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Human capital and start-up success of nascent entrepreneurs

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Abstract: We explore the role of human capital aspects in explaining whether nascent entrepreneurs succeed in the start-up of a new venture. The data used are based on a survey among nascent entrepreneurs in Germany and the Netherlands supplemented by follow-up interviews one year after the first contact. Applying multinomial probit estimations we find that several human capital aspects are related to the probability of getting the business started. For example, a high general degree of human capital (i.e. holding a university degree) lowers the likelihood to succeed in the start-up of the venture, whereas recent employment experience (as opposed to being unemployed or out of the labor force) increases start-up success. Furthermore, we find that specialists are more likely to succeed in getting their business started than generalists.

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1. Introduction

Entrepreneurship starts with nascent entrepreneurs. Nascent entrepreneurs are individuals that are actively trying to set up a new business they will personally own and manage. Not all people who are actively involved in starting up a business actually end up by starting the firm. Thus the start-up attempt is not always successful. In this paper we are interested in the factors that explain start-up success.

Insight into the factors that contribute to success or failure in starting a business is vital since a high level of entrepreneurial activity has been shown to contribute to innovative activities, competition, economic growth and job creation (Falck, 2007; Sternberg, 2007; Fritsch and Weyh, 2006; Fritsch, Mueller and Weyh, 2005; Audretsch and Keilbach, 2005; Wennekers and Thurik, 1999). People considering starting a business can in particular benefit from such knowledge, since this could help them to evaluate their own prospects and potential pitfalls. Furthermore, knowledge about the behavior of nascent entrepreneurs is also important for policy makers wishing to promote entrepreneurship since it provides information about factors that facilitate or hinder entry into entrepreneurship.

We focus on a number of potential human capital drivers of start-up success. Human capital describes an individual's investments in skills and knowledge (Becker, 1964). Human capital includes knowledge, education, skills and experience (Deakins and Whittam, 2000) and these aspects are likely to influence the development of a business idea and the organization of resources for setting up a firm. Investments in knowledge, skills and experiences enhance an individual's cognitive abilities and will subsequently result in more productive or efficient behavior. Therefore, human capital is considered to have a positive influence on the success of starting a business. There is considerable evidence that higher levels of relevant human capital, as indicated by education, experience and self-reported skill increases individuals' propensity to engage in venture start-up processes (Davidsson, 2006). However, much less is known about whether such aspects matter for start-up success, especially in a European context.

In sum, this paper explores: To what extent does human capital relate to a nascent's start-up success? The empirical analysis is based on data collected from nascent entrepreneurs from Germany and the Netherlands.

2. Theoretical background

2.1. Nascent entrepreneurship

Entrepreneurship in terms of the set up of new businesses begins with nascent entrepreneurs. Nascent entrepreneurs are those who are actively involved in setting up their own business. They are individuals who take steps to found a new business, but have not yet succeeded in making the transition to new business ownership (Carter, Gartner and Reynolds, 1996). Nascent entrepreneurship relates to the pre-start-up stage in the lifecycle of business startups, namely when potential entrepreneurs are involved in concrete activities to start up a new business before actually owning their new business. In the literature this pre-start-up phase is sometimes classified as organizational emergence (Gartner, Bird and Starr, 1992) or gestation (Reynolds and Miller, 1992).

Some authors discern sub-phases in the pre-start-up process (Bhave, 1994). Van Gelderen, Thurik and Bosma (2006) four phases that are distinguished in the literature. The first phase concerns the development of an intention to start a business. The second phase involves the recognition of an entrepreneurial opportunity and the creation of a business concept. In the third phase resources are assembled and the organization is created. In the fourth and final phase the organization starts to exchange with the market. Nascent entrepreneurship is considered to be the active pursuit of organization creation and thus coincides with the second and third phase in the pre-start-up process (Van Gelderen, Thurik and Bosma, 2006).

Nascent entrepreneurship research seeks to discover the individual and environmental characteristics of those individuals who are attracted to becoming an entrepreneur and who subsequently fail or succeed in this role (Johnson, Parker and Wijbenga, 2006). Empirical studies of nascent entrepreneurship seek to identify a statistically representative sample of on-going venture start-up efforts and to subsequently follow these start-up efforts over time so that insights can be gained into process issues as well as determinants of outcomes (Davidsson, 2006).

Relatively few attempts have been made to study nascent entrepreneurship empirically, mainly because of the lack of a representative sample: nascent entrepreneurs are unregistered which makes them difficult and costly to sample in comparison to, for example, small business owners (Reynolds, 1997).

Alternatively one could choose to study the pre-start-up process based on samples of established firms. However, a disadvantage of such studies is that they are prone to survival bias meaning that many interesting cases that do not succeed in completing the process of market entry are missing. Survival bias is important because the characteristics that effect survival are not necessarily the same as those affecting start-up (Gartner, Shaver, Carter and Reynolds, 2004). Furthermore, studies in which entrepreneurs who succeeded in starting up are asked to recall the circumstances and attitudes present at the inception of the venture are susceptible to a 'hindsight' bias. This refers to the incorrect reporting of information to survey interviewers caused by memory loss and the re-interpretation of facts as a consequence of events that occurred after the business was started.

To avoid such problems of survival and hindsight bias initiatives have emerged to develop new data sets that identify individuals at the moment they are actively involved in starting up their own firm. Paul Reynolds was the first to do this and set up the Entrepreneurship Research Consortium (ERC) for this purpose. This initiative resulted in the Panel Study of Entrepreneurial Dynamics (PSED). The PSED is a US data set and provides a longitudinal analysis of nascent entrepreneurs. Another large initiative that attempts to identify nascent is the Global Entrepreneurship Monitor (GEM). GEM data are collected in numerous countries by means of an adult population survey. Every year a new random sample of the adult population in participating countries is surveyed. Within the frame of the GEM project it is not standard practice to follow up individuals identified as nascent entrepreneurs, but some countries have taken initiatives to organize follow up surveys themselves, which also forms the basis of the current paper.

Of course such panel initiatives, like all panel initiatives, suffer from 'panel mortality'. An individual who participates in one wave may not be able or willing to participate in the next wave, or sometimes cannot be reached or found anymore (Solg, 2001; Gross Sobol, 1959). Since the disposition to participate is usually not independent of the success of the start up efforts, those who are successful are probably more likely to participate.

Empirical work on success and risk factors in nascent entrepreneurship is scarce. Previous research considers many aspects of human capital in explaining entry into (nascent) entrepreneurship (Bates, 1995; Davidsson and Honig, 2003; Gimeno et al., 1997; Kim et al.,

2006; Robinson and Sexton, 1994) and in explaining new ventures' business performance (Bosma et al., 2004). In this paper we are interested in investigating whether human capital aspects can explain start-up success or failure.

2.2. Human capital and entry into entrepreneurship

The start-up attempt is likely to be dependent on the skills and experiences that entrepreneur(s) and their networks bring to a new organization. Human capital relates to the intrinsic qualities and is thought to have a positive influence on the success of starting entrepreneurs. Human capital theory predicts that investments in knowledge, skills and experiences enhances cognitive abilities and subsequently result in more productive or efficient behavior (Becker, 1964). Knowledge is an important factor in this respect, which may be acquired through general education or through time. Human capital variables include knowledge, education, skills and experience (Deakins and Whittam, 2000) and these variables are likely to influence the development of a business idea and the organization of resources. In this paper we explore how three types of human capital relate to entry into entrepreneurship: general human capital, specific human capital and broadness of human capital.

2.2.1. General human capital

It could be argued that general human capital or the overall knowledge, skills and experience that people have acquired throughout their life e.g. through education or work experience may help individual's in setting up a firm. Individuals who have a higher level of education may be better equipped to start up a business. However, they also are likely to have alternative employment opportunities. This may explain why most previous studies report a non-significant effect for education on start-up success (Davidsson and Gordon, 2009). Also, a rather consistent finding across studies so far is that the amount of overall work experience does not matter for explaining start-up success (Davidsson and Gordon, 2009).

Overall, results from previous studies tend to suggest that general forms of human capital do not really affect the outcome of venture start up efforts (Davidsson and Gordon, 2009).

One issue that has not yet been fully explored in previous studies is whether being employed when taking steps to set up a business affects start up success. Up-to-date employment experience is possibly relevant since it may provide relevant human capital such as knowledge of a particular market, competitors and customers. Such experience may also be relevant from a social capital perspective (Bourdieu, 1986; Nahapiet and Ghoshal, 1998) since it can provide relevant network ties to individuals or organizations with access to resources. It has been suggested that in particular previous employment experience in small and young firms may be valuable. Wagner (2004) reports that when individuals have work experience in young and small firms this has a positive effect on the likelihood of becoming a nascent entrepreneur.

2.2.2. Specific human capital

Individuals may possess specific human capital which is directly relevant for the business they are setting up, such as prior experience within the same industry or prior start-up experience. It can be expected that such human capital provides relevant knowledge, skills and experiences that are likely to facilitate entry into entrepreneurship. With respect to same industry experience the majority of previous studies that explored this type of human capital have found a non-significant effect on outcomes (Davidsson and Gordon, 2009).

Where included previous self-employment or experience of starting one's own firm typically come out with positive effects on the probability to become a nascent entrepreneur (Davidsson, 2006). Previous self-employment experience is also likely to positively affect start-up success. Prior experience with new ventures may provide basic business skills and

confidence that can help compensate for liabilities of newness and may therefore facilitate the new market entry (Shrader, Oviatt and McDougall, 2000). Also, individuals with previous start-up experience may be more efficient at decision making and at running the firm, for example because they have developed routines, processes and relevant networks (Gimeno, Folta, Cooper and Woo, 1997). Furthermore, individuals with prior start-up experience may have developed skills for recognizing promising opportunities (Shane, 2003; Ucbasaran, Wright, and Westhead, 2003).

Following the rationale developed above, we expect that nascent entrepreneurs with previous start-up experience are more likely to be successful in their start-up attempt. Again previous self-employment experience can also provide relevant social capital as this experience may have generated relevant networks of individuals and organizations that may help to access resources such as knowledge that may facilitate the start up process. The positive effect of previous start-up experience on start-up success gains quite some support in previous studies (Davidsson and Gordon, 2009).

Several studies confirm that having self-employed parents increases the likelihood for someone to set up its own business, for example because an individual may be more inclined to view entrepreneurship as a viable career option when having self-employed parents (Shapiro and Sokol, 1982). We believe that having self-employed parents may also increase start-up success e.g. because the parents may serve as role models and sources of advice. However, prior studies for Sweden (Davidsson and Honig, 2003) and the US (Parker and Belghitar, 2006) found no indications that having self-employed parents facilitates start-up success.

Furthermore, there is considerable evidence that higher levels of relevant human capital, as indicated by self-reported skill increases individuals' propensity to engage in venture start-up processes (Davidsson, 2006). It can also be expected that such skills facilitate start-up success once in the process (Brixy, Sternberg and Stüber 2008).

Of course individuals who attempt to set up a firm do not have to possess all knowledge and skills relevant for setting up a business themselves; they can also draw on advice and resources from others such as a former employer or another entrepreneur (role model). Thus it can be expected that the use of external sources for advice and resources facilitates completing the start-up process.

2.2.3. Broadness of human capital

Broadness refers to the amount of diversity or variety in human capital available to an individual. In this respect, the "jack of all trades" theory of entrepreneurship (Wagner 2003; Lazear, 2004) may also be relevant. According to this theory more generalist gifted persons decide to become an entrepreneur, whereas more one-sided talented persons will decide to become an employee. Once in the start-up process, given the variety of activities it may entail - such as preparing a business plan, doing marketing and promotional activities, making financial projections - a generalist focus can be expected to be more useful for getting the business started than a narrower or specialist view.

Finally, the amount of human capital available to a business is also reflected in the number of partners involved in the business. Studies so far have not been able to find any consistent effect of being a team rather than a solo start up on outcome effects (Davidsson and Gordon, 2009; Cantner and Stuetzer 2010).

3. Data and Methodology

We collected data based on a survey among nascent entrepreneurs in Germany and the Netherlands. The nascents were identified from the adult population survey of the Global Entrepreneurship Monitor (GEM) in 2006 and 2007 (Germany and the Netherlands). A follow up survey was held among these nascents approximately one year after the adult population survey. Then it was assessed whether the nascents had succeeded in setting up the firm, whether they were still in the process of setting up their firm or whether they abandoned their start-up attempt. Table 1 shows the numbers of respondents for each of these three categories.

--- Insert Table 1 about here ---

In the next sections we will describe the dependent, independent and control variables used. Please note that a full list of all the variables that we use, including a detailed description, is given in Table 2.

--- Insert Table 2 about here ---

4. Dependent variable: start-up success

Our dependent variable is start-up success. The dependent variable consists of three categories: individuals who succeeded in setting up their own firm (1), those who are still in the process of setting up a business (2) and those who gave up or abandoned the start-up attempt (3).

It is difficult to observe a firm's inception (Katz and Gartner, 1988; Reynolds and Miller, 1992; Carter, Gartner and Reynolds 2004). Here inception is based on self-assessment of the nascent entrepreneur on whether the new venture is operational or not. Furthermore, it is also difficult to define a precise moment for when exactly someone has become a nascent entrepreneur. Often there is no exact point in time at which someone becomes a nascent entrepreneur – rather it is a gradual process where one step follows another. The information if and how the planned business was founded is based on follow-up interviews that were conducted one year after the GEM-screening interviews. Therefore, we cannot take account of the fact that during the first screening in which the nascents were identified some start-up initiatives were already more advanced than others.

We will now describe the independent and control variables that we use. Some descriptive statistics for these variables are given in Table 3.

--- Insert Table 3 around here ---

4.1. Independent variables: human capital

We use several human capital indicators, reflecting the three types of human capital (general, specific and broadness).

4.1.1. General human capital

Three dummies are constructed for low education (no education or some secondary education), medium education (secondary education) and high education (post secondary education or graduate experience). High education is the reference category in the regression analysis.

To control for a longer period of non-working we included an indicator whether someone was working (either in paid employment or self-employment) directly before the firm was started or, in case the firm is not (yet) started, whether the person is actually working or not.

4.1.2. Specific human capital

Previous experience in the same industry captures the number of years that the individual has experience in the specific field in which the business is or was being set up. We also include same industry experience squared. Prior start-up experience is based on the individual's response to the question of whether he/she started a new venture in the past (coded 1 if 'yes'). We also include a variable self-employed parents to indicate whether at least one of the parents of the nascent entrepreneur was self-employed (coded 1 if 'yes')¹. In addition we also use two human capital variables taken from the initial GEM-screening. The first is a variable that indicates whether someone knows another person who successfully founded a firm in the past two years (coded 1 if 'yes'). The second variable reflects whether someone feels he/she has the skills needed for becoming an entrepreneur (coded 1 if 'yes'). Sometimes nascent entrepreneurs are supported by a former employer. We included a dummy indicating whether resources of former employer are used (coded 1 if 'yes'). Another variable is used to indicate with how much effort advice was sought. It is based on questions about the sources that were used to get advice (e.g. family, friends, banks, lawyers, accounts). Individuals could indicate using several sources. In our sample some people did not use any source of advice while some individuals used multiple sources of advice, therefore the variable ranges from zero to seven.

4.1.3. Broadness of human capital

A first variable reflects the number of fields of experience which was assessed based on a list of eight items (i.e. R&D/design/engineering, production, marketing, finance/accounting, law, human resources, general management, consulting) for which respondents had to indicate whether they have experience in this field or not. Related to this we also use an indicator that reflects whether someone sees himself more as a specialist or as an allrounder (coded 1 if 'allrounder'). Furthermore, a dummy is included that indicates if the firm is founded alone or together with partner(s) (coded 1 if founded with partners).

4.2. Control variables

We include a number of control variables which we divide into firm-specific variables, personal dispositions and other controls.

4.2.1. Firm-specific variables

The size and technological state of the firm is measured by the following variables. A dummy is included to indicate whether the (planned) investment is over 10,000 euro (coded 1) or below. We asked how many jobs the firm would probably provide five years after founding. From these answers we constructed a variable whether the expected employment growth is higher or lower than the median expectations (coded 1 if higher). The technological state of

¹ We also asked if the planned start-up is connected with the parental firm. This was the case only in 7 out of 68 cases with self-employed parents.

the firm is measured by three variables. First, a variable is used on the newness of the technology used that is coded 1 if the technology is younger than five years. Second, we included an indicator that is coded 1 if the products or services are new to at least some or all costumers. We also included a third variable about the number of competitors, coded 0 if at least some or many competitors are expected.

4.2.2. Personal dispositions

Whether entrepreneurs seek public founding for their start-up is measured by a dummy coded 1 if public funding was sought. This variable turns out to be very different for the two countries included in our sample. Whereas in the Netherlands only few (11%) applied for public support, in Germany some 30% did. Since acquiring the financial resources needed is often one of the main problems for entrepreneurs, the possibility to get public support should be crucial for some nascent entrepreneurs. Even though Stouder and Kirchhoff (2004) conclude that internal or relational sources are more often utilized by nascent entrepreneurs, public funding is often the next best option since it is subsidized.

The motives underlying the wish to start a firm are important although not undisputed (Hinz and Ziegler 1999; Wagner 2006; Williams 2009). We distinguish between those who state that they want to start the firm out of "classical"-entrepreneurial ("opportunity") motives and those who are forced to become self-employed because they cannot find a job elsewhere ("necessity" motives). In addition, we also identify individuals who start out of a combination of opportunity and necessity motivation ("mixed" motives).

We also include one variables based on questions that are posed to everyone in the initial GEM-screening. This variables relates to whether someone thinks that there will be good opportunities for start-ups in the area where they live (coded 1 if 'yes'). Even though this variable is expected to differ mainly between entrepreneurs and non-entrepreneurs, it could also tell something about the commitment and self-esteem of nascent entrepreneurs and the favorability of the market conditions in which they are setting up their firm and may therefore be relevant for explaining start-up success.

4.2.3. Other controls

Finally, we include a number of other controls. We control for gender (coded 1 if 'male') and age of the nascent entrepreneur. We also include a squared term for age. We control for sector of industry by including seven industry dummies. Furthermore, we control for the number of constraints encountered during the start-up process (ranging from zero to eight) as people who encountered a larger number of constraints (such as financial constraints, work-life balance constraints, time-related constraints, regulatory constraints) may have more difficulty in getting their business started. We also control for the number of start-up activities (e.g. preparing a business plan, developing products/services, doing market research, making financial projections) that an individual already started or completed (ranging from zero to thirteen), since this is likely to positively relate to getting a business started. Since our data covers more than one year we include a year dummy to control for temporal changes (the reference category is 2006). We also use a dummy that indicates if a person comes from the Netherlands (coded 1) or Germany.

4.3. Methodology

To test whether human capital aspects affect start-up success while taking account of several control variables we use multinomial probit estimations. In the next section we present the results of the analysis.

5. Results

Results of the estimations are given in Table 4.

--- Insert Table 4 about here ---

Marginal effects are given for the probability that someone succeeds in setting up a firm, for the probability that someone is still in the process of setting up a firm and for the probability that someone gives up the start-up attempt. The estimates are robust² and the overall fit is highly significant. For convenience easily to interpret marginal effects are calculated and shown in the first column.

We first look at the results for *general* human capital. First, it is found that having a medium level of education increases the likelihood of succeeding in setting up a firm, while it decreases the likelihood of being still in the process of setting up a firm. The results regarding education are a bit surprising, because we expected that in particular highly educated persons would be successful in getting a business started. However, our results probably reflect that for those with a higher level of education plans to become self-employed are likely to compete with attractive job opportunities as employees. Therefore they face higher opportunity-costs for starting a business as compared to individuals with a lower level of education. Regarding previous employment experience the results indicate that when someone was working directly before starting a business this substantially raises the probability of start-up success while it decreases the probability of being still in the process. In fact this variable has the biggest influence of all human capital variables used. Thus, overall we find quite some support that general human capital matters for start-up success.

Next, we take a look at the indicators for *specific* human capital. Most of these indicators are not significantly related to start-up success and also do not affect whether someone is still in the process. For example, the number of years of experience in the same industry in which the business is set up has no significant impact on getting the business started. However, it does decrease the probability that someone gives up the start-up attempt. Furthermore, previous experience with starting a firm has no influence on start-up success. A third of all nascent entrepreneurs already started a new venture in the past – but this has no impact at all on the start-up success later. Furthermore, when someone has a parent who was or is self-employed this usually considerably raises the likelihood for this person (to wish) to become self-employed. It is argued that the role model of the parent(s) is an important stimulus to become an entrepreneur³. However, our results suggest that once someone is already in the process of setting up a firm having a self-employed parent does not affect start-up success. We do find some support for the role model effect in the sense that when a nascent entrepreneur knows someone who recently started a firm this increases start-up success and decreases the probability of still being in the process of setting up a firm.

Using many sources of advice decreases the probability of start-up success and it increases the likelihood that someone postpones setting up a firm. Possibly it is a sign of uncertainty or lack of knowledge or experience when someone is looking for a lot of information from external sources. Using many sources of advice could also reflect the degree of complexity of the business in the sense that when several different types of advice are needed this may be indicative of a more complex start-up attempt. Also when resources of a former employer are

² As a check OLS was applied with only minor differences.

³ Note that we controlled for the case that someone plans to become self-employed by taking over the parent business or parts of it. We only included persons that do not wish to continue a parental business.

used this decreases start-up success. It could be possible that someone's wish to start a firm competes with the interests of the former employer to continue the existing employment relationship. But it could also mean that the use of resources from a former employer requires close coordination with the former employer which may complicate the start-up attempt.

With respect to *broadness* of human capital there is no significant effect for the number of fields of experience. Surprisingly, when someone perceives himself as being an allrounder (as opposed to being a specialist) this has a negative influence on start-up success while it increases the probability of still being in the process of setting up a business. This is not in line with our expectations according to the "jack of all trades" hypothesis. Finally, we find that when someone attempts to set up a business with at least one partner (as opposed to setting up the business alone) this decreases start-up success.

We will now briefly discuss the influence of some of the control variables. Funding is likely to make it easier to start; depending on the type of funding one might even lose a title if the business is not started until a certain date. The variable for public funding that we included is not significantly related to start up success while it decreases the likelihood of still being in the process. A further inspection of this variable reveals that this is in fact a "divided" variable. If an interaction term is included (nation*funding, results not reported here for brevity) there is a significant positive effect for funding on start-up success and a significant negative effect on postponing in Germany, while no significant effects are found for the Netherlands.

There is some discussion about the importance of the motives that accompany the wish for self-employment. Usually a distinction is made along the push-pull argument – distinguishing between "classical" entrepreneurial motives (income maximization and independence) and "necessity" entrepreneurs who do not find an adequate job elsewhere. Wagner (2006) shows, using data of the "Regional Entrepreneurship Monitor" in Germany, that these two groups are indeed different and he speculates that necessity entrepreneurs perform worse than those that seek to exploit the opportunity. While there is some difference in the likelihood to succeed in setting up a firm between opportunity-driven and necessity-driven nascents, the most striking finding here is that if both motivations are at work (it means that a person is both, intrinsically motivated and driven through a lack of opportunities) the likelihood to succeed in setting up a business clearly increases, while the likelihood to postpone or give up the start-up attempt decreases.

When someone perceives good opportunities for starting up a firm this increases start-up success and decreases the probability that someone postpones setting up a firm. As expected the number of start-up activities that someone has started or completed also positively relates to start-up success and negatively to postponement and to giving up. Finally, it should be noted that we find a significant negative effect for the year dummy on start-up success and a positive effect on postponing and on giving up, indicating that individuals who were identified as nascents in 2007 were less likely to succeed in starting up a firm and more likely to postpone and to give up setting up a firm than those identified as nascents in 2006.

6. Discussion and Conclusion

With our paper we aim to investigate how three types of human capital (i.e. general, specific and broadness) relate to start-up success among nascent entrepreneurs. While several studies have related human capital indicators to the outcomes of new venture start up attempts (see Davidsson and Gordon (2009) for an overview) we include more human capital indicators than most previous studies. In addition, our geographical coverage (including nascent entrepreneurs from the Netherlands and Germany) differs from most previous studies. Furthermore, we combine data from two countries while most previous attempts have focused exclusively on single country contexts. In our paper we build on human capital theory which predicts that investment in knowledge, skills and experience enhances an individual's cognitive abilities and will subsequently result in more productive or efficient behavior (Becker, 1964). Start-up success is defined as succeeding in setting up a business as opposed to still being in the process of setting up a firm or abandoning or giving up a start-up attempt. Start-up success was assessed by asking nascent entrepreneurs from Germany and the Netherlands one year after they were identified as nascent about the development of their start-up effort.

While most previous studies found that more general forms of human capital do not influence the outcome of start up attempts (Davidsson and Gordon, 2009) the results of our study underline the importance of general human capital for start-up success in several respects. First, one of the main findings of our analysis is that people who were employed just before starting the firm are more likely to succeed in starting up their business and less likely to postpone the start-up attempt than people who were not employed before (i.e. being unemployed or out of the labor force). Thus, being unemployed or out of the labor force before or during starting up a firm decreases start-up success, which is an important finding since entrepreneurship is one of the potential routes for individuals out of unemployment or inactivity. Possibly up-to-date employment experience provides individuals with specific knowledge, experience, skills and networks that facilitate completing the start-up process. Second, we find that education relates to start-up success although the sign is opposite to prior expectations since it is found that nascent entrepreneurs with a medium level of education are more likely to succeed and less likely to postpone their start up efforts than those with a high level of education. This finding possibly reflects that higher educated individuals have more alternative employment options or that they simply need more time because they are setting up more complex businesses.

Regarding specific human capital we find no significant effect for most indicators. However, one finding that stands out from our results is that individuals making use of a higher number of sources of advice are less likely to succeed and more likely to postpone the start-up attempt. Furthermore, using resources from a former employer decreases start-up success. One possible explanation for these findings may be that the use of resources and advice from others requires extensive coordination with external partners which may subsequently hinder the start-up process. It may also be the case that in particular more complex or difficult start-up attempts need resources and advice from others.

With respect to specific human capital we also find some support for the role model effect in the nascent entrepreneurs who know someone who recently started a firm are more likely to succeed in setting up a firm. However, in line with previous results for Sweden (Davidsson and Honig, 2003) and the US (Parker and Belghitar, 2006) we find no indications for a role model effect of self-employed parents. So it seems to be the freshness of a start-up role model that is important during this stage of the entrepreneurial process.

Finally, we also explored whether broadness of human capital is relevant for explaining start-up success. Our results suggest that being an allrounder (as opposed to being a specialist) decreases the likelihood of start-up success. Previous research based on the "jack of all trades" hypothesis suggested that generalist people are more likely to enter self-employment than more specialist ones. Our results complement previous research by suggesting that such generalist experience actually hinders start-up success. So – according to our results – those who describe themselves as "specialist" are more likely to start their business. Possibly it is easier to get businesses started that are based on specialist knowledge.

In our study we also explored the role of entrepreneurial motivation. We were able to not only distinguish between push and pull motivations, but to also consider individuals who start out of a combination of push and pull motivations ("mixed motivations"). While opportunity motivated entrepreneurs appear more likely to succeed and less likely to postpone than necessity motivated ones, we in particular find that individuals with mixed motivations are even more likely to succeed in setting up a firm and less likely to postpone and to abandon their start-up attempts than individuals who are purely necessity driven. In case of mixed motivations both opportunity and necessity are at play. So these individuals are acting upon a perceived opportunity in the market, while at the same time they also have an urge to start up a firm (e.g. because they do not have another job that provides income). It is this combination of push and pull motivations that in particular seems to facilitate entry into entrepreneurship.

Limitations of our study include the small sample size. Also, the sample includes nascent entrepreneurs from only two different countries. As mentioned before, some authors discern sub-phases in the pre-start-up process and in our paper we are not able to identify such sub-phases. It may be relevant to distinguish between such sub-phases since a success factor in one phase might very well be a failure factor in another phase (Tiessen, 1998).

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Table 1: Status of the business start-up attempt one year after first screening

	Number	Percent
Business founded	109	57,7
Postponed	40	21,2
Given-up	40	21,2
Total	189	100,0

Table: 2: Dependent, independent and control variables

Variable	Description	Reference category/Range
Dependent variable		
Start-up success	3-staged Dummy: - business started in follow-up survey (1 year after first contact) - start up is postponed - given-up the intention to start a firm	
Independent variables:		
Human capital		
General human capital		
Education	Dummy with 3 groups	University degree
Overall work experience	Number of years of over all work experience (ln)	Metric
Employed before starting firm	Dummy: not employed/employed	Not employed before
Specific human capital		
Same industry experience	Number of years of specific work experience (ln)	Metric
Experience with starting	Dummy	No prior experience with starting
Parent(s) self employed	Dummy	Parent(s) not self employed
Know entrepreneur	Dummy	I don't know someone personally who started a business in the past 2 years
Skills	Dummy	I have not the knowledge, skill and experience required to start a new business
Resources former employer	Dummy	No resources former employer used
Advice	List of 7 items	0-7
Broadness of human capital		
Number of fields of experience	List of 8 items	0-8
Generalist	Dummy (all-rounder vs. specialist)	Specialist
Partner	Dummy	Without partner(s)
Control variables		
Firm specific variables		
Aspired growth	Dummy	Growth expectation lower than median
Investments	Dummy	(Intended) invest < 10,000 €
Technology	Dummy	Technology older than 5 years
Newness of product	Dummy	Product or service is not new to any customers
Extent of competition	Dummy	There are no competitors

Table: 2: Dependent, independent and control variables (continued)

Personal dispositions		
Funding	Dummy	No funding sought
Motivation	Dummy with 3 groups: necessity driven, opportunity driven, mixed motivation	Necessity entrepreneur (cannot find job elsewhere)
Opportunity perception	Dummy	In the next six months there will be no good opportunities for starting a business in the area where I live

Other controls		
Sex	Dummy	males
Age	Age in years (ln)	
Number of constraints encountered	(List of 8 items)	0-8
Number of start-up activities	Number of activities started or finished for starting a firm (List of 13 items)	0-13
Industry	Dummies for 7 industries	Industry not (yet) known
Nation	Dummy	Germany
Year of screening	Dummy (2006 or 2007)	2006

Table 3: Descriptive statistics independent variables

	mean	sd	min	max
Human Capital:				
General Human Capital				
Education (ref. highly educated)				
<i>High</i>	0.30	0.46	0.00	1.00
<i>Medium</i>	0.51	0.50	0.00	1.00
<i>Basic</i>	0.19	0.40	0.00	1.00
Over all work experience (ln)	2.72	0.83	0.00	4.09
Over all work experience squared (ln)	8.11	3.67	0.00	16.76
Employed before starting firm	0.82	0.38	0.00	1.00
Specific Human Capital				
Same industry experience (ln)	1.76	1.15	-1.11	3.74
Same industry experience squared (ln)	4.41	3.74	0.00	13.97
Experience with starting	0.32	0.47	0.00	1.00
Parent(s) self employed	0.37	0.48	0.00	1.00
Know entrepreneur	0.67	0.47	0.00	1.00
Skills	0.88	0.33	0.00	1.00
Resources former employer	0.15	0.35	0.00	1.00
Advice	1.85	2.00	0.00	8.00
Broadness of Human Capital				
Number of fields with experience	3.02	2.03	0.00	8.00
Generalist	0.63	0.48	0.00	1.00
Partner(s)	0.38	0.49	0.00	1.00
Firm specific variables				
Aspired growth	0.35	0.48	0.00	1.00
Investments	0.52	0.50	0.00	1.00
Technology	0.25	0.44	0.00	1.00
Newness of product	0.35	0.48	0.00	1.00
Extent of competition	0.11	0.31	0.00	1.00
Personal Dispositions				
Funding	0.25	0.43	0.00	1.00
Motivation (ref. necessity):				
<i>Opportunity driven</i>	0.46	0.50	0.00	1.00
<i>Necessity driven</i>	0.39	0.49	0.00	1.00
<i>Mixed motives</i>	0.15	0.35	0.00	1.00
Opportunity perception	0.55	0.50	0.00	1.00
Controls				
Sex (ref. male)	0.30	0.46	0.00	1.00
Age (ln)	3.71	0.26	2.89	4.22
Age squared (ln)	13.81	1.89	8.35	17.80
Number of constraints encountered	1.20	1.26	0.00	6.00
Number of start-up activities	5.48	2.91	0.00	13.00
Industries (ref. not (yet) known):				
<i>Manufacturing</i>	0.07	0.26	0.00	1.00
<i>Elect., gas and water, construction</i>	0.04	0.20	0.00	1.00
<i>Wholesale/retail trade etc.</i>	0.16	0.36	0.00	1.00
<i>Hotels and restaurants</i>	0.04	0.20	0.00	1.00
<i>Business Services</i>	0.30	0.46	0.00	1.00
<i>Personnel Services</i>	0.24	0.43	0.00	1.00
<i>Not (yet) known</i>	0.15	0.35	0.00	1.00
Year of survey (ref.2006)	6.50	0.50	6.00	7.00
Nation (ref. NL)	0.69	0.46	0.00	1.00

Table 4: Results from the multinomial Probit estimations (n=186)

	Outcome: Started		
	dF/dx *	t	P > t
Human Capital:			
General Human Capital			
Education (ref. highly educated)			
<i>Medium</i>	0.20	2.26	0.020
<i>Basic</i>	0.02	0.16	0.880
Over all work experience	0.01	0.04	0.970
Over all work experience squared	0.03	0.59	0.550
Employed before starting firm	0.34	2.61	0.010
Specific Human Capital			
Same industry experience	0.07	0.48	0.630
Same industry experience squared	-0.02	-0.58	0.560
Experience with starting	-0.10	-0.92	0.360
Parent(s) self employed	-0.08	-0.88	0.380
Know entrepreneur	0.19	1.73	0.080
Skills	0.00	-0.02	0.990
Resources former employer	-0.26	-1.74	0.080
Advice	-0.11	-4.15	0.000
Broadness of Human Capital			
Number of fields with experience	0.03	1.19	0.240
Generalist	-0.23	-2.97	0.000
Partner(s)	-0.17	-1.66	0.100
Firm specific variables			
Aspired growth	-0.09	-0.92	0.360
Investments	-0.09	-0.84	0.400
Technology	0.10	1.07	0.290
Newness of product	0.11	1.15	0.250
Extent of competition	-0.14	-0.84	0.400
Personal Dispositions			
Funding	0.14	1.57	0.120
Motivation (ref. necessity):			
<i>Opportunity driven</i>	0.19	2.28	0.020
<i>Mixed motives</i>	0.27	3.13	0.000
Opportunity perception	0.26	2.98	0.000
Controls			
Sex (ref. male)	0.08	0.75	0.450
Age	-5.52	-1.43	0.150
Age squared	0.79	1.46	0.140
Number of constraints encountered	-0.04	-1.27	0.210
Number of start-up activities	0.11	5.71	0.000
Industries (ref. not (yet) known):			
<i>Manufacturing</i>	-0.27	-1.04	0.300
<i>Elect., gas and water, construction</i>	-0.24	-0.81	0.420
<i>Wholesale/retail trade etc.</i>	-0.02	-0.08	0.940
<i>Hotels and restaurants</i>	-0.22	-0.69	0.490
<i>Business Services</i>	-0.27	-1.34	0.180
<i>Personnel Services</i>	-0.32	-1.40	0.160
Year of survey (ref.2006)	-0.35	-3.79	0.000
Nation (ref. NL)	-0.02	-0.22	0.820
chi2		211.87	
p		0.000	

* for a dummy variable the discrete change in y as the dummy changes from 0 to 1 is calculated

Table 4: Results from the multinomial Probit estimations (continued) (n=186)

	Outcome: Given-up		
	dF/dx *	t	P > t
Human Capital:			
General Human Capital			
Education (ref. highly educated)			
<i>Medium</i>	-0.02	-0.53	0.600
<i>Basic</i>	0.02	0.39	0.700
Over all work experience	-0.08	-0.79	0.430
Over all work experience squared	0.01	0.65	0.520
Employed before starting firm	-0.04	-0.78	0.430
Specific Human Capital			
Same industry experience	-0.12	-1.69	0.090
Same industry experience squared	0.03	1.54	0.120
Experience with starting	0.03	0.70	0.480
Parent(s) self employed	0.06	1.19	0.230
Know entrepreneur	-0.03	-0.60	0.550
Skills	-0.05	-0.67	0.500
Resources former employer	0.20	1.61	0.110
Advice	0.01	1.43	0.150
Broadness of Human Capital			
Number of fields with experience	0.00	-0.41	0.680
Generalist	0.06	1.57	0.120
Partner(s)	0.03	0.79	0.430
Firm specific variables			
Aspired growth	0.10	1.78	0.080
Investments	0.00	0.02	0.980
Technology	0.01	0.14	0.880
Newness of product	-0.06	-1.72	0.090
Extent of competition	-0.06	-1.69	0.090
Personal Dispositions			
Funding	0.00	0.06	0.950
Motivation (ref. necessity):			
<i>Opportunity driven</i>	0.01	0.22	0.820
<i>Mixed motives</i>	-0.09	-2.30	0.020
Opportunity perception	-0.04	-1.05	0.290
Controls			
Sex (ref. male)	0.02	0.46	0.640
Age	3.56	1.51	0.130
Age squared	-0.51	-1.54	0.120
Number of constraints encountered	0.02	1.35	0.180
Number of start-up activities	-0.03	-2.39	0.020
Industries (ref. not (yet) known):			
<i>Manufacturing</i>	0.02	0.16	0.880
<i>Elect., gas and water, construction</i>	0.16	0.51	0.610
<i>Wholesale/retail trade etc.</i>	0.11	0.59	0.550
<i>Hotels and restaurants</i>	0.19	0.54	0.590
<i>Business Services</i>	0.22	1.05	0.290
<i>Personnel Services</i>	0.10	0.52	0.600
Year of survey (ref.2006)	0.15	2.39	0.020
Nation (ref. NL)	0.09	1.98	0.050
chi2		211.87	
p		0.000	

* for a dummy variable the discrete change in y as the dummy changes from 0 to 1 is calculated

Table 4: Results from the multinomial Probit estimations (continued) (n=186)

	Outcome: Postponed		
	dF/dx *	t	P > t
Human Capital:			
General Human Capital			
Education (ref. highly educated)			
<i>Medium</i>	-0.18	-2.28	0.020
<i>Basic</i>	-0.04	-0.38	0.710
Over all work experience	0.07	0.32	0.750
Over all work experience squared	-0.05	-0.91	0.360
Employed before starting firm	-0.30	-2.44	0.010
Specific Human Capital			
Same industry experience	0.05	0.48	0.630
Same industry experience squared	-0.01	-0.20	0.840
Experience with starting	0.07	0.68	0.490
Parent(s) self employed	0.02	0.29	0.770
Know entrepreneur	-0.16	-1.65	0.100
Skills	0.05	0.48	0.630
Resources former employer	0.07	0.52	0.610
Advice	0.09	4.02	0.000
Broadness of Human Capital			
Number of fields with experience	-0.02	-1.09	0.270
Generalist	0.17	2.42	0.020
Partner(s)	0.13	1.43	0.150
Firm specific variables			
Aspired growth	-0.01	-0.10	0.920
Investments	0.09	0.92	0.360
Technology	-0.11	-1.33	0.180
Newness of product	-0.05	-0.54	0.590
Extent of competition	0.19	1.21	0.220
Personal Dispositions			
Funding	-0.15	-1.94	0.050
Motivation (ref. necessity):			
<i>Opportunity driven</i>	-0.20	-2.65	0.010
<i>Mixed motives</i>	-0.18	-2.14	0.030
Opportunity perception	-0.23	-2.78	0.010
Controls			
Sex (ref. male)	-0.10	-1.18	0.240
Age	1.96	0.59	0.560
Age squared	-0.28	-0.60	0.550
Number of constraints encountered	0.02	0.67	0.500
Number of start-up activities	-0.07	-4.42	0.000
Industries (ref. not (yet) known):			
<i>Manufacturing</i>	0.25	0.93	0.350
<i>Elect., gas and water, construction</i>	0.08	0.30	0.760
<i>Wholesale/retail trade etc.</i>	-0.10	-0.69	0.490
<i>Hotels and restaurants</i>	0.03	0.13	0.890
<i>Business Services</i>	0.05	0.28	0.780
<i>Personnel Services</i>	0.23	0.97	0.330
Year of survey (ref.2006)	0.20	2.26	0.020
Nation (ref. NL)	-0.07	-0.62	0.530
chi2		211.87	
p		0.000	

* for a dummy variable the discrete change in y as the dummy changes from 0 to 1 is calculated

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We explore the role of human capital aspects in explaining whether nascent entrepreneurs succeed in the start-up of a new venture. The data used are based on a survey among nascent entrepreneurs in Germany and the Netherlands supplemented by follow-up interviews one year after the first contact. Applying multinomial probit estimations we find that several human capital aspects are related to the probability of getting the business started.Â Human capital and start-up success of nascent entrepreneurs. @inproceedings{Brixy2010HumanCA, title={Human capital and start-up success of nascent entrepreneurs}, author={Udo Brixy and Jolanda Hessels}, year={2010} }. Udo Brixy, Jolanda Hessels.