The KfW/ZEW Start-up Panel: Design and Research Potential

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Abstract: To date there is no data set in Germany which observes firm formations not only on an annual basis, but also continuously over a number of years. Therefore, the Centre for European Economic Research (ZEW), the KfW Bankengruppe and Creditreform are cooperating to form a start-up panel for Germany. In the context of the KfW/ZEW start-up panel, telephone interviews with approximately 6,000 newly founded companies from all industries will be conducted once a year using computer-aided telephone interviews (CATI). In this way, the KfW/ZEW start-up panel will for the first time make it possible to conduct a profound analysis of the temporal development of newly founded companies, including studies of firm survival. This paper describes in detail the design of the KfW/ZEW start-up panel. Its research potential is illustrated using data from the first panel wave conducted in the year 2008. Data access for external researches and data protection issues of the confidential micro data are discussed.

Keywords: *micro data, firm data, panel data, firm foundation, Germany.*

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1 Introduction

To date there is no data set in Germany, which observes firm formations not only on an annual basis but also continuously over a number of years. Extant data sets suffer from various shortcomings that prohibit analyses on newly founded firms over time. Other survey data like the Global Entrepreneurship Monitor (Sternberg 2007) or the KfW Foundation Monitor (Kohn and Spengler 2008b) that are prominent in the field of entrepreneurship research, do not follow a panel design in the narrow sense, that is, they do not track the same individuals over time but rather contact periodically different random samples. The establishment panel of the German Federal Employment Agency (Bellmann et al. 1991) has the disadvantage that it observes firm not before they employ their first employee subject to social insurance contribution. However, many start-ups do not have any employees that are subject to social insurance contributions, at least not during their start-up period, so that a large number of small firms are excluded from the data set. The Mannheim Enterprise Panel (Almus et al. 2000) of the Centre for European Economic Research (ZEW) that is based on the database of Creditreform, Germany's largest credit rating agency, comprises data on start-ups that are regularly updated. However, there are a lot of research questions that cannot be answered using solely the information available in the Mannheim Enterprise Panel. For example, the panel neither includes detailed information on the firms' founders nor any data on innovation activities or the firms' financial structure. Since the latter variable are regarded as decisive for the performance of young firms, the Mannheim Enterprise Panel can only give limited insight into the factors influencing firm growth and survival.

In order to address this gap in the availability of data on newly founded firms, the Centre for European Economic Research (ZEW), the KfW Bankengruppe and Creditreform are cooperating to form a start-up panel for Germany. In the context of the KfW/ZEW start-up panel, telephone interviews with approximately 6,000 newly founded companies from all industries will be conducted once a year ("computer-aided telephone interviews", CATI). In this way, the KfW/ZEW start-up panel for will the first time make it possible to conduct a profound analysis of the temporal development of newly founded companies and their probability of survival or failure.

The first survey was already conducted in spring 2008. The survey collected information on the firm's founders, market entry strategies and innovation, the number and structure of employees and the fluctuation of employees, and the firms' financing structure. The results of the

first survey are published in the first start-up panel report (Gründungspanelreport, Gottschalk et al. 2008).

This paper describes the design and the research potential of the KfW/ZEW start-up panel. The remaining of this paper is organised as follows. In section 2, we first describe in detail the design of the KfW/ZEW start-up panel including the stratification procedure used to build the gross sample. The research potential of the KfW/ZEW start-up panel is illustrated in section 3 using data from the first survey of the panel. The data access for external researches and data protection issues of the confidential micro data are discussed in section 4. Section 5 summarises and gives a preview how the research potential of the start-up panel will be ensured and further improved in the future.

2 Survey design

The starting point for the design of the start-up panel's sample is the database of Creditreform, the largest German credit rating agency. Creditreform collects data in a decentralised way, currently by 130 offices all over Germany but in accordance with a standard data collection procedure. The statistical unit of Creditreform database is the legally independent firm. The database includes, among other things, the name and the address of the firm, legal form, industry classification, foundation date and data regarding insolvency procedures. In this way, Creditreform has the most comprehensive database of German firms at its disposal. It provides its database to the ZEW for research purposes (see Almus et al. 2000 for a detailed description of the database).

The Creditreform database is used by the ZEW research team in order to identify those firms that are suitable for the survey and to draw the random sample of firms that will be contacted in the course of the survey. Three stratification criteria are applied in order to construct the sample of the start-up panel: year of firm formation, sector, and whether or not the firm received financial support from the KfW bank. In each year, a random sample of firms that have been founded in the three years prior to the year of the survey is drawn. Older firms are excluded because we want to identify firm-specific characteristics at the time of firm formation. If we allowed for a larger time lag between the year of firm formation and the first survey, it would probably be difficult to collect precise quantitative data, for instance on the sources of finance used by the business at the time of start-up. Moreover, we are interested in the characteristics of firm founders. However, firms are often affected by changes in ownership when getting mature, precluding to survey comprehensive data on the founder if she is no longer

engaged in her business. Therefore, firms must be three years of age or younger when they are interviewed for the first time.

The KfW/ZEW start-up panel intends to track the development of newly founded firms over the first eight years after firm formation. Firms that already participated in the survey will be contacted during the subsequent years as long as they are eight years of age and younger. Older firms will no longer be contacted. This means, for example, that a firm founded in 2005 will be interviewed for the last time in 2013, firms from the cohort 2006 will finally be contacted in 2014 and so forth. The decision to interview firms until the eighth year after their formation accounts for the fact that is takes at least a period of eight years until firms mature. Previous studies showed that hazard rates (i.e. the probability of market exit during a year, given that the firm was still operating at the beginning of that year) of firms that are eight years of age or younger tend to exceed the comparative value of mature firms. Agarwal and Audretsch (2001) and Prantl (2001) find evidence that hazard rates exhibit a local maximum when firms are seven or eight years of age – at least for some industries depending on the life cycle stage and the technological intensity of the industry. Thus, covering an eight year period the start-up panel enables us to analyse the years when firms are faced with a higher risk of failure before their hazard rates converge towards those of established firms.

The second stratification criterion that is applied to design the sample of the start-up panel is the industry sector the firm is active in. The start-up panel covers almost all industry sectors. The only sectors that are excluded are agriculture, mining and quarrying, electricity, gas and water supply, health care and the public sector. The sample is stratified by ten industrial sectors. Table 1 shows the composition of the ten industrial sectors using the NACE code, revision 1. Four out of ten sectors encompass high-technology industries whereas non-technical industries are related to the remaining six sectors. Start-ups from high-technology industries are expected to play an important role with respect to innovation, structural change and job creation (see, e.g., Birch 1989, Audretsch and Fritsch 2003). Therefore, newly-founded technology-based firms are overrepresented in the start-up panel's sample. Half of the firms included in both the gross sample and the net sample operate in a high-technology industry (see below).

<<< Table 1 near here >>>

The third stratification criterion of the start-up panel is the dummy variable whether or not a firm received financial support from the KfW bank. The KfW bank provides the ZEW with firm names and addresses of those firms and individuals that were supported by the KfW

bank. Based on firm names and addresses, the data set of supported firms is matched with the Creditreform database applying a self-developed heuristic search engine. In this way, firms that received financial support are identified in the Creditreform database. Firms with financial support from the KfW bank are also overrepresented in the start-up panel's sample. In each stratification cell defined first by the year of firm formation and second by the industrial sector, a maximum of 50 percent of the firms in both the gross and the net sample have been financially supported by the KfW bank. The large number of financially supported firms in the sample of the start-up panel enables the researches from the KfW to suggest on how to improve the bank's support programmes and to better adapt them to the needs of young firms.

The target size of each year's net sample, i.e., the number of realised full interviews, totals to an average of 6,000 firms. During the initial years of the start-up panel we plan to realise a smaller number of interviews. In 2008, for instance, 5,500 firms were interviewed, in 2009 we plan to conduct interviews with 5,600 start-ups. The target size of the net sample will gradually increase over time because firms that have been interviewed in the previous years remain in the gross sample. This means that older firms are added to the random sample of start-ups from the three foundation cohorts prior to the year of the survey, leading to an increase in the number of interviews over the next six years.[1] From 2014 onwards, there will be no further increase in the sample size because the first foundation cohort, i.e. that of 2005, will drop out from the sample.

Based on experience from other studies, we expect a response rate (i.e., the share of interviewed firms in all firms that are contacted) of approximately 20 percent for those firms that have not been contacted before. Therefore, the gross sample, i.e. the number of firms drawn from the Creditreform database, has to be five times as high as the planned sample size of the net sample. Table 2 shows the composition of the gross sample drawn for the survey conducted in 2008, differentiated by the stratification criteria industrial sector and year of firm formation. 25,551 firms were drawn from the Creditreform database, of which 21,587 firms were eventually contacted. Finally, 5,508 full interviews were realised, which corresponds to a response rate of just under 26 percent. The composition of the net sample, as before differentiated by industrial sector and year of firm formation, is depicted in Table 3. It should be noted that the number of firms from high-technology manufacturing industries is relatively

[1] The target size of the net sample could be held constant if we reduced the number of planned interviews with newly founded firms to the same amount as we conduct interviews with older firms that already participated in the survey in previous years. However, since we are interested to guarantee a sufficiently high number of interviews with firms that will be founded in future years, we allowed for a gradual increase in the size of the net sample instead.

small in both the gross and the net sample. This mirrors the fact that there is only a small number of newly-founded technology-based manufacturing firms in Germany and consequently in the Creditreform database. Therefore, we decide to include all of these firms that have been recorded by Creditreform in the start-up panel's gross sample to obtain an adequate number of interviews with technology-based manufacturing firms in the panel data set. For the other sectors, the coverage of the population of newly founded firms is somewhat smaller than for high-technology manufacturing industries. Nevertheless, we still collect data on a considerable number of start-ups in these sectors.

<<< Table 2 and Table 3 near here >>>

The surveys of the start-up panel are currently conducted by the Zentrum für Evaluation und Methoden (ZEM) of the University of Bonn. Each interview is introduced by a screening procedure in order to determine whether the contacted firm is eligible for the start-up panel. Firms that are contacted for the first time are excluded from the survey if the interviewee indicates that her firm was not founded in the three year period prior to the year of the survey[2] and if the firm was founded as a de-merger or a subsidiary of another firm. The latter criterion is applied because we are only interested in the development of economically independent firms. Moreover, the interview will not be continued if it is impossible to talk to an interviewee who is engaged in the management of her business. Firms that participated in at least one survey in the past will no longer be interviewed if the firm has been taken over by another company so that the firm is no longer economically independent. The surveys of the start-up panel are carried out using computer-aided telephone interviews (CATI). The average length of an interview amounts to 25 minutes.

3 Research potential

The sampling strategy and the survey design of the KfW/ZEW Start-up panel offer three unique assets for research analyses. First, longitudinal dimension of the panel, which is constructed for least six years, allows for analyses of start-up success in the first years of existence. Start-up success comprises firm survival as a minimum requirement as well as, e. g., sales and employment growth (Brüderl et al. 1992, 2007). While the latter issues can be ad-

[2] In the course of the 2008 survey, just under 24 percent of all contacted firms indicated a foundation year other than 2005, 2006 or 2007. One main reason as to why the foundation year indicated by firm representatives deviates from the foundation year recorded in the Creditreform database is that Creditreform in most cases measures the year of start-up by the date of registration in the trade register, whereas entrepreneurs often regard the year in which they start to prepare the set-up of their new business as the year of firm formation.

dressed by means of corresponding questions in the survey questionnaire, firm survival is intrinsically linked to survey non-response.

Non-surviving firms can in some cases be identified by an identifier in the Creditreform data base. Yet—this measure may be available with a large time lag only—if liquidation is recorded at all. In some other cases, information on liquidated firms may be obtained from survey participants if the telephone number is still in order after firm closure. Third, and most importantly, the KfW/ZEW Start-up panel offers an additional alternative. Starting in the year 2010, the status of firms which do no longer respond to the telephone survey and for which there is no closing identifier in the Creditreform data, will be investigated by members of Creditreform directly. To this end, employees from Creditreform's regional branches will in person visit the addresses of those firms and investigate the status of the firm as well as, if possible, reasons for non-response or non-survival. This approach will clearly spur future analyses of new firms' survival.

Second, the large cross-sectional dimension of the KfW/ZEW Start-up panel opens up the possibility of investigations into the characteristics of start-ups already at an early stage. What is more, the oversampling of start-ups in high-tech sectors of the economy allows for detailed analyses of these firms and comparisons of start-ups from different sectors. This is highly relevant also to policy makers as rare high-tech start-ups are often attributed a high importance for economic growth, employment and competitiveness of the economy.

That said, the firm-level panel follows a different focus than existing population surveys at the personal level, such as the Global Entrepreneurship Monitor (GEM, Sternberg et al. 2007) or the KfW Start-up monitor (*KfW-Gründungsmonitor*, Kohn and Spengler 2008b). The latter data are designed to give a representative picture of start-up activities in the population. By construction, they include only a smaller number of business starters and thus offer a more limited scope for structural analyses of firm-level characteristics.

On the other hand, the broad scope of the KfW/ZEW Start-up panel exceeds existing firm-level panels which cover selective regions and industries only. While, for example, the Start-up panel NRW is restricted to start-ups in the handicrafts sector in the German State of North-Rhine Westphalia (Schulte 2001), the KfW/ZEW Start-up panel is representative for the region of entire Germany and—as explained above—covers the lion's share of all industries.

Third, the extensive questionnaire combines information on the firms as well as personal information about the founders themselves (resp., the team of founders). Therefore, the design and the research potential are similar to those of linked employer-employee data which have

proven a powerful tool in recent years' labor economics (Hamermesh 1999). In addition, the set-up takes account of the particular importance of the entrepreneur in start-ups and young firms (Kohn and Spengler 2008b).

There are two versions of the yearly questionnaire. Firms contacted for the first time are asked a broad range of structural information. Firms contacted repeatedly in subsequent years provide additional information on their development. Basic aspects such as sales and employment numbers, investment and financing behaviour are collected in each year's central questionnaire. In addition, the yearly questionnaires put different emphasis on changing issues.

The following paragraphs illustrate the cross-sectional potential of the KfW/ZEW Start-up panel, drawing on results from the first panel wave conducted in the year 2008 (Gottschalk et al. 2008).

… *to be completed*

4 Data protection and data access

In order to fulfil legal requirements and to ensure that firms agree to take part in our survey – also repeatedly – we have to deal with data protection issues. The necessity to take care of sometimes sensitive information about individual firms is not only based on statutory requirements, but is also a prerequisite for assuring data quality. Hence, it is essential to guarantee confidentiality in order to avoid high numbers of unit and item non-response as well as inexact answers.

At the beginning of each telephone interview we promise the participating firm to maintain confidentiality concerning their stated information and to use the surveyed micro-data for scientific purposes only. The ZEW, which is responsible for the realisation of the questionnaire, and the institute carrying out the telephone interviews are solely able to identify the enterprises taking part in the questionnaire, i.e. they know the addresses of the firms and names of the interviewed persons. Information about the contacted person during the telephone interview is only registered if he or she agrees to this. The contact data are only recorded with the purpose to reach the firms again in the next years and to report about research results which are causally related to the survey.

The two remaining co-operation partners, the KfW and Creditreform, receive the surveyed micro-data from the ZEW without any formal firm identifiers, i.e. firm names, addresses and names of contact persons. This means, the micro-data are formally anonymised. The KfW,

Creditreform as well as the ZEW are not allowed to publish any micro-data. Firm characteristics may be published only in aggregated form, ensuring that a firm cannot be re-identified by a third-party.

These rules guarantee that Creditreform will not match the survey data with their own business or process data, because this would presume a re-identification of firms and implies a non-scientific exploitation of the data. The employees of Creditreform will not apply survey data for credit ratings of the participating firms. In case of the KfW the micro-data will not be used for credit negotiations. The utilisation of the firm records is only allowed for the employees of the KfW, Creditreform and the ZEW, who are involved in associated research projects of the KfW/ZEW start-up panel. That is, even within the institutes data protection has to be fulfilled. Therefore, scientific and data protection standards will in all probability be complied.

In some cases scientific empirical studies demand further external information which is not part of the survey data itself. Therefore, the ZEW may match records from the KfW/ZEW start-up panel with external data using names and addresses of the interviewed firms. This has to be done within a context of a research co-operation project with external partners (usually the owners of external data) in which data protection issues are contractually regulated: Even within the context of such a co-operation, we will not pass on any micro-data concerning individual information about the contact persons of the firms. The external co-operation partners will oblige to fulfil all data protection requirements, too. As the exploitation of the matched firm information is reduced to research objectives due to the co-operation confidentiality is not jeopardised at all.

Scientific-use-files of the cross-sections of the KfW/ZEW start-up panel will be provided for external scientists. These data will be allowed to be used for purely non-commercial basic research only. Teaching purposes will be also excluded. Researchers will have to apply for external use of the scientific-use-files and each project partner (KfW, Creditreform and ZEW) will have to approve it. Afterwards, a contract specifying the research projects and the project members will have to be signed in each case.

Scientific-use-files will be generated for each cross-section of the survey with a delay of three years. Individual information about the contact persons of the firms are not part of those datasets. Furthermore, the data will not be passed on in panel format. Different methods will be used to prevent single firms from being identified. The ZEW has already experienced the anonymisation of firm micro-data in producing scientific-use-files of the Mannheim Innova-

tion Panel (see Janz et al., 2001). In general, the anonymisation techniques used there will be also applicable for this project. For example, variables measured in money amounts are available only as ratios to sales or employees or are made anonymous using the disguised random factor method, i.e. these variables are multiplied by a firm-specific unique random factor. Data sets of firms which could be identified quite easily are completely removed from the data.

For this project some alterations of the referred anonymisation technique will be necessary, because here we deal with very young firms in contrast to those used by Mannheim Innovation Panel. Developing an appropriate method will be the subject of the next years' investigations.

5 Summary and preview

Since 2008, the Centre for European Economic Research (ZEW), the KfW Bankengruppe and Creditreform are cooperating to form a start-up panel for Germany. The KfW/ZEW start-up panel is a unique data set on newly founded firms in Germany. In comparison to other data sets the KfW/ZEW start-up panel has a number of important advantages: First, the statistical unit of the start-up panel is the economically independent firm, whereas several other data sets either include economically dependent branches or firms or regard the person of the entrepreneur as the statistical unit. Second, the start-up panel tracks firms from the first year of their existence. In contrast, most other databases observe firms only after they have exceeded a threshold value either in terms of the number of employees (e.g., the first employee subject to social insurance contributions) or in terms of the volume of sales. Another advantage of the KfW/ZEW start-up panel is the fact that, third, it covers almost all industrial sectors. Due to the relatively target large size of the net sample, the panel, fourth, comprises data on a considerable number of start-ups for each of the ten sectors included in the sample. However, the most important distinction of the start-up from other data sets is that it will track young firms over an eight year period, allowing to analyse changes within a firm during this decisive period of a firm's life. The panel character of the data set further permits the application of panel data econometrics in order to appropriately account for firm specific heterogeneity which is not possible using currently available data sets.

The specific design of the start-up panel forms the basis for its high research potential. In particular, it will enable scientists to examine research questions that require a panel data set. For example, it is still an open question when and in which way firms replace one source of fi-

nance by another (e.g. business angel financing is replaced by venture capital) and how this affects the long-term performance of the firm. Similarly, we do not know when to which extent firms convert workers on temporary loan they are forced to rely on during their start-up years to full-time employees subject to social insurance contributions. It is the primary, long-term objective of the KfW/ZEW start-up panel to build up a data set that is suitable for the analysis of changes like this.

In addition to the panel character of the data set, the start-up panel has also a high research potential due to the comprehensive cross sectional data we survey each year, including research questions related to fields like investment and financing of newly founded firms, innovation and R&D activities, labour demand, or market entry strategies. In order to fully exploit the research potential of the KfW/ZEW start-up panel, we use two different questionnaires for each year's survey. One questionnaire is addressed to whose firms that were founded in the three year period prior to the survey. In this way, we collect detailed information on the characteristics of start-ups. The second questionnaire is targeted to firms that already participated in the survey and has a particular focus on changes within these firms during the previous year. Nonetheless, there is a significant overlap of the two questionnaires that guarantees that we can compare the characteristics of younger firms that are interviewed for the first time and older firms that already participated in at least one survey of the start-up panel in the past.

One of the most important research topics that have been examined only insufficiently in extant literature is the analysis of firm survival. Of course, interviews of the KfW/ZEW start-up panel will only be conducted with existing firms. It is, however, a common problem of all firm surveys that very little in known about the fortune of those firms that could not be contacted in the context of the survey. Some of these firms might have exited from the market. However, firms might also have changed their name, their legal form, their telephone number, they might have been taken over by another firm or they might have moved to another site. Therefore, if a firm cannot be contacted, it will in general be difficult to distinguish between firm death and other events that impede an interview with a particular firm. For this reason, Creditreform will investigate all firms that were interviewed in the course of at least one previous survey and that cannot be contacted in the following years. Due to the decentralised organisational structure, staff members in each of the 130 offices of Creditreform have a profound knowledge of their local market which facilitates to determine the actual status of the firms in question. In this way, we plan to build up a data set that contains reliable information on all firms that ever have been interviewed by the start-up panel as to why they do no longer exist as economically independent firms. In doing so, we will distinguish between forced liq-

uidations (bankruptcies), voluntary liquidations and take-overs by other companies. This will enable us, first, to consider the survival bias when carrying out econometric analyses with data of still existing firms. Second, due to the panel character of our data we will be able to track firms in the years before market exit and to identify the determinants of different types of firm survival.

The research potential of the start-up panel is dependent both on real mortality rates (liquidations) and panel mortality rates of participating firms. If these rates are high, this will reduce the number of observations available in the panel data set, jeopardising the research potential of the start-up panel. Real mortality cannot be influenced by the research team. Instead, the project team works on reducing panel mortality rates. For example, firms that were interviewed receive a summary report of the results in November after the yearly survey. Moreover, we provide sector specific results that are exclusively available for survey participants. Hopefully, these measures will ensure a high participation rate and reduce panel mortality and back our efforts to build up a comprehensive data set with a high potential for research focussing on entrepreneurship and the development of young firms.

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Table 1: Composition of industry sectors covered by the KfW/ZEW start-up panel

	Abbreviation	sector	NACE Rev. 1
		high technology sectors	
1	CETM	superior (cutting edge) technology manufacturing industries	23.30, 24.20, 24.41, 24.61, 29.11, 29.60, 30.02, 31.62, 32.10, 32.20, 33.20, 33.30, 35.30
2	HTM	high technology manufacturing industries	22.33, 24.11, 24.12-4, 24.17, 24.30, 24.42, 24.62-4, 24.66, 29.12-4, 29.31-2, 29.40, 29.52-6, 30.01, 31.10, 31.40, 31.50, 32.30, 33.10, 33.40, 34.10, 34.30, 35.20
3	TIS	technology-intensive services	64.2, 72 (without 72.2), 73.1, 74.2, 74.3
4	software	software supply and consultancy	72.2
		non-technical sectors	
5	NHTM	non-high-tech manufacturing industries	15 – 37 (without sectors 1 + 2)
6	SIS	skill-intensive services (non-high-tech consulting services)	73.2, 74.11-4, 74.4
7	CS	other commercial business services	71.1, 71.2, 71.3, 74.5 – 74.8 (without 74.84.7), 90, 64.1, 61, 62, 60.3, 63.1, 63.2, 63.4
8	PS	consumer-oriented (personal) services	55, 70, 71.4, 92, 93, 80.4, 65-67, 60.1, 60.2, 63.3
9	constr	construction	45
10	sales	wholesale and retail trade (without agents)	50 – 52 (without 51.1)

Source: Grupp and Legler (2000), own classification.

Table 2: Composition of the gross sample 2008 by sector and year of firm foundation

sector	**2005**	**2006**	**2007**	total
superior technology manufacturing	370	346	202	918
high technology manufacturing	707	780	541	2,028
technology-intensive services	2,134	2,102	2,045	6,281
software	1,549	1,265	696	3,510
non-technical manufacturing	900	787	496	2,183
non-technical consulting services	421	375	297	1,093
other business activities	460	427	304	1,191
consumer-oriented services	1,100	1,100	764	2,964
construction	900	864	619	2,383
wholesale and retail trade	1,100	1,100	800	3,000
total	9,641	9,146	6,764	25,551

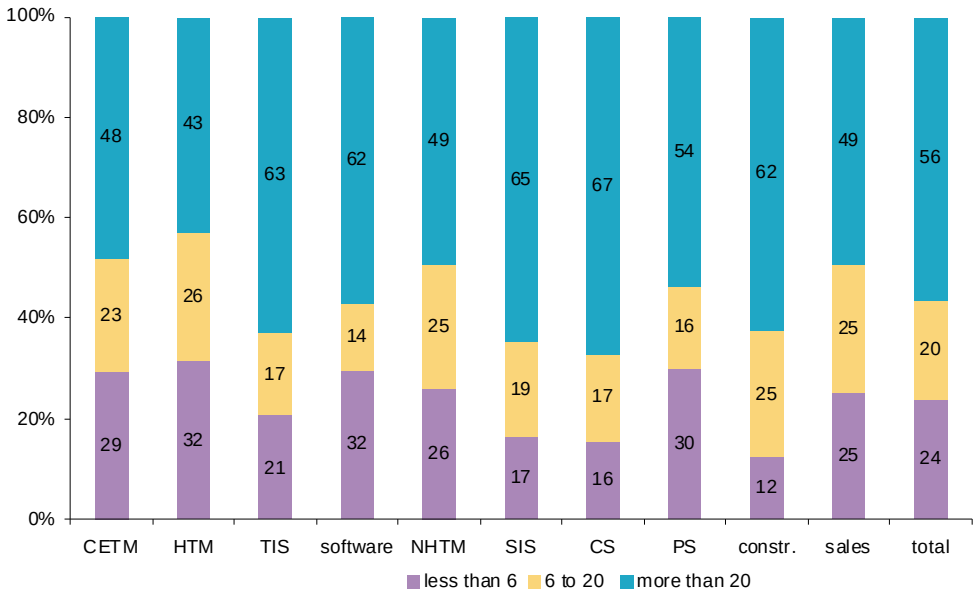
Source: KfW/ZEW start-up panel.

Table 3: Composition of the net sample 2008 by sector and year of firm foundation

sector	**2005**	**2006**	**2007**	total
superior technology manufacturing	71	77	55	203
high technology manufacturing	138	177	120	435
technology-intensive services	398	438	472	1,308
software	283	303	221	807
non-technical manufacturing	170	177	155	502
non-technical consulting services	86	99	87	272
other business activities	93	96	92	281
consumer-oriented services	173	187	176	536
construction	184	188	168	540
wholesale and retail trade	202	225	197	624
total	1,798	1,967	1,743	5,508

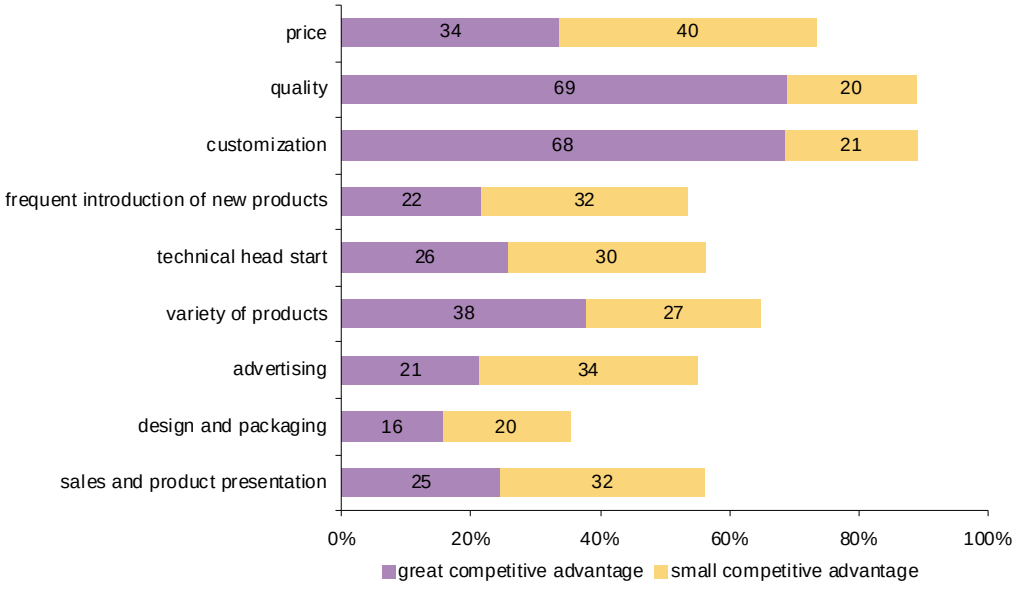
Source: KfW/ZEW start-up panel.

Figure 1: Number of Main Market Competitors, By Industry



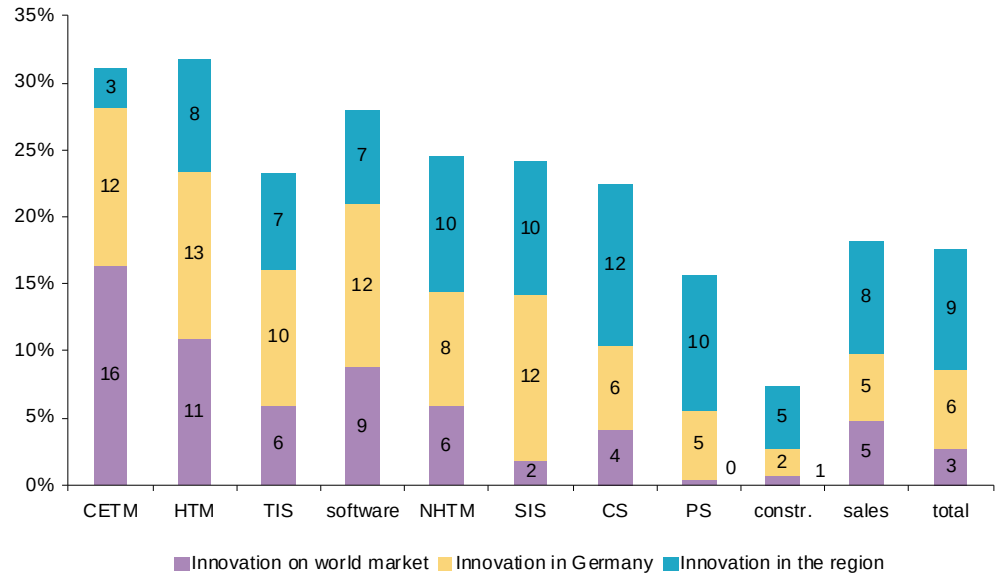
Shares of start-ups in three classes of market size (number of competitors). See table 1 for abbreviations of industry classification. Source: KfW/ZEW Start-up panel, Gottschalk et al. (2008).

Figure 2: Comparative Advantages over Main Competitors



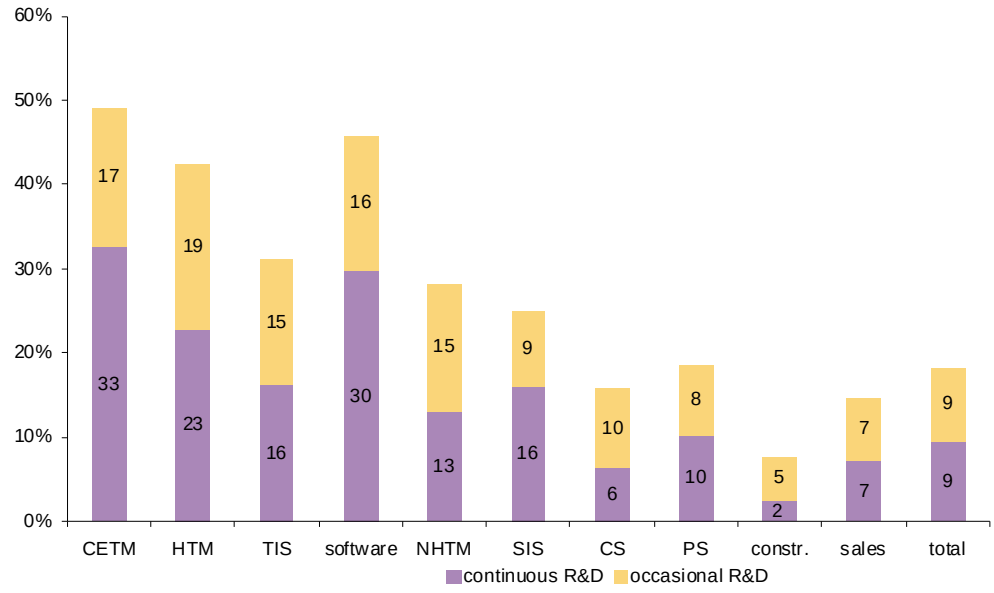
Numbers: shares of start-ups. Source: KfW/ZEW Start-up panel, Gottschalk et al. (2008).

Figure 3: Introduction of Innovations, By Industry



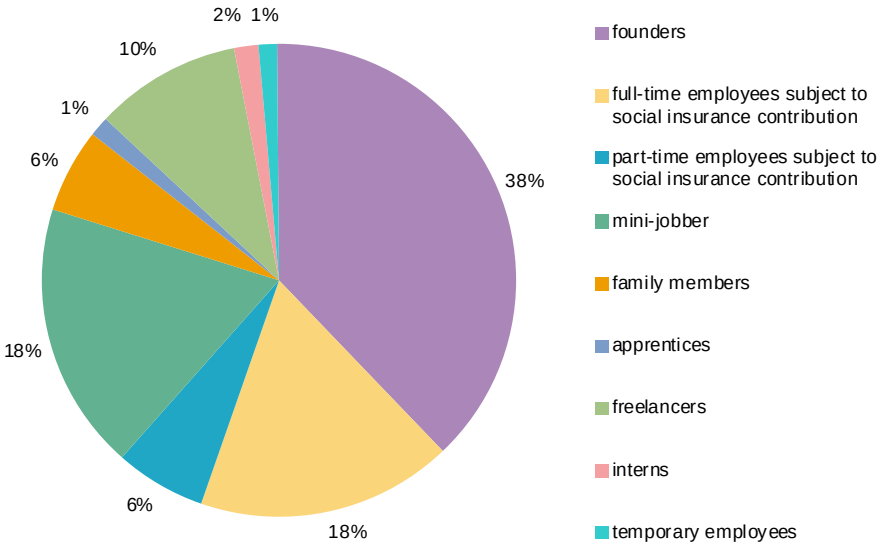
Numbers: shares of start-ups. See table 1 for abbreviations of industry classification. Source: KfW/ZEW Start-up panel, Gottschalk et al. (2008).

Figure 4: Research and Development in Start-Up Firms, By Industry



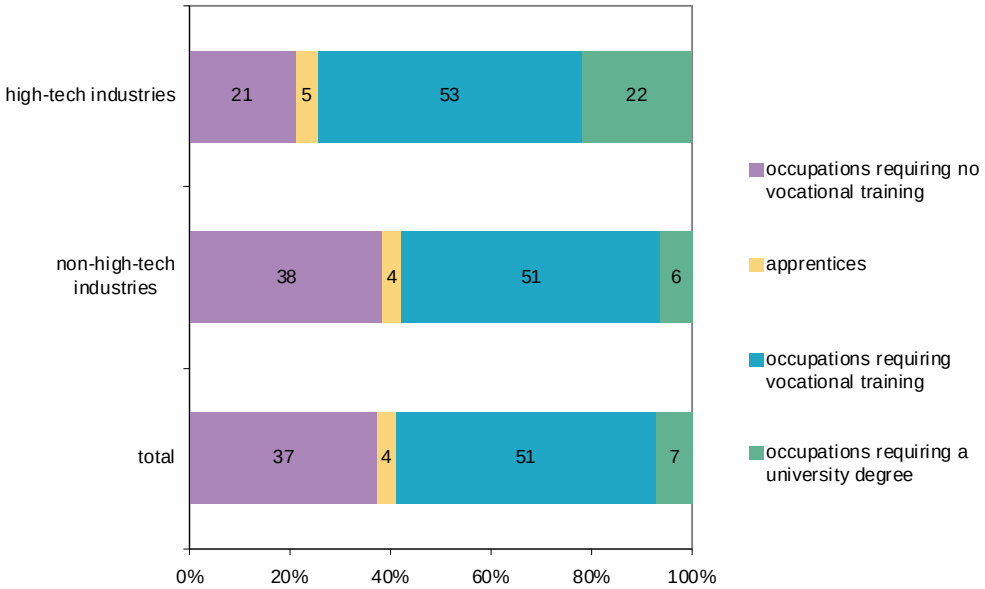
Numbers: shares of start-ups. See table 1 for abbreviations of industry classification. Source: KfW/ZEW Start-up panel, Gottschalk et al. (2008).

Figure 5: Composition of Total Employment at Time of Start-up



Distribution among all persons employed at time of start-up (including founders themselves). Source: KfW/ZEW Start-up panel, Gottschalk et al. (2008).

Figure 6: Skill Structure of Employees in Start-Ups, High-Tech versus Non-High-Tech Firms



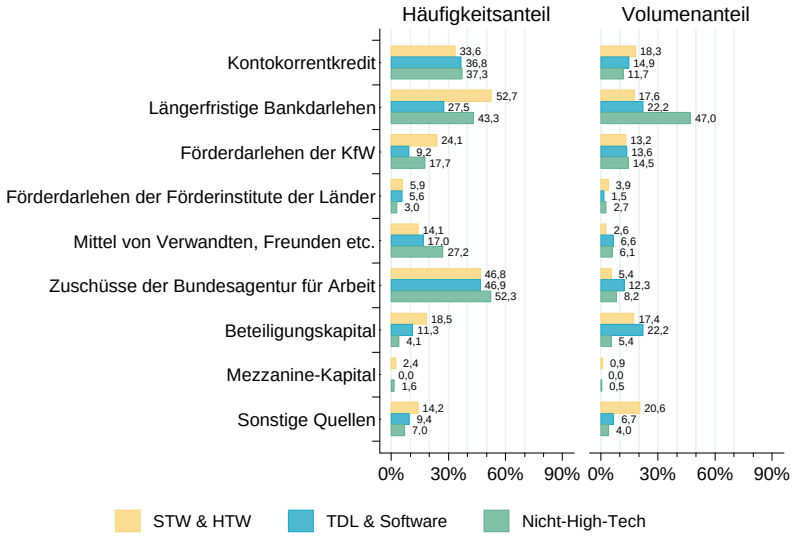
Numbers: shares of start-ups. See table 1 for industry classification. Source: KfW/ZEW Start-up panel, Gottschalk et al. (2008).

Table 4: Financing Amounts in Start-up Year, by Industry

	Cashflow		Founders' Own Sources		External Financing	
	Mean	Median	Mean	Median	Mean	Median
CETM	45.3	24.0	42.7	16.1	64.6	21.2
HTM	31.0	12.4	33.3	11.5	81.5	63.0
TIS	16.9	5.7	15.0	6.0	27.0	13.8
software	24.5	2.7	20.8	4.2	20.3	13.5
NHTM	53.3	12.0	40.0	20.0	48.7	20.0
SIS	26.5	7.6	18.7	7.0	19.1	10.3
CS	21.2	6.8	30.4	10.0	15.5	8.0
PS	41.2	10.5	28.7	11.9	26.7	12.5
constr	13.3	3.8	8.4	3.6	25.0	7.5
sales	33.5	8.0	22.0	11.0	46.3	12.0
total	**30.8**	**7.1**	**24.2**	**9.3**	**31.5**	**11.9**

Numbers: Amounts (thousands of Euros) conditional on use of financing types. Calculation of means based on resp. 99 percentiles. See table 1 for abbreviations of industry classification. Source: KfW/ZEW Start-up panel, Gottschalk et al. (2008).

Figure 7: Frequency and Volume of External Financing Sources



Left column: use of different financing sources (shares of start-ups, multiple answers); frequencies conditional on use of external financing. Right column: volume shares of external financing. Source: KfW/ZEW Start-up panel, Gottschalk et al. (2008).