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New Microeconometric Evidence
from the German Socio-Economic Panel

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ABSTRACT

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If certain start-up characteristics will indicate a business success, knowing such characteristics could generate more successful start-ups and more efficient start-up counseling. Our study will contribute to this by quantifying individual success determinants of freelance start-ups. The data base for the microeconometric analyses of the survival of the first three years is a revised German Socio-Economic Panel (SOEP) for 1992 until 2002, which allows to incorporate institutional, personal and family/household socio-economic variables. We describe and discuss the datawork to achieve compatible information over time within a revised GSOEP and present microeconometric rare events logit, logit and probit results.

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1 Introduction

The question of which factors finally lead to start-up success is one of the central questions of the start-up research. The answer can help start-ups make the 'right' decision and supply instrumental information on economic policy. Even though research on start-ups of the self-employed in general has been done (for an overview see Schulte 2002, Ekkenga, Fritsch and Schmude 1998), the situation for liberal professions (freelancers) is still hardly transparent, a group after all which comprises about 20 percent of all self-employed people and which is particularly relevant for the growing service sector (cf. BMWi 2002). There are findings by Merz and Paic 2004 on setting-up freelance businesses as compared with other self-employed (entrepreneurs), but none on the freelance start-up success as far as we know.

This article is aimed at reducing this research gap by examining the success of freelance start-ups. The central question is: Which parameters/determinants have an influence on the success of freelance start-ups – judged by the probability of survival of a freelance start-up business after three years? The results of our study reveal for the first time empirically relevant insights about the crucial influential parameters for a freelance start-up success in the liberal professions. The Socio-Economic Panel (SOEP) of the German Institute for Economic Research (Deutsches Institut für Wirtschaftsforschung, DIW), which supplies the base data for this study, has been used before for research on 'setting up business' (cf. Pfeiffer 1994, Uhly 2000), but not yet for freelance start-ups. The SOEP is one of the few panel data bases that considers explicitly the group of the liberal professions in the Federal Republic of Germany. Since it is a longitudinal dataset, the SOEP can locate freelance start-ups and trail their further existence. However, the SOEP is subject to some limitations which require a re-working of the dataset. Therefore, the amendment of frequent changes within the group of self-employed people in the SOEP dataset is a central contribution of this study.

About the structure of this study: Against the background of the well-known theoretical approaches in start-up research (for an overview see Preisendörfer 2002, Wippler 1998) we deduce hypotheses for a freelance start-up success. The criterion for measuring success is the survival for at least three years after starting business. From the descriptive results we will deduce features of successful and unsuccessful freelance start-ups. The results of the multivariate analyses quantify the competing

explanatory factors with the help of rare-events logit, logit and probit models. They test the influence the determinants and hypotheses have on a freelance start-up success, in our case the probability of surviving three years after the business foundation. A conclusion stating the characteristic features of successful freelance start-ups will conclude this study.

2 The liberal professions in the Socio-Economic Panel

The Socio-Economic Panel (SOEP) is a micro dataset which repeatedly conducts in a representative survey every person older than 16 years in private households in Germany and which is provided by the German Institute for Economic Research (Deutsches Institut für Wirtschaftsforschung, DIW). Since 1984 these micro data are generated annually by following the same people in Germany (SOEP project group 2004, www.diw.org/soep). The SOEP divides the group of the self-employed into four different categories. These are the farmers, the liberal professions, other self-employed people and assisting family members.

This annual survey thus enables complex analyses in particular about the group of liberal professions over a period of time. However, the SOEP is also subject to some limitations that don't allow theoretically relevant aspects of a freelance start-up success to be analysed. The SOEP ascertains representative individual and household data, but not specific data of those working as self-employed freelancers. As a consequence no differentiation between e.g. original and derivative freelance start-ups can be made in the SOEP.

All in all, the SOEP offers, as compared with other databases, the most comprehensive socio-economic information and analysis possibilities about liberal professions and is in general an excellent data source for research on setting-up freelance businesses.

Criticism about the subdivision and integration of self-employed people in the SOEP relates to the categorisation and structure of the group of self-employed, to the varying conclusion of co-workers and to problems of interpreting the differentiation of the different groups of self-employed people (cf. Pfeiffer 1994, Uhly 2002). Concrete hints to the interpretational problems and the respondents' faulty answer behaviour in the single sub-categories of the self-employed people in the SOEP have led to according corrections that we would like to point out briefly. A high number of

changes over time within the groups of self-employed became apparent, in particular among the freelancers and other self-employed start-ups. The high rate of businesses start-up out of a previous entrepreneurial occupation – especially among the freelance start-ups, but also among entrepreneurial start-ups, who worked as freelancers the year prior to setting up their business – suggests, apart from a possibly faulty encoding, the respondents' faulty answer behaviour or else their inter-pretational problems concerning the sub-categories of the self-employed in the SOEP. The present results lead to the assumption that the respondents' answers regarding their category of self-employment vary, especially between the two sub-categories of the liberal professions and the entrepreneurs.

In order to verify the characteristics of these changes all those respondents, who had answered questions about their freelance activities in at least one year over the research period from 1992 to 2002, were regarded in particular. These people were screened via the sub-category "liberal professions" from within the variable on "professional status of self-employed people" for the overall research period. This way, a total of 969 people were extracted from the SOEP dataset.

We have now compared individually the selected persons' answers' plausibility for each wave in the variable "current status self-employed" with their answers to the control variables about their new self-employed occupation (the kind of change in their work-life), with the occupation classification ISCO-88 (International Standard Classification of Occupations from 1988), the industry according to NACE (Nomen-clature des statistiques des activites economiques de la Communaute Europeenne) and with the classification of occupations according to the Federal Statistical Office (Statistisches Bundesamt, KldB) (SOEP Gruppe 2003, Hartmann and Schütz 2002).

The structure and the specific national characteristics of the KldB make it possible to differentiate most clearly, as compared to other job titles, between a freelance and an entrepreneurial occupation.

The answers concerning the change each selected respondent made are first of all checked for confirmation of this change within self-employment with the answers to the variable about a change in their work-life. If this change is not confirmed by the control variable, the answers are compared with the KldB. If there is no parallel change of the occupation and the job title, the change is a non-plausible change.

Only from an overall perspective on each specific individual check over time and with further control variables can the changes of the kind of occupation within the group of

the self-employed be plausibly comprehended. The check revealed five main different patterns of changes between freelance and entrepreneurial occupation.

(1) Single "critical changes" between a freelance and an entrepreneurial occupation as well as between an entrepreneurial and a freelance occupation (see respondent 1501 in table 1).

(2) Multiple "critical changes" between a freelance and an entrepreneurial occupation as well as between an entrepreneurial and a freelance occupation (161701).

(3) Another pattern was a "critical change" within self-employment from freelancers to entrepreneurs when the number of employees/co-workers increased (51201).

(4) There was also an increased occurrence of problems regarding the answer behaviour of self-employed people in the first year of their self-employment (2204901).

(5) Faulty answers like e.g. from an actor (7225401) or a dentist (2699202) who were coded as farmers.

The respondents are listed according to the person's number assigned by the SOEP on the left side of table 1. They are followed from left to right by the variable "current status self-employed" for each of the waves from I to S. The variables about the "current status self-employed" listed in chronological order next to each other have the following sub-categories with the numbers adopted from the SOEP terminology: farmers ([1] Land.), liberal professions ([2] FB), self-employed with up to 9 co-workers ([3] Selb.), self-employed with more than 9 co-workers ([4] Selb.), assisting family members ([5] Mith.).[2] Table 1 gives an overview of selected examples of faulty answers over each considered wave between 1992 and 2002.

Table 1: Overview of faulty changes in the SOEP from 1992 to 2002

All 969 selected people were checked and corrected in the SOEP with the help of the control variables. An example will explain this method of decoding[3]. The SOEP respondent number 1501 in table 1 is almost consistently working as a freelancer in the research period from 1992 to 2002 (2). The year 1997 is the only exception where that respondent is self-employed with up to nine co-workers (4). The person number 1501 was then checked for possibly taking up a new self-employed occupation. Such an answer was not given in the control variable. Next the person

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[2] From 2000 onward the sub-categories of the variable "current status self-employed" were extended to comprise six sub-categories.
[3] For an exhaustive documentation of the correction of the SOEP dataset see Paic 2005.

was checked for a change of job title. Here too, no change of the title of job the person does could be ascertained in the KldB. Since this person was working as an apothecary according to the KldB over each wave and gave "freelance occupation" as an answer in ten out of eleven observed waves, the answer "self-employed" in 1997 was a faulty answer or a wrong coding. The answer made in the year 1997 was therefore decoded (corrected) from self-employed (4) to freelance (2).

A total of 811 changes in the dataset were made for 465 respondents, i.e. almost 52 percent of all selected and checked respondents were affected by a correction. After the correction the number of freelancers decreases by almost a third from 969 people to now a total of 688 people. The number of start-ups from self-employment, which was exorbitantly high in the original SOEP dataset, was significantly reduced by correcting the wrong answers. The corrected SOEP dataset now contains a significantly more realistic picture of the liberal professions and therefore of the freelance start-up activities.

3 Theoretical approaches of a freelance start-up success

There is no unified theoretical approach to entrepreneurial start-ups on a microeconomic level, neither in the German nor in the international start-up research (Schulte 2002; Merz 2001a, b; Brüderl, Preisendörfer and Ziegler 1996). An important criterion for choosing suitable theoretical approaches is the incorporation of statements after the time the business was set up as well as statements about the personality of the business founder. The most widespread theoretical approaches in start-up research are: people-related approaches, institutional economics, industrial economics and organisational ecology (cf. Schulte 2002).

The focus of our study is on the success of freelance start-ups. The deduction of the hypotheses about freelance start-up success is based on the one hand on theoretical models of person-related approaches – e.g. push and pull factors (cf. Shapeo and Sokol 1982, Plaschka 1986) – as well as on more specific approaches like the human capital theory (Becker 1975; Mincer 1970, 1974) which proved to be a successful predictor in many analyses (cf. e.g. Dworschak 1986, Doré and Clar 1997, Hamilton 2000). On the other hand, the industrial economics approach of an incomplete competition (cf. Bester 2002) is applied as well. From the theoretical models and the so far existing empirical results we deduce five main hypothesis about freelance start-up success.

According to findings of previous studies made by Simon (2002) and Heil (1997) about the interrelation between the geographical background and start-up success, originating from the East German states does have a negative impact on the start-up survival probability. This thesis seems plausible enough against the background of weaker East German economic power and thus a lower demand of services from the liberal professions.

> H1 success: A geographical origin from the East German states has a negative impact on the probability of a freelance start-up survival.

According to the general human capital theory, start-ups with a higher professional education tend to have better chances of succeeding. Based on the productivity effects of the human capital theory it is assumed that a higher school and professional education as well as years of work experience have a positive impact on the chance of freelance survival. Such a positive impact on the start-up survival chances is generally expected from a university degree as well. But some studies on self-employed start-up success doubt this impact (cf. for an overview Brüderl, Preisendörfer and Ziegler 1996). However, for the liberal professions, which are marked in particular by their highly qualified and intellectual characteristics, a university degree is assumed to have a positive impact on the chances of surviving. These assumption about success deduced from the human-capital theory proved to be very productive in previous studies (cf. Simon 2002; Brüderl, Preisendörfer and Ziegler 1996).

> H2 success: A higher general human capital has a positive impact on the probability of a freelance start-up survival.

The assumptions of the specific human capital theory can be applied to the freelance start-up success in form of better survival chances. According to them, freelance start-ups with previous knowledge of being self-employed, as superiors and with the specific knowledge about their business and industry, should have a better chance of surviving. These assumptions are also supported by previous empirical studies (cf. Brüderl, Preisendörfer, Ziegler 1996, Wanzenböck 1998). We will apply these particular human capital assumptions even more specifically to the freelance start-up success. Previous work experience in an area characteristic and close to the liberal professions should increase the chances of the freelance start-up survival. More concretely, positive effects on the survival probability are expected from previous self-employed or employed occupations. Occupations that are untypical for the liberal

professions, such as civil services in general, should have a negative impact. These theoretical assumptions about the freelance success from the productivity and selection effects of the human capital theory as well as the assumptions about freelance peculiarities can be expanded by a psychological moment from the theoretical approach of the push and pull factors. The theory model of the push and pull factors supposes that previously unemployed start-ups have a lower chance of surviving. Their "escape" into self-employment is a sign that they did not want to set up a business according to this theory. They are supposed to lack the entrepreneurial spirit and to have the short-term motive of securing their income, which is detrimental to a lasting business success. Applying this theory to the freelance start-up success, one would assume a low survival probability for start-ups previously unemployed or not employed. These assumptions are in turn supported by the human capital theory that postulates a decreasing productivity effect the greater the time since the work knowledge and experience were gathered, i.e. the "depreciation effect on human capital" (cf. Paic 2005).

> H3 success: A higher specific human capital has a positive impact on the probability of a freelance start-up survival.

A reliable indicator for the start-up success should be the income from a freelance occupation. A higher income as early as the first year after having started the freelance business should improve the prospects of success for a three-year survival. Start-ups with a higher income, unlike start-ups with a lower income, should be considerably better able to survive the start-up phase, since they can be said to have had initial success and since they have a greater financial scope and therefore better prospects (cf. Paic 2005).

> H4 success: A higher income from a freelance occupation in the first years after having started the business has a positive impact on the probability of a freelance start-up survival.

The assumptions of an incomplete competition are particularly suitable for representing the freelance peculiarities of the associated professions ("Kammerberufe"). Although the intensity with which each of the liberal associated professions interfere with the freelance competition varies, the barriers restricting the access to the market can be assumed to have a general effect on the probability of survival of a freelance start-up. A greater chance of surviving is assumed for start-ups in the associated liberal professions than for start-ups in the non-associated professions. Whereas the non-associated freelance start-ups are exposed to the

market, start-ups of associated liberal professions are under certain protective - mechanisms asserted by the associations that protect them from free competitors (cf. Paic 2005).

> H5 success: Start-ups within the associated liberal professions have a positive impact on the probability of a freelance start-up survival.

4 Descriptive results about a freelance start-up success

The SOEP dataset contains no direct information about the length of time freelance start-ups survive. These pieces of information have to be extracted from each wave and worked into a new variable, which provides the information as to whether a new freelance business has survived for three years or not. Figure 1 shows the time relations of the endogenous and exogenous variables in the three-year-survival model. The independent variables at the point of time t2 are generated under the assumption of the structuring influence of the so-called "imprinting factors" at the beginning of a freelance start-up (cf. Hannan and Freeman 1977, 1989). If someone sets up a freelance business at the point in time t1 and is still working as a freelancer at the point in time t4, it means the start-up business survived three years (and gets code 1 in the success variable). If the person is no longer working as a freelancer at the point in time t4, it means the start-up business did not survive (and gets code 0 in the success variable).

Figure 1: Time relation of the endogenous and exogenous variables in the model

Because of the relatively low sample number of freelance start-ups in the SOEP, we use a pooled data model for the analysis. The structure of the representation of the descriptive results follows the different theoretical approaches and the hypothesis deduced from them about a freelance start-up success. The empirical relevance of the stated hypothesis will be undertaken at the end by presenting multivariate results. We have recourse to data from a total of 139 start-ups from originally 232 freelance start-ups in the three-year research model.

We present central results about the freelance start-ups as a whole as well as about the group of surviving and non-surviving founders. In addition, the results are interpreted in their class-specific development. The survival quota allow initial conclusions to be drawn about the peculiarities and characteristics of successful

freelance start-ups. Within all descriptive tables the column of the survivors, i.e. the successful start-ups, also contains the information of a univariate t-test comparing the share of the survivors among the start-ups of one group (e.g. age group up to 29 years) with the quota of the survivors among the start-ups of all other groups of one category (e.g. age category with all its age groups; $\alpha<10\%$: *, $\alpha<5\%$:**, $\alpha<1\%$:***).

Table 2 shows the **results of the person-related evaluation.** The majority of all start-ups is given within the **age-group** of the 30 to 39-year-olds (significant on a 10% level). Overall, the two age-groups of those between 30 and 39 years of age and those of the 40 to 49-year-olds feature the highest survival quotas. Apparently, middle age – against the background of the general human capital – as well as work experience have a positive effect on a three-year survival.

Table 2: Person-related results about the three-year survival of start-up freelancers. SOEP pooled 1992-2002

More than 60 percent of the researched freelance start-ups were undertaken by members of the male **gender**. Seen from the perspective of each gender, it shows that 50 percent of all female start-ups still exist after three years, whereas the survival quota for men is 57 percent. Overall, the share of surviving male start-ups is clearly above the average of all surviving start-ups: successful freelance start-ups are marked by a significantly higher share of male start-ups.

As regards the **geographical perspective**, the West German start-ups dominate numerically as opposed to the East German ones. The percentage of East German start-ups of all freelance start-ups corresponds roughly to the percentage of East Germans in the total population of the Federal Republic of Germany. Out of the 29 East German start-ups 19 survive the first three years as compared with 105 West German start-ups and 56 survivors. Seen from the class-specific perspective, 53 percent of the West German start-ups survive the first three years. The percentage of East German surviving freelancers is 65.5 percent. In the end, the percentage of start-ups still existing after three years in East Germany is (not significant) higher than in West Germany, contrary to our hypothetical assumption (H1).

With regard to the **actual weekly working hours** (cf. table 3) from the business-related results, the class of working hours "up to 10 hours", with a share of 30.6 percent for all start-ups, and the highest class of working hours of "more than 40 hours", with a share of 41 percent, stand out (highly significant). The high percentage

of start-ups in the lowest class of working hours suggests a relatively high number of freelance start-ups as a second occupation. Those freelance start-ups who work 40 hours a week in their first start-up year have a survival quota of over 70 percent. Thus a high working hour intensity is positively correlated with a start-up success.

83 people finally responded their personal **monthly gross income from a freelance occupation** in the SOEP. As table 3 shows the income class "more than one thousand € to two thousand €" with a share of more than 27 percent is the most frequent class of all freelance start-ups, followed by the highest income class. Overall, the group of surviving start-ups is clearly marked by an income of more than one thousand € to two thousand € in their first year. Compared with all start-ups, start-ups with an income of under one thousand € and in the middle income class (two thousand € to four thousand €) have a lower start-up quota. All in all, a higher income at the time of founding the start-up proves to have a higher survival quota. The t-test, reveals significant differences between the lowest income class and all other classes and supports our second hypothesis of a higher survival probability with a higher income in the first year after the start-up foundation.

There is a tendency for all freelance start-ups to be **"rather content" with their work** in their first year. About 58 percent of those who are "rather discontent" with their work and a good 72 percent of those who are "rather content" belong to the group of the surviving freelance start-ups. An accordingly inverse picture can be found for the group of the non-surviving start-ups.

Further business-related descriptive results regard the kind of profession and the being an associated profession (table 3). With a share of 38.8 percent the liberal artistic, journalistic and pedagogical professions form the biggest group of freelancers, dominating numerically the group of surviving as well as the group of the non-surviving freelance start-ups.

Table 3: Business-related results about the three-year existence of start-ups from the pooled data 1992-2002

In a category-specific comparison the highest three-year survival rate can be found for the liberal medical professions – 75 percent survive. They are followed by the liberal legal and commercial consultancy professions with a survival quota of 61.5 percent. The group of the liberal technical and scientific professions, with a share of survivors of 51.6 percent, and the group of the liberal artistic, journalistic and

pedagogical professions, with a share of survivors of only 40.7 percent, are both below the average. All in all, the liberal medical professions have the highest survival quota of all professional groups by far, followed by the liberal legal and commercial consultancy professions. The group of non-surviving freelance start-ups is clearly dominated by the liberal artistic, journalistic and pedagogical professions. Their share of non-surviving start-ups is almost 60 percent.

The above categorisation of each of the freelance professional groups as well as the differentiation according to **associated professions** and non-associated professions was retrospectively added to the SOEP for the overall research period.

Almost three quarters of the freelance start-ups observed in the SOEP are non-associated professions. Accordingly, the non-associated professions dominate numerically the group of survivors as well as the non-survivors. The percentage of the surviving freelance start-ups within the associated professions is higher than for the non-associated professions. This finding is congruent with the assumption that associated professions have better chances of survival in their protected market surrounding than the non-associated professions.

The **findings about the human capital** are summarised in table 4. As their **highest school degree** level A is dominant with 71 percent of all freelance star-ups (significance level 5%). Other school degrees are rather rare among the freelance start-ups (cf. table 4). From a class-specific perspective, the 71 percent of A-level graduates in the group of the non-survivors stand out as quite a high percentage. Only five start-ups come from secondary school or higher education school and three have a different degree. It is remarkable that the majority of freelance start-ups with one of these degrees usually survive.

Table 4: Findings about the human capital and the three-year existence of start-ups from pooled data 1992-2002

Concerning specific **job training**, over 38 of the freelance start-ups have had vocational training. The group of apprenticeship dominates with a share of almost 63 percent. The group-specific perspective shows that 62.5 percent of the freelance start-ups with an apprenticeship survive the first three years of their freelance occupation, which is clearly dominant if we neglect the small number of respective start-ups in the other groups.

All in all, each group - except for the apprenticeship - is very small because around 62 percent of start-ups have no specific job training at all. Still, the findings, in particular those about job trainings in the health services (significant at 5%) and the technical colleges, are of interest. All freelance start-ups with one of these two job trainings survive. Yet again, the sample number for the research period with 7 and 3 respondents respectively is extremely low.

A **university degree** is dominant among freelance start-ups: 67.9 percent of all freelance start-ups have such a university degree. With a university and non-university degree 55 respective 58 percent survive the first three years. Contrary to the assumptions made in the second hypothesis, the descriptive results show a slightly more favourable picture with regard to the freelance start-up survival chances for a start-up without a university degree. This is in some contrast to our hypothesis.

Though many freelance occupations require a university degree, this finding suggest some particular influence of the non-academic freelancers and is congruent with the dominant A-level school degree discussed above.

From the corrected SOEP dataset the **employment status** prior to the freelance start-up was generated in order to estimate the influence specific human capital has on the chances of survival. The biggest class is the one with start-ups who were previously employed comprising 45.3 percent. Compared with the average survival quota of all freelance start-ups, especially a previous occupation as an employee or as self-employed as well as a previous un-employment have a positive effect on the survival quota. Those people who were un-employed before setting up their freelance business are in the lead. 72.2 percent of all previously unemployed start-ups survived the first three years of their freelance occupation. 60.3 percent of the previously employed and 56.3 percent of the previously unemployed start-ups survived.

Previous employment: A previous non-employment has a negative effect on the survival quota; or in other words: a previous employment increases the start-up success (significant at 1%). However, interpreting the findings one has to bear in mind that only the bigger groups are those of the employed with 63 people and of the non-working with 33 people. The sample numbers in the other groups are below 20 people. Overall, a positive effect on the survival quota showed for previously employed and self-employed occupations as well as for a previous unemployment, which, of course, is preceded by an employment. A negative effect occurs if a start-up person was not working the year before starting their business.

The results support our assumptions of the third hypothesis about the specific human capital.

5 Multivariate analysis about freelance start-up success

The multivariate analyses – compared to the univariate descriptive analyses above – have the advantage to show the significance of the competing explanatory patterns. The corrected SOEP dataset 1992 to 2002 serves as our database. The SOEP-dataset, however, does not supply comprehensive information on all 139 start-ups. In particular details on the income from freelance occupations as well as the subjective influential parameters are increasingly missing. For this reason we have information on 104 freelance start-ups at our disposal for the multivariate analysis.

As already apparent in the above descriptive section of our analysis, not all groups are always covered with different non-response items. Therefore not all the determinates presented in the descriptive part can be integrated into the multivariate model about the freelance start-up success. The sample numbers of freelance start-ups in each wave drop down to sometimes less than 10 people. For this reason a longitudinal, paneleconometric approach is not appropriate; for our multivariate analysis with competing explanatory pattern we therefore use a pooled dataset.

The dependent variable in the research model about the start-up success is the dichotomous variable of a freelance start-up that survives three years. The analysis relies on a logit, probit and rare-events logit model (relogit) that quantifies the explanatory factors for the probability of surviving three years, i.e. the thus assessed start-up success. In principle, the logit and probit estimates reveal similar results for the area of the middling success quota, but will be different with regard to very small respective very large survival quotas. To handle these marginal quotas in an appropriate way we also use a rare-events-logit model, which was especially developed for small success quotas of certain groups (King and Zeng 2001a, 2001b; for its usage in start-up research see also Wagner 2004).

The **very overall result of the multivariate analysis** based on table 5: all three methods for all explanatory variables show a similar picture with regard to the sign and the significance of the coefficients and – together with a significant overall goodness of fit - underlines the robustness of our further single results.

An older **age** has a positive impact on the three-year-survival probability of a freelance start-up. All models show a significant non-linear effect of the age on the probability of surviving. The results support our human capital theory assumptions (H 2) of a higher age against a background of general longer working experiences.

The start-up person's **gender** has no significant impact on the probability of a three year surviving. Thus, gender plays no significant role in the freelance start-up success, other factors are dominant.

Table 5: Results of the logit, probit and relogit models on the basis of the pooled corrected SOEP data 1992-2002

Neither did the **micro-social background** of the start-up's **marital status** prove to have a significant impact. As compared with the reference of the "single start-up persons" the "married start-up persons" display a minus sign in the coefficient, but they have neither in the logit and probit model nor in the relogit model a nearly significant value.

The **number of children** as a further family indicator and possible indicator for a particular work performance in the freelance start-up household has no significant impact on the survival probability either. This is the results all three estimate models arrive at.

Surprisingly, according to the descriptive results about the **geographical origin of the start-ups**, no significant values showed up in the logit, probit or in the relogit model. As compared to West German start-ups no significant influence was found for the survival probability of East German start-ups. This means the fifth hypotheses about the freelance start-up success, according to which originating from the East German states has a negative impact on the survival probability because of assumed lower productivity, was not confirmed. In contrast, the survival quota is higher in East German start-ups, however not significantly different to West Germany.

Regarding **general human capital** the parameters of the school degree and the university degree were examined. Among the highest school degrees no significant impact on the three-year survival probability was seen for the freelance start-ups with O-levels or A-levels as compared to a secondary school degree.

A university degree shows in all models a significantly negative impact on the survival probability. Even though the significance value decreases slightly in the relogit model, this finding is surprising against the background of the freelance features and

characteristics. For a great number of liberal professions a university degree is a prerequisite for their job. But then again, a very high survival quota for freelancers without a university degree but with training in the health service or a college degree, for instance, instead became already apparent in the descriptive results. Their high survival quota as well as the generally low sample number of 104 start-ups have to be taken into consideration when interpreting these results. Therefore, human capital theory assumptions from the second hypothesis about school and university degrees cannot be confirmed.

The **specific human capital** examines the impact of a previous occupational activity on the survival probability of a freelance start-up. As compared with the reference of the employees all other influential parameters feature a minus sign in the coefficient. This is true for the results of all three estimates. Thus, active occupational experiences and acquired skills support a start-up success of freelancers in particular. Note that according to the former occupation as a civil servant and as an entrepreneur the probit and logit model have significant (in contrast to the relogit model) negative coefficients showing a diminishing probability to survive when working before in these occupational status. Altogether, the third hypothesis about the positive impact the specific human capital has on the start-up success is confirmed.

The **business-related background** of the freelance start-ups tests the influence the starting income, the associated professions and the professional group have on the three-year survival probability.

The **personal gross income** of freelance start-ups in their first year after setting up their business has no significant overall impact on their survival probability.[4] The result is slightly surprising against the background of the descriptively gained insights about the survival quotas (albeit with inconsistent results for a growing income). Therefore, the fourth hypotheses, according to which a higher income increases the survival probability of start-ups, is not confirmed, a first year (income) success is not a reliable predictor for surviving the first three years.

As regards the **professional groups** clearly differing results show. As compared with the liberal artistic, pedagogical and journalistic professions (reference group) the liberal medical professions (1%significance level) and the liberal technical and scientific professions (5% significance level) have a positive impact on the three-year

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[4] Missing values were replaced by the arithmetic mean value.

survival probability of a start-up. The results fo the medical professions are highly significant in the probit and logit model and still significant at a 5% level by the relogit model. Only the liberal legal and commercial consultancy professions show no significance, as compared to the liberal artistic, pedagogical and journalistic professions. Here it is in particular the positive impact the liberal medical professions have on the chances of surviving that stand out.

Marginal effects

Since the applied discrete choice models are non-linear models the sign of coefficients indicates in a right way the final impact on the survival probability, but not its direct marginal contribution, the direct impact of a changing explanatory variable to the success probability. Thus table 5 in addition shows the marginal probability effect (and its rank) if one explanatory variable is changed infinitesimal (at the mean of the other variables). Note, that the marginal effect for a dummy variable is computed as the probability with dummy=1 minus the probability with dummy=0 to consider the non-infinitesimal metric. The result supported again by all three models: The start-up success measured as the probability to survive the first three years is first of all influenced by an a active labour force participation with its acquired skills and working experiences just before the start-up period followed by a non-university degree as the highest general human capital indicator, the (non-linear) experience indicated by age and the business related background as the type of liberal profession.

6 Conclusion

This paper for the first time of its kind examined the freelance start-up success with the corrected data of the Socio-Economic Panel for the years 1992 to 2002. The descriptive and multivariate analysis allowed us to locate some central influential parameters for a three-year survival after the business foundation.

The **descriptive results** reveal the following characteristics of a typical successful start-up freelancer. The age of surviving start-ups is between 30 and 49 years. Men show a clearly higher survival rate compared to women. Start-ups with single marital status survive more frequently. Likewise start-ups in East Germany survive the first three years more often. Start-ups with weekly working hours of more than 40 hours feature a high survival rate. Freelance start-ups with an income from their freelance occupation of more than one thousand € in their first year show very good survival quotas. Start-ups in the liberal medical professions and of the liberal legal and

commercial consultancy professions also have a high survival rate. An apprenticeship or a qualifying job training increases the chances of surviving. Those start-ups who acquired working skills as employed or self-employed or unemployed (connected with their former occupation) before they set up their business show a high survival rate. Table 6 shows the central features of freelance start-up from the descriptive results.

Table 6: Overview of central features and characteristics of freelance start-ups from the descriptive results

The descriptive results focus on a respective univariate explanation. In the multivariate analysis, however, competing explanatory factors have to prove their significance. Our **multivariate analysis** estimated the influential parameters of a three-year survival probability with the help of the logit, probit and relogit model, to handle marginal survival quotas in an appropriate manner.

Altogether, the similar results of all three model types concerning the sign and significance of a respective coefficient underlines the robustness of our single results. The start-up success measured as the probability to survive the first three years is first of all influenced by an active labour force participation with its acquired skills and working experiences just before the start-up period (rank 1), followed by a non-university degree as the highest general human capital indicator (rank 2), a general (non-linear) experience indicated by age (rank 3) and the business related background (rank 4) as the type of liberal profession in the group of the liberal medical professions and the liberal technical and scientific professions.

Table 7 gives an overview of the central multivariate results of the survival probability. Our assumptions in the first hypothesis were not confirmed. We assumed the East German states to have a negative impact on the survival probability of a freelance start-up as opposed to the West German states. But the descriptive results showed a higher survival quota among the East German start-ups, which found, however, no significant confirmation in the multivariate results. In the end, the interrelation of a weaker East German economic productivity and a lower freelance start-up success is not true. Apparently, the freelance start-ups adjusted to the market surrounding so that there are no significant differences between East and West as regards the three-year survival.

Neither can the multivariate results support the second hypothesis about the start-ups' general human capital. On the contrary, a university degree proved to have a negative impact. This is due to freelance occupations that don't require a university degree and that offer excellent chances of survival especially in the area of the liberal medical professions.

The assumption about the specific human capital in the third hypothesis was confirmed. A negative survival probability showed for previously not active in the labour force start-ups against the background of decreasing productivity effects in connection with the pull-factors. In connection with the assumptions of the push and pull model as well as the decreasing productivity effects from a previous non-employment showed a significant negative impact on the survival probability of freelance start-ups. The negative impact of a previous occupation – compared to an occupation as an employee - as a civil servant was likewise confirmed in the logit and probit model. A negative impact compared to a former occupation as an employee became apparent for the previously self-employed in the results of both estimators.

The generally positive postulation of a previous self-employed occupation is not reflected in our research with regard to freelance start-ups. It is rather specific knowledge for the future freelance occupation that is decisive.

Table 7: Overview of the positive and negative significant influential parameters on the freelance survival probability.

The fourth hypothesis is rejected according to which a higher income in the first start-up year increases the survival probability. No overall significance showed. But in the end it is not implausible, considering that especially in the initial phase the resource expenditure for the start-up is particularly high and taken into account by many start-ups. Apparently, start-ups tide themselves over during the first year, a higher first year income thus is in some contrast to y further success.

Neither had the associated professions significant impact on the start-up success. The assumption of better survival chances compared with the non-associated professions, due to a market surrounding protected by the associations, was not confirmed by the multivariate results. Yet the results of each professional group point out some correlations. Thus, the non-associated artistic, pedagogical and journalistic professions in particular have a lower survival probability as opposed to the other groups. When it comes to start-ups in the liberal medical professions of both non-

associated and associated professions, the differentiation between associated and non-associated professions proved to have no impact. The varying intensity of regulations in the various associated professions also speaks for the missing impact.

All in all, despite the use of a pooled data model, the data material of the present study is not sufficient, in particular for evaluating individual sub-groups due to a low sample number of freelance start-ups. Desirable further aspects and analysis, about a university degree and about the associated professions for example, are therefore not possible, yet desirable. Analysing the survival probabilities for a longer period of five or eight years would make sense. Although the limited sample number again restricts the possibilities of the analysis. We did not present the five-year survival probabilities because the sample number of freelance start-ups in the five-year survival model dropped to 90 people. For the same reason we also refrained from doing a panel-econometric estimate. Since the sample number of the liberal professions in the SOEP panel increases heavily with the recent high-income random sample survey, one should be able to use a panel-econometric evaluation method for future waves.

The insights gained here about the influential parameters of a three-year survival probability are a first step in researching the freelance start-up success. The research model about freelance start-up success, with the gauge of a three-year survival, was able to reveal initial interesting and significant results and influential parameters. By way of our new results which require some quite time-consuming reworking of the data we would particularly like to encourage the use of the Socio-Economic Panel for further studies in the field start-up research.

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Table 1: Overview of faulty changes in the SOEP from 1992 to 2002

year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
RESP. NO	ip4802	jp4802	Kp5102	lp4302	mp4102	np3502	op3502	pp3802	qp3602	rp4002	sp4002
1501	2	2	2	2	2	4	2	2	2	2	2
51201	4	3	**2**	**2**	**2**	4	.	.	.	.	.
161701	3	2	3	3	2	3	4	4	4	4	4
162401	3	2	3	3	3	5	5	4	2	2	2
2160202	.	.	.	.	.	.	4	2	4	4	4
2204901	.	.	.	.	.	.	2	4	3	-2	3
2205001	.	.	.	.	.	.	2	4	4	.	3
7225401	.	.	.	2	2	4	3	2	1	.	2

Source: Self-made table. SOEP 1992-2002. Legend: 2=independent, 3=self-empl., 4= self-empl., 5= self-empl., 6=ass. family member, -2= missing answers, dot = no answer.

Table 2: Person-related results about the three-year survival of start-up freelancers. SOEP pooled 1992-2002

Person-related micro-social surroundings	Start-ups in total n	%	survived n/t-test	s-%	%	not survived n	%
Age							
up to 29 years	13	9.7	4 *	30.8	5.3	9	15.3
30 to 39 years	63	47	38	60.3	50.7	25	42.4
40 to 49 years	31	23.1	21	67.7	28,0	10	16.9
50 to 59 years	16	11.9	8	50.0	10.7	8	13.6
60 years onwards	11	8.2	4	36.4	5.3	7	11.9
Total	**134**	**100**	**75**	**56.0**	**100**	**59**	**100**
Gender							
male	83	59.7	47	56.6	62.7	36	56.3
female	56	40.3	28	50.0	37.3	28	43.8
Total	**139**	**100**	**75**	**54.0**	**100**	**64**	**100**
Marital status							
married, co-habiting	75	56	38	50.7	50.7	37	62.7
married, separated	3	2.2	3	100	4.0	0	0
single	47	35.1	27	57.4	36.0	20	33.9
divorced	8	6	6	75.0	8.0	2	3.4
widowed	1	0.7	1	100	1.3	0	0
Total	**134**	**100**	**75**	**56.0**	**100**	**59**	**100**
Number of children in hh							
no children	75	56	38	50.7	50.7	37	62.7
one child	27	20.1	19 *	70.4	25.3	8	13.6
two children	21	15.7	12	57.1	16.0	9	15.3
more than two children	11	8.2	6	54.5	8.0	5	8.5
Total	**134**	**100**	**75**	**56.0**	**100**	**59**	**100**
Area							
East Germany	29	21.6	19	65.5	25.3	10	16.9
West Germany	105	78.4	56	53.3	74.7	49	83.1
Total	**134**	**100**	**75**	**56.0**	**100**	**59**	**100**

s-%: Survival quota: survived/start-ups in total (in %)
Source: SOEP 1992-2002. Own calculations. pooled data. unweighted data;
t-test significances: α<10%: *, α<5%:**, α<1%:***.

Table 3: Business-related results about the three-year existence of start-ups from the pooled data 1992-2002

Business-related background	Start-ups in total		survived			not survived	
	n	%	n/ t-test	s-%	%	n	%
Working hours per week							
up to 10 hours	41	30.6	12 ***	29.3	16.0	29	49.2
over 10 to 20 hours	10	7.5	7	70.0	9.3	3	5.1
over 20 to 30 hours	10	7.5	6	60.0	8.0	4	6.8
over 30 to 40 hours	18	13.4	11	61.1	14.7	7	11.9
more than 40 hours	55	41	39 ***	70.9	52.0	16	27.1
total	**134**	**100**	**75**	**56.0**	**100**	**59**	**100**
pers. gross income							
up to 1,000 €	16	19,3	8 ***	50.0	12,3	8	44,4
over 1,000 € to 2,000 €	23	27,7	20	87.0	30,8	3	16,7
over 2,000 € to 3,000 €	15	18,1	12	80.0	18,5	3	16,7
over 3,000 € to 4,000 €	10	12,0	9	90.0	13,8	1	5,6
over 4,000 €	19	22,9	16	84.2	24,6	3	16,7
total	**83**	**100**	**65**	**78.3**	**100**	**18**	**100**
contentment with work							
rather discontent	48	44	28	58.3	38.9	20	54.1
rather content	61	56	44	72.1	61.1	17	45.9
total	**109**	**100**	**72**	**66.1**	**100**	**37**	**100**
Profession							
liberal medical prof.	28	20.1	21 **	75.0	28.0	7	10.9
liberal legal/commercial	26	18.7	16	61.5	21.3	10	15.6
liberal tec./scientific	31	22.3	16	51.6	21.3	15	23.4
liberal artistic/journ./pedag.	54	38.8	22 **	40.7	29.3	32	50.0
total	**139**	**100**	**75**	**54.0**	**100**	**64**	**100**
Associated professions							
non-associated profession	103	74.1	53	51.5	70.7	50	78.1
associated profession	36	25.9	22	61.1	29.3	14	21.9
total	**139**	**100**	**75**	**54.0**	**100**	**64**	**100**

s-%: Survival quota: survived/start-ups in total (in %)
Source: SOEP 1992-2002. Own calculations. pooled data. unweighted data;
t-test significances: α<10%: *, α<5%:**, α<1%:***.

Table 4: Findings about the human capital and the three-year existence of start-ups from pooled data 1992-2002

Human capital	start-ups total		Survived			not survived	
	n	%	n/t-test	s-%	%	n	%
School degree							
Secondary school	5	3.8	4	80.0	5.4	1	1.8
O-levels/GCSE	25	19.1	18 *	72.0	24.3	7	12.3
Higher education/GNVQ	5	3.8	4	80.0	5.4	1	1.8
A-levels	93	71	46 **	49.5	62.2	47	82.5
Other degrees	3	2.3	2	66.7	2.7	1	1.8
Total	**131**	**100**	**74**	**56.5**	**100**	**57**	**100**
Job training							
Apprenticeship	32	62.7	20	62.5	57.1	12	75.0
Vocational school	2	3.9	1	50.0	2.9	1	6.3
Health service	7	13.7	7 **	100	20.0	0	0.0
Technical college	3	5.9	3	100	8.6	0	0.0
Civil service training	3	5.9	2	66.7	5.7	1	6.3
Other training	4	7.8	2	50.0	5.7	2	12.5
Total	**51**	**100**	**35**	**68.6**	**100**	**16**	**100**
University degree							
University degree	91	67.9	50	54.9	66.7	41	69.5
No university degree	43	32.1	25	58.1	33.3	18	30.5
Total	**134**	**100**	**75**	**56.0**	**100**	**59**	**100**
Employment status prior to start-up							
Non-working	33	23.7	10 ***	30.3	13.3	23	35.9
Unemployed	18	12.9	13 *	72.2	17.3	5	7.8
(Blue-collar) worker	3	2.2	2	66.7	2.7	1	1.6
Employed	63	45.3	38	60.3	50.7	25	39.1
Civil servant	6	4.3	3	50.0	4.0	3	4.7
Self-employed	16	11.5	9	56.3	12.0	7	10.9
Total	**139**	**100**	**75**	**54.0**	**100**	**64**	**100**

s-%: Survival quota: survived/start-ups in total (in %)

Source: SOEP 1992-2002. Own calculations. pooled data. unweighted data;

t-test significances: α<10%: *, α<5%:**, α<1%:***.

Table 5: Results of the logit, probit and relogit models on the basis of the pooled corrected SOEP data 1992-2002

Theoretical approach/model	Relogit		Logit				Probit			
Endogenous variable: start-up survived three years (yes/no)	Coefficient	P-value	Coefficient	P-value	marginal effect	rank	Coefficient	P-value	marginal effect	rank
Constant	-12.663	0.009	-16.597	.014	-2.766		-10.243	.009	-3.000	
Person-related approaches										
Age	**.711***	**.002**	**.999***	**.004**	**.166**	**15**	**.609***	**.003**	**.178**	**15**
Age2	**-.803***	**.002**	**-1.131***	**.004**	**-.189**	**8**	**-.691***	**.003**	**-.202**	**8**
Women	.187	.722	.241	.722	.040	11	.183	.652	.053	12
Micro-social background										
Marital status (ref: single)										
married, cohabitating	-.646	.249	-.898	.195	-.150	9	-.510	.207	-.149	9
Number of children in hh	.181	.483	.265	.368	.044	12	.142	.408	.042	11
East Germany	.704	.264	1.011	.199	.143	13	.560	.223	.144	13
General human capital										
School degree (ref: secondary)										
O-levels	-.805	.495	-1.258	.351	-.252	5	-.696	.362	-.233	6
A-levels	-.956	.353	-1.515	.206	-.215	7	-.871	.196	-.221	7
University degree	**-1.318****	**.034**	**-1.828****	**.028**	**-.252**	**6**	**-1.080****	**.028**	**-.265**	**5**
Specific human capital										
Work before start-up (ref: empl.)										
not working	**-2.385****	**.094**	**-3.655****	**.036**	**-.723**	**1**	**-2.161****	**.030**	**-.72**	**1**
unemployed	-1.48	.348	-2.364	.198	-.508	3	-1.392	.181	-.494	3
civil servant	-1.843	.169	**-2.879***	**.066**	**-.455**	**4**	**-1.686***	**.055**	**-.457**	**4**
entrepreneur	-2.019	.181	**-3.102***	**.066**	**-.648**	**2**	**-1.813***	**.056**	**-.633**	**2**
Business-related background										
Contentment with work	.606	.210	.838	.166	.145	14	.502	.163	.151	14
Personal gross income (10⁴)	1.164	.358	1.748	.289	0.291	19	1.049	.272	.307	19
Associated profession	.485	.412	-.651	.445	-.117	10	-.366	.475	-.114	10
Profession (ref. artist)										
liberal medical professions	**2.146****	**.015**	**3.037***	**.004**	**.325**	**18**	**1.803***	**.003**	**.341**	**18**
liberal legal/commercial	1.026	.193	1.370	.182	.180	16	.800	.191	.191	16
Liberal techn./scientific	**1.612****	**.030**	**2.215****	**.0180**	**.248**	**17**	**1.314****	**.016**	**.265**	**17**
LR-statistic chi square				37.983				38.521		
p-value/n				.006/104				.005/104		

Note: Marginal effect for dummy variable is P|1 - P|0; Source: SOEP 1992-2002. Own calculations, t-test significances: α<10%: *, α<5%:**, α<1%:***.

Table 6: Overview of central features and characteristics of freelance start-ups from the descriptive results

Characteristics	Successful freelance start-ups ...
Person-related	
	are between 40 and 49 years old are predominantly male are most of them singles
Business-related	
	work more than 40 hours a week have an income of more than one thousand € a month come from the liberal medical professions or the liberal legal and commercial consultancy professions come from the associated professions
Geography-related	
	come from East Germany
Human capital	
	have accomplished an apprenticeship/job training were previously employed, self-employed or unemployed

Source: SOEP 1992 – 2002. Self-made table.

Table 7: Overview of the positive and negative significant influential parameters on the freelance survival probability.

Kind of influence	Significant influential parameters on the freelance start-up probability
	Specific human capital: start-up out of an active labour force participation (rank 1) General human capital: lower than university degree (rank 2) Higher age: general experience (rank 3) Type of liberal profession engaged (rank 4)
Positive	
	higher age start-up out of an active occupation liberal medical profession compared to arts profession liberal technical and scientific profession compared to arts profession
Negative	
	a university degree a previous non-employment compared to employees a previous occupation as civil servant compared to employees a previous self-employed occupation compared to employees

Source: SOEP 1992 to 2002. Self-made table.

Figure 1: Time correlation of the endogenous and exogenous variables in the model

pgen	92	93	94	95	96	97	98	99	00	01	02
started in 1993	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10

t4: last survival period

t2: information in the first year of the start-up (e.g. working hours, professional group, income, human capital, micro-social surrounding ...

t1: year of freelance start-up foundation

t0: information on start-up variables and on previous professional occupations