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Abstract

This paper examines the effects and origins of balanced skills among nascent entrepreneurs. In a first step we apply Lazear's jack-of-all-trades theory to investigate performance effects of a balanced skill set. Second, we investigate potential sources of balanced skills, thereby testing the investment hypothesis against the endowment hypothesis. Analyzing data on high-potential nascent projects, we find support for the notion that balanced skills are important for making progress in the venture creation process. Regarding the origins of balanced skills, the data support both hypotheses. In line with the investment hypothesis an early interest in an entrepreneurial career, prior managerial and entrepreneurial experience are significantly related with a more balanced skill set. Supporting the endowment hypothesis, an entrepreneurial personality profile indicating entrepreneurial talent is correlated with a balanced skill set. Our results thus hint at the need for theories on the origins of a balanced skill set that integrate both views.

Keywords: Nascent entrepreneurship; balanced skills; human capital; new venture creation; entrepreneurship

JEL Classification: L26 M13 J24

1 Introduction

What actually makes an entrepreneur and what is the "essence of being entrepreneurial" (Krueger 2007, p. 123)? A great deal of research dealing with this question focuses on the entrepreneurs' human capital. Grounded in economics (Becker 1964), human capital theory posits that investments in skills and knowledge pay off in terms of (1) getting a nascent venture up and running (e.g., Davidsson and Honig 2003), (2) firm survival (e.g., Brüderl et al. 1992), (3) venture growth (e.g., Baum and Locke 2004), and (4) profitability (e.g., Bosma et al. 2004). However, a recent meta-analytical study reports low correlations between traditional human capital variables and entrepreneurial success in general (Unger et al. 2011). For nascent entrepreneurship in particular there is also no strong link between traditional human capital and outcomes (Davidsson and Gordon in press). One reason for these disappointing results might be that skills and knowledge from education and on-the-job-training may also be related to superior performance in paid employment (Gimeno et al. 1997). In search of a distinctive set of skills and abilities as the "essence" of entrepreneurial human capital, Lazear (2005) recently proposed a theoretical model highlighting the importance of *a balanced skill set* for entrepreneurs. The author´s basic proposition is that entrepreneurs must be multi-skilled in a number of areas because they have to combine different resources such as physical and financial capital, people and ideas in order to successfully run a business. Previous entrepreneurship research on the jack-of-all-trades view has primarily focused on the entry decision (e.g., Lazear 2005; Silva 2007; Wagner 2006), indicating that people with a balanced skill set are more likely to opt for self-employment.

In this paper we apply Lazear's theory to derive performance predictions of a balanced skill set in a nascent entrepreneurship context. In general, the link between entrepreneurial performance and a balanced skill set has not been thoroughly investigated yet (see for notable exceptions Oberschachtsiek in press; Åstebro and Thompson 2011; Hartog et al. 2010), and we could identify only one empirical study investigating performance effects of balanced skills in a nascent entrepreneurship context. Examining a representative sample of nascent projects, Brixy and Hessels (2010) found contradictory results between several measures of balanced skills and nascent entrepreneurship success – an objective indicator of balanced skills was not correlated with success, while entrepreneurs who perceived themselves as generalists were less likely to get a nascent project up and running. Given this conflicting pattern of evidence, we know little about whether the jack-of-all-trades view also applies when studying nascent

entrepreneurship. Answering this question is important for two reasons. Firstly, entrepreneurship is critical for economic development (e.g., Audretsch and Keilbach 2004) and experts deem nascent entrepreneurship, i.e., the founding of new firms, as prototypical entrepreneurial behavior (Gartner 1988; Shane and Venkataraman 2000). Secondly, although not a "free lunch", their own human capital is the most easily accessible and an often used resource of nascent entrepreneurs (Davidsson and Honig 2003).

Because of its importance for economic wellbeing, human capital and its origins have been extensively investigated in (labour) economics. What we know from this general literature is that education and training, as well as innate ability (though to a lesser degree) pay off for the individual (Ashenfelter and Rouse 1998). However, research about the development and formation of entrepreneurial human capital is scarce. In particular our knowledge about the origins of a balanced skill set is very limited and subject to disagreement among scholars (Åstebro and Thompson 2011; Lazear 2005; Silva 2007). In brief, there are two competing models explaining variation in entrepreneurs' skill sets. On the one hand, the investment hypothesis states that individuals planfully *invest* in a balanced skill set by working in a range of jobs to acquire skills for starting a business (Lazear 2005). On the other hand, the endowment hypothesis questions the intentionality of skill acquisition. Instead, scholars posit that dispositional factors such as entrepreneurial talent or "taste for variety" drive the skill accumulation process (Åstebro and Thompson 2011). It is argued that an *innate entrepreneurial endowment* leads individuals to accumulate different roles in the labour market and to form a balanced skill set as prototypical entrepreneurial competence (Silva 2007). Questions on whether entrepreneurship can be taught and what should be included (Sexton and Upton 1987) are of central importance for entrepreneurship education – a field which is rapidly expanding.

In view of these research gaps, this paper examines the origins and effects of balanced skills among nascent entrepreneurs. Our study stands in the tradition of Schultz' (1980) human capital approach, which focuses on the supply and demand of "entrepreneurial ability" in society. According to him, entrepreneurial abilities are not equally distributed among individuals, but are scarce and thus valuable; they can be both innate and/or acquired. First, we apply Lazear's jack-of-all-trades theory to formally model and test performance effects of balanced skills. Second, we explore potential sources of balanced skills relevant for entrepreneurship. Regarding the investment hypothesis, we investigate the question of whether a balanced skill set is the result of an individual's investment strategy, which

might encompass prior entrepreneurial experience or prior work experience in young and small companies. With respect to the endowment hypothesis, we draw on findings reported in the psychological literature on entrepreneurship. We examine whether a balanced skill set might be rooted in the personal development of the entrepreneur and whether skill accumulation may be unintentionally driven by personality traits. In order to test these hypotheses we use a longitudinal data set of 90 nascent entrepreneurs engaged in setting up high-potential nascent firms in the German federal state Thuringia. In doing so this paper makes two interrelated contributions to the literature. First, we combine recent advancements in the fields of entrepreneurship and developmental psychology research to present a more holistic view on the origins of entrepreneurial human capital. Second, by establishing a link between entrepreneur's balanced skills and nascent entrepreneurship performance we add evidence that balanced skills might indeed be regarded as an important human capital feature throughout the entrepreneurial process.

The present paper is organized as follows. In the next section, we set out theoretically informed hypotheses regarding the effects and origins of balanced skills. We then present the data and the variables used to test the hypotheses followed by the empirical analysis. The last sections present the core findings and conclusion.

2 Theoretical background

2.1 Performance effect of balanced skills in the nascent entrepreneurship context

Lazear (2005) proposed a model of vocational choice that gained some consensus in the scientific community. He states that those individuals with a balanced skill set are more likely to opt for self-employment when facing a decision between entrepreneurship and paid employment. Past research testing this assumption found initial support for this jack-of-all-trades hypothesis (Åstebro and Thompson 2011; Lazear 2005; Silva 2007; Wagner 2006). If a balanced skill set is indeed so central for entrepreneurship that it can be deemed as prototypical entrepreneurial human capital, then it should also be relevant for achieving entrepreneurial success. We test this by applying Lazear's approach to derive performance implications for those individuals who have chosen entrepreneurship.

We are not the first to suggest such an application of Lazear's (2005) theory. Lazear himself presented some thoughts on the distribution of earnings among entrepreneurs in a prior working paper (Lazear 2003). Åstebro and

Thompson (2011) have formally modelled income implications among entrepreneurs in a jack-of-all-trades setting by using specific assumptions on the distribution of the skills. Indeed, one part of their model predicts a positive impact of a balanced skill set on entrepreneur's income. We use a somewhat different approach. Like in the original model, we do not expect a particular distribution of the skills but leave them unrestricted. Before we describe our application of Lazear's model in more detail, we start this section with an outline of Lazear's formal approach (see Lazear, 2005, pp. 652-654, for comparison).[1]

Let us assume two activities – entrepreneurship and paid employment – through which an individual can earn a living, and in each activity earnings depend on the productive use of two skills. The skill levels (before vocational choice) are denoted by x_1 and x_2. At the beginning the two skills are expected to be independent from each other. Every individual is endowed with a skill pair (x_1, x_2), whereby $g(x_1, x_2)$ is the joint density of both skills. As an employee the individual may specialize in one skill to earn

$$w_S = max[x_1, x_2], \tag{1}$$

while as an entrepreneur his or her earnings are limited by the weakest skill

$$w_E = \lambda\, min[x_1, x_2]. \tag{2}$$

The decision to become an entrepreneur is based on a comparison of the earnings. Individuals choose entrepreneurship as long as $\lambda\, min[x_1, x_2] > max[x_1, x_2]$.[2] The weaker skill must exceed a minimum level otherwise the individual becomes a specialized employee. This can also be seen in Figure 1, where the individual decision, its conditions and outcomes are depicted.

[Figure 1 about here]

Given the distribution of the skills, the probability of an individual to choose entrepreneurship is equal to both shaded areas in Figure 1 or in mathematical terms

[1] We will use the same notation as in the original model to make it easy for the reader to follow our application of Lazear's model.

[2] Lazear (2005) terms λ as a market-determined premium to entrepreneurship that is endogenously defined within the model so as to equate supply and demand. λ is a multifaceted catch-all variable. It can be interpreted as the level of technological complexity or economies of scales in an industry which hinders the transformation of individual entrepreneurial talent into succesfull start-up attempts.

$$Prob = \int_{0}^{\infty} \int_{x_1/\lambda}^{\lambda x_1} g(x_1, x_2)\, dx_2 dx_1 . \tag{3}$$

For those individuals who become entrepreneurs, Lazear's theory can be used to derive performance implications. In our use of the model the expected earnings of an entrepreneur are given by the product of the probability to become an entrepreneur (3) and the entrepreneurial income function (2) such as

$$E(w_E) = \int_{0}^{\infty} \int_{x_1/\lambda}^{\lambda x_1} w_E(x_1, x_2)\, g(x_1, x_2)\, dx_2 dx_1 . \tag{4}$$

As a next step the assumption of independence of the skills is relaxed and the possibility of balanced skills is introduced. The income equation of the entrepreneur in (2) already contains the intuition. Only if the entrepreneur is sufficiently good in both skills will he/she be able to set up a successful business, since the earnings are limited by the weaker skill. To be a jack-of-all-trades should thus pay off for entrepreneurs. In formal terms and following Lazear (2005), let x_2 depend upon x_1 and a different factor v such as

$$x_2 = \rho x_1 + (1-\rho)v , \tag{5}$$

where $\rho \in [-1,1]$ denotes the correlation between both skills, and $f(x_1)$ and $h(v)$ are density functions of x_1, respectively v. In order to solve this model setup we adapt the solution process of the original Lazear (2005) model. Firstly, we incorporate the balanced skills notion into the earning equation in (4). Thereby one has to use a standard change of variables and alter the limits of integration to obtain

$$E(w_E) = \int_{0}^{\infty} \int_{[(x_1/\lambda)-\rho x_1]/(1-\rho)}^{(\lambda x-\rho x_1)/(1-\rho)} w_E(x_1, v)\, f(x_1)\, h(v)\, dv dx_1 . \tag{6}$$

Secondly, this equation is differentiated with respect to ρ. Because the min-function in (2) is non-monotonic and cannot be easily differentiated, we split the integral into two parts. In Figure 1, the income function is given by $w_E(x_1) = \lambda x_1$ for points above the 45-degree line ($x_2 > x_1$). For points below the 45-degree line ($x_1 > x_2$), entrepreneurial income is given by $w_E(x_1, v) = \lambda x_2 = \lambda[\rho x_1 + (1-\rho)v]$. Reorganisation of the integral limits yields equation (7a) for points above the 45-degree line, and (7b) for points below the 45-degree line:

$$E(w_E) = \int_0^{\infty} \int_{x_1}^{(\lambda x_1 - \rho x_1)/(1-\rho)} w_E(x_1) f(x_1) h(v) dv dx_1 , \tag{7a}$$

$$E(w_E) = \int_0^{\infty} \int_{[(x_1/\lambda) - \rho x_1]/(1-\rho)}^{x_1} w_E(x_1, v) f(x_1) h(v) dv dx_1 . \tag{7b}$$

Differentiating both equations with respect to ρ and denoting UL as the upper limit, respectively LL as the lower limits of the inside integral (Lazear, 2005), yields

$$\frac{\partial E(w_E)}{\partial \rho} = \left[\int_0^{\infty} h(UL) \lambda x_1 \frac{x_1(\lambda - 1)}{(1-\rho)^2} - 0 \right] f(x_1) dx_1 , \tag{8a}$$

$$\frac{\partial E(w_E)}{\partial \rho} = \left[\int_0^{\infty} 0 - h(LL) x_1 \frac{-x_1(1 - 1/\lambda)}{(1-\rho)^2} \right] f(x_1) dx_1 . \tag{8b}$$

Both equations are positive upon the condition $\lambda > 1$, which is always given according to Lazear (2005). Thus, the theory predicts a more balanced skill set of the entrepreneur to be associated with higher performance. Given that nascent projects are per definition in gestation and not yet completed, performance indicators such as income, sales and profit (growth) – as proposed by Lazear's theory – are not applicable. Recent research indicates that *making progress in the venture creation process* is an equivalent performance indicator for nascent projects (see for an overview Davidsson and Gordon in press, and for applications Liao and Welsch 2008; Davidsson and Honig 2003). From an emergence perspective, as more gestation activities are undertaken, the more the emerging venture takes shape or manifests itself (Katz and Gartner 1988). The more gestation activities are undertaken the more the project is able to act as a complete venture, organise production and finally generate earnings for its founders. Prior research supports this reasoning. The number of activities undertaken, for example, is a strong predictor for project continuation (Carter et al. 1996) and achieving initial sales (Brush et al. 2008).

We put this jack-of-all-trades hypothesis to a test by controlling for traditional human capital factors such as entrepreneurial experience, managerial experience and work experience in young and small companies which are often used as indicators for entrepreneurial skills and abilities (Tornikoski and Newbert 2007; Liao and Gartner 2006). If the jack-of-all-trades view indeed applies in the nascent entrepreneurship context, and if Lazear is right when deeming a balanced skill set as the "essence" of entrepreneurial human capital, than venture creation success

should be primarily a function of such a skill set (and not so much of other more traditional human capital variables). This leads to the following hypotheses:

H1: A balanced skill set is positively associated with making progress in the venture creation process even when controlling for traditional human capital variables.

2.2 Origin of balanced skills

Recent efforts to empirically test the jack-of-all-trades theory have sparked a controversy. Where does a balanced skill set relevant for entrepreneurship come from? This controversy refers to one of the "oldest" questions in entrepreneurship research, namely whether an entrepreneurial mindset is the result of development and experiences or whether it is a talent some people have and others do not. Past research on this more general question found support for both views. For example, genetic studies revealed a genetic influence on entrepreneurial behavior (Shane et al. 2010). Other studies indicate that experiences and learning are crucial for entrepreneurship (Krueger 2007; Obschonka et al. 2011a, 2011b; Stam et al. 2008). Nevertheless, the jack-of-all-trades perspective has only been recently considered in tackling this pivotal controversy. Reflecting the basic debate (innate talent vs. experience and learning), two opposing schools of thought have emerged in the literature on the origins of balanced skills: The idea of *planful investment* (e.g., Lazear 2005) versus the idea of *entrepreneurial endowment* (e.g., Silva 2007). In the following sections, these ideas are explained in detail and then used as the foundation for further hypotheses. In brief, we aim to find out here whether a balanced skill set relevant for entrepreneurship is more the result of planful investments in an entrepreneurial career or of an innate entrepreneurial talent.

2.2.1 Investment hypothesis

The investment hypothesis states that individuals purposely invest in a balanced skill set by engaging in a diverse education, working in different industries and jobs to acquire the variety of skills needed to successfully start a new business in the future (Lazear 2005). The theoretical foundation of this view is human capital theory (Schultz 1980; Brüderl et al. 1992) which argues that investment in entrepreneurial skills and abilities pay off in terms of surviving, profitability and progress. The increased offer and availability of entrepreneurship education in schools and universities is a good indication that individuals (and governmental institutions) actually invest heavily in the

development of entrepreneurial skills (Kuratko 2005). We argue that if a balanced skill set is the outcome of a planful investment strategy of future nascent entrepreneurs, vocational planning and interests that relate to entrepreneurship should play a central role in the acquisition of a balanced skill set.

As a baseline, the crystallization of a concrete *entrepreneurial career interest* should play a role (Schmitt-Rodermund 2004). Following the logic of the investment hypothesis, we investigate the age of a first entrepreneurial career interest as a proxy for starting with planful investments in entrepreneurial human capital. It is well documented that such vocational interests, when referring to a very specific, clear, and realistic interest (such as becoming an entrepreneur) guide a person's human capital development in general and the development of skills and abilities needed for the specific vocation in particular (Schoon 2001). It has also been shown that those who develop an entrepreneurial career interest as early as in adolescence more often engage in entrepreneurship during their subsequent career than others (Falk et al. in press; Schmitt-Rodermund 2004). According to the investment hypothesis, it is our basic expectation that those who develop a first entrepreneurial career interest earlier in life may start earlier to invest in a balanced skill set, which in turn results in a more pronounced balanced skill set as nascent entrepreneur. Simply put, they would have more time for conducting such planful investments than those who develop such a first career interest later. Thus, we hypothesize:

H2a: The age of a first entrepreneurial career interest is negatively associated with a balanced skill set.

Once individuals have an interest in an entrepreneurial career, they might take deliberate steps to invest in a balanced skill set. A review of the literature revealed four possible routes to do so. First, *previous self-employment* can be considered as a mechanism to acquire a balanced skill set. It is well known that previously self-employed individuals represent a high proportion of nascent entrepreneurs (Evans and Leighton 1989). Sarasvathy and Menon (2006) argue that serial entrepreneurship is all about entrepreneurial learning what works and what does not work. Because an entrepreneur has to deal with various tasks such as product development, and raising financial funds (Lazear 2005), past entrepreneurial experience might therefore be seen as the best training to gain specific knowledge and skills in various fields, which are then most productively applied in later entrepreneurship.

Second, *managerial experience* can be regarded as a path to purposely acquire a balanced skill set. Irrespective of whether the managers' role is organisational long-term planning and control (Fayol 1916) or day-to-day management of a multitude of people and tasks (Mintzberg 1973), it seems reasonable that "of all job grades, managers will have the greatest exposure to work experience which spans diverse tasks" (Parker 2009, p.485). To put it differently, we argue that the nature of managerial work in itself enables would-be entrepreneurs to build up experience and acquire tacit knowledge in various fields, or in other words to acquire a balanced skill set.

Third, *work experience in young and small firms* might be seen as a route to acquire balanced skill set in a planned way. Because small (and especially young and small) firms usually lack complex hierarchical structures and highly-specialized work places, working conditions are characterized by the opportunity for employees to conduct a variety of tasks (Parker 2009; Bublitz and Noseleit 2011; Elfenbein et al. 2010). Exposure to different tasks subsequently leads to balanced skills via learning-by-doing. Indeed, Wagner (2004) reports substantially higher probability for individuals with previous work experience in small and young firms to engage in entrepreneurship.

Fourth and finally, besides on-the-job training, *formal education* can also be regarded as an indicator for a planful investment strategy to acquire balanced skills. By taking a varied curriculum students gain formal knowledge in different fields instead of specializing in one field. A varied curriculum, then, enables students to subsequently work in different jobs and industries, and further establish a balanced skill set relevant for entrepreneurship (Lazear 2005). Some support for this reasoning is provided by Backes-Gellner et al. (2010) who report higher probability for individuals with a mixed and balanced educational and vocational training to engage in entrepreneurship. Taken all into account, we apply the following set of hypotheses:

H2b: Prior entrepreneurial experience is positively associated with a balanced skill set.

H2c: Prior managerial experience is positively associated with a balanced skill set.

H2d: Prior work experience in young and small firms is positively associated with a balanced skill set.

H2e: Prior variety in university curricula is positively associated with a balanced skill set.

2.2.2 Endowment hypothesis

In contrast to a directed and planful acquisition of a balanced skill set, individuals may possess entrepreneurial skills through unintentional, predetermined factors. The idea of entrepreneurial skills as a direct expression of innate talent has long been championed in entrepreneurship research (Knight 1921; Schumpeter 1934; Lucas 1978; Silva 2007; Rosti and Chelli 2005). Both personality research (Rauch and Frese 2007) and new genetic research (Shane, et al. 2010) provides empirical evidence for this view. Accordingly, the investment hypothesis in the balanced skills context has been challenged by some scholars. Silva (2007) found no evidence for a causal and intentional relationship between skill acquisition in one employment spell and entrepreneurial activity in the following employment spell when controlling for time-fixed individual unobservables. He argues that a jack-of-all-trades attitude "only matters as an innate attribute" (p. 122) leading to an endowment of entrepreneurs with multiple skills – a view Lazear (2005) only found limited support for. A similar argument has been brought forward by Åstebro and Thompson (2011). They show that a more balanced skill set and entrepreneurial entry is related to several personality traits that were subsumed under the label "taste for variety". In search for proxy measures of an entrepreneurial talent we reviewed the literature on vocational development and choice in the context of entrepreneurship. We came up with two basic constructs, one referring to personality research (entrepreneurial personality profile) and one to developmental research (early entrepreneurial competence in adolescence).

First, supported by the trait-approach to entrepreneurship, a person's *personality structure* can be indicative of his or her entrepreneurial talent. This particularly applies to broad traits such as the Big Five (extraversion, consciousness, openness to new experiences, agreeableness, and neuroticism) because they are relatively stable over time, substantially influenced by the genetic make-up (Caspi et al. 2005; see also Shane et al. 2010), and related to entrepreneurial behavior (Rauch and Frese 2007). However, a person's personality is not fully described by single traits alone – it is better characterized by an intra-individual configuration of traits. Thus, one has to take into account trait profiles in order to capture personality as a whole (Block 1971; Magnusson 1998). But what is an entrepreneurial personality? In this respect, a number of studies show that a personality profile high in extraversion, consciousness, and openness to new experiences, and low in agreeableness and neuroticism relates to an entrepreneurial career choice and to entrepreneurial behavior (Schmitt-Rodermund 2004; 2007; Obschonka et al. 2010), as well as to traditional human capital relevant for the entrepreneurial process of venture creation (Obschonka et al., 2011a). Kösters and Obschonka (2011) further showed such a personality profile to be related to the perceived

effectiveness of public business advice delivered during the founding process (it was particularly those without such an entrepreneurial profile that benefited the most from the advice, probably due to their lack of entrepreneurial talent and skills). To asses the trait profile, these studies quantified the fit between the individual empirical Big Five profile of a person and a prototypical entrepreneurial Big Five profile (highest possible value in extraversion, consciousness, and openness to new experiences and lowest possible value in agreeableness and neuroticism).We follow this promising stream of research and investigate this fit-measure of an entrepreneurial personality profile as proxy of entrepreneurial talent and in relation to a balanced skill set. According to the endowment hypothesis, we expect that:

H3a: An entrepreneurial personality profile is positively associated with a balanced skill set.

Second, following the developmental perspective of entrepreneurship, an entrepreneurial talent should not only be indicated by personality but also by the formation of age-appropriate forms of entrepreneurial competence early in life. More general research on talent and expert performance suggest that talent in a specific field often manifests itself via related early competencies in childhood and adolescence (Csikszentmihalyi et al. 1993; Heller et al. 2000). Proponents of that view argue that among the talented respective accelerated competence growth finds expressions in early competencies that are superior when compared to less talented same-aged peers. This notion already received some attention in entrepreneurship research. For example, in her analysis of the famous Terman-longitudinal study that followed its participants virtually across the whole life course, Schmitt-Rodermund (2007) found that age-appropriate *early entrepreneurial competence* measured in adolescence (indicated, for example, by age-appropriate behaviours such as assumed leadership roles and inventive activities) forecasted an entrepreneurial career choice during the subsequent career. This finding was replicated in a retrospective sample consisting of highly-innovative entrepreneurs (Obschonka et al. 2010). Moreover and even more important for the present study, such early entrepreneurial competences in adolescence have been identified as part of the entrepreneurial competence growth process across adolescence and adulthood (Obschonka et al. 2011a). Taken together, and consistent with further longitudinal research pointing to the relevance of adolescent development for entrepreneurship (Falck et al. in press; Zhang and Arvey 2009), we used early entrepreneurial competence in adolescence (indicated by leadership, inventions, and commercial activities, Obschonka et al., 2010, 2011a, 2011b) as proxy for innate entrepreneurial talent. According to the endowment hypothesis, we expect that:

H3b: Early entrepreneurial competence in adolescence is positively associated with a balanced skill set.

3 Methods

3.1 Sample and procedure

The data for this analysis stems from the Thuringian Founder Study (TFS) (Thüringer Gründer Studie), an interdisciplinary research project on success and failure of innovative new ventures in the German federal state Thuringia (see also Obschonka et al. 2010). One part of this study is a sample of "high-potential" nascent projects that were prospectively followed along the founding process. We defined high potential nascent projects as projects that have – due their characteristics – the ability to decisively drive the market process (Davidsson 2008; Kirzner 1973). Driving the market process refers to the introduction of new means-ends relationships, the more efficient use of resources and/or the implementation of both organizational and marketing innovations. According to this definition, the targeted sample of high-potential projects should not be limited to tech-based nascent projects, but also includes innovative activity in the service sector. Building a sample of high-potential nascent projects consistent with this broad definition is in line with previous work using panel datasets of nascent ventures (Davidsson et al. 2008; Samuelsson and Davidsson 2009; Newbert 2005).

Constructing the dataset for this paper comprised three steps. First, possible sources for identifying high-potential nascent projects were assessed. We utilized a multitude of sources to minimize the bias which would occur when focusing on a single source. The most important sources were the random samples of scientists and innovative young companies constructed within the TFS. Among the scientists some indicated actually trying to start a new business. Some of the innovative young companies were also still in the gestation phase as they had no positive cash-flows yet. Accordingly they did not qualify for the sample of young firms but for the nascent sample. Another source of high-potential nascent projects were public business consultants, technology transfer offices of universities, business angels, and venture capitalists. The research team also visited elevator pitches (events where entrepreneurs pitch their business ideas to venture capitalists or angel investors) to get in contact with high-potential nascent projects. To a smaller extent, some high-potential nascent projects were identified through nascent entrepreneurs and

members of the research team who indicated they knew other projects. All in all, using these different sources 364 suspected high-potential projects could be identified.

The second step of the procedure was comprised of a customized screening procedure to separate high-potential from regular projects. All suspected high-potential nascent projects were rated by a combination of criteria related to a) human capital of the entrepreneurs (management experience, start-up experience and starting as team), b) sophistication level of the project (e.g., scientist sample: relation of the idea to own research; others: novelty of the product / service, or production process, or methods of promotion and selling), and c) belonging to a growth-friendly industry (e.g., sample of young companies: operating in a growing market; specific industries). Note that these criteria are usually considered as important drivers of (new) venture growth (e.g., Eisenhard and Schoonhoven 1990; Unger et al. 2011) and have been successfully applied in prior attempts to construct datasets of high-potential firms (Davidsson et al. 2008). The projects were coded for each criterion as 1 for low, 2 for medium, and 3 for high level. In sum, 232 cases that reached the predefined score of 6 points qualified for the main interviews.

In the third step, actual data collection took place. In order to build a longitudinal data base allowing for causal analysis, data collection was carried out across two waves. At the first measurement occasion (T1; assessment between July 2008 and May 2009), the research team contacted the respective founders. We were able to conduct 152 extensive face-to-face interviews with the solo entrepreneur or leading entrepreneur of the high-potential project (response rate of 66%). The interviews took one and a half hour on average. Some of the projects were already abandoned at the time of the interview. A couple of other projects were already "complete" firms (in terms of having officially registered and having obtained monthly positive cash flows). Since these cases are not nascent projects according to the usual standards in nascent entrepreneurship research, we solely focus on the remaining 100 projects in gestation.[3] We further excluded two cases where the start-up project was not genuinely new, leaving us with a sample of n = 98 valid cases.

[3] There is no response bias between the 152 participants and the 80 non-participants with respect to gender and region (testing for an age bias was not possible due to missing data for the non-participants). Furthermore there is no bias with respect to age, gender and region between the entrepreneurs of the 100 nascent projects, the 34 already complete firms and the 18 abandoned projects. Also when comparing the final sample of 90 entrepreneurs with those 142 entrepreneurs dropping out at several stages of the data collection process, we find no sample bias with respect to gender and region.

The T1 interviews covered a broad set of questions regarding socio-demographic and psychological personal data and characteristics of the project (e.g., timing of gestation activities). Some of this data refers to retrospective information (e.g., regarding teenage years) which can be subject to memory decay (Davidsson 2008). In developmental research although drawing from retrospective information is a well-established strategy (e.g., Laub and Sampson 2003), developmentalists (e.g., Elder 1994) recommend the use of effective tools for guided recall to ensure data validity. Following this recommendation, the research team of the TFS employed the *Life-History-Calendar* (LHC, Caspi et al. 1996). Broadly speaking, the LHC employs mnemonic techniques using cognitive and visual memory anchors and retrieval cues. Retrospective LHC data were shown to be more reliable and valid than retrospective data collected with the traditional questionnaire method (Belli et al. 2004). There is strong support for the validity of the LHC-method (Belli et al. 2004). For example. Caspi et al. (1996) showed the accurateness of the LHC method by comparing current data collected from adolescents (e.g., educational status for each month) with the respective information the same persons gave retrospectively and by means of the LHC in adulthood. In the Thuringian Founder Study, the LHC and the interviewing strategy were planned according to the recommendations of Belli et al. (2004). At the beginning of the T1 interview, respondents were asked to enter the dates of major life events, transitions, and sequences in the LHC (e.g., schooling, place of residence during adolescence, secular 'Jugendweihe' or Christian confirmation, higher education, working sequences, family life, entrepreneurial activities). These biographical data then served as memory anchors during the subsequent interview (the completed LHC remained visible to the participants during the interview). Before each set of the retrospective survey items was introduced, participants were asked to look at the respective point in time in the completed LHC to contextualize and to better remember that time.

Twelve months after the T1 interview the research team contacted the founders for a follow-up survey by phone. Of the 98 founders at T1, 90 could be re-interviewed in T2. These 90 participants serve as the final sample for our analyses. This follow-up interview mainly collected information on the progress made in the venture creation process since T1. Some of the projects had been abandoned between T1 and T2 (n = 14; 15.6%), whereas others had already resulted in an ongoing business (n = 14; 15.6%). The majority, however, were still in the process of venture creation (n = 62; 68.9%).

3.2 Central variables

Making progress in the venture creation process was measured by the *number of gestation activities undertaken between T1 and T2*. Using a list of 32 gestation activities such as talking to customers, product development (which was developed on basis of Samuelsson and Davidsson 2009) at T2, respondents were asked which of these gestation activities they had undertaken between T1 and T2. The resulting count variable served as dependent variable.

As an indicator for a *balanced skill set* we use the number of functional areas in which the respondent had work experience prior to the first gestation activities.[4] The five possible categories underlying this count variable include 1) marketing, sales and promotion; 2) accounting, controlling and finance; 3) engineering and R&D; 4) production; and 5) personnel. Similar measures have been successfully used in previous research studying the jack-of-all-trades approach (Wagner 2006; Lazear 2005).

3.2.1 Variables related to the investment hypothesis

Age of first entrepreneurial career interest was assessed by applying the LHC method. We asked the nascent entrepreneur about the year of his or her first interest in an entrepreneurial career and computed the respective age. Prior *entrepreneurial experience* and prior *managerial experience* are measured by the entrepreneur's number of years as business owner and in executive positions, respectively. As a proxy for prior *work experience in young and small companies* we use a dummy variable indicating whether the nascent entrepreneur had work experience in a company younger than four years and with less than 20 employees (Wagner 2004). Prior *variety in university curricula* is measured with the number of fields in which the nascent entrepreneur had studied.

3.2.2 Variables related to the endowment hypothesis

The measure of the *entrepreneurial personality* profile is based on the Big Five personality (traits agreeableness, conscientiousness, extraversion, neuroticism, and openness) which was assessed with a well-validated 45-item German questionnaire (Ostendorf 1990). Following previous research (Obschonka et al., 2010; in press; Schmitt-

[4] Variance in this variable might be an artefact of the utilisation of the different sources in the construction of the dataset. However, the results of the Kruskal-Wallis equality-of-populations rank do not support this concern (χ^2 = 5.4, p = 0.61), allowing us to safely proceed.

Rodermund 2004; 2007), we defined a specific *entrepreneurial reference type* with the highest possible score (5) in extraversion, conscientiousness, and openness, and the lowest possible score (0) in agreeableness and neuroticism. We then calculate an index for individuals' match with this reference type as depicted in more detail in Table 1. The higher the value in the resulting variable, the better the fit between the person's Big Five personality profile and the defined entrepreneurial reference type.

Following a well established measurement of age-appropriate *early entrepreneurial competence* (Obschonka et al. 2010, 2011, in press, Schmitt-Rodermund 2004, 2007), we used three variables, assessed retrospectively, to capture different aspects of early entrepreneurial competence in adolescence (early leadership, inventive activities, and commercial activities). The target age to remember was 14 to 15 years and the LHC was used to optimize the recall process. The full item list is provided elsewhere (Obschonka et al. 2011) and the steps to compute the final variable early entrepreneurial competence are described in Table 1.

[Table 1 and 2 about here]

3.3 Control variables

For the analysis of the performance effect of a balanced skill set we employ a wide array of controls. Due to space constraints we just briefly discuss these variables but provide more detailed information on the operationalization in Table 2. Human capital is one of most researched areas in entrepreneurship (see for an overview Davidsson and Gordon in press). At the level of the individual entrepreneur we employ the above described variables: prior *entrepreneurial experience,* prior *managerial experience,* prior *work experience in young and small companies,* and prior *variety in university curricula* as controls. As previous research has shown higher education is particularly important for making progress in a high-potential project (Samuelsson and Davidsson 2009; Obschonka et al. 2011) we include the dummy variable *PhD degree* into the regressions. Social capital appears to be conducive for nascent entrepreneurs in providing access to novel information and trusted feedback concerning business strategies (Uzzi 1997), in product development (Lechner and Dowling 2003) and in getting into contact with potential investors (Shane and Cable 2002). The exact measurement of social capital, however, is subject to controversial debates. As a very basic indicator for social capital we use a dummy variable: whether or not the participants personally knew other entrepreneurs (*knowing entrepreneurs*). Note that this indicator has been applied with reasonable results in

previous nascent entrepreneurship studies (Davidsson and Honig 2003; Parker and Belghitar 2006). We use respondents' *age* and *gender* as additional control variables.

Some other controls relate to the nascent project. As we were interested in examining progress in the venture creation process between T1 and T2, we had to take into account in our analyses the achievements prior to T1. Following the procedure developed by Obschonka et al (2011) we include the variable *prior progress* into the regressions. Previous research has found that new ventures are likely to suffer from financial constraints (Cooper et al 1994; Holz-Eakin et al. 1994; Bruederl et al. 1992). In order to account for this we use the variable *financial capital invested*. High-potential projects are often founded by teams in order to combine skills and abilities (Samuelsson and Davidsson 2009; Davidsson et al. 2008). We use *size of the founding team* as an indirect control for this potential bias. High-potential projects are also often supported by governmental institutions in order to build winners (Kösters and Obschonka 2011; Parker and Belghitar 2006; Davidsson and Honig 2003). Thus, we control for whether or not the project received *public advice* by governmental institutions. Although all follow-up interviews were scheduled twelve months after the first interview, due to reasons beyond the control of the research team (e.g., high work load of the founders), some founders could only be re-interviewed significantly after the proposed 12 month period. Furthermore, in case of the abandoned projects, the founders spent less than twelve months working on the projects. We control for this bias in the regression analysis by including the number of months in which the founders worked for the project as an indicator of the *time invested between T1 and T2*. In order to take sectoral differences into account (Samuelsson and Davidsson 2009) we include six *industry dummies*.

With respect to the origins of balanced skills we employ a partly different set of control variables. The labour market literature teaches us that labour force participation and thus skill acquisition often depends on the individual's socio-economic state. With respect to our empirical context (Germany) the labour force participation of women is low and even shrinking in East Germany (Rosenfeld et al. 2004). Econometric studies also revealed that having children increases the likelihood of unemployment (Hunt 2000). In addition, due to a decreasing level of child care facilities in East Germany, having children might reduce the time available to invest in skill accumulation on- and off-the job. Minorities are often subject to labour market discrimination (Bertrand and Mullainathan 2004; Kaas and Manger in press), greatly reducing their ability to acquire skills relevant for "high-potential" entrepreneurship.

One factor which potentially leverages skill acquisition relevant for entrepreneurship is having entrepreneurial parents. As mentioned above, individuals with entrepreneurial parents are overrepresented among nascent entrepreneurs (Evans and Leighton 1989). One plausible explanation for this link is an inter-generational transfer of skills via work experience in the parents company or the general exposure to the tasks associated with running a business (Delmar and Gunnarsson 2000). To control for these effects we include the variables *gender*, *having children*, belonging to an *ethnic minority* and having *entrepreneurial parents* into the regression. We also include entrepreneurs' *age* and *origin* (West vs. East) as control variables.

4 Results and discussion

4.1 Empirical strategy

Table 1 and Table 2 presents descriptive statistics and Table 3 correlations for all variables used in the statistical analyses. Our two central variables – *making progress in the venture creation process* and *balanced skill set* – involve count data suggesting the use of a Poisson model. With respect to *making progress*, the descriptive statistics, however, reveal that the variance exceeds the mean suggesting the presence of overdispersion. If this is the case, the standard errors of parameters will be underestimated, resulting in spuriously higher levels of statistical significance. In this instance Hausmann et al. (1984) recommend using negative binomial regressions. In order to select between both models we conducted a likelihood ratio test, which indeed provides evidence for overdispersion ($\chi^2 = 10.7$, $p < 0.01$), making a negative binomial model the most adequate choice. The main concern regarding our second central variable – *balanced skill set* – is not overdispersion but underdispersion (mean exceeds variance) which can lead to an overestimation of standard errors and thus erroneously lower levels of statistical significance. Applying the procedure described in Cameron and Trivedi (2001), we indeed find evidence for the presence of underdisperion.[5] Therefore we follow recommendations from the econometric literature and use a generalized event count model with

[5] In more detail, count models often specify any form of dispersion as $V[y_i \mid x_i] = \mu_i + \alpha g(\mu_i)$. Underdispersion is given if $\alpha < 0$ resulting in lower than expected levels of variance V. In order to test for underdisperion we first estimated a Poisson model to compute predicted counts $\hat{\mu}_j$ of our model. We then run the auxiliary OLS regression $[(y_i - \hat{\mu}_j) - y_i]/\hat{\mu}_j = \alpha g(\hat{\mu}_j)/\hat{\mu}_j + u_i$ where the function is specified as $g = \mu^2$. The coefficient for the α parameter was negative and significant at the 1% level providing strong evidence for underdispersion.

standard errors scaled to the square root of the Pearson chi-square dispersion for data analysis (Winkelmann and Zimmermann 2001; King 1989).

[Table 3 about here]

4.2 Performance effects of balanced skills

The first part of the analysis concerns the effect of *balanced skills* on the *progress* of nascent projects in the founding process (Test of H1, Model 1–2 in Table 4). Model 1 includes all explanatory variables with the exception of *balanced skills*. Among the project level controls, *time invested between T1 and T2* ($p < 0.01$) and *prior progress* till T1 ($p < 0.01$) have an effect on the number of initiated gestation activities in T2. This aligns with evidence of the cumulative nature of the venture creation process as discussed by Lichtenstein et al. (2006). Regarding the individual level controls, founders with a *PhD* degree progress faster in the venture creation process, which is in line with Samuelsson and Davidsson's (2009) analysis of Swedish high-potential projects. None of the other traditional human capital variables, e.g., *entrepreneurial experience,* turn out to be relevant predictors. This finding concurs with a recent meta-analysis also reporting low correlations between such traditional human capital and entrepreneurial success (Unger et al. 2011).

Model 2 adds the core independent variable balanced skills to the regression. We find *balanced skills* to be positively associated ($p < .05$) with the progress of the project even when controlling for traditional indicators of human capital and project level controls. Thus, we conclude our Hypothesis 1 is fully supported. This result concurs with empirical findings from Lazear and other scholars who reported associations between a balanced skill set and the likelihood of becoming an entrepreneur (Lazear 2005; Wagner 2006; Silva 2007). Our findings are also consistent with work from Oberschachtsiek (in press) who found balanced skills to positively predict self-employment longevity. However, our empirical results differ from those of Brixy and Hessels (2010) who found null to negative correlations between several measures of balanced skills on the likelihood to get a nascent project up and running. One possible explanation for this difference might be that Brixy and Hessels findings are based on a random sample of nascent projects, which are usually dominated by non-ambitious and non-innovative projects while our sample consists of high-potential nascent projects. Because high-potential projects are more complex to set up than regular projects, it can be reasonably argued that its founders need more varied skills. Taken all together, there is

growing evidence suggesting that a balanced skill set is an important ingredient and success factor throughout the entrepreneurial process. However, more research is needed to provide further support for the notion that balanced skills positively predict entrepreneurial earnings, as Lazear's model posits. Whereas Hartog et al. (2010) found empirical support for this notion, Åstebro and Thompson's (2011) results do not support this proposition.

[Table 4 and 5 about here]

4.3 Origins of balanced skills

We now turn to the origins of balanced skills. First, the impact of the variables associated with the investment hypothesis is checked (Model 1–2 in Table 5). In the second step we analyze the investment hypothesis variables in isolation (Model 3–4 in Table 5). Third, a full model containing explanatory variables from both schools of thought is investigated (Model 5–6 in Table 5).

The investment hypotheses stated that the *age of a first entrepreneurial career interest* is negatively associated with a balanced skill set (H2a), while *prior entrepreneurial experience* (H2b), *prior managerial experience* (H2c), *prior work experience in young and small firms* (H2d) and *prior variety in university curricula* are positively associated (H2e) with nascent entrepreneurs balanced skill set. In Model 1, controlling for entrepreneur's *age*, *gender* and *origin* we find that respondents with an entrepreneurial career interest at a young age indeed had a more balanced skill set prior to start-up ($p < .05$), which supports H2a. In Model 2 the *age of first entrepreneurial career interest* variable was exchanged with the more direct indicators of the investment hypothesis.[6] In support of H2b–H2c, nascent entrepreneurs with more *entrepreneurial experience* ($p < .05$) and *managerial experience* ($p < .05$) enjoyed a more balanced skill set. However, we find only partial support for H2d that *prior work experience in young and small firms* ($p < .10$) is related to balanced skills. *Prior variety in university curricula* was not significantly related to balanced skills rejecting H2e. Along with the limited performance of the traditional human capital variables in explaining nascent project success, these results point to a fundamental problem in the measurement of human capital in entrepreneurship studies. Managerial experience and entrepreneurial experience might rather be seen as human capital investments, whereas balanced skills are more an *outcome* of human capital

[6] With this we also avoid the negative effects of multicollinearity in the model, which is due to the high correlation of the investment hypothesis variable with age of first entrepreneurial career interest and the control variable age.

investments. This view is supported by Unger et al.'s meta-analysis (2011), which found a stronger relationship between *outcomes* of human capital investments (e.g., knowledge) and entrepreneurial success than between human capital investments itself (e.g., education) and entrepreneurial success.

The endowment hypotheses stated that an *entrepreneurial personality profile* (H3a) and *early entrepreneurial competence* in adolescence (H3b) are associated with nascent entrepreneurs' balanced skill set. In Model 3 (Table 5) *early entrepreneurial competence* ($p < .10$) is a significant predictor of a balanced skill set. This variable however becomes insignificant when we add in Model 4 the *entrepreneurial personality profile* ($p < .01$), supporting the respective hypothesis. This finding contributes to an ongoing discussion on the trait-approach, namely *how* personality actually affect entrepreneurship (Baum and Locke 2004; Hisrich et al. 2007). Whereas human capital, in general, has long been deemed a central factor here (Rauch and Frese 2007), earlier research has neglected to consider the jack-of-all-trades view when understanding why traits are important. We were somewhat surprised that early entrepreneurial competence was not a robust predictor of a balanced skill set. One explanation for this is that current personality characteristics are more important for present skills than a past, age specific impact of the same personality. Early competencies, however, do not add to the range of experiences that would help someone to become a Jack-of-all trades. Rather one would want to see them as a sign of broad interests and experiences, and, thus as a set of balanced skills present during adolescence.

As a final step and robustness test, variables from both schools of thought were entered into the analysis to explore the origins of balanced skills. (Model 5–6 in Table 5). Similar to Models 1 and 2 we either combined the age of first entrepreneurial career interest variable (Model 5) or the more direct indicators of the investment hypothesis (Model 6) with the investment hypothesis variables. While in principal the results remain unchanged, the significance level of the key explanatory variables is reduced and the coefficients of *entrepreneurial experience* and *prior work experience in young and small firms* are no longer significant in the combined model. This suggests that neither the investment approach (Model 1–2) nor the endowment approach (Model 3–4) have an edge over each other. Although the dataset used in this study does not contain the same level of very detailed information on the timing of skill accumulation as Silva's (2007) study on Italian employees, the results of the present study raise doubts on the generalizability of Silva's conclusion that a balanced skill set is purely attributable to an innate ability.

Our results further qualify Lazear's (2005) interpretation that the investment hypothesis dominates the endowment hypothesis. In contrast, our data suggest that *both* planful investment and initial talent seem to be important. Above and beyond this basic comparison, our findings further suggest that investment and innate ability are interrelated. A plausible explanation of this phenomenon could be that individuals with an innate entrepreneurial talent invest more in entrepreneurial skills because they either have higher marginal returns or lower marginal costs of training (Ashenfelter and Rouse 1998). In order to answer this and related questions we need new theories that combine both, the investment and the endowment view to explain skill accumulation processes. Nonetheless, it can be stated that our results on the origins of a balanced skill set fit with the broader research view of entrepreneurial mindsets as the results of both predispositions and experiences (Krueger 2007; Shane et al. 2010). This also fits well with newer views in developmental psychology, according to which human development is driven by gene-environment-interactions and by personal agency (Lerner 2006; Rutter 2006).

Taken together, our results can also inform literature dealing with the discovery of opportunities. It is often argued that some individuals discover profitable opportunities mainly because they possess prior knowledge (through education and work experience) not available to others (Shane 2000). Applying the jack-of-all-trades view to entrepreneurship, we might speculate that it is not so much the absolute amount of knowledge available to the individual but the variety of prior knowledge that fertilizes discovery. Discovery often involves combining different strands of knowledge to perceive new means-ends relationships. Although we do not have data to test the hypothesis that entrepreneurs with balanced skills discover more opportunities future studies might pick up this notion.

This research has some limitations. First and most importantly, the data were collected during the venture creation process so that some information was reported retrospectively. Thus, we might suffer from an endogeneity issue, as for example, in cases the progress of the project till the first interview might impact the self-reported early-entrepreneurial competencies or other variables. Although the research team adopted the Life History Calendar method to facilitate the recall process and to ensure validity of the data (Belli et al. 2004; Caspi et al. 1996), our results – in particular those on the origins of balanced skills – must be interpreted as correlative rather than causal. However, the use of cross-sectional designs is not uncommon in balanced skill studies. For example Åstebro and Thompson (2011), Baumol (2005) and Lazear (2005) himself employ such an approach with promising results.

Second, a common-method bias could result from the use of self-reported data from the same source, namely the lead entrepreneur of a team or the solo entrepreneur. However, we did gather secondary data to validate our performance measure: an external business information provider (Creditreform) provided us with data on the credit rating of the nascent projects. Correlation between both variables clearly show that projects which were more advanced in the venture creation process have a better credit rating (corr = 0.47, $p < 0.05$), ensuring that the information provided by the founder is valid and reliable. A third caveat is related to the level of analysis. Although new ventures are often founded by teams, we deliberately chose the individual (leading) entrepreneur as the main unit of analysis. While team members often bring complementary skills to the team, a team's functional heterogeneity can also have detrimental performance effects. Investigating this highly relevant question was beyond the scope of this paper and is therefore left for future research. A fourth limitation is that this analysis is restricted to high-potential nascent projects in one German federal state: Thuringia. This might raise the question of external validity of the results. However, the dataset is comparable in scope with the leading CAUSEE research project on high-potential nascent entrepreneurship, and the formal model on balanced skills presented in this paper can be considered a more universal approach not limited to the regional context.

5 Conclusion

To conclude, our nascent entrepreneurship data contributes to research indicating the validity of Lazear's jack-of-all-trades-view on entrepreneurship. Regarding the origins of a balanced skill set, it seems that both innate talent and systematic investment play a role. These results may stimulate further theory development in the field of entrepreneurial human capital and its origins. According to our study, future entrepreneurship models on balanced skills should consider an integrative view, combining talent and investment influences as well as entrepreneurship research and approaches of human development (Lerner 2006; Silbereisen et al. 1986).

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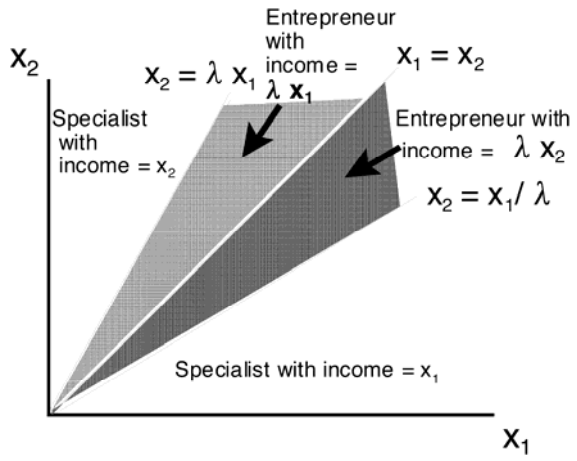

Figure 1: The impact of balanced skills on vocational choice. Source: Lazear (2005), reprinted with permission of the copyright owner.

Table 1: Overview of central variables and variables related to the investment and endowment hypothesis

Variables	Operationalisation	Mean and SD
Progress in the venture creation process (T2)	Count of gestation activities undertaken between T1 and T2 (e.g. talking to customers, looking for financial capital, preparation of business plan (max = 32)	14.11 / 6.32
Balanced skill set (T1)	Count of categories with working experience prior to the first gestation activities for the individual entrepreneur. Six possible categories: 1=Marketing, sales, promotion, 2=Accounting, controlling, financing, 3=engineering, R&D, 4=production, 5=Personnel	2.76 / 1.37
Age of first entrepreneurial career interest (T1)	Entrepreneur's age of first interest in an entrepreneurial career	29.23 / 10.22
Entrepreneurial experience (T1)	Count of years with experience as a business owner prior the first steps into the venture creation process for the individual entrepreneur	3.08 / 5.96
Managerial experience (T1)	Count of years with experience in executive positions (netting out years of entrepreneurial experience) prior to the first gestation activities for the entrepreneur	2.71 / 6.06
Work experience in young and small firms (T1)	Dummy: 1=Entrepreneur with work experience in companies younger than four years and less than 20 employees prior to the first gestation activities; 0=otherwise	0.40 / 0.49
Variety in university curricula (T1)	Count of fields in which the entrepreneur had studied. The four possible categories include 1) natural sciences and medicine, 2) engineering and computer science, 3) business administration and economics, 4) others. In case the entrepreneur did not receive a university education (7% of the cases) we recoded the variable as zero.	1.17 / 0.57
Entrepreneurial personality profile (T1)	The entrepreneurial personality profile is based on the Big Five traits. Agreeableness (e.g., "good-natured vs. cranky"), conscientiousness (e.g., "lazy vs. diligent"), extraversion (e.g., "uncommunicative vs. talkative"), neuroticism (e.g., "vulnerable vs. robust"), and openness (e.g., "conventional vs. inventive") were measured by nine bipolar items each with answers ranging from (0) to (5). Cronbach alpha coefficients exceeding 0.6 for all these traits indicate the internal consistency of the scales. An entrepreneurial reference type was defined with the highest possible score (5) in extraversion, conscientiousness, and openness, and the lowest possible score (0) in agreeableness and neuroticism. We then calculate an index for individuals' match with this reference type. First, we estimated each person's squared differences between the reference values and the personal values on each of the five scales. If a person, for instance, scored a 3 in neuroticism, the squared difference was 9 (because the reference value was 0). Second, the five squared differences were summed up for each person, and third, the algebraic sign of this sum was reversed (e.g., a value of 5 became -5). The resulting value served as the final variable entrepreneurial personality	-21.11 / 5.74
Early entrepreneurial competence (T1)	The measure of early entrepreneurial competence is based on three variables: early inventive activities, early leadership, and early commercial activities (age 14-15). *Early inventive activities* targeted respondents' inventive behaviors during leisure time (e.g., composing, painting, or building) (14 items; 1 = never, 5 = very often; $M = 2.43$, $SD = 0.53$, $\alpha = .62$). *Early leadership* was assessed via a six-item checklist that asked for six types of leadership roles (e.g., class spokesman or captain in a sports team) (six items; 0 = no, 1 = yes). The sum score served as the variable ($M = 1.62$, $SD = 1.44$). *Early commercial activities (T1)* covered age-related selling activities (e.g., "How often did you sell things e.g., to friends?"; three items; 1 = never, 5 = very often; $M = 2.31$, $SD = 0.89$, $\alpha = .60$). We z-standardized and averaged the three variables, resulting in the final variable early entrepreneurial competence in adolescence	0.00 / 2.06

Table2: Overview of control variables

Variables	Operationalisation	Mean / SD
PhD (T1)	Dummy: 1=Entrepreneur had a PhD degree prior to the first gestation activities; 0=otherwise	0.24 / 0.43
Knowing entrepreneurs (T1)	Dummy: 1=Entrepreneur knew personally other entrepreneurs or business founders; 0=otherwise	0.89 / 0.32
Prior progress (T1)	The measure of prior progress is based on the number of gestation activities undertaken between the start of the project and the T1 interview (max. 32 activities). As the time period covered here varied across participants, we conducted a regression analysis with *number of activities undertaken until T1* (M = 14.10, SD = 6.32) as the dependent variable and *duration (in months) of the venture creation process until T1* (M = 37.47, SD = 28.70) as the independent variable. It explained 10% of the variance and had a positive effect of $\beta = .34$ ($p < .01$). The standardized residuals of this regression analysis represented the time-adjusted achievements prior to T1 (prior progress in the venture creation process). In our regression analysis regarding the performance effect of balanced skills in this study, we use the number of gestation activities between T1 and T2 as the dependent variable. The prior progress variable (the standardized residual) is included as an independent variable. This has the effect that the number of gestation activities between T1 and T2, adjusted for prior progress, represent the *progress between T1 and T2* (our outcome variable of interest). Note, that this approach has been successfully applied in other studies on nascent entrepreneurship (Obschonka et al. 2011b)	0.00 / 1.00
Financial capital invested (T1)	Categorical variable: 1= less than 1,000 euros; 2= 1,000 to 9,999 euros; 3= 10,000 euros to 49,999 euros; 4= 50,000 euros to 99,999 euros; 5= 100,000 euros to 249,999 euros; 6= 250,000 euros to 499,999 euros; 7= 500,000 euros or more	3.38 / 1.99
Size of the founding team (T1)	Number of entrepreneurs which have been actively involved in the venture creation process and own or will own a part of the venture	2.39 / 1.27
Public advice (T1)	Dummy: 1=Project received public advice by a governmental institution; 0=otherwise	0.57 / 0.50
Time invested between T1 and T2 (T2)	Number of months between T1 and T2 in which the entrepreneur's worked on the project	14.56 / 4.78
Industry dummies (T1)	The industry dummies are based on the technology sectors of the nascent project: 1) information and communication technology, software, and picture processing (28.9%); 2) (opto-)electronic, hardware, and measurement instrumentation (11.1%); 3) quality management, consulting, professional training, and marketing services (20.0%); 4) biotechnology, pharmaceutics, and chemistry (11.0%); 5) environmental technology, energy management, and solar technology (10.0%); 6) miscellaneous technology sectors (19.0%)	
Age (T1)	Age of the entrepreneur at the start of the venture creation process	36.78 / 10.07
Origin (1= West; 0 = East) (T1)	Dummy: 1=Entrepreneur grew up in West Germany or a non-communistic country; 0=Entrepreneur grew up in East Germany or a communistic country	0.30 / 0.46
Gender (T1)	Dummy: 1=male; 0=female	0.89 / 0.32
Having children (T1)	Number of entrepreneurs' children at the start of the venture creation process	0.79 / 1.04
Ethnic minority (T1)	Dummy: 1=Entrepreneur belongs to an ethnic minority; 0=otherwise	0.03 / 0.18
Entrepreneurial parents (T1)	Dummy: 1=Respondent had entrepreneurial parents at the age of 14 or 15 years; 0=otherwise	0.22 / 0.42

Table 3: Correlation matrix

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) Progress in the venture creation process between T1 and T2	-																				
(2) Balanced skill set	**.33**	-																			
(3) Age of first entrepreneurial career interest	-.03	.00	-																		
(4) Entrepreneurial experience	-.01	**.36**	**-.28**	-																	
(5) Managerial experience	**.19**	**.38**	**.42**	-.02	-																
(6) Work experience in young and small firms	.01	.16	**-.19**	.13	-.12	-															
(7) Variety in university curricula	.03	-.06	-.17	-.10	.06	-.08	-														
(8) Entrepreneurial personality profile	-.01	**.23**	-.15	.04	.08	.09	.15	-													
(9) Early entrepreneurial competence	.16	**.26**	.10	**.19**	**.25**	.09	.10	**.26**	-												
(10) PhD	.17	.08	**.22**	-.06	**.19**	**-.25**	-.08	-.10	**.22**	-											
(11) Knowing entrepreneurs	**.20**	**.22**	**-.19**	.16	.10	.14	-.15	.14	.17	.04	-										
(12) Prior progress	**.58**	**.29**	-.12	-.07	.19	.07	.07	.08	-.01	.00	.09	-									
(13) Financial capital invested	**.43**	**.37**	-.07	**.30**	**.26**	.10	-.04	.00	**.33**	**.30**	**.21**	**.54**	-								
(14) Size of founding team	.08	-.01	**-.21**	.05	-.02	.08	.08	.07	.04	.09	-.03	**.26**	**.30**	-							
(15) Public advice	-.09	-.07	.13	-.11	-.05	-.06	.02	-.10	-.06	-.02	-.17	.11	-.08	-.06	-						
(16) Time invested between T1 and T2	**.47**	.04	.06	-.09	.11	.09	-.10	.01	.16	.02	.30	**.24**	**.27**	-.11	**-.18**	-					
(17) Age	.04	**.42**	**.54**	**.44**	**.54**	-.06	**-.18**	-.16	**.25**	**.22**	.04	-.06	**.29**	-.13	-.05	.09					
(18) Gender	**.19**	**.20**	-.05	.08	.08	.14	.04	-.12	.05	.15	.12	.02	.10	.10	.08	-.10	.16				
(19) Origin (West vs. East)	.00	-.01	**-.25**	**.25**	-.10	.06	.15	-.09	.06	.02	-.15	.12	**.27**	**.22**	-.06	-.12	.01	.00			
(20) Having children	.13	**.29**	**.51**	.02	**.45**	-.14	**-.19**	-.08	**.25**	.14	.03	-.01	.09	-.15	-.01	.17	**.66**	.03	**-.22**		
(21) Ethnic minority	**-.22**	.01	**.20**	-.05	-.08	-.03	.06	.11	.14	**.18**	-.13	**-.22**	-.10	-.16	-.21	-.16	.15	.07	-.12	.10	
(22) Entrepreneurial parents	**-.18**	-.10	-.16	-.09	**-.19**	.11	-.06	.15	-.13	-.12	.10	-.09	-.05	-.10	-.13	-.02	**-.23**	**-.24**	.15	-.12	**.20**

Note: Correlation coefficients displayed in bold are significant at the 5% level.

Table 4: Performance effects of balanced skills

	Dependent variable: Progress in the venture creation process	
	Model I β	Model II β
Main variable		
Balanced skills (number of fields)	----	0.07 ** (0.04)
Individual level controls		
Entrepreneurial experience (years)	0.01 (0.01)	0.00 (0.01)
Managerial experience (years)	-0.00 (0.01)	-0.00 (0.01)
Work experience in young and small firms (1 = yes; 0 = no)	0.00 (0.09)	-0.03 (0.09)
Variety in university curricula (number of fields)	0.03 (0.07)	0.02 (0.07)
PhD (1 = yes; 0 = no)	0.26 ** (0.13)	0.25 ** (0.12)
Knowing entrepreneurs (1 = yes; 0 = no)	0.09 (0.14)	0.03 (0.14)
Public advice (1 = yes; 0 = no)	-0.05 (0.08)	-0.05 (0.08)
Age (years)	-0.00 (0.01)	-0.01 (0.01)
Gender (1 = male; 0 = female)	0.21 (0.14)	0.16 (0.14)
Project level controls		
Team size (number)	-0.02 (0.03)	-0.01 (0.03)
Financial capital invested (7 categories)	-0.00 (0.03)	-0.00 (0.03)
Time invested between T1 and T2 (months)	0.04 *** (0.01)	0.04 *** (0.01)
Prior progress (residuals from auxiliary regression)	0.25 *** (0.05)	0.22 *** (0.05)
Industry dummies (6 binary variables)	Yes	Yes
Intercept	1.94 *** (0.34)	1.84 *** (0.34)
LR χ^2	60.26 ***	64.12 ***
Pseudo R^2	0.46	0.48
N	90	90

Notes: Negative binomial regression; β=regression coefficients, standard errors in parentheses; *** (**,*) denote a significance level of 1% (5%, 10%). Following recommendations of Zheng & Agresti (2000) we compute the Pseudo R^2 measure by taking the square of the correlation coefficient between the observed response Y and the predicted response $\hat{Y}$ by the model.

Table 5: Origins of balanced skills

	Dependent variable: Balanced skill set					
	Model I	Model II	Model III	Model IV	Model V	Model VI
	β	β	β	β	β	β
Investment hypothesis						
Age of first entrepreneurial career interest (years)	-0.01 ** (0.01)	-----	-----	-----	-0.01 ** (0.01)	-----
Entrepreneurial experience (years)	-----	0.02 ** (0.01)	-----	-----	-----	0.02 * (0.01)
Managerial experience (years)	-----	0.02 ** (0.01)	-----	-----	-----	0.01 (0.01)
Work experience in young and small firms (1 = yes; 0 = no)	-----	0.17 * (0.10)	-----	-----	-----	0.15 (0.10)
Variety in university curricula (number of fields)	-----	-0.01 (0.09)	-----	-----	-----	-0.04 (0.08)
Endowment hypothesis						
Entrepreneurial personality profile	-----	-----	-----	0.03 *** (0.01)	0.03 *** (0.01)	0.02 ** (0.01)
Early entrepreneurial competence	-----	-----	0.04 * (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.03)
Controls						
Age (years)	0.02 *** (0.06)	-0.00 (0.01)	0.02 *** (0.01)	0.02 *** (0.01)	0.02 *** (0.01)	0.00 (0.01)
Gender (1 = male; 0 = female)	0.23 (0.18)	0.24 (0.18)	0.29 (0.18)	0.36 ** (0.18)	0.31 * (0.17)	0.31 * (0.18)
Origin (1 = West; 0 = East)	-0.07 (0.11)	-0.03 (0.11)	-0.06 (0.11)	-0.18 (0.11)	-0.06 (0.11)	-0.15 (0.11)
Having children (number)	0.05 (0.06)	0.08 (0.06)	-0.00 (0.06)	0.02 (0.06)	0.05 (0.06)	0.07 (0.07)
Ethnic minority (1 = yes; 0 = no)	-0.14 (0.29)	0.05 (0.30)	-0.34 (0.29)	-0.38 (0.28)	-0.26 (0.28)	-0.11 (0.30)
Entrepreneurial parents (1 = yes; 0 = no)	0.04 (0.13)	0.02 (0.13)	0.10 (0.13)	0.05 (0.13)	0.02 (0.13)	0.00 (0.13)
Intercept	0.33 (0.29)	0.59 * (0.34)	0.09 (0.26)	0.54 * (0.29)	0.76 ** (0.30)	0.84 ** (0.36)
Deviance	47.29	44.05	48.89	44.00	41.42	40.98
Pearson	46.06	42.70	47.24	42.53	40.47	39.86
BIC	-321.7	-311.4	-320.1	-320.5	-318.6	-305.5
Pseudo R^2	0.24	0.31	0.24	0.33	0.36	0.38
N	90	90	90	90	90	90

Notes: Generalized event count model; β=regression coefficients, standard errors in parentheses; *** (**,*) denote a significance level of 1% (5%, 10%). Following recommendations of Zheng & Agresti (2000) we compute the Pseudo R^2 measure by taking the square of the correlation coefficient between the observed response Y and the predicted response $\hat{Y}$ by the model.