.1621	0.087	0.0015	-0.0262	-0.1546	-0.139	-0.0563	1		
(9 b) education/social welfare	-0.1264	0.1876	0.0034	-0.0306	-0.1808	-0.1626	-0.0658	-0.0434	1	
(10 b) else profession	-0.1526	0.0061	-0.0191	-0.0415	-0.2453	-0.2207	-0.0893	-0.059	-0.069	1

	(1 c)	(2 c)	(3 c)	(4 c)	(5 c)	(6 c)	(7 c)	(8 c)	(9 c)	(10 c)
(1 c) unemployment rate	1									
(2 c) unemployment rate (sq)	0.9849	1								
(3 c) unemployment index	0.0472	0.0394	1							
(4 c) variation index	0.368	0.3741	-0.032	1						
(5 c) firm hazard	0.7493	0.7074	0.2346	0.0173	1					
(6 c) east Germany	0.7801	0.7834	-0.0914	0.5108	0.4892	1				
(7 c) year 1999	-0.0017	-0.0037	-0.3035	0.0213	-0.1272	0.0236	1			
(8 c) year 2000	-0.0123	-0.0099	0.0092	0.0067	-0.0387	0.0116	-0.3744	1		
(9 c) year 2001	0.0116	0.0136	0.1904	-0.0017	0.0558	0.0057	-0.3395	-0.3361	1	
(10 c) year 2002	0.0032	0.0007	0.1222	-0.0283	0.1213	-0.0435	-0.3281	-0.3248	-0.2946	1

Figure A.4.1: Assessment of the model selection



source: ieb, own calculations
graphs in the following order (top to bottom):
non-parametric smoothed hazard function, hazard function without frailty, unconditional and conditional hazard functions

Chapter 5

Concluding Comments

5.1 Summary and conclusions

Much attention has been devoted to the study of comparative advantage with a focus on entry into the self-employment market. However, the entry situation does not allow a sufficient identification of comparative advantages. First, if their true underlying mechanisms remain ambiguous, attributes that are discussed with a view to capturing comparative advantage may be unclear in their contribution to the identification of comparative advantages. Second, relating comparative advantages to the choice of becoming self-employed may remain incomplete because individuals do not initially know either their potential earnings or the returns related to non-pecuniary employment characteristics. Therefore, empirical evidence for the determination of the likelihood of entering a period of self-employment period can only be one necessary condition for the identification of comparative advantages.

However, greater knowledge of 'true' and 'reliable' comparative advantage is of major significance to political attempts to promote self-employment and political intervention. In particular, self-employment and entrepreneurship are discussed as an inherent driver of economic growth and dynamism and are, therefore, associated with significant political interest. This thesis presents three studies that contribute to the understanding of comparative advantage in self-employment.

The first study, which is presented in *Chapter Two*, addresses the 'Jack-of-all-Trades' hypothesis, which presumes that the variety of competencies or experience of individuals drives entrepreneurship (Lazear 2005). Recent research shows that there are two distinct dimensions related to the skill balance of individuals: (1) taste for variety; and (2) ability. Using representative survey data for Germany, the study shows that it is important to distinguish between discrete and high level investments in experience. For examples, having a very high number of distinct task roles is less correlated with formal schooling than with discrete investments. Second, the results indicate that both taste and ability correlate variety of experience, but the nature of the correlation differs. While taste relates linearly to variety of experience, the analysis reveals an inverse u-shaped nexus between competence and variety of experience. This highlights a diminishing marginal rate in competence with an increase of variety. In addition, the

study shows, for males in particular, that the 'Jack-of-all-Trades' hypothesis predominately relates to competence.

The second study (*Chapter Three*) investigates how the initial experience of a founder affects self-employment duration, including its relevance for competing exit risks. The analysis uses data taken from a regional survey that allows a focus on the role of founder's experience. As observed in previous studies, the descriptive findings support a sickle-shaped pattern of the hazard rate, which means that the population average risk to quit starts relatively low and increases to a extremum followed by a monotone and diminishing decrease The results show that most self-employed individuals find themselves unemployed on ending their self-employment; this finding differs from that of some earlier studies (e.g., Taylor 1999; Johansson 2000). In general, these types of exit occur later than exits involving a return to wage work. However, the focus of the analysis is the importance of the founder's qualification and his or her experience with self-employment. Different measures of the individual's balance of skill sets are of special interest in this context. In line with previous studies, the results show that firm level characteristics are less important when it comes to explaining self-employment duration while experience and motivation appear to be driving forces for self-employment duration. The findings support the importance of the combination of practical experience and sufficient skills. Having broad experience combined with competence in sales/business is one of the most important factors for self-employment duration. This result partly supports Lazear's (2005) hypothesis but also stresses the relevance of having sufficient knowledge in sales to keep a business going as compared with potential earnings in wage work. Contrary to other studies, the results show that previous self-employment experience is associated with early exits. The study also reveals that being trained in a commercial occupation accelerates exits into wage work.

The third study (*Chapter Four*) analyzes the importance of local labor market conditions and individual characteristics in the context of the duration of self-employment periods. Similar to the study presented in *Chapter Three*, the research for this study also focused on formerly unemployed founders who had received support in entering self-employment, however this study uses administrative data. Again, we find that most founders exit back into unemployment; we also find that these exits occur at a later point of time compared with exits into wage work. In addition, the results show that survival chances are lower than reported in earlier research (e.g., Wießner 2001; Caliendo and Kritikos 2007). Furthermore, by focusing on post-exit employment status, the research demonstrates a lot dynamics concerning the post exit state that have not previously been reported. Many individuals quit their post-exit employment status within a short period. The analytical results of this study are threefold. First, the study shows that individual characteristics are most important in explaining self-employment longevity. Second, local information plays a substantial role in the duration of self-employment but its importance is mainly concentrated on exits into unemployment. This result seems to differ from previous findings which indicate a

higher relevance of external conditions on exiting into wage work positions (e.g., Taylor 1999; Johansson 2000). Third, individual and local conditions show significant interaction effects. More specifically, the duration analysis shows that greater qualification prolongs the self-employment, duration and that it also accelerates exits into wage work. However, this correlation mainly applies to the male population. The analysis emphasizes the existence of strong comparative advantage for self-employment, which is observed for experienced individuals in small firms and supports the 'hot-house' hypothesis (Blanchflower and Meyer 1994; Wagner 2004). Comparative disadvantage is found for a commercial employment background and for the number of job changes. Higher and increasing local labor market pressure cause shorter durations of self-employment, whereas greater instability and lower economic prosperity lead to its prolongation. In this context, local firm hazard may also operate in part as an indicator for reduced local competition or as a proxy for the option value of wage work positions (opportunity costs). However, the effect of external conditions is multidimensional and shows a non-linear pattern in relation to self-employment duration. This indicates that the effects of external conditions change under extreme conditions. Finally, the study reveals that more highly qualified individuals and males display greater elasticity reacting to external changes.

The combined consideration of the three studies supports the following general conclusions.

One result is that the empirical findings support the notion that comparative advantage operates via different channels, of which competence is only one factor. Attitudes, motivation, and external changes are also important dimensions. In particular, the individual level provides support for comparative advantage from 'pulled' motives, e.g., qualification as a master craftsman or employment experience in small firms.

Second, the measurement of broad experience, as emphasized by Lazear (2005), is addressed in all three studies. The first study suggests that the (expected) comparative advantage found in previous entry research may be a mixture of taste and competence, but appears to be mainly related to competence. The survival analysis in study two shows that broad experience operates as comparative advantage if it is combined with commercial competence. To some extent, the positive correlation between qualification as a master craftsmen (or foreman) and survival supports this interpretation (studies two and three). Direct support for the importance of broad experience for self-employment longevity is limited (studies two and four) and even supports the argument of unsteadiness in study three (Hyytinen and Ilmakunnas 2007). However, the number of job changes may be an invalid measure of the competence dimension of the balance property.

Third, the survival analyses in study two and three show that exits into wage work emerge earlier than exits into unemployment, but that most founders exit into unemployment. One explanation for this is that founders systematically overestimate their potential utility (earnings) differential between self-employment and wage work in the entry situation. In this context it is found that overestimation is more likely for highly qualified founders and for founders with a commercial background. Furthermore, it also emerged that the re-unemployment risk is highest for individuals who tend to switch jobs more frequently and for those with prior self-employment experience.

Fourth, self-employment stability appears to be most likely for those with above average productivity, those with higher motivation and for those who are able to combine broad skills with commercial competence. We also find strong support for this correlation based on the effects related to the attribute of a master craftsman. Furthermore, comparative advantages also relate to an employment background in small businesses. In this context, study three provides initial evidence of the fact that the 'hot-house' argument also operates for self-employment longevity.

Fifth, the effect of external conditions – as they are measured – on the chances of survival in self-employment are dominated by the change of the local unemployment rate and local firm hazards. Because external conditions mainly affect exits into unemployment, regions with worse conditions must also expect higher exit rates with a subsequent period of unemployment. Interestingly, insecure local employment conditions and local firm hazard have the opposite effect. However, the results display a greater complexity that relates to external conditions.

One political implication of these central findings supports the notion that the gaining of qualifications by potential founders may be of benefit, if the focus is on training in 'sufficient' distinct skills combined with commercial knowledge. However, the studies did not test this implication directly. In addition, overestimation of expected rewards immediately raises questions of dead-weight effects in the context of financial support for the transition from unemployment to self-employment. This effect appears to be higher for the highly qualified and is even higher for the highly qualified if employment options are rare. Local employment policy could account for this nexus and may gain from the reduction of political attempts to promote self-employment if local labor market pressure increases or is at a high level. However, this suggestion is reliant on results that do not control for potential general equilibrium effects.

Future research may address some of these issues that limit conclusions for political implications. It would be interesting, at least, to use better measures to capture the taste and competence dimensions of the 'Jack-of-all-Trades' hypothesis. For instance, future research could

use supplemented information that would enable the more in-depth investigation of the quality of experience (e.g. duration, success). In addition, it would appear to be worth focusing on the regional context of self-employment in greater detail - for example, through the inclusion of additional local information relating to job-specific market conditions. Finally, future research should also show whether some of the discussed findings of the survival analysis are limited to unemployed founders, and whether these findings also hold if the duration of the post-exit employment state(s) is (are) accounted for.

5.2 References

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