Subjective Perceptions and the Survival of Business Start-Ups – Microeconometric Evidence from Germany

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Abstract: Using individual-level data from the KfW start-up monitor 2006, our paper scrutinizes the effect of entrepreneurs' subjective perceptions on short-term survival of business start-ups in Germany. Standard probit estimations indicate that, ceteris paribus, positive perceptions regarding the desirability of entrepreneurship, financial feasibility of the start-up project, personal entrepreneurial aptitude, and the compatibility of self-employment with personal living conditions come along with a higher probability of start-up survival in the first two years of existence. Yet when instrumental variable estimations are employed, the effect of subjective perceptions is markedly reduced and becomes insignificant. Accounting for potential endogeneity of perceptions thus raises doubts about the causality of the observed effects. This finding corroborates the notion of hindsight bias in subjective perceptions.

Keywords: Entrepreneurship, start-up success, instrumental variable estimation, KfW start-up monitor, Germany.

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1. Introduction

In addition to analyses of the extent and the determinants of start-up activity, entrepreneurship research focuses on the success of business start-ups. Meaningful measures of success include changes in the number of employees, the development of sales volume and, above all, the very survival of the business as a 'minimum criterion' (Brüderl, Preisendörfer, and Ziegler, 2007).

Factors of start-up success include the start-up environment, specifics of the start-up project, and personal characteristics of the founder. As regards the founder's personality, management and entrepreneurship literature has traditionally ascribed a key role to psychological factors, such as self-confidence or perception of the start-up environment (see, for instance, Klandt, 1980). Subjective perceptions are fundamental to discovering and exploiting decision alternatives (Kirzner, 1979; Shane, 2003) and thus may have an important impact on business success, which itself results from the entire set of entrepreneurial decisions. However, due to high data requirements, empirical evidence of the influence of subjective perceptions on start-up success is still sparse.

First, suitable individual-level survey data sets have to acknowledge not only whether the interviewee has recently started a business, but also whether the business continues to exist or has since been terminated. Second, the set of possible factors of success not only has to include 'hard' factors such as socio-demographic characteristics of the entrepreneur or specifics of the start-up project, but also 'soft' factors such as the founder's abilities, attitudes, or perceptions. Microeconometric choice models (e.g., probit analyses) can then be used to estimate partial effects on the probability of business survival.

Yet the identification of the effect of subjective perceptions is non-trivial. On the one hand, perceptions can in fact have a causal impact on the survival of a start-up, to the extent that, e.g., a positive attitude towards entrepreneurship per se can encourage an entrepreneur to not give up self-employment quite as soon.

On the other hand, the effect of subjective perceptions could also reflect the impact of other factors which are not included in the estimated model, but which – such as social context variables – are correlated with perceptions. In this case, articulated perceptions would serve as proxies for the omitted variables without having a causal effect.

Finally, subjective assessments in survey data are generally subject to a hindsight bias (Fischhoff, 1975; Thaler, 2000). At the time of the survey, when interviewees state their perceptions, success or failure of start-up projects – as measured by continuing or terminated self-employment – have since become apparent. Thus, the direction of a (causal) relationship

between perceptions and business survival is not clear a priori. On the one hand, a positive attitude and greater self-confidence of the entrepreneur in him/herself or in the start-up project contribute to longevity of the project. On the other hand, entrepreneurs who are doing well may perceive themselves and their environment more affirmatively ex post.

Against this background, our paper scrutinizes the impact of entrepreneurs' subjective perceptions on the survival of their self-employment, using representative data from the KfW start-up monitor for the year 2006. We compare various probit specifications of start-up survival to assess the ceteris paribus effects of subjective perceptions. In order to meet the conceptual challenges outlined above, we use instrumental variable estimation. Our results show that positive perceptions of the entrepreneur regarding the desirability of self-employment, financial feasibility of a start-up project, compatibility of self-employment with his/her personal living conditions, and regarding his/her own entrepreneurial aptitude are associated with a higher probability of start-up survival. This holds true in both unconditional comparisons as well as in standard probit regressions. Yet estimations which take the potential endogeneity of subjective perceptions into account yield a reduced and insignificant effect of perceptions. Our analysis thus corroborates the notion that the observed impact of entrepreneurs' subjective perceptions on start-up survival does not constitute a causal effect.

The paper is organized as follows. Section 2 briefly reviews related literature on the survival of business start-ups and on the impact of subjective perceptions on entrepreneurial activity. Section 3 introduces our data set – the KfW start-up monitor – and our econometric approach. Empirical results are presented in section 4. Section 5 concludes with a summary of main results and prospects of future research.

2. Related Theoretical and Empirical Literature

2.1 Survival of Business Start-Ups

Nascent enterprises are at particular risk of failure. This 'liability of newness' (Stinchcombe, 1965) stems from the fact that new firms cannot resort to existing resources to the same degree as mature firms. Moreover, they have experienced less know-how about production technologies and production costs, goods and factor markets. In accordance with a 'liability of adolescence' (Fichman and Levinthal, 1991), though, one frequently observes an inverted U-shape trend of business mortality rates over the life cycle. Immediately after start-up mortality rates are low, since it takes some time before a business project can be deemed a success or a failure. In addition, starters can fall back on start-up resources which enable the business to

survive the very early phase (Brüderl und Schüssler, 1990). The risk of business failure then rises over the first months following start-up, before starting to decline in later years.

Finally, a 'liability of smallness' (Aldrich and Auster, 1986) applies to the majority of start-ups. Compared to larger established firms, small firms are less viable because they face disadvantages in exploiting economies of scale in production, in borrowing funds, or in recruiting qualified staff.

Determinants of start-up survival include characteristics of the entrepreneur (e.g., educational attainment, professional experience and previous employment status, amount of start-up capital, access to promotional programs), specifics of the start-up project (e.g., innovativeness of the product, industry, firm size), and the start-up environment (e.g., business cycle, regional employment growth and unemployment rate, city size). In the wake of recent years' upsurge in data availability, empirical studies use large micro data sets to analyze various impacts on start-up survival. A detailed overview of empirical findings as well as of historical lines of argument can be found in van Praag (2003).[1]

Previous empirical studies of start-up survival in Germany[2] focus on characteristics of the entrepreneur and his/her business project or, on a more aggregated level, on regional specifics or sector-specific characteristics.[3] Yet frequently analyses are based on small or selective data sets, so that caution should be exercised when generalizing results. There is need for representative evidence and in particular for analyses of partial effects of the various determinants.

2.2 Business Start-Ups and Subjective Perceptions

A second strand of literature investigates the impact of subjective perceptions, individual attitudes or abilities on the decision whether to start a new business. In this context, 'overconfidence' (Hofrege 2004) and unrealistic optimism have been shown to be disproportionately prevalent among entrepreneurs; cf. Cramerer and Lovallo (1999), de Meza and Southey (1996) and Köllinger, Minniti and Schade (2007). Although entrepreneurship does not pay off for the majority of business starters due to high business mortality and a lower average income of self-employed as compared to salaried workers (Hamilton, 2000),

[1] Regardless of different data sets and different methodological approaches, the international literature paints a largely uniform picture of the impact of regularly available variables; cf. our results in section 4 below.

[2] Cf., for example, Almus and Prantl (2002), Block and Sandner (2006), Brixy and Grotz (2004), Brüderl, Preisendörfer, and Ziegler (1992, 1993, 2007), Falck (2007), Fritsch and Weyh (2004), Heckmann and Schnabel (2006), Kohn and Spengler (2007), Merz and Paic (2006), Pfeiffer and Reize (2000), Wagner (1994), Woywode and Struck (2004).

[3] Cf. Kohn and Spengler (2007) for a synopsis of the studies.

entrepreneurs systematically assess their own entrepreneurial aptitude and the economic and personal start-up environment more positively than non-entrepreneurs.[4] There is also support for overconfidence among entrepreneurs in Germany; cf. Köllinger and Schade (2005) and Sternberg, Brixy, and Hundt (2007) for evidence from the Global Entrepreneurship Monitor (GEM), and Kohn and Spengler (2007) for evidence from the KfW start-up monitor.

To the best of our knowledge, though, there are only few studies which analyze the effects of person-related or environment-related perceptions or attitudes of the entrepreneur on the survival – or, more generally, on the success – of business start-ups. Köllinger, Minniti and Schade (2007) find that business survival and entrepreneurs' perceptions regarding their entrepreneurial aptitude are negatively correlated across countries. However, as the GEM lacks information on start-up survival, the aggregate ratio of established to nascent entrepreneurs at the country level serves as a proxy for survival rates in their study. Kohn and Spengler's (2007) study of start-up survival in Germany uses subjective perception variables at the individual level, but does not focus on the estimated effects. In the analysis of Brüderl, Preisendörfer, and Ziegler (2007), entrepreneurial ethos – operationalized by an index of personal attitudes towards the importance of business profits, skepticism as to the amount of social benefits, and strategies for enforcing individual interests – has no significant influence on the survival of start-ups.

A related approach is chosen by Block and Sandner (2006) who assign start-up motives to entrepreneurs in the German Socio-Economic Panel (GSOEP) based on their labor market status prior to start-up. As it turns out, duration of self-employment is, on average, higher among 'opportunity' entrepreneurs than among 'necessity' entrepreneurs. However, this observation is mainly due to differences in human capital endowment – and not to the different start-up motives per se. In the analysis of Bosma et al. (2004) which is based on data from the Dutch Chamber of Commerce, 'profit orientation' as a start-up motive has no significant effect on start-up survival, either.

Our paper at hand contributes to the overlap of the two strands of literature on start-up survival and on the influence of individual perceptions. We explicitly examine the impact of entrepreneurs' subjective perceptions on the survival of their business start-ups.

[4] Cf. Arenius and Minniti (2005) on subjective perceptions of nascent entrepreneurs in the Global Entrepreneurship Monitor (GEM) and Beugelsdijk and Noorderhaven (2005), who compare a wide range of personality characteristics of entrepreneurs and non-entrepreneurs in the European Values Survey.

3. Data and Methodology

3.1 Subjective Perceptions in the KfW Start-Up Monitor

Our empirical analysis uses data from the 2006 KfW start-up monitor (cf. Kohn and Spengler, 2007). The KfW start-up monitor is a representative computer-assisted telephone (CATI) survey on start-up activity in Germany. Its yearly cross sections are conducted among 40,000 randomly selected inhabitants. At the beginning of the interview, entrepreneurs are identified as those persons who started a new business or took over an established firm within the past 12 months or 12-24 months. This includes industrial and commercial self-employment as well as freelancers, and full-timers as well as part-timers. Subsequently, entrepreneurs are asked a broad set of questions about their person and their start-up project. In the 2006 wave, persons who had started a business within the past 24 months were also asked whether their self-employment continued to exist or had since been given up. This allows us to analyze the survival of start-ups in the short run.

The interviewees – both entrepreneurs and non-entrepreneurs – also revealed their subjective perceptions of entrepreneurship by assessing the following four statements on a scale ranging from one ('I fully agree') to five ('I fully disagree'):

(1) "Starting a business is an attractive opportunity for my personal career development."
(2) "I personally see good options to obtain adequate financing for a start-up project."
(3) "My current life circumstances are well suited for starting a business."
(4) "I have the personal and professional skills necessary for a successful business start-up."

The first statement captures the general desirability of self-employment with regard to career advancement. The second statement focuses on perceived financial feasibility of a start-up and perceived financial constraints. The third statement is dedicated to the interviewee's perceptions of the compatibility of self-employment with his/her personal living conditions. Finally, the fourth statement asks for a self-assessment of the interviewee regarding entrepreneurial qualifications.

In order to facilitate the interpretation of results in the empirical analysis, we rescale the responses to a range between 0 ('I fully disagree') and 100 ('I fully agree'). Moreover, since a factor analysis indicates that the four resulting variables all load on the same factor,[5]

[5] The results of the factor analysis can be obtained from the authors upon request.

calculating an individual perception index is a valid alternative to analyzing each of the four perceptional dimensions. We use the arithmetic mean of all four dimensions as a perception index.

3.2 Econometric Specification

We estimate probit models of start-up survival, where the survival propensity y_i^* of start-ups $i=1,...,N$ is explained by a set of exogenous covariates X_i, possibly endogenous perception variables W_i, and an error term u_i:

(1) $$y_i^* = X_i\beta + W_i\gamma + u_i .$$

We observe whether start-up i continues to exist ($y_i=1$) or has since been ended ($y_i=0$):

(2) $$y_i = I(y_i^* \geq 0) = \begin{cases} 1 & , y_i^* \geq 0 \\ 0 & , y_i^* < 0 \end{cases} .$$

Under the probit assumption that u_i is normally distributed, $u_i \sim N(0,1)$, the parameters β and γ of the conditional probability of survival

(3) $$\Pr(y_i = 1 | X_i, W_i) = \Pr(y_i^* \geq 0 | X_i, W_i) = \Phi(X_i\beta + W_i\gamma)$$

can be estimated via maximum likelihood. Focusing on the ceteris paribus effect of subjective perceptions, we compare specifications with and without perception variables as well as a specification which treats subjective perceptions as endogenous. In the latter case we specify the instrumental equation

(4) $$w_i = X_i\alpha + Z_i\delta + v_i .$$

for the perception index w_i. Simultaneous maximum likelihood estimation of equations (1) and (4) assumes that the error terms u_i and v_i are jointly normally distributed, $(u_i, v_i) \sim N(0,\Sigma)$, with σ_{11} being normalized to one. Identification is achieved by means of exclusion restrictions for additional instruments Z_i in equation (1).

4. Results

4.1 Descriptive Evidence

At the time of the survey, 86% of those who had started a business within the past 12 months were still self-employed; cf. table 1. In other words, not less than a seventh of all start-ups fail within the first year. After two years, the corresponding figure is just below one fourth – 24%

of entrepreneurs who ventured into self-employment 12 to 24 months prior to the survey had since given up their business. These numbers are in line with survival rates reported in the related literature; cf., e.g., Brüderl, Preisendörfer, and Ziegler (2007) and Mata and Portugal (1994).

– Table 1 about here –

Table 2 compares characteristics of entrepreneurs whose self-employment is continuing ('survivors') to those of 'non-survivors', who have already abolished their start-up project.

– Table 2 about here –

Regarding the duration of time since start-up, it comes as no surprise that the average duration is lower among survivors than among non-survivors – this reflects the fact that the share of surviving start-ups declines over time. What is more, entrepreneurs with ongoing projects tend to be older and to hold higher educational attainments (higher shares of those with a vocational training, a university or a technical college degree). They more often worked as white-collar employees or were unemployed prior to becoming self-employed. The share of previously self-employed is higher among non-survivors, though. Entrepreneurs living in bigger cities abolish self-employment comparably early, as do entrepreneurs of foreign origin in comparison to Germans. However, there are no gender differences in start-up survival and no differences between Eastern and Western Germany.

Successful founders see themselves and their environment in a more positive light. In all four perception categories, average scores among survivors exceed those among non-survivors by 15 to 30 points – this difference amounts to the range of about one response category.[6] The respective tests for equal proportions and comparison of means tests in column 3 of table 2 reveal that the observed differences are, in most cases, significant.

4.2 Regression Evidence

Table 3 displays estimated coefficients from different probit specifications of start-up survival. All specifications include a set of time dummies in order to control for duration dependence of survival at the time of the interview.

– Table 3 about here –

By and large, the results of the multivariate analysis support those of the unconditional comparisons in the previous section, and the estimated effects of the control variables are in line with the results of existing studies (cf. section 2).

[6] Compared to non-enterpreneurs, entrepreneurs generally perceive themselves more positively; cf. Kohn and Spengler (2007). This result supports the above hypothesis of overconfidence among founders.

Across the different specifications, for example, start-ups by younger entrepreneurs (compared to older ones); by former executive employees, skilled blue-collar workers, self-employed persons, and by those from out of the labor force (compared to former white-collar workers); as well as by entrepreneurs from larger cities (compared to smaller cities) tend to have a lower probability of survival, whereas both university graduates and entrepreneurs without completed vocational training (compared to those with vocational training) *ceteris paribus* are more likely to remain in self-employment.

The multivariate results thus differ from the bivariate ones in table 2 in two cases. First, start-ups by low-skilled entrepreneurs – those with neither a vocational training nor a high-school degree – are ceteris paribus more likely to survive than start-ups by entrepreneurs with a completed vocational training. Apparently it is important to control for the effect of unemployment, which affects a disproportionately high number of low-skilled persons (Reinberg and Hummel, 2005) and serves as the primary push factor for business start-ups. Second, former executive employees and civil servants are ceteris paribus more likely to abandon self-employment than former white-collar employees. The contrary unconditional result above then primarily reflects the effect of qualificational differences.

Some of the variables turn out insignificant in some or all probit specifications. In particular, the partial effects of gender and region are low in value and insignificant in all specifications; if these variables are omitted (columns 3, 4, and 6), the coefficients associated to the other covariates are largely unaffected. Therefore, there are no differences in start-up survival with regard to gender or to the two regions of residence. This result – which holds true both in unconditional terms and ceteris paribus – is in line with findings in the related literature on start-up survival[7], but it contrasts results obtained for the start-up decision itself. While both gender and region of residence matter for the decision to start a business (cf. Kohn and Spengler, 2007), they have no effect on start-up survival, once the start-up project has been put into effect.

When subjective perceptions or the perception index (columns 2 and 4 to 6) are included, they have positive and significant effects throughout. In case of the perception index (columns 5 and 6), the estimated coefficient is roughly the sum of the coefficients of the single perception categories. Accordingly, more positive perceptions of an entrepreneur regarding his/her own

[7] Brüderl, Preisendörfer, and Ziegler (2007) note that, ceteris paribus, start-ups by men are not more likely to survive than those by women. Fritsch and Weyh (2004) find similar structures of business survival in Eastern and Western Germany. According to the cell-data analyses of Brixy and Grotz (2004) and Fritsch, Brixy, and Falck (2006), regional effects are relevant at a more disaggregated level. Our study additionally controls for city size.

person and entrepreneurship in general, ceteris paribus come a long with higher probability of start-up survival. However, the coefficients of various control variables change in the extended specifications, suggesting that different groups of entrepreneurs perceive entrepreneurship and their own entrepreneurial aptitude systematically different. This notion is corroborated by a regression of the perception index on the other explanatory variables in table 4.

– Table 4 about here –

Column 1 of table 4 displays an OLS regression of equation (4), and column 2 contains the corresponding effects from the simultaneous ML estimation of equations (1) and (4). The respective results are very similar with regard to both point estimates and levels of significance. Ceteris paribus, entrepreneurs without professional training, former non-skilled blue-collar workers and unemployed persons, part-time entrepreneurs, women and persons in Eastern Germany articulate significantly more negative perceptions, whilst former executive employees and entrepreneurs in smaller cities articulate more positive perceptions compared to entrepreneurs in the respective reference categories. What is more, it is plausible to assume that the subjective perceptions also correlate with observed variables, such as entrepreneurs' social networks. And – as suggested by a hindsight bias – success or failure of a start-up could also have feedback effects on the subjective perception of one's own entrepreneurial aptitude as well as of entrepreneurship in general. In these cases perceptions are endogenous and the simple probit models in columns 2 and 4 to 6 of table 3 yield biased results.

For this reason, we instrument the perception index, with the estimation in table 4 (column 2) corresponding to the specification of the instrumental equation (4). We use gender and region as additional instruments, both of which are significantly correlated to subjective perceptions at the first stage (table 4), but have no direct effect on start-up survival (table 3). Column 7 of table 3 displays the result for the instrumented survival equation.[8] The estimated effect of the perception index is reduced by more than three quarters and it becomes insignificant. So if we account for simultaneity of start-up survival and subjective perceptions of the entrepreneur we find no causal effect of perceptions on survival. Both endogenous variables are rather driven by third-party determinants.

[8] A test for endogeneity of the perception index does not reject the null hypothesis of exogeneity (correlation coefficient $\rho(u,v)=0$, p-value 0.25). This result is quite common for IV estimations given the additional number of parameters to be estimated and the additional variation induced by the instrumentation. Nevertheless IV estimation is consistent albeit not efficient.

5. Conclusion

The success of newly founded firms in general and the survival of business start-ups in particular have received increasing attention in recent entrepreneurship literature (van Praag, 2003). Start-ups are especially prone to the risk of mortality over the first months and years. Determinants of start-up survival include the disposition of the start-up environment, specifics of the start-up project, and characteristics of the entrepreneur. A second strand of literature emphasizes the importance of personality, of individual traits, and subjective perceptions for entrepreneurial decisions and in particular for the start-up process (Shane, 2003).

Our empirical study contributes to the overlap of the two strands of literature. Using individual-level data from the KfW start-up monitor 2006 we scrutinize the effect of subjective perceptions on survival of business start-ups in Germany. From a descriptive perspective, positive perceptions regarding the desirability of entrepreneurship, financial feasibility of the start-up project, personal entrepreneurial aptitude, and the compatibility of self-employment with personal living conditions come along with a higher probability of start-up survival in the first two years of existence. This finding holds in unconditional comparisons of survivors and non-survivors, as well as in standard probit regressions of business survival, controlling for additional characteristics of the entrepreneur.

Yet when instrumental variable estimations are employed, the effect of subjective perceptions is markedly reduced and becomes insignificant. So our results show that it is crucial to account for potential endogeneity of perceptions and raises doubts about the causality of the observed effects. Even if subjective perceptions reflect the entrepreneur's fair assessment of his/her entrepreneurial aptitude and of entrepreneurship in general, these traits of personality have no direct effect on start-up success. Endogeneity of subjective perceptions arises, for example, if the perceptions solely serve as proxies for omitted variables which would be relevant to success, or if articulated perceptions are subject to a hindsight bias in view of entrepreneurial success or failure.

In sum, the results of this paper contribute to a better understanding of the impacts of perceptional variables on the survival of business start-ups. At the same time they emphasize the need for further research on the nature and the effectiveness of 'soft' and 'hard' factors of personality. Using alternative measures of success – such as employment growth (cf. Birley, 1987, and Schwarz, Ehrmann, and Breitenecker 2005) or the development of earnings (cf. van Praag, van der Sluis, and van Witteloostuijn, 2004) – or applying duration analyses (cf. van Praag, 2003) would broaden the scope. These approaches would, however, require even more informative data sets, in particular with respect to the duration of the observation period. As

the provision of retrospective information is limited in cross-sectional surveys, a start-up panel which would repeatedly record entrepreneurs' perceptions as well as their business success or failure would be an asset. Not only would such a panel enable researchers to track changes of persons' perceptions and their respective impacts; it would also permit to tell apart the effect of articulated perceptions and unobserved individual heterogeneity.

References

Aldrich, H. E., and E. Auster (1986): Even Dwarfs Started Small – Liabilities of Size and Age and their Strategic Implications, *Research in Organizational Behavior* 8, 165-198.

Almus, M., and S. Prantl (2002): Die Auswirkungen öffentlicher Gründungsförderung auf das Überleben und Wachstum junger Unternehmen, *Jahrbücher für Nationalökonomie und Statistik* 222, 161-185.

Arenius, P., and M. Minniti (2005): Perceptual Variables and Nascent Entrepreneurship, *Small Business Economics* 24, 233-247.

Bates, T. (1990): Entrepreneur Human Capital Inputs and Small Business Longevity, *Review of Economics and Statistics* 72, 551-559.

Beugelsdijk, S., and N. Noorderhaven (2005): Personality Characteristics of Self-Employed; An Empirical Study, *Small Business Economics* 24, 159-167.

Birley, S. (1987): New Ventures and Employment Growth, *Journal of Business Venturing* 2, 155-165.

Block, J., and P. Sandner (2006): The Effect of Motivation on Self-employment Duration in Germany: Necessity versus Opportunity Entrepreneurs, mimeo, TU München.

Bosma, N., M. C. van Praag, R. Thurik, and G. de Wit (2004), The Value of Human and Social Capital Investments for the Business Performance of Startups, *Small Business Economics* 23, 227-236.

Brixy, U., and R. Grotz (2004): Regionale Muster und Determinanten des Gründungserfolgs, in: M. Fritsch and R. Grotz (eds.), *Empirische Analysen zum Gründungsgeschehen in Deutschland*, Physica, Heidelberg, pp. 161-186.

Brüderl, J., P. Preisendörfer, and R. Ziegler (1992): Survival Chances of Newly Founded Business Organizations, *American Sociological Review* 57, 227-242.

Brüderl, J., P. Preisendörfer, and R. Ziegler (1993): Staatliche Gründungsfinanzierung und der Erfolg neugegründeter Betriebe, *Jahrbücher für Nationalökonomie und Statistik* 212, 13-31.

Brüderl, J., P. Preisendörfer, and R. Ziegler (2007): *Der Erfolg neu gegründeter Betriebe. Eine empirische Studie zu den Chancen und Risiken von Unternehmensgründungen*, 3., ext. ed., Duncker & Humblot, Berlin.

Brüderl, J., and R. Schüssler (1990): Organizational Mortality. The Liability of Newness and Adolescence, *Administrative Science Quarterly* 35, 530-547.

Cramerer, C. F., and D. Lovallo (1999): Overconfidence and Excess Entry: An Experimental Approach, *American Economic Review* 89, 306-318.

Cressy, R. (1996): Are Business Startups Debt-Rationed?, *Economic Journal* 106, 1253-1270.

De Meza, D., and C. Southey (1996): The Borrower's Curse: Optimism, Finance and Entrepreneurship, *Economic Journal* 106, 375-386.

Falck, O. (2007): Survival chances of new businesses: do regional conditions matter?, *Applied Economics* 39, 2039-2048.

Fichman, M., and D. A. Levinthal (1991): Honeymoons and the Liability of Adolescence: A New Perspective on Duration Dependence in Social and Organizational Relationships, *Academy of Management Review* 16, 442-468.

Fischhoff, B. (1975): Hindsight Is Not Equal to Foresight: The Effect of Outcome Knowledge on Judgement under Uncertainty, *Journal of Experimental Psychology: Human Perception and Performance* 1, 288-299.

Fritsch, M., U. Brixy and O. Falck (2006): The Effect of Industry, Region, and Time on New Business Survival – A Multi-Dimensional Analysis, *Review of Industrial Organization* 28, 285-306.

Fritsch, M., and A. Weyh (2004): Marktzutritt, Markterfolg und sektorale Entwicklung, in: M. Fritsch and R. Grotz (eds.), *Empirische Analysen zum Gründungsgeschehen in Deutschland*, Physica, Heidelberg, pp. 141-159.

Hamilton, B. H. (2000): Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment, *Journal of Political Economy* 108, 604-631.

Heckmann, M., and C. Schnabel (2006): Überleben und Beschäftigungsentwicklung neu gegründeter Betriebe, in: L. Bellmann and J. Wagner (eds.), *Betriebsdemographie*, Beiträge zur Arbeitsmarkt- und Berufsforschung Nr. 305, IAB, Nürnberg, pp. 1-29.

Hofrege, U. (2004): Overconfidence, in: R. F. Pohl (ed.), *Cognitive Illusions: Fallacies and Biases in Thinking, Judgement, and Memory*, Psychology Press, Hove, pp. 235-254.

Kirzner, I. (1979): *Perception, Opportunity, and Profit*, Chicago University Press, Chicago.

Klandt, H. (1980): Die Person des Unternehmensgründers als Determinante des Gründungserfolgs, *Betriebswirtschaftliche Forschung und Praxis* 32, 321-335.

Kohn, K., and H. Spengler (2007): KfW-Gründungsmonitor 2007. Gründungen im Vollerwerb stark rückläufig – Aussicht auf Trendwende in 2007, KfW Bankengruppe, Frankfurt am Main.

Köllinger, P., and C. Schade (2005): Warum Amerikaner mehr Unternehmen gründen als Deutsche. *DIW-Wochenbericht*, 45/2005, 673-680.

Köllinger, P., M. Minniti, and C. Schade (2007): "I think I can, I think I can": Overconfidence and entrepreneurial behavior, *Journal of Economic Psychology* 28, 502-527.

Mata, J., and P. Portugal (1994): Life Duration of New Firms, *Journal of Industrial Economics* 42, 227-245.

Merz, J., and P. Paic (2006): Start-up Success of Freelancers: New Microeconometric Evidence from the German Socio-Economic Panel, IZA Discussion Paper 2036.

Pfeiffer, F., and F. Reize (2000): Business Start-ups by the Unemployed – an Econometric Analysis Based on Firm Data, *Labour Economics* 7, 629-663.

Reinberg, A., and M. Hummel (2005): Vertrauter Befund – Höhere Bildung schützt auch in der Krise vor Arbeitslosigkeit, IAB-Kurzbericht 9/2005, Institut für Arbeitsmarkt- und Berufsforschung, Nürnberg.

Schwarz, E. J., T. Ehrmann, and R. J. Breitenecker (2005): Erfolgsdeterminanten junger Unternehmen in Österreich: eine empirische Untersuchung zum Beschäftigungswachstum, *Zeitschrift für Betriebswirtschaft* 75, 1077-1098.

Sternberg, R., U. Brixy, and C. Hundt (2007): Global Entrepreneurship Monitor (GEM) – Länderbericht Deutschland 2006, Global Entrepreneurship Research Association, Hanover/Nuremberg, March 2007.

Shane, S. (2003): *A general theory of entrepreneurship: The individual-opportunity nexus*, Edward Elgar, Northampton, MA.

Stinchcombe, A. L. (1965): Social Structures and Organizations, in: J. G. March (ed.), *Handbook of Organizations*, Rand McNally, Chicago, pp. 142-193.

Thaler, R. H. (2000): From Homo Economicus to Homo Sapiens, *Journal of Economic Perspectives* 14, 133-141.

Van Praag, C. M. (2003): Business Survival and Success of Young Small Business Owners, *Small Business Economics* 21, 1-17.

Van Praag, C. M., J. van der Sluis, and A. van Witteloostuijn (2004): The Impact of Locus-of-Control Personality Trait on the Earnings of Employees vis-à-vis Entrepreneurs, Tinbergen Institute Discussion Paper 130/3.

Wagner, J. (1994): The Post-Entry Performance of New Small Firms in German Manufacturing Industries, *Journal of Industrial Economics*, 42, 141-154.

Woywode, M., and J. Struck (2004): Zu den Ursachen des Erfolgs staatlich geförderter Unternehmen: Ergebnisse einer aktuellen empirischen Untersuchung, in: KfW Bankengruppe (ed.), *Was erfolgreiche Unternehmen ausmacht. Erkenntnisse aus Wissenschaft und Praxis*, Physica, Heidelberg, pp. 89-137.

Tables

Table 1: Survival Rates

	Start-up 0 - 12 months ago	Start-up 12 - 24 months ago
Self employment is continuing.	0.865	0.758
Self employment has ended.	0.135	0.242
Number of observations	941	578

Survival of start-up at date of interview (class shares).
Data source: KfW start-up monitor for the year 2006.

Table 2: Entrepreneurs' Characteristics

	(1) Survivors	(2) Non-Survivors	(3) p-value (1)-(2)*
date of start-up			
0 - 3 months ago	0.193	0.043	0.000
4 - 6 months ago	0.160	0.081	0.001
7 - 9 months ago	0.140	0.167	0.276
10 - 12 months ago	0.140	0.167	0.276
13 - 15 months ago	0.108	0.147	0.071
16 - 18 months ago	0.075	0.128	0.006
19 - 21 months ago	0.094	0.128	0.104
22 - 24 months ago	0.089	0.140	0.012
age			
18 - 24 years	0.105	0.206	0.000
25 - 34 years	0.263	0.277	0.629
35 - 44 years	0.314	0.243	0.023
45 - 54 years	0.201	0.191	0.703
55 - 64 years	0.117	0.082	0.099
education			
university degree	0.195	0.167	0.312
technical college degree	0.107	0.080	0.188
Vocational training	0.593	0.570	0.498
no vocational training, but high-school degree (*Abitur)*	0.073	0.139	0.001
no vocational training, no *Abitur*	0.032	0.044	0.331
professional status			
executive employee	0.200	0.145	0.042
white-collar employee	0.216	0.161	0.049
civil servant	0.030	0.024	0.557
skilled blue-collar worker	0.043	0.047	0.752
non-skilled blue-collar worker	0.032	0.055	0.074
self-employed	0.084	0.212	0.000
unemployed	0.178	0.106	0.005
out of labor force	0.217	0.251	0.239
city size			
< 5,000 inhabitants	0.140	0.120	0.389
5,000 – 20,000 inhab.	0.240	0.202	0.190
20,000 – 100,000 inhab.	0.243	0.213	0.307

100,000 – 500,000 inhab.	0.206	0.236	0.278
> 500,000 inhab.	0.172	0.228	0.029
foreign origin	0.109	0.142	0.126
part-time	0.550	0.599	0.152
gender (female)	0.458	0.457	0.982
region (Eastern Germany)	0.198	0.199	0.988
subjective perceptions			
desirability of self-employment	71.61	55.17	0.000
financial feasibility	59.04	35.60	0.000
compatibility with personal circumstances	61.85	31.42	0.000
entrepreneurial ability	79.58	64.13	0.000
perception index	68.00	46.50	0.000
number of observations	1252	267	

Numbers display class shares; perception variables: mean values.
* tests for equal proportions; perception variables: mean comparison tests.
Data source: KfW start-up monitor for the year 2006.

Table 3: Determinants of Start-Up Survival

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Probit, w/o perception variables	Probit, w/ perception variables	Probit, w/o perception variables, w/o instruments	Probit, w/ perception variables, w/o instruments	Probit, w/ perception index	Probit, w/ perception index, w/o instruments	IV Probit
constant	2.069***	0.535*	2.021***	0.637**	0.473*	0.572**	1.743*
	(0.229)	(0.297)	(0.225)	(0.291)	(0.282)	(0.276)	(0.950)
date of start-up (Ref.: 0 - 3 months ago)							
4 - 6 months ago	-0.410**	-0.346	-0.401**	-0.360*	-0.369*	-0.383*	-0.393*
	(0.198)	(0.214)	(0.199)	(0.216)	(0.214)	(0.215)	(0.203)
7 - 9 months ago	-0.825***	-0.738***	-0.822***	-0.744***	-0.756***	-0.762***	-0.814***
	(0.182)	(0.195)	(0.182)	(0.195)	(0.194)	(0.193)	(0.186)
10 - 12 months ago	-0.920***	-0.786***	-0.919***	-0.792***	-0.821***	-0.827***	-0.936***
	(0.183)	(0.196)	(0.184)	(0.196)	(0.196)	(0.196)	(0.194)
13 - 15 months ago	-0.893***	-0.731***	-0.894***	-0.732***	-0.765***	-0.765***	-0.904***
	(0.191)	(0.209)	(0.191)	(0.209)	(0.209)	(0.208)	(0.210)
16 - 18 months ago	-1.099***	-0.906***	-1.092***	-0.917***	-0.939***	-0.949***	-1.068***
	(0.200)	(0.210)	(0.201)	(0.211)	(0.208)	(0.208)	(0.211)
19 - 21 months ago	-1.044***	-0.907***	-1.041***	-0.919***	-0.925***	-0.936***	-1.018***
	(0.192)	(0.211)	(0.192)	(0.211)	(0.207)	(0.207)	(0.198
22 - 24 months ago	-1.103***	-0.921***	-1.103***	-0.921***	-0.943***	-0.944***	-1.091***
	(0.195)	(0.212)	(0.195)	(0.212)	(0.207)	(0.207)	(0.210)
age (Ref.: 35 - 44 years)							
age 18 – 24 years	-0.594***	-0.658***	-0.589***	-0.663***	-0.670***	-0.674***	-0.628**
	(0.154)	(0.166)	(0.154)	(0.167)	(0.164)	(0.165)	(0.178)
age 25 – 34 years	-0.180	-0.177	-0.178	-0.182	-0.189	-0.193	-0.183
	(0.118)	(0.127)	(0.117)	(0.127)	(0.127)	(0.127)	(0.123)
age 45 – 54 years	-0.136	-0.177	-0.136	-0.174	-0.162	-0.159	-0.168
	(0.123)	(0.135)	(0.123)	(0.135)	(0.135)	(0.135)	(0.128)
age 55 – 64 years	0.055	0.011	0.062	0.001	0.027	0.015	-0.006
	(0.161)	(0.175)	(0.160)	(0.174)	(0.175)	(0.174)	(0.165)
education (Ref.: vocational training)							
university degree	0.016	0.106	0.015	0.105	0.123	0.121	0.075
	(0.123)	(0.136)	(0.122)	(0.134)	(0.135)	(0.134)	(0.138)
technical college degree	0.027	0.047	0.028	0.046	0.060	0.058	0.046
	(0.148)	(0.162)	(0.148)	(0.162)	(0.160)	(0.160)	(0.153)
no vocational training, but high-school degree (*Abitur)*	-0.045	0.133	-0.029	0.106	0.116	0.088	-0.002
	(0.178)	(0.193)	(0.176)	(0.190)	(0.191)	(0.189)	(0.197)
no vocational training, no *Abitur*	0.045	0.202	0.046	0.200	0.198	0.197	0.098
	(0.226)	(0.243)	(0.226)	(0.243)	(0.238)	(0.239)	(0.256)
professional status (Ref.: white-collar employee)							
executive employee	-0.016	-0.169	0.003	-0.194	-0.181	-0.207	-0.077
	(0.144)	(0.157)	(0.143)	(0.155)	(0.156)	(0.154)	(0.185)
civil servant	-0.162	-0.340	-0.142	-0.374	-0.341	-0.374	-0.295
	(0.286)	(0.317)	(0.285)	(0.313)	(0.321)	(0.317)	(0.313)
skilled blue-collar worker	-0.228	-0.230	-0.208	-0.272	-0.210	-0.251	-0.206
	(0.228)	(0.247)	(0.224)	(0.239)	(0.245)	(0.239)	(0.242)
non-skilled blue-collar worker	-0.478**	-0.279	-0.469**	-0.300	-0.310	-0.330	-0.446*
	(0.217)	(0.233)	(0.217)	(0.233)	(0.232)	(0.233)	(0.241)

self-employed	-0.847***	-0.970***	-0.837***	-0.988***	-1.002***	-1.020***	-0.920***
	(0.148)	(0.162)	(0.147)	(0.161)	(0.161)	(0.160)	(0.209)
unemployed	0.023	0.094	0.024	0.081	0.103	0.090	0.029
	(0.154)	(0.162)	(0.155)	(0.163)	(0.162)	(0.163)	(0.166)
out of labor force	-0.152	-0.240	-0.163	-0.224	-0.260*	-0.245*	-0.220
	(0.136)	(0.147)	(0.135)	(0.147)	(0.147)	(0.146)	(0.145)
city size (Ref.: > 500.000 inhabitants)							
< 5,000 inhab.	0.284*	0.187	0.277*	0.197	0.194	0.203	0.262
	(0.161)	(0.179)	(0.161)	(0.178)	(0.177)	(0.176)	(0.170)
5,000 – 20,000 inhab.	0.159	0.098	0.162	0.095	0.106	0.102	0.162
	(0.136)	(0.149)	(0.136)	(0.149)	(0.149)	(0.148)	(0.144)
20,000 – 100,000 inhab.	0.186	0.145	0.187	0.146	0.148	0.147	0.190
	(0.132)	(0.147)	(0.132)	(0.146)	(0.147)	(0.147)	(0.138)
100,000 – 500,000 inhab.	0.054	0.113	0.052	0.112	0.109	0.108	0.102
	(0.132)	(0.144)	(0.131)	(0.144)	(0.144)	(0.143)	(0.138)
foreign origin	0.048	0.007	0.057	-0.003	-0.002	-0.012	0.010
	(0.143)	(0.160)	(0.143)	(0.160)	(0.161)	(0.161)	(0.150)
part-time	-0.162*	0.052	-0.164*	0.054	0.068	0.070	-0.113
	(0.090)	(0.102)	(0.090)	(0.102)	(0.101)	(0.101)	(0.176)
gender (female)	-0.060	0.109			0.108		
	(0.088)	(0.097)			(0.096)		
region (Eastern Germany)	-0.052	0.042			0.039		
	(0.106)	(0.114)			(0.114)		
subjective perceptions							
desirability of self-employment		0.004**		0.004**			
		(0.002)		(0.002)			
financial feasibility		0.005***		0.005***			
		(0.002)		(0.002)			
compatibility with personal circumstances		0.009***		0.009***			
		(0.002)		(0.002)			
entrepreneurial ability		0.005**		0.005**			
		(0.002)		(0.002)			
perception index					0.023***	0.023***	0.005
					(0.002)	(0.002)	(0.015)
number of observations	1,360	1,333	1,360	1,333	1,333	1,333	1,333
log L	-559.73	-472.94	-560.07	-473.61	-475.81	-476.45	-6539.57
p-value ρ(u,v) = 0							0.25

Estimated coefficients, heteroskedasticity-consistent standard errors in parentheses.
* significant at 10% level; ** significant at 5% level; *** significant at 1% level.
Data source: KfW start-up monitor for the year 2006.

Table 4: Regression of Perception Index

	(1) OLS		(2) Simultaneous MLE	
	Coeff.	(Std. err.)	Coeff.	(Std. err.)
constant	80.308***	(2.901)	80.321***	(2.865)
date of start-up (Ref.: 0 - 3 months ago)				
4 - 6 months ago	-3.074	(2.183)	-3.076	(2.158)
7 - 9 months ago	-6.900**	(2.257)	-6.902**	(2.231)
10 - 12 months ago	-10.637***	(2.257)	-10.638***	(2.231)
13 - 15 months ago	-12.001***	(2.377)	-11.999***	(2.351)
16 - 18 months ago	-12.117***	(2.742)	-12.115***	(2.711)
19 - 21 months ago	-9.726***	(2.620)	-9.728***	(2.591)
22 - 24 months ago	-13.311***	(2.328)	-13.310***	(2.301)
age (Ref.: 35 - 44 years)				
18 - 24 years	-0.398	(-2.311)	-0.399	(2.284)
25 - 34 years	-0.437	(1.722)	-0.440	(1.702)
45 - 54 years	-1.147	(1.890)	-1.148	(1.868)
55 - 64 years	-1.816	(2.366)	-1.825	(2.339)
education (Ref.: vocational training)				
university degree	-2.293	(1.776)	-2.302	(1.755)
technical college degree	-0.429	(2.307)	-0.434	(2.281)
no vocational training, but high-school degree (*Abitur)*	-6.576***	(2.582)	-6.588***	(2.551)
no vocational training, no *Abitur*	-5.485*	(3.889)	-5.474*	(3.847)
professional status (Ref.: white-collar employee)				
executive employee	5.896***	(1.976)	5.887***	(1.953)
civil servant	1.570	(4.209)	1.565	(4.163)
skilled blue-collar worker	-0.209	(3.568)	-0.231	(3.527)
non-skilled blue-collar worker	-9.481**	(3.924)	-9.491**	(3.881)
self-employed	0.835	(2.505)	0.831	(2.476)
unemployed	-3.716*	(2.123)	-3.734*	(2.102)
out of labor force	1.354	(2.069)	1.355	(2.045)
city size (Ref.: > 500,000 inhabitants)				
< 5,000 inhab.	5.129**	(2.426)	5.122**	(2.397)
5,000 – 20,000 inhab.	3.941*	(2.104)	3.943*	(2.081)
20,000 – 100,000 inhab.	3.236	(2.040)	3.238	(2.017)
100,000 – 500,000 inhab.	0.076	(2.050)	0.072	(2.026)
foreign origin	0.563	(2.215)	0.568	(2.189)
part-time	-10.898***	(1.366)	-10.895***	(1.352)
gender (female)	-5.388***	(1.321)	-5.429***	(1.289)
region (Eastern Germany)	-3.859**	(1.675)	-3.775**	(1.641)
number of observations	1387		1386	
R^2	0.13			

Heteroskedasticity-consistent standard errors in parentheses.

* significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Data source: KfW start-up monitor for the year 2006.