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Who Chooses to Become an Entrepreneur?  
The Jacks-of-all-Trades in Social and Human Capital

Uschi Backes-Gellner and Petra Moog

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# **WHO CHOOSES TO BECOME AN ENTREPRENEUR? THE JACKS-OF-ALL-TRADES IN SOCIAL AND HUMAN CAPITAL**

**BY USCHI BACKES-GELLNER\* AND PETRA MOOG\*\***

## **ABSTRACT**

This paper studies willingness to become an entrepreneur depending on an individual's composition of human and social capital. Our theoretical analysis is an extension of Lazear's (2005) jack-of-all-trades theory. Our primary implication is that it is not individuals with a higher level of human or social capital but rather individuals with a more balanced portfolio of human and social capital that are more willing than others to become entrepreneurs. We use survey data from a sample of more than 2000 German students to test this hypothesis and find that the jacks-of-all-trades, i.e. the more balanced individuals are more likely to become entrepreneurs. On the other hand, the Masters-in-One, i.e. the specialists, are better off being an employee and rightly prefer to be so.

**Keywords:** Entrepreneurship, Jack-of-all-trades theory, Social capital

\*Prof. Dr. Uschi Backes-Gellner, ISU – Institute for Strategy and Business Economics, Universität Zürich, Plattenstrasse 14, CH – 8032 Zürich. Tel.: +41 44 6344280, Fax: +41 44 6344370, email: [ubg@isu.unizh.ch](mailto:ubg@isu.unizh.ch)

\*\*Prof. Dr. Petra Moog, Departement for Business Succession, Universität Siegen, Hölderlinstraße 3, D – 57086 Siegen, Tel.: +49 271 7403012, Fax: +49 271 7403013, email: [p.moog@uni-siegen.de](mailto:p.moog@uni-siegen.de)

## INTRODUCTION

Entrepreneurship is often seen not only as the cornerstone of innovation, growth and social welfare (e.g. Acs and Audretsch 2003; Blanchflower 2000) but also as the key to higher individual income and well-being (e.g. Benz and Frey 2004; Kawaguchi 2002; Hamilton 2000). However, most people never consider starting their own business but rather restrict their occupational choice to being an employee. In the US and most European countries the rate of entrepreneurs in the workforce has stabilized at around 10 percent (max. 15 percent) over recent decades (Thurik 2003; OECD 2000 and 2005). The rate of academics becoming entrepreneurs is even lower than average, regardless of the fact that entrepreneurs with an academic background are in general more successful (Acs 2006; Moog 2004). This raises two questions: what determines whether a person decides to become an entrepreneur and what individual characteristics drive occupational choice?

Human capital is one of the factors often mentioned, assuming that a larger stock of human capital encourages entrepreneurship (e.g. Davidsson and Honig 2003). However, this cannot be sufficient to explain the observed differences in entrepreneurship rates; in fact, it raises new puzzles. On the one hand, many entrepreneurs have rather low levels of human capital, such as the owner of a street-corner fish and chips shop, which clearly does not fit with a traditional human capital explanation of highly skilled individuals becoming entrepreneurs. And on the other hand, we observe that the educational level in general has constantly increased over recent decades but that the entrepreneurship rate has not risen in the same way, which is also inconsistent with a traditional human capital explanation.

This paper is based on a novel theory with an alternative view of how human capital affects entrepreneurship, namely the jack-of-all-trades theory on entrepreneurship introduced by Lazear (2005). What is novel in Lazear's approach is that it is not the *level* of any single skill that matters for the decision to become an entrepreneur but the *balance of skills* in an individual's portfolio of skills. Entrepreneurs differ from employees in that they must be

sufficiently well versed in a whole set of entrepreneurial skills. Some entrepreneurs may have balanced skills on rather low levels (such as the owner of the small fish and chips stand) and others on rather high levels (such as the founder of a bio-chemical start-up in Silicon Valley). Employees, on the other hand, are specialists who work for others and whose talents are combined with those of other specialists (employees) by the entrepreneurs. Therefore, entrepreneurs are above all characterized by *balanced* skills (on any level) whereas employees are characterized by specialized skills portfolios. So far, only a few studies have tested the theory and provided preliminary supporting evidence: Lazear (2004 and 2005) shows in a cross-sectional study, that MBA students from Stanford who took classes in more study fields and who play more different roles in the labor market are more likely to become an entrepreneur rather than an employee. Wagner (2003) replicates Lazear's research with German data and confirms his results. Baumol (2004) with US and international data and Astebro (2006) with Canadian data give further evidence that the accumulation of a balanced skill-mix fosters becoming an entrepreneur. However, Silva (2006) with Italian panel data finds that differences in the spread of knowledge across different fields do not increase the probability of becoming an entrepreneur.

We think a second factor that is important for entrepreneurship is *social* capital. However, the relation between the *decision to become* an entrepreneur and social capital has hardly been studied, despite the fact that much empirical research shows that social capital is key to the *success* of a start-up once it has been founded (Uzzi 1997). In this paper we build on this research, arguing further that social capital, firstly, is as important as human capital for the *decision* to become an entrepreneur, and secondly, that the jack-of-all-trades explanation applies not only to human capital but also to social capital.

Thus, our study has three innovative features. First, we provide empirical evidence showing that differences in willingness to become an entrepreneur depend on differences in *portfolios*

of *human capital* and thereby present a novel test of Lazear's jack-of-all-trades theory. Second, we extend Lazear's idea and look not only at the portfolio of human capital (traditional skills as measured by education and job experience or university skills) but also at the *portfolio of social capital* in order to explain willingness to become an entrepreneur. Thirdly, we use advanced proxies to measure the balance of a portfolio (of human and/or social capital). With *new operationalizations* we try to obtain a more accurate measure of the balance in a portfolio and thereby of its effect on entrepreneurship. Using a sample of more than 2000 German university students we are fourthly able to show that it is indeed the balance and not so much the level of skills that matters and find that a balanced human capital portfolio is not sufficient to foster entrepreneurship if it is not complemented by a balanced portfolio of social capital.

## **ENTREPRENEURS: THE JACK-OFF-ALL-TRADES**

### **BALANCING HUMAN AND SOCIAL CAPITAL**

According to Lazear's jack-of-all-trades model, entrepreneurs – in order to run a business successfully - must have knowledge in a large number of business areas, from professional knowledge, to knowledge of production management, accounting, marketing and more. If one of the areas is missing, the start-up cannot be successful. The *weakest* factor determines the overall success of the start-up. Thus a specialist, i.e. a person who is very strong in one dimension, would not be well advised to become an entrepreneur because his income would be limited by his weakest skill and he would waste potential earnings that he could earn as an employee given his strongest skills. On the other hand, an individual with a balanced portfolio has all the prerequisites to run a business and gains an entrepreneurial premium on his skills

by using them as an entrepreneur (Lazear 2005). Thus, the income-generating functions can be described as follows

$$(1) \text{ Employee or Specialist Income } Y_S = \max[x_1, x_2]$$

$$(2) \text{ Entrepreneurial Income } Y_E = \lambda \min[x_1, x_2];$$

$x_1, x_2$  are two different skills and  $\lambda$  is the value of entrepreneurial activities in a given market segment. Individuals choose to become an entrepreneur if and only if

$$(3) \lambda \min[x_1, x_2] > \max[x_1, x_2]$$

Thus, the more balanced individuals' skills are,<sup>1</sup> the more it pays to become an entrepreneur to cash in on the entrepreneurial premium  $\lambda$  and the higher is the probability of becoming an entrepreneur.<sup>2</sup> Lazear further shows that the entrepreneurial premium  $\lambda$  is larger in market segments where a larger number of skills ( $x_1, x_2, x_3, x_4, \dots$ ) are needed. Thus, the larger the number of (balanced) skills a person holds, the more likely he or she is to become an entrepreneur because it pays more to do so. Finally, Lazear (2002, 651) shows that individuals who (plan to) become entrepreneurs should have more balanced investment strategies to keep or improve their skill balance.

This gives us two empirically testable hypotheses:

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<sup>1</sup> As Lazear (2005) shows, there are two possible interpretations of a positive correlation between balance of skills and the likelihood of becoming an entrepreneur. The first is that the breadth of skill acquisitions reflects an endowed balance of skills, i.e. those with broader talents are able to acquire more skills. The second is that the correlation reflects conscious investment, i.e. those who plan to become entrepreneurs decide to acquire the varied background necessary to start a business and therefore choose to learn a broader set of skills. Both are equally consistent with the jack-of-all-trades theory.

<sup>2</sup> The argument would not change structurally if income is substituted by other non-monetary returns that may result from entrepreneurial activities, such as job satisfaction or self determination, which is often claimed to be important for the decision to become an entrepreneur (cf. e.g. Hamilton 2000 or Benz and Frey 2004).

*Hypothesis 1: The more balanced an individual's skills are, the higher is his willingness to become an entrepreneur.*

*Hypothesis 2: The broader an individual's skills portfolio, the higher is his willingness to become an entrepreneur.*

However, we argue that if Lazear's jack-of-all-trades model is correct, it should not only apply to human capital but also to other individual production factors such as social capital.<sup>3</sup> Despite the fact that a large number of studies have provided evidence for the importance of social capital for the success of start-ups, the role of social capital in the *decision* to become an entrepreneur has not been studied in depth – unlike the frequent studies on the impact of human capital on the decision to become an entrepreneur. We argue in this paper that social capital is just as important for a person's willingness to start a business.<sup>4</sup>

Social capital in this paper is defined as an individual characteristic, as in Coleman (1990) and especially in Glaeser, Laibson and Sacerdote (2002). Glaeser et al. (2002) were among the first to theoretically analyze the formation of social capital on an individual level and study individual investment decisions by adapting the traditional models of investment in human and physical capital, thus their definition fits perfectly with the theoretical considerations of this paper. Thus, to quantify the elements of private forms of social capital we think of social capital as a private good by measuring the size of the personal network (similar to Nielsen 2003).

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<sup>3</sup> Anderson and Miller (2003), Weisz and Vassolo (2002), or Stuart et al. (1999) for example find that the social capital endowment of single entrepreneurs or a team of entrepreneurs strongly affects the success and the development of their start-up. Helliwell and Putnam (1999) or Brush (1992) also find social capital important for early start-up success.

<sup>4</sup> Moreover, we argue that social capital plays an important role in the decision to become self-employed because entrepreneurship is a socio-economic process and a social activity. Economic elements of entrepreneurship are conducted in a social web of parents and friends, potential customers/suppliers, lenders and employees, former colleagues and bosses, etc. (Anderson and Miller 2003). This follows from Greve and Salaff (2003), Carter et al. (2001), and Aldrich (1999), who state that social capital influences both the idea for a start-up and the actual founding.

Our analysis then takes the analogy between social and human capital one step further and adapts Lazear's jack-of-all-trades theory to explain the impact of social capital on willingness to become an entrepreneur. We hypothesize that it is not so much the level of social contacts, but more the balance between different types of social contact (social and business relationships) that matters for a person's willingness to become an entrepreneur. Not the one-sided tend to become entrepreneurs but the social all-rounders, i.e. those who have a balanced variety of different types of relationships (social capital) plus a balanced portfolio of skills (human capital, as already argued in Lazear 2005). Knowing people of all kinds from different business and personal spheres helps to collect and screen the relevant knowledge, get to know the relevant market players, and start relational contracts or gain sufficient credit, all of which are indispensable production factors for a start-up. This leads to two more empirically testable hypotheses:

*Hypothesis 3: The more balanced an individual's social contacts are, the higher is his willingness to become an entrepreneur.*

*Hypothesis 4: The broader an individual's portfolios of social contact are, the higher is his willingness to become an entrepreneur.*

Since we assume that for human and social capital Lazear's balanced portfolio argument is valid, we consequently argue that it should apply to the combination of human and social capital as well. Not those specialized in skills (e.g. computer nerds) nor those specialized in social contacts (e.g. social butterflies) are the ones who become entrepreneurs, but those who have a balance of both. This leads to our fifth and last hypothesis:

*Hypothesis 5: The more balanced an individual's (overall) portfolio of human and social capital, the higher is /her willingness to become an entrepreneur.*

*Hypothesis 6: The broader an individual's overall portfolio, the higher is his willingness to become an entrepreneur.*

## **DATA, VARIABLES AND METHODS**

We test our hypotheses with a rich and representative dataset of German university students from all major study fields. It is the so-called Cologne Founder Study<sup>5</sup> that consists of a sample of students from the five universities in the metropolitan area of Cologne, which is representative of other metropolitan university areas in Germany. The survey included 5,520 students (undergraduate, graduate and PhD level); for the set of variables that are needed here it contains 2,007 students. The data were collected using a standardized 6 page questionnaire sent out by mail in 1999/2000. We have detailed data on our respondents' social capital, their formal education and their previous work experience (employed and self-employed spells). We also have a number of socio-economic variables like gender or family status and we have answers to questions that should help to identify personal characteristics, such as an individual's degree of risk aversion or preference for self-determined work, etc. (for a full list of relevant variables cf. Table 2 - Variable Definition and Descriptive Statistics). In the following, we explain our dependent variable "willingness to become an entrepreneur" and our innovative explanatory variables for a balanced (or *un*-balanced) portfolio, i.e. "balance of skills", "balance of social capital" and "overall (un-)balance".

### **Dependent Variable: Willingness to Become an Entrepreneur**

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<sup>5</sup> The student database is, along with another company database, part of a project supported by the German Research Foundation (DFG). We thank the DFG for this financial support. We also express our thanks to the Deutsche Ausgleichsbank (DtA -SME Bank), the Stadtsparkasse Köln (Cologne Savings Bank) and the City of Cologne for further financial support. For more information on the project and the survey see Backes-Gellner, Demirer and Moog (2000).

As the *dependent variable* we use an individual's *willingness to become an entrepreneur* measured on a four point ordinal scale. We are aware that willingness is only a first step on someone's way to becoming an entrepreneur and that not all of those who ever thought of becoming an entrepreneur will finally become one (Reynolds 2007; Blanchflower 2004; Bessau/Klumpp/Lenk 2001). However, many empirical studies have shown that actual entrepreneurs are a sub-sample of so called nascent entrepreneurs.<sup>6</sup>

Thus, someone who has never thought of becoming an entrepreneur is almost certain not to become an entrepreneur and someone who thought about becoming an entrepreneur at an early stage of his or her occupational decision-making has a significantly higher probability of becoming an entrepreneur later on in their career. In effect, an individual's early *entrepreneurial intention* (or as we name it here, *an individual's willingness*) is the single best predictor for starting a business later on (see for example Villanueva et al. 2005, Krueger and Reilly 2000, or Isfan and Moog 2003). Hence our results concerning the willingness to become an entrepreneur can be interpreted as an upper bound of the probability of becoming an entrepreneur. Finally, using "willingness to become an entrepreneur" instead of "actually being an entrepreneur" as a dependent variable has the advantage that our data are not faced with typical selection biases, of which the non-survivor bias is the most important in entrepreneurship research. Instead, in our study we start with an unbiased sample of students and know the ex ante willingness to become an entrepreneur or an employee for all of them.

Our variable "WILLINGNESS" to become an entrepreneur is an ordered multinomial variable with four values: "1 = *I never thought of becoming an entrepreneur*", "2 = *I have considered becoming an entrepreneur, but I do not have an actual business idea*", "3 = *I thought of*

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6 A nascent entrepreneur is defined in a first step as an individual who has entrepreneurial ability and who might consider becoming an entrepreneur. The second level includes the existence of an affinity towards entrepreneurship and a first idea. This defines a potential entrepreneur who is still not involved in a start-up (see Reitan 1997; Aculai et al. 2004). From this group nascent entrepreneurs in the narrower sense emerge, being those individuals who are actively engaged in the start-up process, but who have not yet achieved an actual firm founding (Reynolds and Wight 1997; Reynolds 2000).

*becoming an entrepreneur and I have a specific business idea, but I have not taken any steps towards a realization*”, “4 = *I thought of becoming entrepreneur, I have a specific business idea and I have already taken first steps towards the realization of this business idea (such as talking to first customers, writing a business plan, searching for financial support, or founding the start-up already)*”. Thus, the more developed a person’s business idea is, the higher the value of the variable “WILLINGNESS”. However, we do not consider the variable to be metric but only rank ordered, which means we will use ordered probit regressions to test our hypotheses later on.

Table 1 displays the distribution of the willingness to become an entrepreneur in our data set. Almost 36% of the students never thought of the possibility of becoming an entrepreneur, 21% considered self-employment as a future option but did not have a business idea, 28% had a business idea but were not actively pursuing the start-up process, and finally, 16% had a business idea and were already actively involved in the start-up process. Thus, there is substantial variation in the willingness to become an entrepreneur and the question is whether this variation can be explained by the balance of social or human capital as expected by Lazear’s jack-of-all-trades theory.

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Insert Table 1 about here  
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### **Explanatory Variables**

Regarding the *human capital* investments of our respondents, a standard approach using years of schooling as a proxy for human capital investment does not work because our population consists of students only, so the typical schooling variables hardly vary. But there is substantial variation in the non-schooling aspects of human capital. Firstly, students differ

markedly with respect to work experience. We have detailed information on how many weeks or months they worked in different kinds of jobs and occupations (such as prior working experience as a free lancer, intern, full-time or a part-time employee). We also have information on whether they finished an apprenticeship before studying (which is quite common in Germany, particularly among business students, but also among others) and we know whether they ever worked as self-employed workers. We group these six types of human capital together and refer to them as WORK EXPERIENCE in the following. A second source of variation is the type of academic skills students acquire while studying. As a proxy for their academic skill portfolio we have their own subjective assessment of four types of knowledge acquired during their studies, namely analytical, practical, financial or marketing skills. We group these skills together and call them ACADEMIC SKILLS.

Regarding an individual's *social capital* portfolio we assume social capital to be an individual characteristic and less a network characteristic (because as such it is similar to our human capital variables and suitable for the jack-of-all-trades analysis). We measure individual social capital by an individual's personal contacts as did already Davidsson and Honig (2003). Fortunately, we are not restricted to a sheer quantitative variable but we also have qualitative information, such as the variety of social contacts (e.g. Nielsen 2003) which the respondents consider to be generally useful on the labor market.<sup>7</sup> Thus, for our further analysis we use the number of contacts in two different categories for our social capital portfolio. In so doing we ignore the differences between weak and strong ties that was originally proposed by e.g. Putnam (2000) or Granovetter (1973). However, since we count the contacts in different types of social relationships separately we think that differences between weak and strong ties are at least in part implicitly dealt with. A first category includes the number of "contacts from

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<sup>7</sup> The respondents were asked: "How many formal and informal contacts (number of individuals) could be useful for your entry into the labor force? \_\_\_\_\_stemming from university \_\_\_\_\_, from family or friends \_\_\_\_\_ or from business \_\_\_\_\_."

university”, “contacts from family and friends” and “business contacts” (all of which the respondent in general considers helpful on the labor market). A second category is defined as a respondent’s contacts with self-employed people and distinguishes between self-employed parents and self-employed friends (for descriptive statistics see Table 2). To get these information the respondents were asked: : *“Are your parents or people from your circle of friends self-employed or have they ever been self-employed? (parents: yes/no; friends: yes/no)”*.

Making use of these data, we have to constructed variables measuring the balance and the breadth of an individual’s skills or social contacts portfolio in order to test the jack-of-all-trades hypotheses. We construct three variables to measure the breadth of the human capital, social capital and overall portfolio of a person (BROADHCPORTFOLIO, BROADSCPORTFOLIO, BROADOVERALLPORTFOLIO). And we construct three variables to measure the balance (or rather the un-balance) in the human capital, the social capital and the overall portfolio (UNBALANCEDHC, UNBALANCEDSC, UNBALANCEDOVERALL).

In the first step, borrowing from the operationalization used in Lazear (2005), we construct the variable BROADHCPORTFOLIO to measure how broad the human capital portfolio of a person is. We take the different types of work experience and the different types of study related entrepreneurial skills (of which there are seven altogether) and count how many types an individual holds (similar to Lazear 2005 who counts how many “roles” - i.e. different types of jobs - an individual holds). This approach followed Baumol (2004), Astebro (2006) and Silva (2006), too. We then divide this number by the maximum number of seven to obtain a variable that varies between zero and one. Our variable BROADHCPORTFOLIO is equal to one if a person possesses a full set of different skills, i.e. has all types of work experiences and academic skills; but BROADHCPORTFOLIO is for example  $1/7$  if a person possesses only one type of skill (work experience or academic) and is thus very specialized.

*According to hypothesis 2 we expect the regression coefficient of BROADHCPORTFOLIO to be positive, i.e. individuals are more willing to become entrepreneurs with a broader set of skills because all of these are valuable for entrepreneurs starting their own business.*

In a second step we construct the variable for measuring how (un)balanced the human capital portfolio is (UNBALANCEHC) because some work experiences may be rather short and others may be very long. Thus, in the second step we have to account for differences in lengths of different types of work experience. The problem is that comparing absolute length is not appropriate because for example spending six months in an apprenticeship may not indicate a strong specialization in this type of work experience if apprenticeships typically last one year or more, whereas spending six months in an internship may indicate a strong specialization if internships typically last no more than 2-3 months. Hence we cannot just compare the absolute length of an apprenticeship with the absolute length of an internship but have to account for differences in the typical length of the respective types of experience to identify individuals who really concentrated their labor market experience on a particular type of work. To neutralize differences in typical length we use a standardized (z-transformed) length instead of the original length of each type of work experience to construct our balance variables. Using these standardized lengths we create a variable UNBALANCEDHC which measures how unbalanced a human capital portfolio is. As an illustration, take internships: we start by calculating the average length of internships in our sample (which is about 5 months) and subtract it from an individual's internship length (assume for example a person X with 19 months of internships). The result shows whether X has invested more or less than average in internships (+14 months above average for X). We then divide this number by the standard deviation of internship length (which is around 7 in our sample); the result ( $14/7 = 2$  for person X) gives us the relative deviation of this particular person from the sample average

(measured in standard deviations). In our example, person X invested two standard deviations more on internship than an average person in the sample. A similar number is calculated for each type of a person X's work experience (apprenticeships, free-lancer, teaching assistant, employee, self-employed) giving us the relative deviations for all types of work experience (e.g. two standard deviations above average in internships but half a standard deviation below average in apprenticeships, etc.). In the next step we compare these numbers across all different types of work experience to see whether the person is balanced or unbalanced. For person X, who invested two standard deviations above average in internships but half a standard deviation below average in apprenticeships, this is obviously not balanced but *unbalanced*; person Y, on the other hand, who invested two standard deviations above average in internships and two standard deviations above average in apprenticeships would obviously be more balanced. Formally, we call a person balanced if he or she has the same relative deviation in any type of skill (apprenticeship, internship, free lancer). Thus, if person Y were two standard deviations above average in apprenticeships, internships, self-employment and as a free lancer, he or she would be labeled perfectly balanced. Conversely, person X, who is far above average in one type of experience but far below average in other types would be classified as *unbalanced*. To get one single number as a proxy for how unbalanced a person's portfolio of human capital is we constructed a variable "UNBALANCEDHC", which takes the difference between the "maximum deviation in any type of work experience" and the "average deviation across all types of work experience".<sup>8</sup> The larger the difference between maximum and average, the more UNBALANCED is a person's portfolio and vice versa. If a person is fully balanced there is no difference between maximum and average and UNBALANCEDHC is zero.

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<sup>8</sup> This is similar to the procedure used in Lazear (2005) to construct the SPECDIFF-Variable, which indicates whether students are lopsided instead of balanced in their study curriculums.

Mathematically the construction of our “UnBalanced”-variables can be written as follows. First, the absolute lengths of each type of work experience  $j$  ( $j=1, \dots, m$ ) is z-transformed; so for each individual  $i$  ( $i = 1, \dots, n$ ) we have  $m$  standardized length-variables  $Z_{ij}$ :

$$Z_{ij} = \left( \frac{X_{ij} - \mu_j}{\sigma_j} \right) \sim N(0,1).^9$$

Second, we calculate the average  $\bar{Z}_i$  for each individual  $i$ :

$$\bar{Z}_i = \frac{1}{m} \sum_{j=1}^m Z_{ij}, i=1, \dots, n$$

Third, we calculate for each individual  $i$  the difference between maximum and average and use it for our UnBalanced10 variable:

$$UnBalanced_i = \max[Z_{i1}, Z_{i2}, Z_{i3}, \dots, Z_{im}] - \bar{Z}_i.$$

UnBalanced<sub>*i*</sub> is zero if maximum and average are equal; UnBalanced<sub>*i*</sub> increases the more the maximum grows beyond average, meaning a person specializes more and more in his/her maximum skill.

In our data set (cf. Table 2) the empirical values for UNBALANCEDHC vary from a minimum of 0.1516 (indicating almost perfect balance in the human capital portfolio and thus high likelihood of becoming an entrepreneur) to a maximum of 10.7894 (indicating a very unbalanced portfolio of skills and low likelihood of becoming an entrepreneur).

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<sup>9</sup>  $X$  stands for the individual value of a variable.  $\sigma$  stands for the standard deviation,  $\sigma^2$  for the variance and  $\mu$  stands for the mean of the variable in the whole dataset.

<sup>10</sup> Another option for measuring imbalance would be to subtract the minimum deviation from the maximum deviation but basically the idea and the results are similar.

*According to hypothesis 1 we expect the regression coefficient of UNBALANCEDHC to be negative, i.e. individuals are less willing to become entrepreneurs if their human capital portfolio is more unbalanced because they will be better off specializing in their strongest skill.*

In the next steps, the same procedures are used to create the proxies to measure the breadth and balance of the social capital variables. BROADSCPORTFOLIO is equal to the relative number of different types of social contacts a person holds. The variable UNBALANCEDSC is created by using the z-transformations as described above. Thus if UNBALANCEDSC is equal to zero, there is no difference between maximum and average number of different types of contacts, i.e. the person has a fully balanced portfolio of social contacts. The larger UNBALANCEDSC, the less balanced is a person's portfolio of social contacts. In our dataset the minimum of UNBALANCEDSC is 0.4891 and the maximum is 11.1878, indicating balanced as well as very unbalanced respondents in our sample (cf. Table 2).

*According to hypothesis 3 we expect the regression coefficient of UNBALANCEDSC to be negative, i.e. individuals are less willing to become entrepreneurs if their social capital portfolio is more unbalanced.*

*According to hypothesis 4 we expect the regression coefficient of BROADSCPORTFOLIO to be positive, i.e. individuals with a broader set of different types of social contacts are more willing to become entrepreneurs because all of these are valuable for entrepreneurs.*

In a last step we constructed the variables for the breadth and balance of the overall portfolio of all types of resources (skills and social contacts). BROADOVERALLPORTFOLIO is equal to the sum of different types of skills and social contacts of a particular person X divided by the overall sum of skill and contacts. If BROADOVERALLPORTFOLIO is *equal* to one (*smaller* than

one), a person X holds the *full* set (a *restricted* set) of skills and contacts. Similarly, the variable UNBALANCEDOVERALL is created by comparing maximum and average of all z-transformed skills and contacts variables. If UNBALANCEDOVERALL is equal to zero there is no difference between maximum and average number of different types of skills or contacts. The larger the difference between maximum and average, the more unbalanced is a person's overall resource portfolio. In our dataset the minimum of UNBALANCEDOVERALL is 0.6098047 and maximum 11.1878 (cf. Table 2).

*According to hypothesis 5 we expect the regression coefficient of UNBALANCEDOVERALL to be negative, i.e. individuals are less willing to become entrepreneurs if their social capital portfolio is more unbalanced.*

*According to hypothesis 6 we expect the regression coefficient of BROADOVERALLPORTFOLIO to be positive, i.e. individuals are more willing to become entrepreneurs with a broader set of different types of social contacts because all of these are valuable for entrepreneurs.*

## **Control Variables**

To control for differences which are not due to a balanced portfolio of skills or social contacts we use a large number of control variables that are known to have their own impact on entrepreneurship. Important factors determining entrepreneurship are found to be financial capital (i.e. Parker 2004, Holtz-Eakin et al. 1994a and b; Jovanovic and Evans 1989), regional and institutional support structures (Gianetti and Simonov 2004) as well as personal characteristics such as self-esteem or risk aversion (Dunn and Holtz-Eakin 2000; Werner, 2004). However, the results are far from uniform and only limitedly explain differences in the willingness to become an entrepreneur (with risk aversion being the only undisputed exception, e.g. Wagner 2004 a, b). We try to control for these variables in our empirical part. First, to control for risk aversion we use three variables: an individual's "preference for long

term job security” “preference for foreseeable income” and “preference for foreseeable career options/promotion”. Since entrepreneurship studies have frequently shown that an individual’s preference for self-esteem has a strong impact on the entrepreneurship decision, we also use a variable “preference for realizing one’s own ideas while working” as a second control variable. Thirdly, as do most other studies, we use age and age square as control variables to capture the effect of increasing experience-related human capital on entrepreneurship (cf. e.g. Cagetti 2003). Fourthly, since many studies have shown that there are pronounced differences between men and women as to the likelihood to become an entrepreneur (cf. Strohmeier 2003 or Moog and Backes-Gellner 2007) we use gender as another important control variable. Fifth, we use an indicator for the availability of financial resources as a control variable since many studies have shown that a better financial standing also increases the likelihood of becoming an entrepreneur (cf e.g. Holtz, Joulfaian and Rosen (1994 a+b) or Blanchflower and Oswald (1990 and 1998). Further, we use students’ field of study as a control variable and have grouped them into seven broad study fields according to categories used in official German statistics, i.e. “law, economics and management”, “sociology and political science”, “math and science”, “arts and music/liberal arts”, “engineering”, “sports” as well as “languages and cultural arts/humanities”, the latter being the reference group. We also use dummy variables for each university in our sample (University, University of Applied Sciences (Fachhochschule), German Sports Academy, Music University and Academy of Media Arts (KHM), all Cologne) to control for their particular environment. Furthermore, we have data on students’ business or entrepreneurship related know-how such as taxes, patent law, or employment regulations. We aggregated this information in the dummy variable BUSINESSKNOWHOW. And finally, we have information on whether students know about different types of institutions and organizations that provide advice or help for starting a new venture. These are state- or university-owned information

and funding agencies (such as Chambers of Commerce, TTOs or federal agencies such as GO!Initiative), private entrepreneurial clubs (like NUK, etc.) or university-specific entrepreneurship lectures, workshops and chairs. We aggregated this information in the dummy variable SUPPORTKNOWHOW

## **EMPIRICAL RESULTS**

Since our dependent variable is an ordinal variable, we use ordered probit estimations with “willingness to become an entrepreneur” as a dependent variable (Wooldridge 2003). We estimate five different models. The first model includes only variables replicating the results of past entrepreneurship research and is meant to show whether our data and results are compatible with what traditional entrepreneurship theory and empirical evidence suggest. In model II we add the novel variables BROADHCPORTFOLIO and BROADSCPORTFOLIO which we derived from the jack-of-all-trades model. In model III we use the variable BROADOVERALLPORTFOLIO instead of the two variables measuring the breadth of human capital separately from social capital. In the last two models we test the impact of our UNBALANCE variables, separately for human and social capital in model IV and overall in model V.

The results from our reference model I basically confirm what has been found in previous entrepreneurship research: the willingness to become an entrepreneur depends among other things on the level of human capital investments. As traditional theory expects, having more entrepreneurial work experience as a freelancer or in self-employment is positively correlated with an individual’s willingness to become an entrepreneur. However, experience as an intern or employee has no effect, and having experience in an apprenticeship or as a research assistant even has a negative effect - all of which seems plausible. Entrepreneurial work experience is directly valuable to starting one’s own company, therefore the more one has the

better. Work experience as an intern or employee may not be directly helpful on its own in starting a business (but may be helpful if combined with other helpful skills as the jack-of-all-trades theory would suggest). Work experience as an apprentice or teaching assistant may be very valuable for becoming an employee (in industry or at a university because it teaches specific technical know how) but less so for becoming an entrepreneur (because e.g. apprenticeships are concentrated on one type of know how), making entrepreneurship less attractive. Furthermore, we find that the willingness to become an entrepreneur depends on the kind and level of *social capital*. Having entrepreneurial contacts (i.e. to entrepreneurial friends or parents) is positively correlated with an individual's willingness to become an entrepreneur. The number of business contacts one has enhances one's willingness to become an entrepreneur. Family or study contacts on their own, however, do not have any effect, which is plausible again because only entrepreneurial contacts are directly valuable in starting one's own company. Family or study contacts may be helpful if combined with other helpful factors, but they are not generally helpful and do not foster entrepreneurship on their own. With respect to our control variables we find results similar to those in previous studies. An individual's degree of risk aversion significantly affects willingness to become an entrepreneur. Individuals with strong PREFERENCES FOR JOB and INCOME SECURITY are less likely to ever think of becoming an entrepreneur or take first steps towards starting a business. As in previous research we also find a concave effect of  $AGE/AGE^2$  on entrepreneurship and a negative effect of being female (as for example in Werner and Kay 2006; Boden and Nucci 2000; Cromie and Birley 1992; Brush 1992). We also find a very strong positive effect of an individual's PREFERENCE FOR REALIZING ONE'S OWN IDEAS WHILE WORKING on the willingness to become an entrepreneur. And we find that an individual's know-how about institutions supporting start-ups (SUPPORTKNOWHOW) also strongly correlates with the willingness to

become an entrepreneur. Taken together, the results of our first model show that our data are compatible with past entrepreneurship research.

In models II and III we use our BROADPORTFOLIO-variables to test hypotheses 2 and 4 which are only derived with the help of the jack-of-all-trades model. According to Model II a broader human capital portfolio has a positive impact on the willingness to become self-employed, confirming hypothesis 2. This finding is in line with those of the few previous studies testing the jack-of-all-trades model. Lazear himself for example finds that individuals are more likely to become entrepreneurs if they have had more previous jobs/roles (Lazear 2005). Unlike what we predicted in hypothesis 4, a broader social capital portfolio seems to have no significant impact, at least not in this specification. However, in model III we find that a broader OVERALL portfolio (human and social capital taken together) has a strong positive effect on the willingness to become an entrepreneur, which confirms our hypothesis 6. All other effects remain very similar, so the results are again robust.

In models IV and V we introduce our UNBALANCED-variables and test hypotheses 1, 3 and 5. Model IV shows that the balance is important both for human and social capital: UNBALANCEDHC and UNBALANCEDSC are highly negatively significant which confirms hypothesis 1 and 3, and strongly supports the jack-of-all-trades interpretation of entrepreneurship. Individuals with a very *unbalanced* portfolio of human capital are *unlikely* to become entrepreneurs; for them it pays more to become specialized employees. On the other hand, for individuals with a more balanced portfolio of work experience, it pays more to realize the entrepreneurial premium  $\lambda$  on their balanced skills and they are more willing to become an entrepreneur. In addition we find that once balance of skills is controlled for, length of internships now has a positive impact on entrepreneurship. Thus, internships are obviously considered helpful if they are combined with other skills that match in the portfolio. More entrepreneurial work experience keeps having a positive effect on its own.

Apprenticeships still have no impact. Results for the rest of the control variables remain stable and will therefore not be discussed here. With respect to social capital, we find that with a very *unbalanced* portfolio of social contacts individuals are *unlikely* to become entrepreneurs and the more balanced a portfolio, the more likely they are to become entrepreneurs. Similarly to what has been found for work experience, here again we find that entrepreneurial contacts keep having their single effects once balance of social contacts is controlled for. This indicates that knowing more entrepreneurial individuals is always favourable for someone who wants to start his or her own business, which again seems highly plausible. Furthermore we find that a higher level of family and company contacts has a positive effect on entrepreneurship once balance of social contacts is controlled for, which indicates that they may be helpful in the right combination with other valuable entrepreneurial contacts, but not on their own if they are not combined with them. Results for the rest of the control variables again remain stable.

Finally, in model V we find a significantly negative effect for UNBALANCEDOVERALL showing that the jack-of-all-trades argument also applies across different types of capital (i.e. human and social capital). Individuals who have a balanced portfolio of work experience and contacts are more likely to become entrepreneurs than individuals who are either strong in skills or strong in social contacts.

Thus, all but one hypothesis are supported by the empirical evidence given in models II to V, and, taken together, this strongly supports the jack-of-all-trades explanation. The findings demonstrate how important it is to have balanced personal resources to become an entrepreneur. More balanced individuals are more likely to become an entrepreneur. And, in contrast, whatever the particular specialization of an individual might be, it makes them more likely to become an employee rather than an entrepreneur because as an employee they can use their particular strength fully while working for others.

## CONCLUSION

In this paper we study the willingness to become an entrepreneur based on the entrepreneurship theory of Lazear (2005). We apply his jack-of-all-trades theory not only to human capital as in the original model but also to social capital. We do so because we think social capital should also foster the willingness to become an entrepreneur since many studies have shown that it is an important determinant for the success of start-ups. We use survey data from a sample of more than 2000 German students to test our hypotheses and find strong support for the jack-of-all-trades explanation for human and social capital.

We find that it is not so much the level of skills or the level of social contacts but rather a balanced portfolio of skills and social contacts that makes it more likely that an individual will decide to become an entrepreneur. Those with a more balanced portfolio of work experience are more willing to become an entrepreneur. Those with specialized human capital are worse off in entrepreneurship, where all types of skills are required to be successful, and they are therefore less willing to become an entrepreneur. And those with undiversified social contacts are worse off in entrepreneurship, where all types of social contacts are valuable to run a start-up, so they are also less willing to become an entrepreneur. Specialists in human capital or in social capital prefer to become employees where it pays more to be a specialist. Finally, we also find that the jack-of-all-trades argument even applies across the two types of capital. Individuals who hold a balance of human and social capital are more likely to become entrepreneurs than individuals who are either strong in skills *or* strong in social contacts. Thus it is the jacks-of-all-trades and clearly not the masters-in-one who are likely to become entrepreneurs. Neither are the mere social butterflies nor the mere computer nerds likely to become entrepreneurs because they are both too imbalanced. Thus, we were able to show that the jack-of-all-trades argument can be successfully extended beyond human capital. It proves

to be valuable for other types of capital as well, i.e. social capital in our case. In a next step it would be interesting to see whether the same argument holds for an extension to financial capital, but our data are not well suited for this task.

There are important and far reaching implications which can be derived from our results. If entrepreneurship above all requires a full and balanced set of skills to start a business in a certain industry or field, the conclusion to be drawn is that the more types of talents that are needed in a particular field, the fewer people will ever be able to meet these requirements fully. This in turn helps to explain why in some fields entrepreneurs earn exceptionally high returns (cf. Lazear 2005) and still remain unchallenged by new entrants. The jack-of-all-trades explanation also helps to explain why the entrepreneurship rate does not follow that of educational expansion over the last decades. Since entrepreneurship always requires a balanced set of skills it is not enough to expand investments in one type of skill (like academic knowledge). To raise the entrepreneurship rate any other type of talent and individual resource would have to grow at the same rate. Thus, additional education may not raise the entrepreneurship rate but, in fact, bring about the opposite. If an expansion in education is not flanked by additional social or financial capital it will only lead to a rising share of employees. This effect may additionally be fostered if those individuals who reach a higher educational degree have to specialize more in order to meet the requirements of the higher educational degree. Educational expansion may therefore be highly counterproductive for the entrepreneurship rate if everything else is kept constant. This may explain why despite rapidly growing entrepreneurship trainings, technology transfer offices, start-up advice and incubators the entrepreneurship rate remains more or less stable. As argued above there is a strong trend working against the willingness to become an entrepreneur and if these measures had not been taken, educational expansion would even have driven down the entrepreneurship rate even more. What this means is that a great number of activities may be necessary just to

stabilize the entrepreneurship rate. An increase in the entrepreneurship rate would require more, i.e. more of all according to the jack-of-all-trades argument: human and social capital, and – to take the argument one step further – both have to be balanced with financial capital to make becoming an entrepreneur more attractive.

## REFERENCES

- Acs, Z.J. 2006. A Formulation of Entrepreneurship Policy. In: Lundtsröm, A.; S. Halarsson: **Foundations and Trends in Entrepreneurship**, Vol. 2, No 3 (2006): 223 – 232.
- Acs, Z.J. & Audretsch, D.B. 2003 (eds.). *Handbook of Entrepreneurship Research*. Kluwer Academic Publishers, UK.
- Aculai et al. 2004. Female Entrepreneurship in the Ukraine, Moldova and Uzbekistan: Characteristics, Barriers and Enabling Factors and Policy Issues. In UNECE (ed.), **Access to Financing and ICT for Women Entrepreneurs in the UNECE Region**. United Nations, Geneva, 39–52
- Aldrich, H.W. 1999. *Organizations evolving*. London et al.: SAGE.
- Anderson, A. R. & Miller, C.J. 2003. „Class matters“: Human and social capital in the entrepreneurial process. *Journal of Socio Economics*, 32(2003)1: 15 – 36.
- Astebro, T. B. 2006. *"Does it Pay to be a jack of all trades?"* (August 18, 2006). Available at SSRN: <http://ssrn.com/abstract=925221>
- Baumol, W. J. 2004. *"Education for Innovation: Entrepreneurial Breakthroughs vs. Corporate Incremental Improvements"* NBER Working Papers 10578.
- Becker, Gary S. 1964. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Chicago, University of Chicago Press.
- Benz, M & Frey, B. 2004. Being Independent raises Happiness at Work. *Swedish Economic Policy Review*, 11(2004): 95-134.
- Bessau, D.; Klumpp, M. & Lenk, T. 2001. *Existenzgründung an den Hochschulen in Leipzig*. inomic paper series, paper No. 1, 11/2001, Leipzig
- Blanchflower, D. & Oswald, A. 1990. *"What Makes A Young Entrepreneur?"* Papers 373, London School of Economics - Centre for Labour Economics.
- Blanchflower, D.G. 2000. Self-employment in OECD Countries. *Labour Economics*, 7(2000): 471-505.
- Blanchflower, D.G. 2004. *Self-employment: More may not be better*. NBER Working Paper 10286, February 2004.
- Blanchflower, D.G. & Oswald, A.J. 1998. What makes an entrepreneur? *Journal of Labor Economics*, 16(1998)1: 27 – 60.
- Brush, C. 1992. Research on women business owners: past trends, a new perspective and future directions. *Entrepreneurship Theory & Practice*, Summer(1992): 5 -30.
- Cagetti, M. & De Nardi M. 2003. *Entrepreneurship, Frictions and Wealth*, Federal Reserve Bank of Minneapolis Staff Report no. 322, September 2003
- Carter, N.M.; Anderson, S. & Shaw, E. 2001. *Women business ownership: A review of the academic, popular, and internet literature*. Report to the Small Business Service, RR 002/01.

- Cohen, W. & Levinthal, D. (1990): Absorptive capacity: A new perspective on learning innovation. *Administrative Science Quarterly*, 35(1990)1: 128 – 152.
- Coleman, J.S. 1990. *Foundations of Social Theory*. Cambridge, MA. Harvard University Press.
- Davidsson, P. & Honig, B. 2003. The Role of Social and Human Capital among Nascent Entrepreneurs. *Journal of Business Venturing*, 18(2003): 301 – 331.
- Dunn, T. & Holtz-Eakin, D. 2000. Financial Capital, Human Capital and the Transition to Self-Employment: Evidence from Intergenerational Links. *Journal of Labor Economics*, 18(2000): 287-305.
- Florin, J.; Lubatkin, M. & Schulze, W. 2003. A Social Capital Model of High-Growth Ventures. *Academy of Management Journal*, 46(2003)3: 374-384.
- Giannetti, M.; Simonov, A. 2004. On the Determinants of Entrepreneurial Activity: Social Norms, Economic Environment and Individual Characteristics. *Swedish Economic Policy Review*, 11(2004): 269-313.
- Glaeser, E. L., D. Laibson & Sacerdote, B. 2002. "An Economic Approach To Social Capital," *Economic Journal*, v112(483,Nov): F437 - F458.
- Granovetter, M. 1973. The strength of weak ties. *American Journal of Sociology*, 78(1973): 1360 – 1380.
- Greeve, A. & Salaff, J.W. 2003. Social networks in entrepreneurship. *Entrepreneurship Theory & Practice*, 28(2003)1: 1 -22.
- Hamilton, B. 2000. Does Entrepreneurship Pay? An Empirical Analysis of Returns to Self-Employment. *Journal of Political Economy*, 108(2000): 605-631.
- Helliwell, J. & Putnam, R. 1999. *Education and social capital*. NBER Working Paper 7121.
- Hersch, J. & Kip Viscusi, W. 1996. Gender Differences in Promotions and Wages. *Industrial Relations*, 35(1996)4: 461-472.
- Hoang H & Antoncic B. 2003. Network-based research in entrepreneurship: A critical review. *Journal of Business Venturing* 18(203): 165-187
- Holtz-Eakin, D.; Joulfaian, D. & Rosen, H.S. 1994a: Entrepreneurial Decisions and Liquidity Constraints. *RAND Journal of Economics*, 25(1994): 334-347.
- Holtz-Eakin, D.; Joulfaian, D. & Rosen, H.S. 1994b. Sticking it Out: Entrepreneurial Survival and Liquidity Constraints. *Journal of Political Economy*, 102(1994): 53-75.
- Isfan, K. & Moog, P. 2003. *Deutsche Hochschulen als Gründungsinkubatoren*. Wiesbaden: Gabler DUV.
- Jovanovic, B. & Evans, D. 1989. "An Estimated Model of Entrepreneurial Choice under Liquidity Constraints" *Journal of Political Economy*, 97(1989)4: 808-27.
- Kawaguchi, D. 2002. *Compensating Wage Differentials among Self-employed Workers: Evidence from Job Satisfaction Scores*. Discussion Paper 568, Institute of Social and Economic Research, Osaka University.

- Krueger, N.F.; Reilly, M.D. & Casrud, A.D. 2000. Competing Models of Entrepreneurial Intentions. *Journal of Business Venturing*, 15(2000): 411 – 432.
- Lazear, E.P. 2004. Balanced Skills and Entrepreneurship. *American Economic Review*, 94(2004): 208 – 211.
- Lazear, E.P. 2005. 'Entrepreneurship'. *Journal of Labor Economics*, 23(2005)4: 649-680.
- Moog, P. 2004. *Humankapital des Gründers und Erfolg der Unternehmensgründung*. Wiesbaden: Gabler DUV.
- Moog, P. & Backes-Gellner, U. (2008): Social Capital and the Willingness to Become Self-Employed: Is There a Difference between Women and Men? *International Studies of Management & Organization* (in print).
- Morrison, A. M., White, R. P., Van Velsor, E., & the Center for Creative Leadership (1987): *Breaking the glass ceiling: Can women reach the top of America's largest corporations?* Reading, MA: Addison-Wesley.
- Nahapiet, J.; Ghoshal, S. 1998. Social Capital, Intellectual Capital, and the Organizational Advantage. *The Academy of Management Review*, 23(1998)2: 242-266.
- Nicolaou, N. & Birley, S. 2003. Academic networks in a trichotomous categorisation of university spinouts. *Journal of Business Venturing*, 18(2003): 333-359.
- Nielsen, K. 2003. Social capital and the evaluation of innovation policies. *International Journal of Technology Management*, 26(203)2/3/4: 205 – 225
- OECD 2000. Employment Outlook, June 2000. October 10th, 2004: <http://www.oecd.org/dataoecd/10/44/2079593.pdf>.
- OECD 2005. Employment Outlook, 2005. <http://www.oecd.org/dataoecd/12/46/2079593.pdf>.
- Parker, S.C. 2004. *The Economics of Self-Employment and Entrepreneurship*, Cambridge, University Press.
- Pekkarinen, T. & Vartiainen, J. 2006. *Gender Differences in Promotion on a Job Ladder: Evidence from Finnish Metalworkers*. Finnish Working Paper Series.
- Putnam, R. 2000. Bowling alone. Mimeographed. From Glaeser, Edward L.; Laibson, David; Sacerdote, Bruce (2001): *The Economic Approach to Social Capital*. Discussion Paper Number 1916, Harvard Institute of Economic Research, March 2001, Cambridge MA.
- Reitan, B. 1997. *Where do we learn that entrepreneurship is feasible, desirable and/or profitable? – A look at the processes leading to entrepreneurial potential*. Paper to the 42nd ICSB World Conference San Francisco.
- Reynolds, P. 2007. *Entrepreneurship in the US*. Springer Berlin.
- Reynolds, P. D. (2000). National panel study of US business start-ups. Background and methodology. In J. A. Katz (Ed.), *Advances in Entrepreneurship, Firm Emergence and Growth* (Vol. 4, pp. 153-227). Stamford, CT: JAI Press.
- Reynolds, P.D. & Wight, S.B. 1997. *The entrepreneurial process: Economic growth, men, women, and minorities*. Westport CO, London: Querum Book.

- Silva, O. 2006. *The jack-of-all-trades entrepreneur: innate talent or acquired skill?* IZA Discussion Paper 2264. August 2006 forthcoming Applied Economics Letter.
- Strohmeier, R. 2003. *Gender differences in self-employment: does education matter?* Paper presented at the ICSB 48th World Conference, 15-18th June 2003, Belfast.
- Stuart et al. 1999. Interorganizational endorsements and the performance of new ventures. *Administrative Science Quarterly*, 44(1999): 315 – 349.
- Thurik, A.R. 2003. Entrepreneurship and unemployment in the UK. *Scottish Journal of Political Economy*, 50(3): 264-290.
- Uzzi, B. 1997. Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42(1997): 35-67.
- Villanueva, J., Zellmer-Bruhn, M.A., Forbes, D. & Sapienza, H.J. 2005. *"Entrepreneurial intentions of academic scientist-inventors"*. Presented at BKERC (Babson College-Kauffman Foundation Entrepreneurship Research Conference), Babson College - Boston, June 2005.
- Wagner, J. 2003. 'Testing Lazear's jack-of-All-trades View of Entrepreneurship with German Data', *Applied Economic Letters*, 10(2003)11: 687 - 689.
- Wagner, J. 2004. Are Young and Small Firms Hothouses for Nascent Entrepreneurs? *Applied Economics Quarterly*, 50(2004): 379-391.
- Wagner, J. 2004. *What a difference a Y makes: Female and male nascent entrepreneurs in Germany*. IZA Discussion Paper No. 1134. May 2004.
- Weisz, N. & Vassolo, R. (2002): *The social capital of nascent entrepreneurial teams*. Working Paper 2002, Krannert Graduate School of Business, Purdue University.
- Werner, A. 2004. Arbeitsbedingungen in KMU – Eine multivariate Analyse In: **Jahrbuch zur Mittelstandsforschung** 2/2004, S. 1-20.
- Wooldridge, J.M. 2003. *Introductory econometrics: A modern approach*. Mason: Thomson/South Western.

## APPENDIX

**Table 1: Willingness to become an entrepreneur**

	%	% (cumulated)
1 Never thought of becoming an entrepreneur	34.99%	34.99%
2 Thought about it but have no concrete business idea	20.72%	55.71%
3 Have a business idea but no steps towards realization	27.78%	83.50%
4 Have idea and steps towards realization	16.50%	100%
	100%	n = 2,007

Own data, 2007

**Table 2: Descriptive Statistics**

Variables	Mean	Std. Dev.	Min	Max	Meaning
BROADHCPORTFOLIO	.4976	.1647	0	1	Number of skill types
BROADSCPORTFOLIO	.6067	.2196	0	1	Number of contact types
BROADOVERALLPORTFOLIO	.4636	.1447	0	1	Number of skill and contact types
UNBALANCEDHC	1.4510	.9812	.1516	10.7894	max(z-length) – mean(z-length)
UNBALANCEDSC	1.1727	.7546	.4891	11.1878	max(z-contacts) – mean(z-contacts)
UNBALANCEDOVERALL	1.7221	1.0465	.6098	11.1878	max(z-length&contacts) – mean(z-length&contacts)
APPRENTICESHIP	11.65895	16.1023	0	72	Length of apprenticeship in months
INTERNSHIP	4.843488	6.555575	0	72	Length of internship in months
TEACHING-ASSISTANT	4.6685	10.6105	0	72	Length or working as teaching assistant in months
EMPLOYEE	20.1589	31.4840	0	480	Length in months
FREE LANCER	5.7752	13.9444	0	120	Length of working as free lancer in months
SELF-EMPLOYED	4.0615	15.6080	0	240	Length of being self-employed in months
UNIVERSITYCONTACTS	1.6864	3.2820	0	50	Number of contact persons
FAMILY&FRIENDSCONTACTS	3.0325	4.5330	0	50	Number of contact persons
BUSINESSCONTACTS	2.5665	4.2684	0	50	Number of contact persons
CON_ENTREPRENEUR_FAMILY_D	3.0325	4.5330	0	1	Entrepreneur in family? Dummy, no = 0, yes = 1
CON_ENTREPRENEUR_FRIEND_D	.6666	.4715	0	1	Entrepreneur among friends? No = 0, Yes = 1
<b>Study progress/degree</b>					
PHD_D	.1307	.3371	0	1	PhD student? Dummy, no = 0, yes = 1
BACHELOR/DIPLOMA_D	.6020	.4895	0	1	Bachelor/diploma finished? Dummy, no = 0,

					yes = 1
<b>Type of University</b>					
UNIVERSITY_D	.6382	.4806	0	1	Dummy, no = 0, Uni = 1
COLLEGEAPPLIEDSCIENCES_D	.3019	.4592	0	1	Dummy, no = 0, FH = 1
SPORTS-UNIVERSITY_D	.0313	.1743	0	1	Dummy, no = 0, = 1
ART&MEDIA-UNIVERSITY_D	.0038	.0620	0	1	Dummy, no = 0, SPOHO = 1
MUSIC_UNIVERSITY_D (REFERENCE)	.0082	.09020	0	1	Dummy, no = 0, MusicU = 1
<b>Study fields</b>					
SOCIALSCIENCES (LAW, BUSINESS, ECONOMICS)	0.2244	0.4173	0	1	Dummy, no = 0, yes = 1
POLITICALSCIENCES (SOCIOLOGY/PSYCHOLOGY)_D	0.2584	0.4378	0	1	Dummy, no = 0, yes = 1
MATHEMATICS& NATURALSCIENCES_D	0.1740	0.3791	0	1	Dummy, no = 0, yes = 1
ARTS&MUSIC_D	0.0677	0.2513	0	1	Dummy, no = 0, yes = 1
TECHNICALSCIENCES_D	0.1740	0.3791	0	1	Dummy, no = 0, yes = 1
SPORTS_D	0.0378	0.1907	0	1	Dummy, no = 0, yes = 1
HUMANITIES/LANGUAGES (REFERENCE)_D					Dummy, no = 0, yes = 1
BUSINESSKNOWHOW	.2469	.4313	0	1	Dummy, no = 0, yes = 1
SUPPORTKNOWHOW	.7501	.4330	0	1	Dummy, no = 0, yes = 1
<b>Socio-Demographics</b>					
AGE	26.6285	4.2670	18	65	Number of years
AGE <sup>2</sup>	727.2788	254.74252	324	4225	Number of years squared to measure diminishing effects
GENDER_D	.5851	.4928	0	1	Dummy, women= 0, men = 1
CHILDREN_D	.0810	.2729	0	1	Dummy, no = 0, yes = 1
MARRIED_D	.8861 .3176992	.3176	0	1	Dummy, no = 0, yes = 1
FINANCIALCAPITAL	1.1138	1.5675	0	6	Six classes of financial capital
<b>Degree of risk aversion</b>					
EMPLOYMENT_GUARANTEE-D	.8982	.3024	0	1	Importance of employment security: Dummy, no = 0, yes = 1
FORESEEABLE_INCOME-D	.8576	.3494	0	1	Importance of foreseeable income Dummy, no = 0, yes = 1
FORESEEABLE_PROMOTION-D	.8880	.3153	0	1	Importance of Dummy, no = 0, yes = 1
IDEA_REALIZATION_D	.8581	.3489	0	1	Dummy, no = 0, yes = 1
PUBLIC_ESTEEM_D	.5851	.4928	0	1	Dummy, no = 0, yes = 1

Own data 2007, n = 2,073

**Table 3: Willingness to Become an Entrepreneur regressed on standard variables - Model I**

Willingness to become entrepreneur	Coef.	Std. Err.	P> z
APPRENTICESHIP	.0043498	.0018499	0.019
INTERNSHIP	.0049206	.0039781	0.216
TEACHING-ASSISTANT	-.0082521	.0026621	0.002
EMPLOYEE	.0002338	.0009894	0.813
FREE LANCER	.0088527	.0019188	0.000
SELF-EMPLOYED	.0189608	.0020906	0.000
ACADEMIC-SKILLS	-.1053418	.1217251	0.387
UNIVERSITYCONTACTS	-.0049082	.0085151	0.564
FAMILY&FRIENDSCONTACTS	.0094846	.0061322	0.122
BUSINESSCONTACTS	.0334348	.0069491	0.000
CON_ENTREPRENEUR_FAMILY_D	.2072599	.0573717	0.000
CON_ENTREPRENEUR_FRIEND_D	.3122519	.0555894	0.000
AGE	.1784954	.0425998	0.000
AGE <sup>2</sup>	-.0023853	.000708	0.001
FINANCIALCAPITAL	.0666933	.0193921	0.001
GENDER_D	.2404006	.557459	0.000
CHILDREN_D	-.0250824	.1098387	0.819
MARRIED_D	-.0340361	.0961835	0.723
EMPLOYMENT_GUARANTEE-D	-.1653894	.0970624	0.088
FORESEEABLE_INCOME-D	-.3128407	.0828965	0.000
FORESEEABLE_PROMOTION-D	-.0362275	.0841978	0.667
IDEA_REALIZATION_D	.4856273	.0766987	0.000
PUBLIC_ESTEEM_D	.0251733	.0519392	0.628
PHD_D	-.0179549	.0915948	0.845
BACHELOR/DIPLOMA_D	.0014714	.062747	0.981
UNIVERSITY_D	.2091477	.1937458	0.280
COLLEGEAPPLIEDSCIENCES_D	.1407285	.2084286	0.500
SPORTS-UNIVERSITY_D	.9168799	.7016062	0.191
ART&MEDIA-UNIVERSITY_D	.4673735	.4848739	0.335
BUSINESSKNOWHOW	.0339309	.0589121	0.565
SUPPORTKNOWHOW	.2270881	.061363	0.000
SOCIALSCIENCES (LAW, BUSINESS, ECONOMICS)	.0165976	.1316563	0.900
POLITICALSCIENCES (SOCIOLOGY/PSYCHOLOGY)_D	.0096794	.1245519	0.938
MATHEMATICS& NATURALSCIENCES_D	-.1776267	.1311208	0.176
ARTS&MUSIC_D	.1523998	.1578503	0.334
TECHNICALSCIENCES_D	-.0259217	.1385913	0.852
SPORTS_D	-.808338	.7216119	0.263
/CUT1	3.280503	.6822174	1.943382
/CUT2	3.93919	.6833215	2.599904
/CUT3	4.999304	.6854703	3.655807
Ordered probit regression Number of obs = 2,007 Pseudo R2 = 0.1131	LR chi2(38) = 614.92	Prob > chi2 = 0.0000	Log likelihood = -2410.4013

**Table 4: Willingness to Become an Entrepreneur regressed on human and social capital portfolio – Model II**

Willingness	Coef.	Std. Err.	P> z
<b>BROADHCPORTFOLIO</b>	1.162133	.2202174	0.000
APPRENTICESHIP	-.007349	.0021183	0.001
INTERNSHIP	.0001834	.0043009	0.966
TEACHING-ASSISTANT	-.0137172	.0028984	0.000
EMPLOYEE	-.0006267	.0011016	0.569
FREE LANCER	.0046682	.0021599	0.031
SELF-EMPLOYED	.0174649	.0022454	0.000
STUDY-SKILLS	-.1389112	.1411114	0.325
<b>BROADSCPORTFOLIO</b>	.2437528	.2021161	0.228
UNIVERSITYCONTACTS	-.0096405	.0089037	0.279
FAMILY&FRIENDSCONTACTS	.0059641	.0063407	0.347
BUSINESSCONTACTS	.0281618	.0072758	0.000
CON_ENTREPRENEUR_FAMILY_D	.1904696	.0741326	0.010
CON_ENTREPRENEUR_FRIEND_D	.2472306	.0763559	0.001
AGE	.1118932	.0440693	0.011
AGE2	-.0013534	.0007416	0.068
FINANCIALCAPITAL	.0624972	.0206856	0.003
GENDER_D	.2687391	.0601555	0.000
CHILDREN_D	.0099192	.1173363	0.933
MARRIED_D	-.0325968	.1017511	0.749
EMPLOYMENT_GUARANTEE-D	-.1189068	.1030853	0.249
FORESEEABLE_INCOME-D	-.290584	.0890163	0.001
FORESEEABLE_PROMOTION-D	-.0567815	.0922472	0.538
IDEA_REALIZATION_D	.4912072	.0843805	0.000
PUBLIC_ESTEEM_D	-.0079632	.0557587	0.886
PHD_D	-.1101654	.0944335	0.243
BACHELOR/DIPLOMA_D	.002033	.0643868	0.975
UNIVERSITY_D	.2307613	.2166175	0.287
COLLEGEAPPLIEDSCIENCES_D	.1855731	.2323803	0.425
SPORTS-UNIVERSITY_D	.135911	.2928565	0.643
ART&MEDIA-UNIVERSITY_D	.5140515	.4943409	0.298
BUSINESSKNOWHOW	.0673388	.0625777	0.282
SUPPORTKNOWHOW	.1946348	.067388	0.004
SOCIALSCIENCES (LAW, BUSINESS, ECONOMICS)	-.0478685	.1480162	0.746
POLITICALSCIENCES (SOCIOLOGY/PSYCHOLOGY)_D	-.0543957	.142023	0.702
MATHEMATICS& NATURALSCIENCES_D	-.2058749	.1481404	0.165
ARTS&MUSIC_D	.1262604	.1728198	0.465
TECHNICALSCIENCES_D	-.1281198	.1559205	0.411
/CUT1	2.75295	.7083817	1.364548
/CUT2	3.426865	.7094442	2.03638
/CUT3	4.530583	.7115305	3.136009
Ordered probit regression Number of obs = 2,007 Pseudo R2 = 0.1171	LR chi2(38) = 554.87	Prob > chi2 = 0.0000	Log likelihood = -2092.1174

**Table 5: Willingness to become an entrepreneur regressed on overall portfolio - Model III**

Willingness	Coef.	Std. Err.	P> z
<b>BROADOVERALLPORTFOLIO</b>	1.472016	.2814574	0.000
APPRENTICESHIP	-.006727	.0020597	0.001
INTERNSHIP	.0004645	.0041535	0.911
TEACHING-ASSISTANT	-.0121288	.0028477	0.000
EMPLOYEE	-.000634	.0010783	0.557
FREE LANCER	.0053615	.0020759	0.010
SELF-EMPLOYED	.0182046	.0022096	0.000
ACADEMIC-SKILLS	-.1724112	.1285206	0.180
UNIVERSITYCONTACTS	-.0134392	.008797	0.127
FAMILY&FRIENDSCONTACTS	.0048997	.0062379	0.432
BUSINESSCONTACTS	.0271177	.0070496	0.000
CON_ENTREPRENEUR_FAMILY_D	.0963501	.0652399	0.140
CON_ENTREPRENEUR_FRIEND_D	.1781677	.0666788	0.008
AGE	.1292559	.0452887	0.004
AGE2	-.0015864	.000753	0.035
FINANCIALCAPITAL	.0658244	.0204112	0.001
GENDER_D	.252993	.0593699	0.000
CHILDREN_D	.013462	.1169558	0.908
MARRIED_D	-.0072108	.1009345	0.943
EMPLOYMENT_GUARANTEE-D	-.1326298	.1011174	0.190
FORESEEABLE_INCOME-D	-.3090926	.0875275	0.000
FORESEEABLE_PROMOTION-D	-.0495781	.0907269	0.585
IDEA_REALIZATION_D	.4694636	.0834838	0.000
PUBLIC_ESTEEM_D	.0211573	.0550198	0.701
PHD_D	-.0904718	.0955564	0.344
BACHELOR/DIPLOMA_D	.0109058	.066341	0.869
UNIVERSITY_D	.2049883	.2130005	0.336
COLLEGEAPPLIEDSCIENCES_D	.1386902	.2290179	0.545
SPORTS-UNIVERSITY_D	.0525014	.2888275	0.856
ART&MEDIA-UNIVERSITY_D	.4392797	.4925919	0.373
BUSINESSKNOWHOW	.0633245	.0618918	0.306
SUPPORTKNOWHOW	.1861286	.066321	0.005
SOCIALSCIENCES (LAW, BUSINESS, ECONOMICS)	-.0667921	.1459748	0.647
POLITICALSCIENCES (SOCIOLOGY/PSYCOLOGY)_D	-.0602746	.1404313	0.668
MATHEMATICS& NATURALSOCIENCES_D	-.228571	.146192	0.118
ARTS&MUSIC_D	.111813	.1708795	0.513
TECHNICALSCIENCES_D	-.1326519	.1537937	0.388
/CUT1	2.819214	.7206617	1.406743
/CUT2	3.490005	.721709	2.075482
/CUT3	4.582223	.7238082	3.163585
Ordered probit regression Number of obs = 2,007 Pseudo R2 = 0.1161	LR chi2(38) = 564.09	Prob > chi2 = 0.0000	Log likelihood = - 2148.174

**Table 6: Willingness to become an entrepreneur regressed on balance of social or human capital - Model IV**

Willingness	Coef.	Std. Err.	P> z
<b>UNBALANCEDHC</b>	-.1380832	.0407801	0.001
APPRENTICESHIP	-.0029831	.0019017	0.117
INTERNSHIP	.0117868	.0045185	0.009
TEACHING-ASSISTANT	-.003277	.0030912	0.289
EMPLOYEE	.0009821	.0010162	0.334
FREE LANCER	.0108407	.0020137	0.000
SELF-EMPLOYED	.0217493	.0022326	0.000
STUDY-SKILLS	-.1089679	.122071	0.372
<b>UNBALANCEDSC</b>	-.1419321	.0563422	0.012
UNIVERSITYCONTACTS	.005131	.0097745	0.600
FAMILY&FRIENDSCONTACTS	.0185236	.007045	0.009
BUSINESSCONTACTS	.0415683	.007981	0.000
CON_ENTREPRENEUR_FAMILY_D	.2514653	.060866	0.000
CON_ENTREPRENEUR_FRIEND_D	.2855092	.0565007	0.000
AGE	.1434068	.0436319	0.001
AGE2	-.0017646	.000728	0.015
FINANCIALCAPITAL	.0631118	.0194593	0.001
GENDER_D	.2523701	.0559899	0.000
CHILDREN_D	-.0150374	.1100428	0.891
MARRIED_D	-.0267188	.0963988	0.782
EMPLOYMENT_GUARANTEE-D	-.1583465	.0972183	0.103
FORESEEABLE_INCOME-D	-.3099609	.0829948	0.000
FORESEEABLE_PROMOTION-D	-.0480086	.0843188	0.569
IDEA_REALIZATION_D	.4934235	.0768375	0.000
PUBLIC_ESTEEM_D	.0163696	.0520165	0.753
PHD_D	-.0315392	.0919047	0.731
BACHELOR/DIPLOMA_D	-.0027342	.0627856	0.965
UNIVERSITY_D	.2050136	.1937277	0.290
COLLEGEAPPLIEDSCIENCES_D	.1441133	.2084369	0.489
SPORTS-UNIVERSITY_D	.834108	.7064029	0.238
ART&MEDIA-UNIVERSITY_D	.391672	.4862072	0.420
BUSINESSKNOWHOW	.0273693	.0590028	0.643
SUPPORTKNOWHOW	.2182128	.0615491	0.000
SOCIALSCIENCES (LAW, BUSINESS, ECONOMICS)	.0150226	.1320767	0.909
POLITICALSCIENCES (SOCIOLOGY/PSYCHOLOGY)_D	-.0195412	.1249469	0.876
MATHEMATICS& NATURALSCIENCES_D	-.1925264	.1313533	0.143
ARTS&MUSIC_D	.1363366	.1582185	0.389
TECHNICALSCIENCES_D	-.0565877	.1389594	0.684
SOCIALSCIENCES (LAW, BUSINESS, ECONOMICS)	-.7685203	.7256727	0.290
/CUT1	2.572587	.7022705	3.949012
/CUT2	3.234536	.7031899	4.612763
/CUT3	4.300952	.7049534	5.682636
Ordered probit regression Number of obs = 2007 Pseudo R2 = 0.1165	LR chi2(40) = 633.51	Prob > chi2 = 0.0000	Log likelihood = - 2401.1083

**Table 7: Willingness to become an entrepreneur regressed on overall balance - Model V**

Willingness	Coef.	Std. Err.	P> z
UNBALANCEDOVERALL	-.1644784	.0370252	0.000
APPRENTICESHIP	-.0033706	.0018663	0.071
INTERNSHIP	.0117301	.0042735	0.006
TEACHING-ASSISTANT	-.0032518	.0029056	0.263
EMPLOYEE	.0009062	.0010024	0.366
FREE LANCER	.0108033	.0019685	0.000
SELF-EMPLOYED	.0218048	.0021675	0.000
STUDY-SKILLS	-.1243728	.1220068	0.308
UNIVERSITYCONTACTS	.0044258	.0089449	0.621
FAMILY&FRIENDSCONTACTS	.0183964	.0064822	0.005
BUSINESSCONTACTS	.040418	.0071195	0.000
CON_ENTREPRENEUR_FAMILY_D	.2302538	.0577109	0.000
CON_ENTREPRENEUR_FRIEND_D	.2889543	.0558816	0.000
AGE	.1347129	.0437603	0.002
AGE2	-.0016221	.0007294	0.026
FINANCIALCAPITAL	.0616228	.0194695	0.002
GENDER_D	.2504196	.0558592	0.000
CHILDREN_D	-.0143202	.1100795	0.896
MARRIED_D	-.0358602	.0963994	0.710
EMPLOYMENT_GUARANTEE-D	-.1548769	.0972032	0.111
FORESEEABLE_INCOME-D	-.306031	.0829754	0.000
FORESEEABLE_PROMOTION-D	-.0511492	.0843424	0.544
IDEA_REALIZATION_D	.4891616	.0767894	0.000
PUBLIC_ESTEEM_D	.015439	.0520204	0.767
PHD_D	-.037184	.0919671	0.686
BACHELOR/DIPLOMA_D	.0011744	.0627853	0.985
UNIVERSITY_D	.1309327	.2084394	0.530
COLLEGEAPPLIEDSCIENCES_D	.8747723	.704906	0.215
SPORTS-UNIVERSITY_D	.1936945	.1937853	0.318
ART&MEDIA-UNIVERSITY_D	.401617	.4844128	0.407
BUSINESSKNOWHOW	.0238241	.0590189	0.686
SUPPORTKNOWHOW	.2183677	.0614383	0.000
SOCIALSCIENCES (LAW, BUSINESS, ECONOMICS)	.0132963	.1318051	0.920
POLITICALSCIENCES (SOCIOLOGY/PSYCHOLOGY)_D	-.0156967	.1247956	0.900
MATHEMATICS& NATURALSCIENCES_D	-.1813475	.1312431	0.167
ARTS&MUSIC_D	.1417796	.1580659	0.370
TECHNICALSCIENCES_D	-.0550307	.1388631	0.692
SOCIALSCIENCES (LAW, BUSINESS, ECONOMICS)	-.8132263	.7247821	0.262
/CUT1	2.486687	.7054416	1.104047
/CUT2	3.148811	.706334	1.764422
/CUT3	4.21499	.7080929	2.827153
Ordered probit regression Number of obs = 2007 Pseudo R2 = 0.1168	LR chi2(39) = 634.81	Prob > chi2 = 0.0000	Log likelihood = - 2400.4559