

Business start-ups by the unemployed — an econometric analysis based on firm data

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Abstract

Active labour market policies to promote firm foundation from unemployment were improved considerably in Germany in August 1994, a fact which led to a sharp increase in the number of start-ups by the unemployed. The study compares firm survival and employment growth of start-ups by unemployed and others, based on firm data from 15 regions in East and West Germany. Self-selection effects are taken into account by using simultaneous models of start-up promotion and firm development. While firm survival is negatively affected by foundation from unemployment in East Germany (–6%), an influence on employment growth is not evident. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

In times of persistently high unemployment, labour market policy measures become increasingly important. Apart from traditional programmes such as continuous vocational training or re-education, the transition into self-employment is

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promoted in many industrialised countries. The aim is to shift people out of an unemployed status and to reduce the level of unemployment. This can happen directly, by supporting the transition into self-employment, and indirectly, by creating further jobs in the newly-founded firms.

In Germany, the transition from unemployment to self-employment is supported by the Federal Employment Services by what are known as bridging allowances ('Überbrückungsgeld'). Since August 1994, the conditions for receiving allowances were considerably eased, which led to a sharp increase in the number of persons who were subsidised. Between 1995 and 1998, the transition of 337,498 unemployed people into self-employment was supported compared to 107,733 between 1991 and 1994 (see Table 1).

The aim of this study is to assess the effects of firm formation by the unemployed through transition monies in terms of firm survival and employment growth. This can fundamentally be carried out from either a labour market economics perspective, or an industrial economics one. From a labour market economics point of view, the focus is on the person and his or her occupational alternatives.

The path to self-employment, whether with or without governmental support, competes with the return to a dependent employment relationship, if available. This is investigated in literature on the determinants of self-employment (see for example Pfeiffer and Pohlmeier, 1992). In such literature, typically the roles of risk aversion, human capital, family networks, liquidity constraints, etc., are used to explain occupational choice.

On the other hand, an industrial economics approach would make the market entry and the subsequent firm development the central points of what is being observed. Determinants for this are, among others, capital intensity, returns to

Table 1

Self-employment, unemployment and bridging allowances from 1991 to 1998

Year	Number of self-employed people (millions)	Number of unemployed people (millions)	Subsidised unemployed	Amount (millions DM)
1991	3.037	2.727	13,014	90.3
1992	3.091	2.979	31,587	136.4
1993	3.175	3.419	25,835	98.5
1994	3.288	3.698	37,297	194.8
1995	3.336	3.612	70,634	822.0
1996	3.409	3.965	89,744	1063.0
1997	3.528	4.385	78,824	944.0
1998	3.594	4.279	98,296	1247.4

Source: Statistical Yearbook of Germany; Wießner (1998), own calculations.

scale and market entry barriers created by enterprises already active in the market (see for example Audretsch, 1995).

The two perspectives can be integrated. In this paper, the development of new enterprises started from unemployment is compared with other starts-ups. In order to do this, a regional sample from data collected by the ZEW (Centre for European Economic Research) Start-up Panel is combined with information on bridging allowances held by the Federal Employment Services. The industrial and labour market economics approaches are integrated using firm-specific and personal characteristics of the founder as well as those of any shareholders.

Econometric analyses in the area of public start-up promotions have been rather scarce to date.¹ Due to insufficient data availability, studies might suffer from a lack of an adequate control group for the group of subsidised companies or persons. Therefore, selectivity effects can influence the measurement of firm development. In the case of the bridging allowances, the access to subsidies depends on the design of the programme, which is restricted to people who are officially registered as unemployed. Only those unemployed persons who submit a business plan for the set-up receive the bridging allowances. This is presumably not a random sample of all unemployed people.

This study tries to avoid the potential bias created by selectivity effects through the use of simultaneous models. In order to determine the impact of foundation from unemployment via bridging allowances on the respective firms, a model is estimated which simultaneously explains company development and firm foundation via bridging allowances.² Further, the effect on employment growth can only be estimated in the sample taken among the surviving and thus potentially more successful companies.

The paper is structured as follows. In Section 2, theoretical aspects on the way in which the bridging allowance takes effect and on start-ups by unemployed or employed people are discussed. Section 3 contains a description of the data. Section 4 presents the econometric modeling of company development, taking into account promotion by the unemployed. In Section 5, the estimation results are discussed. The Section 6 draws conclusions.

¹ Benus et al. (1994) investigated the effect of governmental start-up promotion based on a social experiment. Brüderl et al. (1996) examined, based on data of the Munich Founder Study, the effects of governmental start-up subsidies including an indicator variable. More recently, O'Leary (1998) evaluated self-employment promotion among the unemployed in Hungary and Poland. There are many more studies for the evaluation of other active labour market policies such as training or wage subsidies (for an overview, see Heckman et al., 1999 and for an analysis of active labour market programmes in Germany see Lechner, 1999 or the collection of papers in Pfeiffer and Pohlmeier, 1998).

² Other forms of public firm promotion are not taken into account.

2. Aspects of the micro-economics of start-ups and the institutional arrangements of bridging allowances

2.1. *The transition to self-employment*

An individual's decision to form a company depends on the attractiveness of available alternatives, given prevailing governmental conditions.³ Attractiveness will depend on initial financial endowment, human capital, risk aversion, the wish for independence, social and family networks and other factors determining preferences as well as costs and benefits which are also closely related to the size of the company which self-employed persons establish in Germany (Pfeiffer, 1994).

An unemployed person will decide in favour of self-employment if the present value of the stream of expected utilities is higher compared to remaining unemployed or becoming a dependent employee, taking into account the possibilities of firm closure or the probability of finding a job. A wage worker will decide in favour of self-employment if the present value of the expected utilities is higher compared to remaining in his status, taking into account the probability of losing the job or finding a better one. Given similar preferences, the present values of the future stream of expected costs and benefits in the case of firm foundation presumably differ between the employed and unemployed. Substantial inputs have to be provided prior to firm foundation which might possess, in part, the characteristics of sunk costs. These include investments in product and production ideas, in human capital, in the establishments of networks with suppliers and customers, and in capital which depend on both the legal form of the start-up and on the particular trade or industry.

The capital endowment has to be covered by savings of the founder, by funds from banks or by other sources, among them bridging allowances. For an employee, supplier and customer networks might be more easily established compared to how it would be for the unemployed and in fact, in many cases the special circumstances on offer at the job might help to create the idea of becoming a successful entrepreneur. The unemployed on the other hand is out of employment. For them, it might be more difficult to establish networks or create successful ideas for business foundation, depending on the duration of unemployment. On the other hand, the unemployed might have more time for collecting information and creating their business plans than a full-time employee would have.

³ According to the German economic and trade regulations, in principle everybody is allowed to start a business in most parts of the private sector of the economy. However, in the craft sector as well as in some professional occupations (for example lawyer, doctor) special examinations or vocational degrees, and in the banking and insurance sector some minimum requirements with respect to initial capital, are a necessary precondition for becoming self-employed.

The present value of the expected stream of income should generally be higher for founders who were employed than for those who were unemployed before foundation, due to the higher opportunity costs as wage workers. The unemployed founders additionally experience opportunity costs as well. If there were no bridging allowances, the transfers from the unemployment insurance system would stop. With bridging allowances (see Section 2.2 for more details) the transfers continue for the first 6 months after firm foundation regardless of the success of the firm. Further opportunity costs might result if the founder reduces his or her search for permanent employment and thus may miss offers, which are potentially more rewarding. Such costs are however not specific to the unemployed. For a founder who comes from wage work, it might not be easy to return to his or her former job or a comparable job if a period of self-employment signals preferences for independence (Pfeiffer, 1994).

Micro-economic search theory provides a guideline for analysing search behaviour of the unemployed. As far as the authors are aware, the extension of search theory to include the choice of self-employment as an alternative to wage work is still to be made. Due to the diversity of the additional alternatives, it would certainly not be less complex. Instead of job offers, the unemployed person has to deal with market niches, product prices and production possibilities. One can assume that the information requirements of such a step lie above those of an employee.

Theoretical work carried out by Lucas (1978) and Kihlstrom and Laffont (1979) models the role of management capabilities, risk preferences and the initial capital endowment for the choice between self-employment and wage work in a general equilibrium framework with flexible wages and market clearing. Empirical work by Evans and Jovanovic (1989) for example, points to the role of liquidity constraints in the USA. Pfeiffer and Pohlmeier (1992) estimate the determinants of self-employment in a structural model of discrete choice under uncertainty with West German individual panel data.

However, the status of unemployment, a form of imbalance, is not considered by these studies. Human capital, risk preferences and initial capital endowment are also likely to give valuable hints for modeling the microeconomic decision situation of an unemployed person. For authors following the tradition of J.A. Schumpeter, the ability to overcome imbalances points to the presence of entrepreneurial skills (see Schultz, 1981). A situation of economic imbalance, such as high unemployment, leads people to become entrepreneurs. This triggers a process, which can bring about new economic equilibrium. The study by Lechner and Pfeiffer (1993) points to the positive role of expected job losses for firm foundation plans of East German employees after the transition to a market economy in 1990.

The study by Pfeiffer (1999), based on job-seekers from the German labour force surveys 1991, 1993 and 1995, indicates that employment status influenced the search for self-employment in East and West Germany. The unemployed had a

lower probability of seeking self-employment than did dependent employees in 1991. In 1995, there was no longer a difference between unemployed and employed job seekers.

Schulz (1995) models the decision for self-employment status using life cycle models and stresses the role of capital market imperfections and qualification requirements for the particular point in the individual's life cycle at which the transition to self-employment takes place. Although the state of unemployment is not explicitly modeled, the considerations might well be relevant to the situation of an unemployed person. However, these models, which are based on control theory, should also become significantly more complex when the unemployed person can choose between both alternatives: wage and salary employment and self-employment status.

Costs and benefits of company formations and alternative forms of earning a living are determined by aggregate economic factors as well. A shift from wage employment to self-employment might be more likely to occur in a phase of general economic growth since in such a phase, profit expectations might be higher. Contrarily, a weak labour market can be a decisive factor for becoming self-employed. In times of increasing unemployment, an unemployed person might be "forced" into self-employment due to the poor prospects of finding a job. In literature, there is a debate about the relevance of unemployment push vs. demand pull factors for company formations (see for example Meager, 1992; Staber and Bögenhold, 1993). The notion of demand pull and unemployment push is, however, far from being conclusive from a theoretical point of view. It is possible that people are forced into wage work as well as into self-employment. It is an empirical question whether higher or lower unemployment rates lead to more people becoming self-employed or not.

The discussion of expected costs and benefits of occupational choice gives reason to assume that the threshold of the income stream at which a decision in favour of self-employment is made, is lower for unemployed people than for the employed. The opportunity costs in the form of foregone income of an unemployed founder *ceteris paribus*, i.e. given socio-demographic characteristics and capital endowment, probably lie below those of an employed person. The differences might be reinforced in times of high unemployment and poor job opportunities, might depend on individual unemployment duration and can probably be influenced significantly by active labour market programmes such as bridging allowances.

If one agrees that a higher income stream from business creation requires higher initial investments, then one should expect that, as a rule, business start-ups by unemployed people are smaller and require less capital. Brüderl et al. (1996), for example, obtained an average capital endowment of 93,000 DM for companies formed by previously employed people and an average of 34,000 DM for companies formed by previously unemployed people.

In addition they may tend to occur with a higher probability in industries with lower market entry costs, because in such industries initial investments can be lower. Whether this is indeed the case will furthermore depend on risk preferences and consumer behaviour. If consumer behaviour will not depend on the former labour market status of the founder, then differences might be small. Whether risk preferences differ between unemployed and employed persons and whether the fact that a firm has been founded by an unemployed instead of an employed person have *ceteris paribus* any impact on success, thus remains an empirical question.

2.2. Bridging allowances

Start-ups from unemployment are subsidised as part of active labour market policies in Germany. In order to allow and facilitate the transition into self-employment for unemployed people, the Federal Employment Services may pay what is known as a “bridging allowance” according to §55a of the Labour Promotion Law.⁴ The unemployed has to propose bridging allowances. The prerequisite for the bridging allowance is that the applicant has received “unemployment pay” or “unemployment assistance” for at least 4 weeks.⁵

Not every form of self-employed work is supported. The activity has to consist of at least 18 h a week. A competent authority has to assess the sustainability of the self-employment envisaged. Such an authority can be a chamber of commerce and industry, a trade or professional association or a tax consultant. As a rule, it is the task of the unemployed to achieve the assessment which shall ensure that the project earns, in time, a gross monthly income that is at least two thirds of the income of an employed person. The aim is to prevent promotion of the politically disputed category of employees in disguise⁶ and of start-ups, which are badly prepared due to low opportunity costs.

⁴ ‘Überbrückungsgeld’. The bridging allowance in §55a was first introduced with the 7th amendment to the Labour Promotion Law (AFG) on January 1, 1986. Since the January 1, 1998, the legal foundation has changed and is now §57 of the Third Social Security Code. The following countries also have programmes to promote self-employment from unemployment: Australia, Belgium, Canada, Denmark, Finland, France, Greece, Great Britain, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Sweden and the US (OECD, 1995).

⁵ §55a (1) of the AFG. Those supported are not only unemployed people, but also people threatened by unemployment, i.e. workers with reduced hours and employees who have participated in work creation measures according to §91–96 AFG or measures according to §249h and §242s AFG. The latter ones support the reintegration of unemployed people by financing environmental protection, social and youth work, especially in East Germany.

⁶ In Germany a self-employed person is considered to be an employee in disguise if he or she is doing work which in fact has all the characteristics of wage work. There might be an incentive for classifying oneself as self-employed because then it is not necessary to participate in the social insurance transfer systems, where employers currently have to pay 21% of the wage bill, and employees also 21% of the wages. Furthermore, there are no labour protection laws for the self-employed.

The introduction of the Labour Promotion Law on the August 1, 1994 represents the most recent legal change in labour promotion, bringing with it a considerable improvement in promotion terms. Since August 1994, bridging allowances have generally been granted for a period of 26 weeks and for the amount of the last paid unemployed assistance.⁷ In addition, during the time of the support the contributions to health and nursing insurance, as well as to the retirement fund, are financed in an amount equal to the social security contributions which were last paid for the unemployed person.

In 1995, the financial expenditure with which a transition to self-employment was supported, was on average approximately 11,000 DM per unemployed person (see Table 1, which furthermore contains the number of self-employed and unemployed people from 1991 to 1998, the number of receipts of bridging allowances and the total amount of money it costs). After 1994, the improvement in the terms of promotion and the growing unemployment led to a significant increase in the use of the bridging allowance and thus also to an increase in total expenditures for this form of financial support.⁸

There seem to be some binding constraints on overall funding. It can sometimes be more difficult to get bridging allowances at the end compared to the beginning of a year. However, in that case, the unemployed can usually shift their proposals to the very beginning of the next year. According to the terms of the promotion, an unemployed person does not lose his or her right to unemployment payments or assistance by a transition into self-employment. Thus, even with very low expected revenues, the transition into self-employment seems attractive for economic reasons, at least in the short run and for people facing poor prospects as wage workers or slack labour markets.

The novel element of this study lies in the assessment of bridging allowances for company success. To determine the impact of bridging allowances from a theoretical point of view, two adverse aspects have to be taken into account. On one hand, unemployed founders as a consequence of bridging allowances might have a higher capital endowment than otherwise comparable start-ups, which could influence firm success positively. On the other hand, opportunistic behaviour cannot be excluded, as for some applicants, there are hardly any opportunity costs not applying for bridging allowances. If bridging allowances are received, the right to unemployment payments or assistance is extended by 26

⁷ The promotion terms were adjusted and changed several times. Phases of a rather restrictive interpretation (1988–1993), where bridging allowances were granted for a period of around 13 weeks, have alternated with phases of a rather liberal use (1986–1988 and from 1994 onwards).

⁸ The importance of the government attributes to bridging allowances can be seen by the following statistics. In 1996, the expenditure for active labour market policy amounted to 41.2 billion DM altogether, which constituted 30.1% of the total budget of the Federal Employment Services. One billion DM was spent on bridging allowances, compared to almost 18 billion DM spent on training measures.

weeks or 6 months. In this respect, a company formation could be initiated with the aim of receiving unemployment payments for half a year longer. Therefore, it is not possible to determine the effects of the bridging allowance on company survival and employment growth based on theoretical reasoning.

2.3. Empirical studies on bridging allowance

In order to obtain results on both the use and success of bridging allowances, the Institute for Employment Research in Nuremberg (IAB) carried out several analyses on recipients of bridging allowances. The first sample contained people who received a bridging allowance between 1986 and 1988 (see Kaiser and Otto, 1990). The aim was to determine the influence of legislative changes on the granting of bridging allowances, the tendency to become unemployed again after the subsidisation and the socio-demographic structure of the bridging allowance recipients.

The second survey on bridging allowances began in 1994. The IAB obtained a full census of the founder cohort during 1994/1995 in 15 selected labour market districts: Schwerin, Berlin (East), Dessau and Pirna in the new German federal states, and Bremen, Hanover, Kassel, Essen, Hof, Bayreuth, Bad Kreuznach, Mainz, Deggendorf, Landshut and Göppingen in the old states. The 4486 unemployed receiving bridging allowances can be subdivided into “old cases” (bridging allowances in the first/second quarter of 1994 before the promotion terms were improved on August 1, 1994) and “new cases” (fourth quarter 1994, first/second quarter 1995). For an analysis of the differences in the socio-economic structure of the recipients of payments, see Wießner (1998).

At a time of 38 weeks after the start-up, 5.4% were again registered as unemployed; after 78 weeks, this figure rose to 6.9%. Basically, the study could not find any differences between old and new cases. The unemployed founders were surveyed again in 1997. A total of 70.4% were still self-employed, 12% were working in an employment relationship that was subject to social security payments and approximately 13% were registered as unemployed.

3. Data and descriptive statistics: ZEW firm start-up panel

3.1. Samples and definitions

The econometric analysis is based on a regional sample of the ZEW Firm Start-up Panel.⁹ The observation unit is the legally independent enterprise and not the operational facility. The ZEW Firm Start-up Panel contains newly registered

⁹ The data in the ZEW Start-up Panel had been made available to the ZEW since 1989 every 6 months by the Association “Verband der Vereine Creditreform” (VVC); for further details see Harhoff and Steil (1997).

enterprises in Western and Eastern Germany. The information is updated, but not in regular time intervals, and includes the legal form, a five-digit industry code, number of employees and employee structure, date of formation (for take-overs also the date of formation of the predecessor company), date of the trade register entry, turnover, number and socio-economic characteristics of shareholders, debt composition and information on a shut-down other than by bankruptcy or collection proceedings.

Since there are no official statistics in the Federal Republic of Germany which cover company set-ups completely, reliably, and with sufficient time disaggregation, statements on the degree to which new companies are contained in the Start-up Panel are only possible with limitations. Not all companies are required to be officially registered. The probability of being registered is influenced by firms' need for loans and the extent of their business relationships to other companies. Very small companies, agricultural enterprises and professionals in medicine, law and architecture are likely to be under-represented.

The sample used in this study is constructed in two steps. First, it consists of all people contained in the database who are involved in an enterprise and whose addresses lay in the postal code areas of the 15 labour market districts examined in the course of the §55a-sample of the IAB. In the context of a co-operative project with the IAB, those people in the sample who received bridging allowances are identified. In a second step, a sample of enterprises started by those people is compiled. This sample thus includes companies in which unemployed persons receiving bridging allowances are involved and companies for which this is not the case. An enterprise is categorised as being founded by promotion of an unemployed individual if at least one person involved in this enterprise received bridging allowances. Only the cohort of companies which were set up between the fourth quarter of 1993 and the first half of the third quarter of 1995 is considered.¹⁰ Start-ups which are not eligible for subsidisation according to Labour Promotion Law (non-profit associations, agricultural enterprises, take overs) have been excluded.

In addition, the sample is restricted to small and medium start-ups. The aim of this step is again to exclude types of start-ups, which are not applicable to the unemployed. Start-ups with 100 or more employees are usually founded by already existing firms and not by individuals.¹¹ In fact, we furthermore excluded for the same reason start-ups whose numbers of employees at the time of foundation exceeded the maximum number of employees in the firms founded by

¹⁰ This means that the period analysed by the IAB is always extended by a quarter, as there is the possibility that an application for a trade register entry was filed before the subsidies were granted, or a company was formed some time after the support was granted.

¹¹ Often a boundary of only 50 employees is used, see for example Fritsch (1992).

Table 2
Sample sizes of the different models

Region Model	Western Germany		Eastern Germany	
	Non-subsidised	Subsidised	Non-subsidised	Subsidised
Whole sample	5079	223	3916	395
Survival probability (Table 5)	2287	124	2083	198
Employment growth (Table 7)	1774	105	1235	136

Source: Regional sample of the ZEW Firm Start-up Panel.

the unemployed, which was 15 in the old German federal states and 18 in the new states.¹²

After the selection, the sample taken from the 11 labour market districts in the old federal states includes 5302 enterprises, of which 223 are founded by an unemployed person receiving bridging allowances. The sample from the four labour market districts in the new federal states includes 4311 enterprises, of which 395 are promoted from unemployment (see Table 2).¹³

3.2. Firm heterogeneity and promotion of the unemployed

The factors which characterise the heterogeneity of start-ups and which are included in the econometric specification of the subsidisation equation explained in Section 4 are: legal form, industry, economic situation and the investment/shareholder structure.¹⁴

Following the discussion in Section 2, firms that are formed by unemployed people should, as a rule, be rather small, “easily” founded firms with low capital endowment. The legal form is divided into three categories: sole proprietorship, non-corporate firm and corporations. A sole proprietorship (‘Einzelunterneh-

¹² In East Germany the average number of employees in start-ups is higher than in West Germany. One reason for this is a catch-up effect, which should fade over the course of time. In this step, 70 observations in the West and 72 in the East German sample were lost, a factor which might influence the estimates. It turned out, however, that an extension to 100 employees in fact had no influence on the estimates. Results are available upon request.

¹³ In 1994 and 1995, around 4860 unemployed received bridging allowances in these regions where 618 firms have been identified as firms where the founder or a partner of the founder has received bridging allowances. Presumably our sample is not a random sample of the population of the unemployed firm founders; one should bear in mind that very small companies and professionals in medicine, law and architecture are likely to be under-represented in the ZEW start-up panel, see Section 3.1.

¹⁴ Table 3 shows the means of selected variables taken from all models for non-subsidised and subsidised start-ups and contains a test-statistic for the difference of the means in the sub-samples; for the whole list of variables tested in the first version of the paper, see Pfeiffer and Reize (1998).

mung'), that is individual proprietorships run by the owner and with at most one dormant partner can be registered and closed down without major formalities, while the set-up of a limited liability company, a corporation, requires an entry in the trade register and deposit of the nominal capital. As a rule this requires a notary certification.

For this reason, we hypothesise that start-ups by the unemployed do not have the legal form of a corporate firm. The category of non-corporate firms consists of the civil law association ('BGB-Gesellschaft') and limited and general commercial partnerships ('Komanditgesellschaft' and 'Offene Handelsgesellschaft'), where two or more persons are owners and share full responsibility for the firms development. In the old German federal states, 67.3% of subsidised start-ups are sole proprietorship and 13.5% are non-corporate firms. In the new German federal states, non-corporate firms are represented more often, with 16.2% of subsidised start-ups.

Subsidised start-ups are more likely to be found in some parts of the service sector in which market entry costs and capital intensity are relatively low, rather than in the manufacturing sector. In the estimates, 10 industry dummies are used. The industries include manufacturing, construction, automotive dealerships and repair service, retail trade, wholesale trade, hospitality, transportation/communication/insurance/finance, data processing, business services and other services (see Table 3). In the Western regions of Germany, the subsidised firms are more often involved in automotive dealerships and repair service, whereas non-subsidised firms are more often found in hospitality and other services. In Eastern Germany, subsidised firms are more often started in automotive dealerships and repair service and less often in other services.

Networks refer to business relationships and indicate whether the firm's most important shareholder is also a shareholder of one or more other firms. The persons involved in the start-up are called personal shareholders in the following. They are measured ranging from one additional shareholder to two, three or more. Subsidised start-ups from unemployment tend to have more personal shareholders, but a smaller number of them have a network.

Apart from business-related characteristics, firm foundation from unemployment may depend on the economic environment which is included in the regression in the form of the regional unemployment to vacancy ratio 3 months prior to the start-up. The higher this number, the lower the chances of the unemployed finding regular employment. Thus we hypothesise that, *ceteris paribus*, the probability for the decision towards self-employment increases with a higher unemployment to vacancy ratio. From our point of view, the unemployment to vacancy ratio reflects the tightness of the regional labour market better than the unemployment ratio.¹⁵

¹⁵ Later, we will also report the econometric results if the unemployment ratio is used instead.

Table 3

Descriptive statistics of non-subsidised and subsidised business start-ups in Western and Eastern Germany

	Western Germany			Eastern Germany		
	Non-subsidised	Subsidised	<i>p</i> -value (in %)	Non-subsidised	Subsidised	<i>p</i> -value (in %)
<i>Legal form (in %)</i>						
Trade enterprise/sole proprietorship	31.5	19.3	0.0	14.4	11.7	15.0
Non-corporate firm	8.1	13.5	0.9	11.5	16.2	0.9
Corporate firm	60.4	67.3	4.2	74.1	72.2	40.1
<i>Sector (in %)</i>						
Construction	15.1	19.2	10.4	24.0	22.8	61.9
Manufacturing	8.1	9.6	44.9	5.4	6.1	55.9
Auto dealerships and repairs services	3.7	8.2	0.4	3.9	6.9	0.7
Wholesale trade	8.0	7.8	100.0	7.4	9.7	11.0
Retail trade	21.2	22.8	55.5	18.3	18.9	73.2
Hospitality	10.0	6.4	8.2	8.9	7.2	26.1
Communication/Transportation/Finance/Insurance	6.8	5.0	40.5	10.1	9.5	72.5
Data Processing	2.7	4.6	13.3	0.9	1.3	40.0
Business-related services	12.6	9.6	21.0	8.5	9.5	50.8
Other services	11.7	6.9	3.0	12.5	8.2	1.2
Missing values (in %)	2.7	1.8		1.5	1.0	
Networks (in %)	13.2	8.5	4.2	26.4	11.9	0.0
Missing values (in %)	0.2	0.0		0.1	0.0	
<i>Number of additional shareholders (in %)</i>						
0	69.6	69.5	100.0	78.2	73.4	3.1
1	21.9	17.0	9.7	16.4	19.5	12.0
2	5.7	10.3	0.8	3.8	5.6	10.3
3 and more	2.7	3.1	67.2	1.6	1.5	100.0
<i>Labour market district (in %)</i>						
Bremen	12.7	11.7	75.7			
Hanover	15.6	24.7	0.1			
Kassel	9.4	14.4	2.0			
Essen	8.8	5.4	8.7			
Bayreuth/Hof	8.8	11.2	22.8			
Bad Kreuznach/Mainz	18.0	5.8	0.0			
Deggendorf/Landshut	12.4	11.2	67.8			
Schwäbische Alb	14.3	15.7	55.9			

(continued on next page)

Table 3 (continued)

	Western Germany			Eastern Germany		
	Non-subsidised	Subsidised	p-value (in %)	Non-subsidised	Subsidised	p-value (in %)
<i>Labour market district (in %)</i>						
Schwerin				39.2	40.0	78.7
East Berlin				12.5	16.2	4.1
Dessau				23.3	19.0	5.9
Pirna				25.0	24.8	100.0
<i>Age of founder (in %)</i>						
Age < 25	7.7	8.1	77.8	10.4	6.9	7.5
25 ≤ age < 30	18.7	20.0	63.2	17.7	15.5	40.8
30 ≤ age < 35	22.1	26.0	24.0	20.5	20.6	100.0
35 ≤ age < 40	16.9	15.1	61.6	15.8	22.0	1.1
40 ≤ age < 45	12.8	14.1	57.6	15.3	14.8	86.2
45 ≤ age < 50	9.4	10.8	52.0	8.6	7.9	82.2
50 ≤ age < 55	6.6	5.4	64.8	7.9	9.0	48.6
55 ≤ age < 84	5.9	0.5	0.0	3.8	3.3	86.8
Missing values (in %)	17.3	17.0		25.5	29.9	
Female (in %)	25.0	11.0	0.0	24.0	25.6	49.5
Missing values (in %)	2.8	2.2		1.2	1.0	
Unemployment to vacancy ratio	3.8 (4.0)	4.3 (3.6)	6.4	3.4 (3.0)	2.9 (1.6)	0.0
Unemployment ratio (in %)	7.8 (3.1)	8.2 (3.0)	6.0	16.2 (2.9)	15.7 (2.9)	0.0
<i>Quarter of foundation (in %)</i>						
Quarter 93.IV	12.5	4.5	0.0	11.1	6.6	0.5
Quarter 94.I	10.5	12.1	43.7	15.5	13.4	30.5
Quarter 94.II	17.5	14.8	32.2	17.1	12.2	1.3
Quarter 94.III	7.2	5.4	42.2	10.9	11.9	55.5
Quarter 94.IV	14.3	26.0	0.0	10.1	23.3	0.0
Quarter 95.I	14.5	27.8	0.0	14.0	24.1	0.0
Quarter 95.II	13.1	7.6	1.8	15.1	8.1	0.0
Quarter 95.III	10.5	1.8	0.0	6.2	0.5	0.0
<i>Payment histories (in %)</i>						
No experience with respect to payment behaviour	90.9	91.9	72.0	54.0	60.3	2.0
Payment within 30 days	4.5	4.9	74.1	39.0	36.7	38.7
Pays bills without delay	0.2	0.0	100.0	0.2	0.0	100.0
Payment takes longer	0.5	0.0	62.6	0.6	0.0	16.2
Pays slowly	1.0	1.4	50.3	2.9	1.5	14.4
Payment after reminder	0.3	0.0	100.0	0.3	0.0	62.4
Payments overdue	2.6	1.8	66.2	3.0	1.5	11.1

Table 3 (*continued*)

	Western Germany			Eastern Germany		
	Non-subsidised	Subsidised	<i>p</i> -value (in %)	Non-subsidised	Subsidised	<i>p</i> -value (in %)
<i>Credit worthiness (in %)</i>						
No credit experience	84.1	78.5	3.2	38.5	44.6	2.0
Credit advised or possible	7.6	11.2	5.4	12.1	11.1	68.4
Limited credit	4.6	8.1	2.4	44.5	42.3	42.5
Secured credit	0.6	0.5	100.0	1.0	0.5	58.2
No credit recommended	3.1	1.8	32.4	4.0	1.5	1.2
<i>Initial firm size (in %)</i>						
Initial firm size = 1 employee	50.7	52.4	66.9	49.0	54.9	2.8
Initial firm size = 2 employees	24.5	25.2	80.4	19.8	22.5	20.5
Initial firm size = 3 employees	9.4	11.2	39.2	9.8	8.3	36.6
Initial firm size = 4 employees	4.7	4.4	100.0	5.1	4.2	46.4
Initial firm size = 5 employees	3.5	3.4	100.0	4.7	3.6	44.1
Initial firm size = 6 or 7 employees	2.8	2.4	100.0	4.6	1.8	0.8
Initial firm size = 8–10 employees	2.5	0.5	6.3	3.8	2.6	25.9
Initial firm size = 11 and more employees.	1.9	0.5	18.3	3.3	2.1	28.2
Missing values (in %)	16.3	7.2		4.7	2.3	

Note: Regional sample of the ZEW Firm Start-up Panel; standard deviations of continuous variables in parenthesis; *p*-values under the null hypothesis of equal means are calculated by using Fisher's exact test for discrete variables and by a two-sided *t*-test for continuous variables.

The highest average value for the period of time examined is found in Bremen with 12.14, the lowest one in Landshut with 0.72. In the labour market districts of Hanover and Kassel, the number of subsidised enterprises and the unemployment to vacancy ratio is relatively high (see Fig. 1). In the new German federal states, there seems to be no obvious relationship between the two variables and the unemployment to vacancy ratio is lower in the sample of subsidised firms.

3.3. *Survival probability and employment growth*

For success variables, this study uses the mortality status 1 year after set-up and the employment growth. Due to processing delays, the data collection of June 1997 only has sufficient information available on companies up to the year 1996.

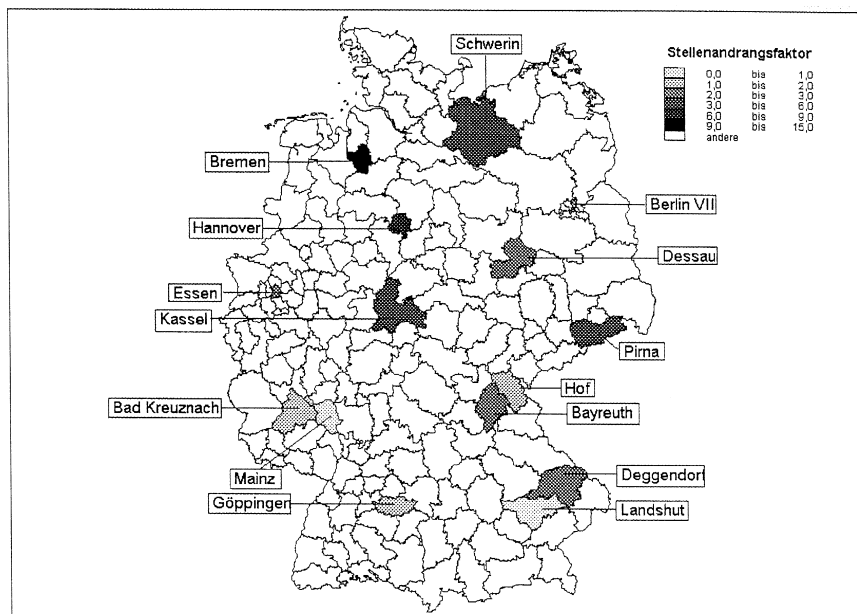


Fig. 1. Mean U/V ratio of the 15 research labour market districts from July 1993 to May 1995. Source: Regional sample of the ZEW Firm Start-up Panel, Bureau of Labour, own calculations; Stellenandrangsfaktor means unemployment to vacancy ratio.

Since the founder cohort of the years 1994 and 1995 are being examined, the time frame for the observations is restricted to approximately one year after the set-up.

A company can be closed down by choice or by force (insolvency).¹⁶ For enterprises, no longer active, the start-up database only gives an exact date of closure for insolvency cases. For voluntary closures, the date of mortality can be determined only by means of approximation between two points in time at which the company was examined by the VVC. If it turns out at an examination date that the firm is no longer alive, then it is only known that it closed at some point between that and the previous time of examination. This period between the individual points of examination can vary significantly between enterprises, ranging from a few weeks up to more than 2 years.

For this lack of an exact date of closure and the differing lengths of the intervals, the binary probability “that a company has survived at least 1 year” is used as a measure for the success of a company. Those companies which, at an

¹⁶ About 10% of the closures were involuntary in nature. The percentage is somewhat higher in the new German federal states, but is not specific for firms started from unemployment.

age of less than 1 year, do not have close-down notices and/or their first close-down is noticed after more than 1 year, were excluded from the analysis.

In the Western regions of Germany, 90.3% of the subsidised and 89.5% of the non-subsidised start-ups survive the first year. In the Eastern regions, 93.8% of the subsidised and 91.8% of the non-subsidised start-ups survive the first year (see Table 4).

About 40% of all start-ups had to be excluded from the analysis, because it cannot be said for sure whether they have survived the first year or not. Since this lack of information is rather great, the survival equation has been estimated under the assumption that 0% or all of these firms have in fact been closed down after 1 year. In a further sensitivity analysis, we used imputed survival rates calculated from bivariate probit models in the sample of subsidised and non-subsidised firms where survival is observed to bound the true population effect of subsidisation.

When determining the survival probability, bridging allowance is included in the form of a qualitative variable in the regression. A further differentiation

Table 4
Descriptive statistics of firm success

	Western Germany			Eastern Germany		
	Non-subsidised	Subsidised	<i>p</i> -value (in %)	Non-subsidised	Subsidised	<i>p</i> -value (in %)
Survival rate 1 year after start-up (in %)	89.5	90.3	88.9	91.8	93.8	29.3
Missing values (in %)	48.0	35.4		29.3	30.9	
Mean annual employment growth rate (in %)	16.2 (51.2)	19.4 (66.9)	59.9	15.5 (52.4)	14.2 (41.8)	70.0
Observation period in days	607 (260)	598 (241)	69.8	593 (254)	581 (255)	54.6
Firm age at first observation in days	107 (127)	93 (134)	24.9	220 (181)	197 (191)	13.2
Firm age at last observation in days	714 (258)	691 (237)	30.0	813 (257)	779 (247)	7.7
Missing values (in %)	59.8	45.3		58.9	53.4	

Note: Regional sample of the ZEW Firm Start-up Panel; standard deviations of continuous variables in parenthesis *p*-values under the null hypothesis of equal means are calculated by using Fisher's exact test for discrete variables and by a two-sided *t*-test for continuous variables.

between old cases (start-up before August 1, 1994) and new cases (start-up thereafter) turned out to be insignificant.

Our second measure of company success is the employment growth rate g . It is defined as follows

$$g = \frac{\ln B(t_2) - \ln B(t_1)}{t_2 - t_1} \quad (1)$$

with $\ln B(t_i)$ being the logarithm of the number of employees at the time of examination t_i .¹⁷ When determining the growth rate, just as when analysing the survival probability, the problem arises that the data needed are not available for all companies in equidistant time intervals. The interview dates t_1 and t_2 are chosen in a way that the point of time 1 is the earliest statement on employment and the second point of time corresponds to the number of employees determined last. Time dummies in the regression shall control for the different periods and lengths of the time intervals, since the earliest statement on employment differs between firms.

In the Western part of Germany, the average growth rate is 19% for the subsidised and 16% for the non subsidised start-ups. In the Eastern part, the growth rate for subsidised start-ups lies at 14% and for non-subsidised start-ups at 16% (see Table 4). The time unit used is a single day. Table 4 shows the average number of interview dates t_1 and t_2 in subsidised and non-subsidised firms and the difference between t_1 and t_2 , ranging from 581 to 607. According to the test statistic, the interview dates and the difference between the dates do not differ significantly between subsidised and non-subsidised firms, with one exception. In the two Eastern samples, the t_2 dates differ, although only weakly significant. Since in the growth equation only the difference between t_1 and t_2 is relevant and the differences in the t_2 values amount to only 30 days, from our point of view the growth equation is well specified.

The information on employment growth is only available for firms which have survived and which have been examined more than once. For estimation of the probability that information on employment growth exists (see Section 4.3), the credit worthiness and the payment history of the company are considered in addition to the variables already mentioned. In the West German sample, subsidised enterprises have more positive credit reports than non-subsidised ones. For 11% of the subsidised, compared to 8% for the non-subsidised start-ups, a loan is granted without any restriction. For 84%, no credit experience is available. In East Germany, a three-times-higher percentage of firms have more positive credit reports. However, non-subsidised companies have more positive credit reports than subsidised ones. For 39%, no credit experience is available. This number is lower than in West Germany because new private firms have been investigated

¹⁷ This specification has been used before in literature on firm growth, see, e.g. Harhoff et al. (1998).

faster and more often in the years after transformation in the Eastern parts of Germany.

3.4. *Factors influencing company growth*

Companies formed by unemployed people possibly have, due to their comparably low endowment of tangible assets and human capital, worse chances for surviving and growing. The analysis takes into account observed firm heterogeneity by including the legal form, industry type, size at market entry and information on the human capital of the founder. Along with the sex of the most important person involved (female), age has been divided into eight intervals with indicator variables. A better human capital endowment promises a higher productivity of the founder (e.g. better management capabilities) and thus presumably a higher success of the enterprise.

Companies which receive loans show a tendency to take higher risks after market entry, as they can shift their profit expectations to their benefit and at the cost of their creditors. This is especially true for limited liability companies, which are not liable to the full amount of their assets when they set up a risky company or one with little chance to survive.¹⁸ On the other hand, the higher readiness to take risks can also result in higher profits when the company survives.

According to the liability of smallness hypothesis, smaller firms have lower survival probabilities (see Brüderl et al., 1992). Due to higher sunk costs, bigger firms prepare their market entry better and put greater effort into the choice of their projects (see Troske, 1995). In this sense, initial firm size and legal form represent indicators for the otherwise unknown planning intensity. Initial firm size has been divided into eight intervals with indicator variables (see Table 3). In literature, initial employment also serves in checking the relevance of Gibrats Law, according to which the growth of a company is independent of its size (see Evans, 1987; Hall, 1987). For roughly half of the start-ups, initial firm size is one person. In East Germany, there are more subsidised than non-subsidised firms in this category. Furthermore, the data show that more East than West German firms are in the larger size groups.

The inclusion of regional dummies allows a control for the regional differences in start-up dynamics, capturing region-specific economic development or infrastructure.

In Section 4, we present econometric models for estimating the impact of the subsidised firm foundation from unemployment on survival probabilities and employment growth using data from the ZEW Start-up Panel.

¹⁸ See Stiglitz and Weiss (1981). For an empirical examination of the influence of the legal form on insolvency, see Harhoff et al. (1998).

4. Econometric modeling of company success

4.1. Firm start-ups by the unemployed and selectivity

For the quantitative analysis of assessing the direct impact of social programmes, fundamentally two methods are available: the experimental and the non-experimental (econometric) method.¹⁹ Both methods aim at solving the fundamental problem of every assessment. This problem consists of the fact that one can view a person or a firm at a given point in time either only as participant or as non-participant of a programme. However, the analysis of an effect is based on the difference between participation and non-participation. One would like to know what would have happened if a person had not participated in a programme or, in terms of our study, what would have happened if the company had been formed by a person without subsidisation through bridging allowances. The fundamental problem does not allow this direct comparison, and thus one has to resort to appropriate econometric methods. The main difficulty involves finding an adequate control group despite self-selection or programme selection.

The econometric framework of programme evaluation is also appropriate in this study. As discussed in Section 2 firm foundation from unemployment is allied with various selection processes. For investigating the impact of subsidised firm foundation from unemployment, the econometric approach assembles the control group *ex post* from non-participants. In the case of self or programme selection, participants and the members of the non-experimental control group can differ in their success even before the start-up, that is the two samples might not be random samples of the combined population.

To study the influence of selectivity on outcome measures in what follows, Y_i^o represents the success of person or firm i without promotion. d stands for the promotion. $d_i = 0$, if the person has not received bridging allowances and $d_i = 1$, if he or she has. The expected outcome before market entry is different if it is assumed that:

$$E[Y_i^o | d_i = 1] \neq E[Y_i^o | d_i = 0]. \quad (1)$$

The outcome Y_i of person i is given by

$$Y_i = Y_i^o + d_i \gamma_i \quad \text{for start-ups promoted from unemployment and} \quad (2)$$

$$Y_i = Y_i^o \quad \text{for the other start-ups,}$$

where γ_i represents the effect of starting a firm with the help of bridging allowances from unemployment in the group of participants (treatment of the

¹⁹ See Heckman et al. (1999). The experimental method is not further discussed here.

treated). Given the case that the impact is the same for all participants ($\gamma_i = \gamma$), it follows

$$\gamma = E[\gamma_i | d_i = 1] = E[Y_i - Y_i^o | d_i = 1]. \quad (3)$$

For the expected subsidisation success of a representative unemployed person, one then obtains

$$E[Y_i | d_i = 1] = \gamma + E[Y_i^o | d_i = 1], \quad (4)$$

and for the other start-ups

$$E[Y_i | d_i = 0] = E[Y_i^o | d_i = 0]. \quad (5)$$

As a difference between the two expected values, one obtains

$$E[Y_i | d_i = 1] - E[Y_i | d_i = 0] = \gamma + \{E[Y_i^o | d_i = 1] - E[Y_i^o | d_i = 0]\}. \quad (6)$$

The term in curved brackets $\{\}$ depicts the selection bias. If this term equals zero, there is no difference between start-ups in terms of their success before market entry. Otherwise, a comparison of success before and after market entry, however measured, will be biased. Part of the selection mechanisms might remain unobserved. The problem of selection based on unobserved variables (see Heckman and Hotz, 1989) arises when variables that are important for success and selection are not contained in the data. This problem cannot be ruled out totally for the current analysis, since variables characterising the founder's endowment of financial and human capital might be missing.

Neglecting selection effects can result in inconsistent estimates. To demonstrate this, Eq. (2) is extended as follows

$$y_i = \mathbf{x}_i' \beta + d_i \gamma + \varepsilon_i, \quad (7)$$

where y_i shall again represent company success, \mathbf{x}_i a vector of influential factors on company success, d_i bridging allowances and ε_i is assumed to be a normally distributed error term. In this formulation, the success of the enterprise depends on promotion, other observable factors and an error term. The equation of being a firm promoted from unemployment shall be given by

$$d_i^* = \mathbf{w}_i' d + u_i \quad (8)$$

where d_i^* represents a latent unobservable variable for which the following binary selection rule applies

$$d_i = 1 \quad \text{if } d_i^* > 0$$

$$d_i = 0 \quad \text{otherwise}$$

\mathbf{w}_i represents the vector of the variables determining the type of start-up, while u_i is assumed to be a standard normally distributed error term. The variance–covariance-matrix of the two error terms is given by

$$\mathbf{V} = \begin{pmatrix} \varepsilon_i \\ u_i \end{pmatrix} = \begin{pmatrix} \sigma_\varepsilon^2 & \sigma_{\varepsilon u} \\ \sigma_{\varepsilon u} & 1 \end{pmatrix}.$$

From this ensues the expected company success

$$E[y_i | \mathbf{x}_i, d_i] = \mathbf{x}_i b + d_i g + \underbrace{E[\varepsilon_i | \mathbf{x}_i, d_i]}_{\neq 0}. \quad (9)$$

where $E[\varepsilon_i | \mathbf{x}_i, d_i]$ corresponds to the term in the curved brackets in Eq. (6). Thus, for Eq. (9) the assumptions of the standard regression model are violated and OLS results in an inconsistent estimation of γ .

4.2. Modeling survival probability

The first measure of success is qualitative in nature and indicates whether the company is still active one year after it was formed. Starting from Eqs. (7) and (8), the following system of two binary probit equations results

$$M_i^* = \mathbf{x}_i' \beta + d_i \gamma + \varepsilon_{iM} \quad (\text{survival equation}) \quad (7a)$$

$$d_i^* = \mathbf{w}_i' \delta + u_i \quad (\text{start-up from unemployment}). \quad (8)$$

M_i^* and d_i^* represent unobservable latent variables, of which the following selection rule applies to both

$$M_i = 1 \quad \text{if } M_i^* > 0, \text{ enterprise survives}$$

$$M_i = 0 \quad \text{otherwise}$$

and

$$d_i = 1 \quad \text{if } d_i^* > 0, \text{ enterprise formed from unemployment}$$

$$d_i = 0 \quad \text{otherwise.}$$

ε_{iM} shall be assumed to be a standard normally distributed error term. The variance–covariance-matrix of the error terms is given by

$$V_M = \text{Var} \begin{pmatrix} \varepsilon_{iM} \\ u_i \end{pmatrix} = \begin{pmatrix} 1 & \sigma_{Mu} \\ \sigma_{Mu} & 1 \end{pmatrix}.$$

Maximum-likelihood estimation of the bivariate probit model takes into account the correlation of the error terms and results in a consistent estimate of γ .

4.3. Modeling employment growth

The estimate of employment growth proceeds in a similar framework. However, two further selection problems have to be taken into account. First, the estimate can be carried out only for the surviving, i.e. the successful companies. However, what one tries to measure is an effect for all start-ups and not only for the group of surviving companies. An estimate using the sample of the surviving companies can overestimate effects on employment growth (“Survivor-Bias”). A second selection process might result for data reasons, since information on employment growth is missing for 59.1% of the enterprises in the West German sample states and 58.4% in the East German sample. It cannot be ruled out that for companies with worse development, more information is available, as these companies are better examined due to the specific objective of the set of data. For enterprises with payment difficulties in particular, inquiries to the VVC by suppliers and customers will be made more frequently.

Thus, when estimating employment growth, two concurring selection mechanisms are at work. The probability that there is a usable statement on employment for a firm depends (i) on the variables determining the survival probability and (ii) on the variables evaluating the payment histories and the credit worthiness of a company (Eq. (10), see Section 3.4). From this, the following somewhat extended model ensues

$$S_i^* = \mathbf{x}'_i \beta_S + d_i \gamma_S + \mathbf{z}'_i \omega_S + \varepsilon_{iS} \quad (\text{observation in the sample}) \quad (10)$$

$$d_i^* = \mathbf{w}'_i \delta + u_i \quad (\text{start-up from unemployment}) \quad (8)$$

$$g_i = \mathbf{x}'_i \beta + d_i \gamma + \varepsilon_{ig} \quad (\text{employment growth}) \quad (7b)$$

where S_i^* represents a latent variable, \mathbf{z}_i a vector of additional variables explaining whether information on employment is available. ε_{iS} is assumed to be a standard normally distributed error term and ε_{ig} a normally distributed error term with the expected value zero and variance σ_g^2 . g_i stands for the growth rate of employment. For the latent variable S_i^* , the following selection rule applies

$$S_i = 1 \quad \text{if } S_i^* > 0 \text{ observation in the sample}$$

$$S_i = 0 \quad \text{otherwise}$$

Employment growth is examined only if $S_i = 1$. The trivariate structure of the model leads to the following variance–covariance-matrix

$$\mathbf{V}_g = \text{Var} \begin{pmatrix} \varepsilon_{ig} \\ u_i \\ \varepsilon_{iS} \end{pmatrix} = \begin{pmatrix} \sigma_g^2 & \sigma_{gu} & \sigma_{gS} \\ \sigma_{gu} & 1 & \sigma_{uS} \\ \sigma_{gS} & \sigma_{uS} & 1 \end{pmatrix}.$$

To account for the possible correlation between the three error terms, the model is estimated in two steps. In a first step, a bivariate probit model is applied to control simultaneously for both selection processes, namely the probability of a valid employment growth information (Eq. (10)) and the probability of being subsidised (Eq. (8)). In a second step, the growth equation is estimated, including two Inverse Mills Ratios calculated from the bivariate probit model, as additional explaining variables. This corrected growth equation has been estimated on the sample firms for which valid information on employment growth is available.

5. Results

5.1. Start-ups promoted from unemployment

First, the results of the equation determining the type of firm are discussed in the context of the bivariate probit analysis.²⁰ The probability of belonging to the group of start-ups promoted from unemployment differs between the Western and Eastern regions of Germany. By and large, the model is better suited to explain promotion in the West than in the East sample. As the number of observations for both regions differ only slightly from each other, the result points to a greater similarity of the enterprises in the Eastern German regions.

It is probably the case that some start-ups which were categorised as non-subsidised in this study have received other kinds of promotion. This might be one factor explaining the greater similarity between the two groups in the East sample, since considerable amounts of firm subsidies have flowed into East Germany. Unfortunately, no information regarding this point can be found in our data.

²⁰ Eq. (8), Table 5 contains the estimated coefficients, p -values and marginal effects. The marginal effects are calculated from the bivariate normal conditional on being subsidised, i.e. $E[M|x, w, d=1]$. The numbers are in general significantly higher if conditioning is on being non-subsidised (results available upon request). For continuous variables the individual marginal effects consist of direct and indirect effects and have been computed according to the following equation (Greene, 1996, 1998):

$$\begin{aligned} \partial \text{BVN} \left(\Phi(x'_i \beta + \gamma, w'_i \delta, \rho) / \partial x_{ik} \right) \\ = \left\{ \phi(x'_i \beta + \gamma) \Phi \left((w'_i \delta - \rho(x'_i \beta + \gamma)) / \sqrt{1 - \rho^2} \right) \right\} \beta_k \text{ direct effect} \\ + \left\{ \phi(w'_i \delta) \Phi(x'_i \beta + \gamma) - \rho(w'_i \delta) / \sqrt{1 - \rho^2} \right\} \delta_k \text{ indirect effect} \end{aligned}$$

where BVN(.) is the bivariate normal distribution, $\Phi(\cdot)$ the cumulative standard normal distribution and $\phi(\cdot)$ the standard normal density. For the exogenous dummy variables the individual marginal effects are $E[M|x_k = 1, w, d=1] - E[M|x_k = 0, w, d=1]$ and for the endogenous dummy variable $E[M|x, w, d=1] - E[M|x, w, d=0]$. In the former equation, $d=1$ refers to the subsidisation equation and in the latter to the dummy in the survival equation, where the expectation of M is still conditional on being subsidised. The reported marginal effects are obtained by averaging the individual effects across the estimation sample.

However, government subsidies from different sources can be cumulated in Germany so that some subsidised and some non-subsidised firms in fact should also have received money from other programmes.²¹

In the old German federal states, firms from unemployment are more likely started as non-corporate firms or trade enterprises than corporations. The unemployment to vacancy ratio leads to a significantly²² higher percentage of subsidised start-ups from unemployment. In the new German federal states, neither the legal form nor the measure of regional labour market tightness plays any measurable role. If the unemployment ratio is used instead of the unemployment to vacancy ratio, the results for the Western part of Germany are not affected while the coefficient in the Eastern part of Germany became negative and weakly significant.²³ A possible explanation for this unexpected result might be a stronger competition between bridging allowances and other active labour market programmes for the unemployed in East Germany (vocational training, re-education, as well as public works programmes, see Lechner, 1999).

In the old German federal states, subsidised start-ups can be found with a lower probability in the areas of hospitality and other services compared to the construction sector. In the new German federal states, no sector-related differences can be observed. Both in the old and in the new German federal states, subsidised start-ups tend to involve several shareholders, which could point to the significance of social networks for firm foundation by the unemployed. In both regions, subsidised start-ups were begun significantly more often in the fourth quarter of 1994 and in the first quarter of 1995. This indicates that the extension of the services provided by bridging allowance indeed led to a considerable increase in the number of subsidised companies.

5.2. *Determinants of firm survival*

In Eastern and Western Germany, the determinants of the probability of firm survival (Table 5) differ to a lesser extent than the coefficients explaining the type of firm. In the new German federal states, the error terms in the survival and bridging allowances equation are correlated with a value of 0.6. The high and positive correlation points to the existence of variables not taken into account

²¹ Start-ups are promoted in Germany by over 100 programmes and many more local initiatives. The two most important quantitative programmes are the bridging allowances scheme and the loan programmes for start-ups from the DTA ('Deutsche Ausgleichsbank'). The DTA promoted more than 45,000 start-ups in 1997 (DTA Annual Report 1998, Bonn).

²² In the following, a coefficient is regarded as (weakly) significantly different from zero when the *p*-value lies below (10%) 5%.

²³ Results are available upon request.

Table 5

Bivariate Probit Model: probability of survival and subsidisation

	Western Germany				Eastern Germany			
Number of observations	2.411				2.281			
Log likelihood function	− 1163.172				− 1308.397			
Survival equation								
Percentage of survived start-ups	90.21				90.93			
Variables	Coefficient	p-value	Marginal effect	Mean	Coefficient	p-value	Marginal effect	Mean
Bridging allowance	− 1.330	15.3	− 6.7	0.051	− 1.301	6.1	− 6.4	0.087
Corporate firm	Reference							
Non-corporate firm	− 0.225	13.1	− 1.5	0.083	− 0.144	29.9	− 0.3	0.119
Trade enterprise/ sole proprietorship	− 0.459	0.0	− 1.0	0.545	− 0.255	2.0	− 0.4	0.703
Construction	Reference							
Manufacturing	0.027	86.6	0.2	0.090				
Auto dealerships and repair services	− 0.133	46.7	− 0.3	0.048				
Wholesale trade	− 0.082	59.1	0.1	0.090				
Retail trade	0.138	26.4	0.3	0.219				
Hospitality	− 0.592	0.0	− 0.7	0.067				
Communication/ Transportation/ Finance/Insurance	− 0.122	46.6	0.0	0.064				
Data processing	− 0.251	7.2	− 1.0	0.029				
Business-related services	− 0.244	25.1	− 0.5	0.106				
Other services	− 0.091	53.4	0.2	0.109				
Network	− 0.211	3.1	− 0.4	0.150	− 0.302	0.0	− 0.6	0.315
Bremen	Reference							
Hanover	− 0.078	56.9	− 0.1	0.181				
Kassel	0.341	4.4	0.4	0.101				
Essen	0.074	64.0	0.1	0.104				
Bayreuth/Hof	0.211	21.6	0.3	0.099				
Bad Kreuznach/ Mainz	0.092	53.4	0.1	0.177				
Deggendorf/ Landshut	0.075	62.5	0.1	0.127				
Schwäbische Alb	0.25	12.2	0.3	0.127				
Schwerin								Reference
East Berlin					0.346	1.2	0.5	0.111
Pirna					0.071	43.9	0.1	0.221
Dessau					0.375	0.0	0.5	0.246

Table 5 (*continued*)

Survival equation								
Percentage of survived start-ups	90.21				90.93			
Variables	Coefficient	<i>p</i> -value	Marginal effect	Mean	Coefficient	<i>p</i> -value	Marginal effect	Mean
Age < 25	Reference				Reference			
25 ≤ age < 30	0.121	39.8	0.2	0.193	0.289	4.0	0.5	0.174
30 ≤ age < 35	0.336	1.8	0.5	0.228	0.047	72.1	0.1	0.197
35 ≤ age < 40	0.380	1.4	0.5	0.176	0.300	3.4	0.5	0.171
40 ≤ age < 45	0.342	3.3	0.4	0.129	0.297	4.0	0.4	0.158
45 ≤ age < 50	−0.009	95.6	0.01	0.098	0.520	0.5	0.6	0.086
50 ≤ age < 55	0.069	71.2	0.1	0.058	0.086	59.8	0.1	0.078
55 ≤ age < 84	0.026	90.0	0.04	0.045	0.066	74.4	0.1	0.037
Female					−0.174	5.0	−0.3	0.203
Constant	1.450	0.0			1.395	0.0		
Correlation survival and subsidisation	0.606	22.7			0.634	8.2		
Subsidisation equation								
Percentage of subsidised start-ups	5.14				8.68			
Variables	Coefficient	<i>p</i> -value	Marginal Effect	Mean	Coefficient	<i>p</i> -value	Marginal effect	Mean
Unemployment to vacancy ratio	0.038	0.1	−0.03	3.568				
Corporate firm	Reference							
Non-corporate firm	0.661	0.0	−1.5	0.083				
Trade enterprise/sole proprietorship	0.504	0.2	−1.0	0.545				
Construction	Reference							
Manufacturing	−0.191	31.1	0.2	0.090				
Auto dealerships and repair services	0.069	73.5	−0.3	0.048				
Wholesale trade	−0.321	11.2	0.1	0.090				
Retail trade	−0.173	21.4	0.3	0.219				
Hospitality	−0.471	3.6	−0.7	0.067				
Communication/Transportation/Finance/Insurance	−0.221	32.3	0.0	0.064				
Data Processing	0.359	12.4	−1.0	0.029				
Business-related services	0.028	86.6	−0.5	0.106				
Other services	−0.384	5.5	0.2	0.109				
Quarter 93:IV	−0.606	0.1	0.4	0.131	−0.689	0.0	0.5	0.116
Quarter 94:I	−0.169	25.6	0.1	0.131	−0.465	0.0	0.4	0.182
Quarter 94:II	−0.563	0.0	0.4	0.188	−0.729	0.0	0.5	0.167

(continued on next page)

Table 5 (continued)

Subsidisation equation								
Percentage of subsidised start-ups	90.21				90.93			
Variables	Coefficient	<i>p</i> -value	Marginal Effect	Mean	Coefficient	<i>p</i> -value	Marginal effect	Mean
Quarter 94.III	−0.641	0.3	0.4	0.085	−0.497	0.1	0.4	0.114
Quarter 94.IV	Reference				Reference			
Quarter 95.I	0.047	72.9	0.04	0.141	−0.202	10.5	0.2	0.142
Quarter 95.II ^a	−0.456	1.5	0.3	0.097	−0.843	0.0	0.6	0.169
Quarter 95.III	−0.943	0.1	0.5	0.076				
No additional share holder	Reference				Reference			
1 additional share holder	−0.065	70.7	0.1	0.257	0.250	0.9	−0.3	0.183
2 additional share holder	0.487	1.8	−0.5	0.073	0.260	10.2	−0.3	0.050
3 and more additional share holder	0.133	66.1	−0.1	0.032	0.171	49.3	−0.2	0.020
Constant	−1.755	0.0			−0.964	0.0		

Note: Maximum likelihood estimation using a regional sample of the ZEW Firm Start-up Panel; *p*-values and marginal effects in percent.

^aFor Eastern Germany the quarters 95.II and 95.III are combined.

which favour bridging allowances as well as the survival chances. One important unobserved factor is probably motivation, which might be especially important in East Germany after unification. Better information on human capital and on work history, such as the duration or frequency of the unemployment spells would certainly be helpful for improving the estimates in this respect. In the old German federal states, the correlation also turns out to have a positive value, which does not differ significantly from zero, however.

Both in the old and in the new German federal states, subsidised foundation from unemployment lead, with otherwise equal observable characteristics, to a reduced survival probability, which is however not significant for the West German regions. For the new German federal states, the *p*-value is 6%, which indicates that the simultaneous approach seems to be worthwhile.²⁴ As can be seen in Table 5, the relative magnitude of the coefficient compared to the other coefficients hints to its quantitative importance.

²⁴ Without taking into account the correlation, the subsidisation effect in the univariate probit model in the new federal states is not significant. Results are available upon request.

Table 6

Survival rates and estimates of bridging allowances with alternative assumptions about survival for unknown status (*p*-values in parenthesis in %)

Sample	Western Germany		Eastern Germany	
	Non-subsidised	Subsidised	Non-subsidised	Subsidised
0% survival	55.9 1.409 (0.0)	63.1	67.9 – 1.238 (0.0)	66.9
100% survival	94.6 – 2.210 (0.0)	92.3	93.3 – 0.970 (12.3)	94.8
Estimated survival status	94.6 – 0.066 (90.1)	78.0	93.4 – 2.712 (0.0)	84.8

Source: Regional sample of the ZEW Firm Start-up Panel; the table shows the ratio of firms, which survived the first year and the coefficients and *p*-values of bridging allowances on the probability of survival in a model comparable to the one documented in Table 5 with the exception of a different sample size.

The marginal effect conditioned on firms being subsidised is –6.4% for the East German regions. This result provokes some explanations. Being a member of the group of East German subsidised firms in the ZEW start-up panel reduces the survival chances after controlling for observable and unobservable characteristics. In other words: if they had not received bridging allowances, the same firms would have had a higher probability of surviving the first year. To participate in bridging allowances therefore seems to be a bad choice for rational firm founders whose objectives are to survive as long as possible.

Did firm founders in East Germany have this objective? That is not certain. One interpretation could be that the primary aim of East German unemployed firm founders was not firm foundation, but receiving bridging allowances. In Section 3, it was shown that 90% of firm closures were voluntary in nature, which seems to support this interpretation. Another interpretation is that the unemployed may have chosen bridging allowances in a rather myopic way.²⁵ After 6 months, when the payment from bridging allowances stops, plans have been revised and the firms have been closed because of changing expectations of costs and revenues and/or because of finding a better paid job as a dependent employee.

In West Germany, the marginal effect conditioned on firms being subsidised is –6.7%, calculated however from an insignificant coefficient. We can therefore conclude that the influence of bridging allowances in our sample of firms started by the unemployed on firm survival is not positive. Wießner (1998) found that 41% of the unemployed would have also started a business without bridging allowances. From our result, opportunistic behaviour cannot be additionally

²⁵ See Lechner and Pfeiffer (1993) and Pfeiffer (1999) for more detailed studies on the determinants of self-employment and the search for self-employment after unification.

Table 7
Employment growth estimation

	Western Germany			Eastern Germany		
Number of observations	1879			1371		
Adjusted R^2	0.111			0.129		
Mean employment growth rate	0.163			0.157		
Variable	Coefficient	p -value	Mean	Coefficient	p -value	Mean
Bridging allowance	0.010	82.8	0.056	−0.061	16.1	0.099
Initial firm size = 1 employee	Reference			Reference		
Initial firm size = 2 employees	−0.215	0.0	0.258	−0.242	0.0	0.203
Initial firm size = 3 employees	−0.285	0.0	0.107	−0.263	0.0	0.106
Initial firm size = 4 employees	−0.320	0.0	0.061	−0.337	0.0	0.054
Initial firm size = 5 employees	−0.390	0.0	0.042	−0.444	0.0	0.059
Initial firm size = 6 or 7 employees	−0.413	0.0	0.038	−0.373	0.0	0.055
Initial firm size = 8–10 employees	−0.394	0.0	0.029	−0.667	0.0	0.053
Initial firm size = 11 and more employees	−0.410	0.0	0.026	−0.533	0.0	0.046
Corporate firm	Reference			Reference		
Non-corporate firm	−0.164	0.0	0.095	−0.073	12.2	0.131
Trade enterprise/ sole proprietorship	−0.232	0.0	0.582	−0.142	0.0	0.681
Construction	Reference			Reference		
Manufacturing	0.027	51.9	0.090	−0.022	67.7	0.068
Auto dealerships and repair services	0.023	65.8	0.048	−0.087	15.3	0.049
Wholesale trade	−0.076	6.5	0.093	−0.177	0.1	0.071
Retail trade	−0.097	0.3	0.239	−0.241	0.0	0.179
Hospitality	0.032	49.7	0.069	0.083	21.6	0.057
Communication/ Transportation/ Finance/Insurance	−0.051	26.5	0.068	−0.159	0.5	0.080
Data Processing ^a	0.025	70.5	0.027	−0.151	0.5	0.077
Business-related services	0.001	98.5	0.080	−0.244	0.0	0.105
Other services	−0.083	4.5	0.095			
Bremen	Reference					
Hanover	−0.040	37.1	0.177			
Kassel	−0.012	80.5	0.114			
Essen	−0.116	1.9	0.103			
Bayreuth/Hof	−0.071	15.0	0.099			
Bad Kreuznach/Mainz	−0.050	25.9	0.191			
Deggendorf/Landshut	−0.086	7.0	0.123			
Schwäbische Alb	−0.050	29.6	0.118			
Schwerin				Reference		
East Berlin				0.112	2.4	0.092
Pirna				0.145	0.0	0.217
Dessau				0.165	0.0	0.255
Network	0.020	51.4	0.132	0.048	10.2	0.298

Table 7 (continued)

Variable	Coefficient	<i>p</i> -value	Mean	Coefficient	<i>p</i> -value	Mean
Age < 25	Reference			Reference		
25 ≤ age < 30	0.078	7.3	0.211	0.031	56.1	0.163
30 ≤ age < 35	0.066	12.2	0.236	0.017	74.7	0.198
35 ≤ age < 40	0.006	89.8	0.179	−0.022	68.4	0.182
40 ≤ age < 45	−0.007	88.3	0.123	0.017	75.1	0.168
45 ≤ age < 50	−0.037	47.1	0.087	0.073	23.0	0.085
50 ≤ age < 55	0.001	98.3	0.049	0.056	36.6	0.088
55 ≤ age < 84	−0.019	76.7	0.038	−0.035	67.5	0.031
Sex	−0.002	94.5	0.229	−0.020	58.3	0.185
Constant	0.723	0.0		0.678	0.0	
Inverse Mills Ratio ^b				−0.192	2.8	0.834

Note: Western Germany Ordinary-least-squares-Estimation and Eastern Germany Two-stage-least-squares-Estimation using a regional sample of the ZEW Firm Start-up Panel; *p*-values in percent.

^aFor Eastern Germany, the sectors of data processing and other services were combined.

^bSelection for existence of information on employment growth. Furthermore nine-time dummies for the different observation intervals are included.

precluded: that may question the effectiveness and efficiency of bridging allowances in Germany. One should keep in mind that the group of companies formed by the unemployed and contained in the ZEW Firm Start-up Panel probably does not represent a random selection from the group of all enterprises subsidised through the bridging allowance. However, it can be assumed that this group is a rather active and successful group.

The sensitivity analyses with respect to missing information on the mortality status confirms the negative results for East Germany (see Table 6). In all three samples, the estimated coefficient of subsidisation is negative, in two cases in a significant manner. In West Germany, however, the coefficient of bridging allowances becomes significantly positive under the assumption that all firms with missing information were not alive, and significantly negative under the assumption that all firms with missing information were alive. In the case of imputed information on survival, the coefficient does not differ from zero, thus confirming the results from Table 5. Therefore from our point of view, the likelihood of a positive effect of subsidisation on firm survival is indeed very low.

The remaining results shall be briefly summarised. The hypothesis of the higher mortality of corporations compared to non-corporate firms does not hold true. For corporations, close-downs as a form of market exit play a less important role. The sample contained mainly voluntary shut-downs as opposed to insolvencies. In contrast, sole proprietorships show a higher mortality rate than corporate firms.

The size of a company, measured by its initial number of employees, has no measurable influence on survival probability, which is in contrast to other studies on firm survival, see Brüderl et al. (1996). In the hospitality sector, firms in the old federal states revealed the lowest survival probabilities relative to construction.

In the new German federal states, the sector variables were excluded because of their insignificance.

The human capital variable, age of the most important person involved in the start-up, has a significant, non-linear influence on survival probability of the start-up. The survival probability reaches its peak in the intervals between 30 and 45 years in the West German regions and between 45 and 50 years in the East German regions. Independent of the region, networks reduce the survival probability of start-ups. In the East German region, start-ups by a woman as the most important person involved have a slightly lower survival probability.

5.3. *Determinants of employment growth*

Estimation of the bivariate probability that information on employment is available and that a firm has been subsidised, shows a significant correlation of the two corresponding error terms for East Germany but an insignificant one for the Western region, i.e. $\sigma_{gu} = \sigma_{gs} = \sigma_{us} = 0$.²⁶ Therefore, ordinary least squares for the employment growth estimation reveals consistent parameter estimates. For Eastern Germany the error term of the equation determining start-up with bridging allowances also does not correlate significantly with the error term of the employment growth equation, but the error term of the equation determining the availability of employment growth information does, i.e. $\sigma_{gu} = 0$, $\sigma_{gs} \neq 0$ and $\sigma_{us} \neq 0$. Therefore, one Inverse Mills Ratio is included in the growth equation and two stage least squares estimation has been applied.²⁷

Both for the old and the new federal states, the foundation from unemployment has no effect on growth in the group of subsidised firms (see Table 7). According to this result, bridging allowances have no positive impact on the number of jobs created in newly founded firms.

The remaining results shall be briefly summarised. Gibrat's "Law" can be abandoned. Firm growth is highest within firms whose initial size is one employee and lowest in firms whose initial size is more than eight employees. In the West German regions, corporations grow up to 23% faster than non-corporate firms or sole proprietors; in the East German regions up to 14%. Between non-corporate firms and corporations, no significant differences can be found in this part of Germany. With this result, the hypothesis that corporations have the greater growth potentials if they survive cannot be refuted.

Company networks have no significant impact on firm growth. Age and gender (female) of the most important person involved in the start-up are, as a rule, insignificant. One exception is West German firms founded by persons in the age

²⁶ These estimates are not documented due to place restrictions. They are available upon request.

²⁷ The Inverse Mills Ratio has been calculated from the bivariate probit model (see Greene, 1998), because of the significant correlation between subsidisation and information availability.

group of 25–29 years which show a significant higher firm growth than firms founded by younger persons (coefficient 0.078). The Inverse Mills Ratio negatively influences employment growth in the East German firms (see Table 7). Compared to that in West Germany, the counter-moving selection effects described in Section 3.4 seem to offset each other.

6. Conclusions

The objective of this paper is to assess whether start-ups from unemployment perform differently with respect to survival and employment growth. The database was a regional sample of enterprises founded between 1993 and 1995 and contained in the ZEW Firm Start-up Panel. Those start-ups, which involve unemployed people promoted with bridging allowances, were compared to a group of firms which were not aided by this instrument. To take care of the selection effects accompanying the promotion and market entry from unemployment, simultaneous econometric models have been employed. For the growth analysis, a further selection effect which ensues from the fact that only the successful companies survive and grow, was considered.

The results of the econometric analyses indicate that selectivity effects influence firm survival in the East German sample. Start-ups from unemployment in the East German regions have a 6% lower 1-year survival probability. In terms of employment growth, they are no different from non-subsidised firms. In the West German regions, start-ups from unemployment show no worse survival probability and also no lower employment growth than other companies. Bridging allowances therefore had no positive impact on the number of jobs created in the firms founded from unemployment via bridging allowances.

Despite remaining theoretical and econometric problems, the absence of any significant impacts on employment growth and a significant negative impact on firm survival in the group of programme participants raises policy questions. The results do not seem to support the effectiveness and efficiency of bridging allowances as an instrument of creating employment through the promotion of self-employment from unemployment in Germany. One reason for this result is presumably the design of the programme, which seems to support opportunistic or myopic behaviour in the group of unemployed persons who received bridging allowances.

In future work, it will be an important task to improve the understanding of alternative programme designs and also the understanding of the dynamic processes which are initiated by active labour market programmes. For this end, improved data covering longer observation periods are necessary. With such an improved database alternative econometric methods could be employed. For example, non-parametric methods, such as the matching approach, require less

assumptions with respect to the distribution of the error term and model specifications.

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References

- Audretsch, D.B., 1995. *Innovation and Industry Evolution*. MIT-Press, Cambridge.
- Benus, J., Wood, M., Grover, N., 1994. *A Comparative Analysis of the Washington and Massachusetts UI Self-Employment Demonstrations*. Abt Associates, Bethesda.
- Brüderl, J., Preisendörfer, P., Ziegler, R., 1992. Survival chances of newly founded business organisations. *American Sociological Review* 57, 227–241.
- Brüderl, J., Preisendörfer, P., Ziegler, R., 1996. Der Erfolg neugegründeter Betriebe. Eine empirische Studie zu den Chancen und Risiken von Unternehmensgründungen. Duncker and Humblot, Berlin.
- Evans, D., 1987. The relationship between firm growth, size, and age — estimates for 100 manufacturing industries. *Journal of Industrial Economics* 35, 567–581.
- Evans, D.S., Jovanovic, B., 1989. An estimated model of entrepreneurial choice under liquidity constraints. *Journal of Political Economy* 97 (4), 808–827.
- Fritsch, M., 1992. Regional differences in new firm formation: evidence from West Germany. *Regional Studies* 26, 233–241.
- Greene, W.H., 1996. *Marginal Effects in the Bivariate Probit Model*, Working paper no. 96-11 (New York University, Department of Economics, Stern School Business).
- Greene, W.H., 1998. Gender economics courses in liberal arts colleges: further results. *Journal of Economic Education* 29 (4), 291–300.
- Hall, B., 1987. The relationship between firm size and firm growth in the US — manufacturing sector. *The Journal of Industrial Economics* 35, 583–606.
- Harhoff, D., Steil, F., 1997. Die ZEW-Gründungspanels — Konzeptionelle Überlegungen und Analysepotential. In: Harhoff, D. (Ed.), *Unternehmensgründungen — Empirische Analysen für die alten und neuen Bundesländer*. Nomos, Baden-Baden, pp. 11–29.
- Harhoff, D., Stahl, K., Woywode, M., 1998. Legal form, growth and exit of West German firms — empirical results for manufacturing, construction, trade and service industries. *The Journal of Industrial Economics* XLVI (4), 453–488.
- Heckman, J.J., Hotz, V.J., 1989. Choosing among nonexperimental methods for estimating the impact of social programs: the case of manpower training. *Journal of the American Statistical Association* 84, 862–880.
- Heckman, J.J., LaLonde, R., Smith, J.A., 1999. The economics and econometrics of active labor market programs. In: Ashenfelter, O., Card, D. (Eds.), *The Handbook of Labor Economics* vol. III.

- Kaiser, M., Otto, M., 1990. Übergang von Arbeitslosigkeit in berufliche Selbständigkeit — Erste Ergebnisse aus IAB-Verlaufserhebungen bei Überbrückungsgeld-Empfängern nach § 55 a AFG der Jahre 1986–1988. *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung* 23 (2), 284–299.
- Kihlstrom, R.E., Laffont, J.J., 1979. A general equilibrium entrepreneurial theory of firm formation based on risk aversion. *Journal of Political Economy* 87 (4), 719–748.
- Lechner, M., 1999. Earnings and employment effects of continuous off-the-job training in East Germany after unification. *Journal of Business and Economics Statistics* 17, 74–90.
- Lechner, M., Pfeiffer, F., 1993. Planning for self-employment at the beginning of a market economy. Evidence from individual data of East German workers. *Small Business Economics* 5, 111–128.
- Lucas, R.E., 1978. On the size distribution of firms. *Bell Journal of Economics* 9, 508–526.
- Meager, N., 1992. Does unemployment lead to self-employment? *Small Business Economics* 4, 87–103.
- OECD, 1995. Self-employment Programmes for the Unemployed — Papers and Proceedings. OECD, Paris.
- O'Leary, C.J., 1998. Promoting Self Employment among the Unemployed in Hungary and Poland, International Conference on Self-Employment, September 24–26, Burlington, Canada.
- Pfeiffer, F., 1994. Selbständige und abhängige Erwerbstätigkeit. Arbeitsmarkt- und industrieökonomische Perspektiven. Campus, Frankfurt a.M.
- Pfeiffer, F., 1999. Existenzgründerpotenziale unter Arbeitsuchenden. Empirische Evidenz mit den Daten des Mikrozensus. *MittAB* 32 (3), 300–314.
- Pfeiffer, F., Pohlmeier, W., 1992. Income, uncertainty and the probability of self-employment. *Recherche Economiques De Louvain* 58 (3–4), 265–281.
- Pfeiffer, F., Pohlmeier, W. (Eds.), *Qualifikation, Weiterbildung und Arbeitsmarkterfolg*. Nomos, Baden-Baden, 1998.
- Pfeiffer, F., Reize, F., 1998. Business Start-ups by the Unemployed — an Econometric Analysis Based on Firm Data, ZEW-Discussion paper No. 98-38 (ZEW, Mannheim).
- Schultz, T.W., 1981. Investment in entrepreneurial ability. *Scandinavian Journal of Economics* 82, 437–448.
- Schulz, N., 1995. Unternehmensgründungen und Markteintritt. *Physica*, Heidelberg.
- Staber, U., Bögenhold, D., 1993. Self-employment: a study of seventeen OECD countries. *Industrial Relations Journal* 24 (2), 126–137.
- Stiglitz, J.E., Weiss, A., 1981. Credit rationing in markets with imperfect information. *American Economic Review* 71, 393–410.
- Troske, K.R., 1995. The dynamic adjustment process of firm entry and exit in manufacturing, finance, insurance, and real estate. *Journal of Law and Economics* 39 (2), 705–735.
- Wießner, F., 1998. Das Überbrückungsgeld als Instrument der Arbeitspolitik — eine Zwischenbilanz. *MittAB* 31 (1), 123–142.