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Human Capital Diversity and Entrepreneurship. Results from the regional individual skill dispersion nexus on self-employment activity.

by

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Human capital has been shown to be highly important in the venture creation process. In this study, we account for the fact that human capital on the individual and regional levels may be interrelated in affecting entrepreneurship. We use German survey data, which allow us to focus on a specific measure of human capital (diversity in task experience) and to study the individual and regional levels. Our research provides evidence for the thesis that diverse human capital increases the level of entrepreneurship activity via individual and aggregated pathways and that the price elasticity of diverse human capital in affecting business activity is low.

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1. INTRODUCTION

To a large extent, the interrelation between human capital and the level of activity in venture creation has been focused on the individual level (e.g., Shane 2000; Bates 1990; Brüderl et al. 1992; Cressy 1996; Robinson and Sexton 1994; Lucas 1978; Parker 2005). Besides facilitating research attempts this phenomenon has also motivated politicians to focus on the individual skill level in order to promote entrepreneurship. In recent research this picture has turned a little - emphasizing a stronger nexus between individual and regional components in the entrepreneurial process (e.g., Armington and Acs 2002; Audretsch and Keilbach 2007). However, little effort has been spent on exactly studying the interrelations between the individual and regional levels of human capital in affecting entrepreneurship. We argue that this is in contrast to recent research that provides support for the idea of a multilevel pattern in market behavior in general (e.g., Wagner and Sternberg 2004; Parker 2005; Doms et al. 2010). Additionally, we believe that a deeper knowledge of the human capital-related multilevel nature of entrepreneurship helps to improve the understanding of the origins of entrepreneurship capital, particularly in a regional context.

While the idea of entrepreneurship as a multilevel phenomenon is already well recognized (Hundt 2012), the existing research on this topic is far from consistent. For example, much work in the context of multilevel research on entrepreneurship is motivated by the theory of planned behavior, which emphasizes that institutional and cultural settings may exist that affect the individual likelihood of starting a venture activity (e.g., Sternberg 2010; Bergman 2002 and Tamasy 2006; Georgellis and Wall 2005; Qian et al. 2013). The idea behind this theory is that cultural characteristics determine the individual's perception of the subjective and social valuation of entrepreneurial activities. In contrast, and as seen from a micro-economic perspective, this research also emphasizes that regional economic conditions constitute differences in the individual's relative cost/benefit structures the individual's choice to start a new venture. For example, related research has shown that the tightness of labor

markets fosters entrepreneurship because of low opportunity costs (e.g., Bögenhold and Staber 1991; Fonseca et al. 2001). Parker (1996), using a similar argumentation, highlights the microeconomic consequences of regional conditions because they might be associated with variance in the quality and total level of riskiness.

In this study, we will contribute to the latter strand of research and focus on differences in the individual's valuation of costs and benefits in relation to regional economic conditions. However, we differ from the earlier research in two principal ways. First of all, we focus on the role of human capital diversity (alternatively, skill diversity) as a specific measure of human capital, as supported by Lazear (2005).[1] Second, we combine the individual and aggregated levels in a way that allows for the study of the spillover effects that may be associated with the local supply of individual skill diversity. This approach directly advances the concept proposed by Parker (2005) in studying the aggregated formation of entrepreneurship-related human capital. Furthermore, our research complements the work by Doms et al. (2010) and Mendonca and Grimpe (2009) in studying the existence of the external effects of aggregated general human capital. Finally, we provide the first empirical evidence of the origins of variance of the self-employment income premium, as proposed by Lazear (2005) in a spatial context.

The data we use are concentrated on nascent entrepreneurs. These entrepreneurs are people who are involved in starting a new venture. The advantage of focusing on this population is that it allows observation of the role of individual and regional characteristics near the point in time at which an individual decides to enter self-employment. In addition, these data allow us to focus on entrepreneurship as its most basic empirical equivalent: the point at which individuals choose a specific type of employment. Individual data based on representative survey regions are identified via regional governmental districts ("*Kreise"*). The pattern of the data corresponds to the GEM (Global Entrepreneurship Monitor) data structure but allows deeper insight into the sub-national level of German regions (called the Regional Entrepreneurship Monitor, REM). To study the specific effects of human capital on entrepreneurship, we use different methodological approaches. One of these approaches is a two-step hierarchical multilevel approach, which allows us to investigate the correlation between the effect of an individual's skill diversity on the likelihood of entering a self-employment position and the regional supply of available skills.

Hereafter, this study is organized as follows: in the next section, we discuss the framework of the investigation, where we provide a brief overview of the related findings and derive the hypothesis of the investigation. Section 3 presents the methodological background of the analysis, which includes data issues and the underlying econometric framework. In section 4, we discuss the empirical findings. Finally, the discussion ends with a brief summary and concluding remarks.

[1] Note that we equally use the terms skills, competencies and experience in this study.

2. FRAMEWORK

For the effect of specific human capital on entrepreneurship, we suspect the existence of three different effects. In addition to demonstrating the direct relationships between the individual's human capital and the individual's likelihood of engaging in an entrepreneurial activity, we show that two different indirect effects may exist for the regional level at which the (aggregate) supply of specific human capital affects entrepreneurship.

Skill diversity and entrepreneurship on the individual level

The role of human capital in venture creation has a long tradition in the entrepreneurship literature. Prior research indicates that the founder's human capital (e.g., schooling and professional experience) is generally useful and that it affects venture creation in multiple ways. According to Shane (2000), the identification and exploitation of new business opportunities largely depends on the founder's creativity and competencies in organizing and assessing business opportunities. Jovanovic (1982) and Ericson and Pakes (1995) emphasize the role of human capital as it relates to passive or active learning. Moreover, as noted by Lucas (1978), the managerial competence held by an individual determines his or her capability to allocate labor across firms.

Research also shows that there are strong interrelations between the founder's human capital and his/her optimal capital endowment, as well as the likelihood of raising loans. Cressy (1996), for example, shows that the founder's human capital is more important than financial constraints and that potential limitations are also associated with different levels of optimal funding, which in turn correspond to the level of human capital. Similar findings have also been reported by Chandler and Hanks (1998) and Parker and van Praag (2006), who highlight the substitutable nature of financial and human capital, as well as subsequent selection effects.

However, critics also highlight the unobserved nature of the individual's qualifications (e.g., Parker and van Praag 2006). The underlying idea is that the founder's human capital can be useful in many settings; hence, productivity may be raised in all potential employment positions (Gimeno et al. 1997). Thus, in addition to overall productivity, there must be other factors related to the individual's human capital that facilitate his/her creation of a new business.

An important contribution in this context has been made by Lazear (2005), who suggests an identification strategy that directly emphasizes a specific quality of the individual's human capital in the context of entrepreneurship. In line with Kremer (1993), it is argued that many different competencies must enter the entrepreneur's process of value creation. The backbone of this idea is the thinking that entrepreneurs must be competent in many fields of activity to successfully run a new business (e.g., business administration, technical aspects, marketing and networking) in which the founder is confronted with a broad range of non-routine tasks (Boone et al. 2004). Hence, entrepreneurs relatively benefit from having a specific type of human capital that refers to the balance

property of the individual skill set – meaning that an individual is equally qualified in many fields of competence. The idea states that a specialist can earn *max [x1, x2],* while entrepreneurs earn $\lambda \cdot$*min [x1, x2],* where *x1* and *x2* denote two different fields of competence that enter the income function, *max* and *min* reflect the different optimization rules and λ denotes the market value (premium) of "entrepreneurial talent" (the reward for offering broad skill sets in an entrepreneurial position). The consequence is that competence in many fields is relatively more beneficial for entrepreneurs, while it is relatively unfavorable for specialists. We will refer to this quality of the founder's human capital as being specific to entrepreneurship.[2]

Summarizing the aforementioned research, we state our first hypothesis as follows:

> *H1: Individuals' likelihood of becoming an entrepreneur is positively associated with his or her experience in distinct fields of competence (specific human capital).*

Specific human capital and the presence of positive externalities

In addition to describing direct effects, recent research has also pointed to the existence of indirect effects of human capital in affecting individual outcomes. The general thinking behind this notion refers to the idea of spillover effects. Usually, such external effects are assumed to be related to specific characteristics of the regional industry, such as agglomeration, firm density, the exchange of knowledge across industries or the breadth of local production capacities (Marshall 1920; Romer 1994; Jacobs 1969; Desrochers 2001) that drive regional development.[3] Rauch (1993) and Moretti (2004), however, also report on external effects in the context of individual outcome measures. They find that the regional aggregate of individual human capital affects the individual's average income, even after controlling for the individual qualification profile. The explanation of this finding is based on the idea that the exchange of knowledge in a regional context exists and that this causes learning effects that also allow less-educated individuals to benefit from the higher qualification of other people. As a result, overall productivity increases.

A first attempt at an empirical investigation of the correlation between the regional aggregations of the level of human capital on the individual's disposition to become a nascent entrepreneur has been suggested by Doms et al. (2010). They argue that not only does the individual's human capital matter, but the aggregated human capital also matters on a regional level. The underlying idea emphasizes the role of the knowledge and experience of others that may stimulate the individual's ability to discover and exploit business opportunities. However, Doms et al. (2010) do not find a positive social effect of

[2] Note that recent empirical assessments show support for this idea (Lazear 2005; Wagner 2003, 2006). However, research also indicates that there remains a limited causal foundation related to this approach (see for example Silva 2007).

[3] Scholars in line with this thinking usually argue that spatial concentration plays an important moderating role in this context. Hence, the diversity of knowledge (and/or competencies) only enforces the generation of new ideas, new products and new technologies when it interacts with a spatial concentration. However, in this study, we will not deal with the aspect of concentration and instead only focus on the role of diverse human capital.

aggregated human capital (share of college equivalents) in encouraging the individual's choice to set up a business. Instead, they find a negative correlation between the aggregated level of human capital and self-employment in the high-skill employment sector, which they explain by higher opportunity costs.

In a regional research context, Mendonca and Grimpe (2009) emphasize the role of the aggregated human capital structure in having an important impact on firm formation in Germany and in Portugal. One major explanatory attribute the authors focus on is the diversity of occupations on the regional level. They argue that new ideas should have higher acceptance in regional areas with more diversified professional backgrounds, qualifications and experience, which should also be associated with a greater likelihood of the individuals to try to venture into self-employment. The authors find such a positive correlation for Germany. In contrast, in Portugal, it is found that the regional level of firm formation benefits more from a specialist environment.

Summing up this research, we find support for the idea that the human capital of others may have effects on the individual level, even after controlling for individual characteristics. However, we believe that it is not the level of general qualification – as used by Doms et al. (2010) – that may cause subsequent external effects, except for the level of a specific quality of human capital. Using the Lazear (2005) approach to identify specific human capital, we expect that the more diverse the individual human capital on the regional level, the more likely it is that all individuals benefit from this resource in becoming entrepreneurs. The reasoning for this interrelation is threefold: first of all, individuals may learn from each other so that specialized individuals may also profit from having a tacit understanding of different fields of competence. Second, a higher level of qualification may enhance the regional hostility for the exchange and the acceptance of new ideas and the identification of new business ideas. Third, a larger set of broadly skilled people may be seen as a particular resource that can be acquired by business founders and by business managers in general. In turn, regions that have a greater supply of broader skill sets should be more likely to induce supportive effects for the creation of new ventures (independent from the quality of the own human capital set) either because they can provide adequate employees or because of the production of relevant tacit knowledge. We summarize this idea with the following hypothesis:

> *H2: A higher level of aggregated human capital that is specific to self-employment and small business increases the likelihood that individuals enter self-employment.*

The market-price perspective

Finally, one should keep in mind that the variation of supply always relates to price effects. This means that we should expect that the reward related to the individual supply of a specific good will vary with the overall level of the regional supply of that good (given a fixed level of demand). To make this point clear, assuming that demand remains fairly stable, any change in the level of the supply curve also affects the level of related returns (the price level). As textbook economics predicts, when supply increases, the quantity of realized contracts rises, which is associated with a decrease in the price of the offered (normal) good. Therefore, whenever we observe differences in the regional endowment of a particular resource, we should also be aware of variant relative returns of this factor across the regions – given that demand is rather invariant. We will apply this view to the human capital approach in explaining entrepreneurship. In our setting, this means that a rise in the overall regional level of diverse human capital may lower the relative returns of being broadly skilled on the individual level.

The idea related to variant relative returns of being broadly skilled has already been proposed in the basic approach of the "balanced skill set framework" (Lazear, 2005). In this approach, a market premium exists that enters the entrepreneur's specific income function, while the premium itself is a function of the aggregated supply of "balanced skills" and the subsequent demand. The supply side will be driven by the individual investment strategies in human capital, while the demand side results from the technology regime, such as being related to a specific industrial structure. Following Lazear (2005), multiple equilibria can exist. He suggests that each level of complexity in the production process (technology regime) creates an independent market. For instance, in complex production sectors, additional skills are needed to sufficiently serve the balance property. Because the required quality of balance strictly depends on the conditions set by the complexity of the production in that sector and because skill balance must relate to a single individual, the price setting of supply for entrepreneurship can only be solved on the individual level while being technology-specific.

We will transpose this idea into a regional setting. A core assumption as proposed in the multiple-equilibrium setting is that the setup of competencies and experience is less likely to be transferable – i.e., technology-specific (Lazear 2005). In a regional framework, we motivate this limited interchangeability with the idea that the human capital relevant for entrepreneurship has limited mobility. The empirical research supports this perspective, as most new vital businesses mature locally (Michelacci and Silva 2007), and knowledge spillovers are also regionally bounded (Audretsch and Feldman 1996; Acs and Plummer 2005).[4] As a result, prices (the premium for having a diverse human capital set for an entrepreneurial activity) may vary across regions only if the supply differs. Additionally, we should expect that the value of being broadly skilled for entrepreneurial activities

[4] The idea is that local entrepreneurs are strongly related to the region because of relative advantages in the access to capital, knowledge spillovers, and networks (social ties). Furthermore, it is easier to acquire and exploit business ideas in a local context.

depreciates with the amount of people that are also broadly skilled. Hence, we can hypothesize as follows:

> *H3: The higher the aggregated level of supply of entrepreneurial-specific human capital, the lower the price of this "talent" (all else being equal).*

3. METHODOLOGY

Data

The data used in this analysis are based on a computer-assisted telephone survey of individuals aged 18 to 64 years. The survey was conducted between June and August 2003 and addressed 12,000 adults in 10 selected regions in Germany (see Lückgen and Oberschachtsiek 2004). The selection of these regions accounted for population density, industrial structure and east-west assignment to reflect the structure of the population in German regions. Hence, the data are representative of the population of the selected regions and conducted in a way that allows a reflection on the entire German working force. Additionally, note that regions are selected in such a way that they do not adjoin spatially, which limits problems related to spatial autocorrelations.

The data we use allow for a sufficient identification of the relevant attributes. These attributes include a measure of the broadness of the individual's experience (human capital diversity) and information related to regionally aggregated supply of the subsequent skills.

Information about the balancing property of the individual's human capital that we assume to be specific to entrepreneurship is taken from a question that asked about the number of different fields of job experience. This question enables a simple identification of the role model emphasized by the multiple task theory, as proposed by Lazear (2005). Note that the meaning of the measurement refers to the individual's experience and that it especially focuses on the number of distinct fields of competence.[5] Recent research supports that this measure is indeed positively correlated with traditional measures of human capital (Oberschachtsiek 2009). Furthermore, referring to Wagner (2005), this measurement also proves to be equally relevant for pushed and pulled start-ups, which additionally support the reliability of this measure in the context of entrepreneurship. To ease readability, we will equivalently use the terms human capital diversity and, as a more technical term, the number of task roles. Additionally, we also exploit information about the interviewee's educational and professional backgrounds and standard biographical characteristics. Finally, the questionnaire

[5] The exact question: "In how many distinct fields of competence have you ever worked?" This question is supplemented by a note that this does not mean different employers but different fields of activity. Unfortunately, we do not have information on the quality of each distinct field of competence. However, our measure directly corresponds to the theoretical concept suggested by Lazear (2005) and has also been used in this form or in similar types of measurements in earlier research (see above).

asked about the different aspects of self-employment attitudes and dispositions (i.e., the interviewee's attitudes toward self-employment, perception of business opportunities, and the competencies required to set up a business).

Note that nascent entrepreneurship is identified on the individual level and that our definition corresponds to the valuation of the individual's statement to be actually (active in trying to start a new firm in the past 12 months) involved in starting a business (having undertaken substantial investments) independent of setting up a business alone or with others. Referring to earlier definitions on nascent entrepreneurship, our definition differs in terms of additional restrictions (see Lückgen and Oberschachtsiek, 2004). In contrast, we also include individuals who already retain income from the new self-employment position. Our particular motivation for this approach refers to the problem of rare events research when focusing on entrepreneurship, to which the research may be even more prone when studying on a more local level.

Our regional data are based on the regional aggregation of subsequent individual characteristics, and we define regions in terms of Nuts 3 regions (*Kreise*).[6] For instance, to define the level of potential supply that exists on the regional level with respect to specific human capital, we use the average number of task roles among the population in each region. Likewise, the overall level of entrepreneurship activity is defined as the share of persons who report to be self-employed. In total, our study covers 52 Nuts 3 regions with an average of 168 individuals per region. For details on the variables, see Table A1 (definitions of the variables) and Table A2 (including selected information on descriptive statistics) in the appendix.[7]

Finally, the sample selection focuses on restricting the population to the labor force. As a consequence, pupils, students, people in civilian and military services, trainees, and homemakers are eliminated from the sample. Furthermore, we also exclude people who are younger than 25 years old and who are older than 60 years old. To limit the position of influential points related to the distribution of the number of task roles, we also only focus on individuals with no more than 13 self-reported distinct fields of competence.[8] Implicitly, this procedure will exclude individuals that may have misunderstood the underlying question.

Strategy of the Empirical investigation

Given the data at hand, the problem that we address in our study can be formulated as a general two-level problem. On the first level, we are confronted by the choice of an individual. We study this issue by using the joint-density distribution corresponding to certain characteristics and the fact that an

[6] For a discussion of different identification strategies in various regions, see Kropp and Schwengler (2011). Note that greater regional entities than *Kreise* usually perform better when trying to identify regional labor markets. In our study, we use *Kreise* because of a greater variance and because of our particular interest in focusing on local conditions.

[7] Further information is available from the author on request.

[8] Note that 90% of the studied people report being experienced in no more than five distinct task roles (95% report no more than seven task roles). For further details on the quality of the number of task roles in the context of entrepreneurship, see Oberschachtsiek (2009).

individual is observed as being a nascent entrepreneur. In particular, the joint distribution of the number of task roles and the nascent entrepreneurship indicator are used to obtain information about the comparatively advantageous nature of the specific human capital for entrepreneurial activity. We apply this approach for the first two hypotheses. Our final focus of interest concerns the dependency of the individual-level effect on the regionally aggregated level of specific human capital (Hypothesis 3).

Beginning with the individual level, we are confronted by a statistical modeling approach as follows:

$$y_i = \beta_0 + \beta_1 x_i + e_i \qquad x_i \in \{age, \ldots., qualification\} \tag{1}$$

We use this econometric approach as the starting point for the investigation. On principle, this approach builds upon the estimation procedure used by Wagner (2006). Likewise, we also add regional characteristics in this approach, which reformulates (1) to:

$$y_i = \beta_0 + \beta_1 x_{i,r} + e_i \qquad x_i \in \{age, \ldots.\}; \;\; x_r \in \{regional, \ldots.\} \tag{2}$$

In (1) and (2), *y* denotes the interesting outcome, which in our case is a dummy variable that indicates whether an individual is a nascent entrepreneur or not. *i* and *r* are subscribers that indicate the level of observation. *i* represents the individual level and *r* represents the regional level. *x* denotes the subset of individual characteristics that we allow to vary across individuals and regions, and *e* captures an error component. β_0 indicates the coefficient of a constant term, and β_1 represents the coefficient related to the covariates.

The practical correspondence of (1) and (2) is that we study the determinants that affect the individual's likelihood of being a nascent entrepreneur as single non-interrelated factors with only individual-specific unobserved heterogeneity. Here, we ignore the nature that we particularly emphasize in the Hypothesis 3. The idea is to control for differences between regions beyond what is included in the set of explanatory variables. Dummies would address this concern. However, with region-specific attributes (fixed effects) and measures that we include on the same regional level, we would run into complications concerning collinearity. A more appropriate model specification may be:

$$y_{ij} = \beta_{0j} + \beta_1 x_{ij} + e_{ij} \tag{3.1}$$

$$\beta_{0j} = \delta_{00} + \delta_{01} z_j + u_{0j} \tag{3.2}$$

$$\beta_{1j} = \delta_{10} + \delta_{11} z_j + u_{1j} \tag{3.3}$$

With (3.1), we formulate a general econometric approach that focuses on a general two-level variation of the interested covariates. In addition to the upper notation, *j* now includes a second level, which in our case focuses on the region. Furthermore, 3.1 also emphasizes that the error depends on two levels. In formula (3.2), we control for variation across regions due to a variation of the constant, while (3.3) focuses on a cross-level variation of the effect a particular covariate. This approach allows us to capture the variation of the constant across regions and to study the effect of particular regional attributes.

However, to study the latent price effect that is associated with the variation of the regional supply of the specific human capital measure, we need a two-level approach that allows us to identify the interactive relation of individual and regional characteristics. To put Hypothesis 3 differently, we ask how the market premium of the "entrepreneurial talent" (having diverse skill sets) changes under different economic conditions. Hence, we simply let the individual effect vary by region while we focus on the level of supply in that region. With this in mind, we can identify the price effect along the variation of the subsequent beta estimates across regions. In turn, we model the variance of the beta as a function of the aggregated level of the reported number of job-related task roles (human capital diversity).

Technically, this procedure can be formulated as a hierarchical two-level modeling framework. The general approach of this procedure is already formulated in (3.3). However, because we are interested in a specific interrelation, we apply a two-step procedure. The advantage of this approach is that it easily allows modeling interactions between nested regressors. Furthermore, outlier diagnostics are simplified (see below). Unfortunately, efficiency is lower compared to joint-multilevel estimation approaches. In addition, a particular concern in running a two-step hierarchical multilevel regression is that we must adequately deal with an estimated dependent variable, which needs extra attention in the modeling approach.

In handling this aspect, we strictly follow the suggestion made by Lewis and Linzer (2005).

$$y_{ij} = \beta_{0j} + \sum_k \beta_{1j} x_{ij} + v_i; \qquad with \quad v_i = q_i + h_i \tag{4}$$

y is now an estimated dependent variable, which is observed for an individual *i* in cluster *j*. *x* are *k* individual characteristics (e.g., age, gender) describing the outcome variable. *v* is an individual disturbance term. *ß* is defined as being *j*-conditioned, which allows estimating varying coefficients. Each covariate is thus allowed to vary across each cluster in its effect on *y*. The core issue in (4) is that the error term *v* consists of two components, *q* and *h,* of which *q* captures the error term of the model, and *h* is the error related to the estimate of *y*.

Following Linzer and Lewis (2005), the idea is to handle the variances of the error components (the respective approximations of the variance) as a weighting device for the correction of the second-stage regression. Thus, the general formulation is as follows:

$$w_i y_i = \beta_0 w_i + \sum_k \beta_{1j} x_{ij} w_i + w_i v_i; \quad (5)$$

This formula can consistently be estimated by using a WLS-procedure where the weights are defined as (see Lewis and Linzer 2005 for details):

$$w_j = \frac{1}{\sqrt{\mathrm{var}(q)+\mathrm{var}(h)}} \quad (6)$$

4. EMPIRICAL FINDINGS

Descriptive results

In total, 8,761 people entered our study. Similar to what has usually been found in other studies about entrepreneurship, nascent entrepreneurship activity appears to be a rare event. Taking into account that we focus on the adult labor force, we observe that only 6% of the study participants were engaged in starting a new venture in 2003. Compared to descriptive findings in other statistics and data sources, this is a fairly similar finding to what we usually observe in Germany.

Furthermore, because we focus particularly on studying the regional context of entrepreneurship activity, we find that the share of nascent entrepreneurs across regions varies between 1.1%, up to a share of more than 12%; one region even indicates a share of 0% in the year 2003. This result is important because it reflects high variance of the propensity to start a new business across regions. Note that the number of people that we observe in each region lies between 34 and 722. Unfortunately, in 6 regions, we observe less than 50 people. Nevertheless, more than 64% of the included regions hold more than 100 individuals that could be studied.

With respect to our measurement of specific human capital, the data include people who, on average, report having task roles in 3.1 different fields. Keeping this in mind, the density distribution is fairly left-skewed. In total, 90% of the people report having experience in up to 5 distinct fields of competence, and 96% report having up to 8 task roles. In addition, initial graphical assessments and subsequent test statistics do not reveal substantial differences in the reported number of task roles between high- (college degree or master craftsman) and low-skilled people ($Pr(|T| > |t|)$; the H_0 that the mean values do not differ is 0.264. Likewise, no substantial differences are found between pushed and pulled founders.

When focusing on the regional variation, the question arises of whether specific human capital has a certain concentration in some regions. We study this question by focusing on the variation of the 90% value and the distribution of other subsequent descriptive statistics of the number of task roles across regions. We find that the overall regional mass-point of the 90% value lies close to the average

in the overall population. We also find that the distribution of the 90% values follows a fairly normal distribution with only a very small right-skewed shape. Similar properties are also observed for the mean, the skewness (left-skewed; varying between 0.6 and 1.9) and the kurtosis (lying between 2.5 and 8.6). Hence, the distribution properties of the number of task roles (human capital diversity) across regions appear to be rather harmonic and do not point to specific concentrations or influential regional mass-points. For further descriptive information, see Table A2 in the appendix.

Skill diversity on the individual level and entrepreneurship

The results with respect to Hypothesis 1 are reported in Table 1. As shown in the table, our study spans different modeling approaches. Basic control variables are age, gender and qualification. Along the different modeling procedures, we add further attributes stepwise to extend the set of controls and to apply a rough check of the robustness of the findings. Note that our focus concerns the role of skill diversity – hence, the discussion is largely limited to this attribute.

Table 1: Testing Hypothesis H1, The probability of being a nascent entrepreneur
near here

As reported in model specification M1a, we find that the effect of an increase in the human capital diversity is different from zero (statistically significant on the 95% level). The point estimate of the coefficient shows a positive effect of an increase in experience in different fields of competence on the likelihood that an individual is engaged in self-employment. In terms of marginal effects (fixed at the median values of the included population; see the notes below Table 1), each incremental increase in experience is associated with the likelihood of being a nascent entrepreneur increasing by 0.4 percentage points. This increase may sound fairly small at first. However, recall that the overall average likelihood of being a nascent entrepreneur is only 6% in our population. A simple step of standardization reveals that a change of 0.5 of the standard deviation of the human capital diversity is associated with a change of the likelihood of being a nascent entrepreneur by almost 0.85 percentage points.

Furthermore, as we can find in model specification M1b that the statistical significance of the effect related to an increase of the human capital diversity on the individual's likelihood of being involved in starting a business remains stable. In this model, we additionally control for the aggregated perception of good economic chances (the perception of a prospering economic development) in the region (Nuts 3 level). We also find that, despite controlling for more information, the point estimate is fairly robust.

In M1c, we use a different measurement for the specific human capital. We change our focus by studying the effect of having an above-average range of experience in different fields of competence. In contrast, in M1a and M1b, we focused on incremental changes in the human capital diversity. Again, the general findings do not substantially differ from our initial findings – revealing a positive

and statistically significant relationship between human capital diversity and the likelihood of starting a new business (95% level). In model M1d, we also control for regional-fixed effects – which we refer to by including a set of dummy variables indicating each single ROR region (*Raumordnungsregion*; a civil planning region that spans a set of Nuts 3 regions).[9] Again, our initial findings do not change substantially.

Finally, the results that allow for the non-linear nature of the human capital diversity as it affects the individual likelihood of being engaged in starting a business are reported in model specification M1e. As we find, a Sasabuchi test (1980) supports the existence of an inversely U-shaped pattern (indicating that the upper and lower bounds of the Fieller interval are both lower than the maximum) – pointing to a maximum in the effect on entrepreneurship around 8 different types of competencies.[10] Despite the support of a non-linear relationship, we will omit this perspective for simplicity. Not accounting for the curvature should not harm our general findings.

Skill diversity on the regional level and entrepreneurship

Studying Hypothesis 2, we use essentially the same modeling approaches as we used in testing Hypothesis 1. Extending our statistical model to test the existence of "external effects," we additionally include the aggregated level via the regional average number individual task roles (= regional human capital diversity). This measure is now at the heart of our interest. The results of the investigation are reported in Table 2. We start with a basic modeling approach, which is then extended and altered to check the robustness of the findings.[11] Again, the results are reported in terms of marginal effects fixed at the median and on the average values (see also the notes below Table 2).

Table 2: Testing Hypothesis 2, Probability of being a nascent entrepreneur
near here

In model M2a, we study the aggregated regional position of the human capital diversity in the population (the average number of reported task roles in the region). As one can see from the reported estimates, we find a positive correlation between the aggregated level of experience and the individual's likelihood of being engaged in starting a business. Similar to what we found for the individual measure, the effect is also statistically significant above the 95% level. This finding is important because it shows that the average regionally aggregated situation indeed influences an

[9] Here, we use *ROR* Regions instead of *Kreise* because of the detrimental loss of variance that may stem from the *Kreis*-aggregated regional human capital measure. Furthermore, our research suggests that *ROR* Regions allow an entity identification that is sufficient with respect to the regional labor market in Germany (Kropp and Schwengler 2011).

[10] The Sasabuchi (1980) test is performed using the *utest.ado* procedure in STATA supported by Lind and Mehlum (2007; http://fmwww.bc.edu/repec/bocode/u/utest.ado).

[11] Note that differences in the estimated coefficients related to the regional human capital measure between linear and non-linear model specifications of the individual human capital measure do not substantially differ. We therefore report only model specifications based on the linear specification.

individual's probability of engaging in entrepreneurship activity, even after controlling for the individual qualities of experience and qualifications. Furthermore, we can also retain information about the size of the effect. As indicated by the marginal effects, we observe that a one-unit increase in the local average of the reported number of task roles is associated with an increase in the likelihood of being a nascent entrepreneur by almost 2.2 percentage points.

At first sight, the magnitude of this effect seems to be fairly promising. However, the problem associated with the reported marginal effect is that it does not control for the factual area of variation. In this context, we must note that the total variation of the average measure of specific human capital across regions only varies between 2.4 and 3.5, which is less than a one-unit change. A simple standardization makes the overall effect (more or less) comparable to the effect that is associated with the individual measure. Again, focusing on half of a standard deviation in changing the average measure (+/- around the mean), we find an effect of more than 0.3 percentage points in the change of the individual's likelihood of starting a business.

To test the robustness of these findings, we add further information by including additional explanatory factors. In model M2b, we also include characteristics that capture the regionally averaged level of subjective perceptions on entrepreneurship. The motivation for this accounts for earlier research that points to the importance of cultural aspects that may operate due to the subjective lens of individuals (e.g., Georgellis and Wall 2005). In our modeling approach, we concentrate on the role of the perception of good business opportunities and on the perception of the reputation of entrepreneurs in the region. In model M2c, we extend this approach by including the subjective perceptions related to entrepreneurship on the individual level. Again, the results found in the basic testing remain stable in terms of statistical significance and related to the direction of the correlation. However, the point estimate is lower because we add further explanatory attributes. Similar results can be found in model M2d, where we also control for regional-specific effects that relate to the *ROR* regions.

Summarizing these findings, we can conclude that correlations indeed exist between (further) regional characteristics (which have not been included in model M2a) and the factor that is at the heart of our investigation of Hypothesis 2. Hence, not controlling for additional explanatory factors is associated with an overestimation of the effect related to the role of the aggregated specific human capital in affecting the individual's likelihood of engaging in an entrepreneurial activity. In all modeling approaches, we find a positive effect of the human capital diversity (number of reported task roles) on individual entrepreneurship at the aggregated regional level. This result clearly provides support for H2.

Based on the specification in model M2d, we also checked (not reported in Table 2) whether differences occur when focusing on greater regional entities (*ROR* regions instead of *Kreise*). We only find small differences of the effect related to the regionally averaged number of fields of experience on the individual's likelihood of being a nascent entrepreneur. In addition, using a rare-events Logit model specification in opposition to common Logit modeling approaches does not substantially

change the reported picture. Finally, in accordance with the discussion in section three, we also run random-intercept models. Again, the results remain stable in terms of statistical significance.

Interrelations between individual and regional skill dispersion

Accounting for Hypothesis 3, the above modeling approach (related to Hypothesis 2) does not explicitly point to two separate correlations that may exist. In more detail, focusing on H3 means that we determine whether the comparative advantage of individual skill diversity that we find to be associated with the number of reported professional task roles on the individual level varies with the overall supply of this specific type of human capital. We will interpret this interrelation as a price effect, as we study the relative value (premium) of "entrepreneurial talent" as captured in an increasing number of fields of competence. In Hypothesis 2, we only focus on the gross effect.

As already indicated above (see section 3) we start with *k* single regressions, one for each region (Nuts 3 level), where we explain an individual's likelihood of being a nascent entrepreneur. Note that we focus on the most basic modeling specification, as reported in Table 1 (model M1a). We then return *k* point estimates, which describe the average effect of the individual's human capital diversity on the individual's chance of being engaged in starting a business for each region. Afterwards, we put these estimates into a regression model where we explain the magnitude of the effects with a set of explanatory regional factors. To account for the additional error that is associated with each coefficient on the left-hand side, we apply the procedure suggested by Lewis and Linzer (2005). Again, our focus concerns the aggregate level of individual skill diversity as the major explanatory attribute. However, we also control for the general demand for entrepreneurship by including the regional level of entrepreneurship. Similarly to our previous approach, we use different modeling approaches to check whether the initial findings remain robust.

Table 3: Testing Hypothesis 3, Interaction between regional and individual measure of specific human capital on the Probability of being a nascent entrepreneur
near here

Note that the values of the estimated coefficient that are close to zero indicate low relevance of the price effect. Additionally, as one can see from Table 3, none of our modeling strategies reveals a significant interrelation between the individual and the aggregated level of human capital diversity in affecting entrepreneurship. First, we focus on a simple Logit estimation, as used above. The results do not reveal that there is an interaction between the individual and the aggregated regional levels of our specific human capital measure. In the second step, we thought of a better representation of the rare events situation, which may be even more relevant on a more local level (e.g., the weights become more relevant in the case of infrequent self-employment observations). However, using a rare-event Logit specification, the results do not substantially change these findings. Finally, we also used linear

probability modeling procedures. The motivation behind this approach mainly corresponds to the unsolved problem in the first two approaches, where differences in the values of the interested coefficients may result from differences in the composition of the populations across regions. Again, the results do not show statistically significant effects and hence do not change the general findings reported above.

Figure 1: Relationship between the regional nested "skill-diversity"-coefficient and the local supply of specific human capital
near here

To retain some more illustrative images of our estimates, even if statistically insignificant, we plotted each estimated coefficient of the regionally conditioned regressions against the regional-aggregated level of individual skill diversity. The results of this illustration are reported in Figure 1. Again, all three estimate procedures are reported. What we can observe from the assessment is that a better representation of the rare events situation tends to increase a negative correlation, which might support our expectations. However, we must be aware that the rare-events procedure loses some observations due to incomplete matrices. Finally, the linear probability modeling approach changes this picture and does not mirror a negative correlation.

Summing up these findings, our results indicate that if the overall supply of specific human capital increases in a region, it does not lower the relative gains of specific human capital for an entrepreneurial activity, which we find to be related to human capital diversity on the individual level. In turn, this means that we do not find support for Hypothesis 3.

Controlling for complexity

So far, the empirical analysis does not account for differences in the complexity of business projects. Following Lazear (2005), we should expect that projects that focus on more complex businesses such as high-tech start-ups may not be mixed with entrepreneurship activity that exploits a venture in the context of a low level of complexity. The more complex an industry, the more skills are needed to provide sufficient "skill balance," and hence, only a broader set of experience serves to have comparative advantages in entrepreneurship.

We will account for this argument. However, the data at hand do not provide a direct measure of the complexity of a business project. Usually, one may use industry classifications to differentiate high- and low-tech industries or the level of R&D investment. Assigning complexity to the industry classification assumes high homogeneity within each classification, which is less likely in cases of rough classification schedules (e.g., the manufacturing industry covers a broad span of production technologies, including high- and low-tech production). In surveys, deep-order classifications are not practical. Instead, we use the level of qualification as a proxy to distinguish between business

formation at higher and lower levels of complexity.[12] For a master craftsman and for founders who hold a university degree, we assume that their businesses (on average) will be set up on a higher level of complexity compared to those founded with a lower level of qualification.

With this in mind, we rerun all investigations separately for higher- and lower-qualified people. Unfortunately, the estimates that focus on the "price effect" Hypothesis (H3) fail because of limited variance. Hence, the reported results focus on Hypotheses 1 and 2. The findings of our additional investigation are reported in Table 4, where we separately report marginal effects and related standard errors for the two major attributes. The last column reports which model types were rerun.

Table 4: Testing H1 and H2 in the context of complexity
near here

Note that we distinguish two specifications. In the version with strong restrictions, all attributes strictly focus on the selected population. This means that the average local values (e.g., skill diversity) only refer to the selected population. In the less-restrictive version, we relax this condition, which means that local averages are based on the whole population. The idea related to these two settings is that in the first version, high- and low-technology markets are completely closed, while in the second version, interrelations are possible.

In beginning the investigation, we observe 282 highly qualified nascent entrepreneurs (2,940 non-entrepreneurs) and 273 founders with a lower level of qualification (5,266 non-entrepreneurs with lower qualification). A Chow (1960) test supports the idea that the statistical modeling may differ between high- and low-qualified people (testing the H0 that both separate model specifications are nested in the overall model; Prob > chi2 = 0.031). In addition, testing the coefficients related to the relevance of the human capital diversity on the individual level also supports distinguishing both groups (Prob > chi2 = 0.053), while no statistical difference can be found for the aggregated measure of broad experience (Prob > chi2 = 0.489). As proposed in the Lazear (2005) model, we also test the thesis that high-qualified people have more diversified experience than those with a lower level of qualification. Surprisingly, we observe the opposite direction. Empirical evidence reveals that lower-qualified nascent business founders (3.85 distinct fields) have more diversified experience (Prob T > t = 0.03) than high-qualified nascent entrepreneurs (3.5 fields).

As reported in Table 4, we find that the human capital diversity on the individual level is quite harmonic in affecting the individual's likelihood of starting a new business. For both populations (the high- and the low-qualified people), we find a statistically significant and positive effect related to an increase in the individual human capital diversity (number of task roles) and the individual's probability of being a nascent entrepreneur. In contrast to the discussion above, we do not discuss

[12] For support for this procedure, see Audretsch (2002), where it is emphasized that growth rates are positively correlated with qualifications, especially in highly innovative sectors.

standardized effects. Differences in the effects compared to the unconditional analysis emerge when focusing on the aggregated level. Here, support for the hypothesis that the aggregated level of our specific human capital measure promotes entrepreneurship is only given for low-qualified population and remains statistically insignificant for high-qualified people.

This picture is somehow confusing because the test statistics reported above indicate differences related to the individual but not for the aggregated measure. One reason for this is that the coefficients reported in Table 4 only test the hypothesis of whether the relation is different to zero, while the upper tests directly focus on differences in the coefficients between the two populations. An effect may be statistically significant and different from zero for one sub-population but may not differ from the effect found for another sub-population. This picture also holds when using rare-events Logit modeling techniques. Summing up, we use this finding as a support for the thesis that significant effects concentrate on the lower-qualified population (when focusing on the aggregated measure) but that differences between high- and low-qualified people remain rather negligible. A simple explanation why the aggregated information may be less relevant for the high-skilled population is that they have a higher level of mobility. However, this idea cannot be tested with our data.

5. SUMMARY AND INTERPRETATION

Summary

The particular contribution of this research is the analysis of a specific human capital measure on the likelihood that an individual is a nascent entrepreneur. We study this measure on the individual level and on the regional level, as well as the interaction between both levels. The measure we focus on is the number of professional task experiences of the individual, which we use as an indicator for human capital diversity. This measure has been suggested to play an important role on the individual level because it should be associated with comparative advantages for entrepreneurial activity (Lazear 2005; Wagner 2005; Oberschachtsiek 2012). For the empirical investigation, we use German individual data on nascent entrepreneurial activities of the adult population, which were collected to represent the average population in different regions.

Our research extends earlier work that has focused on the role of a measure of general human capital in the context of entrepreneurship (the regional level of schooling, see Doms et al. 2010), and it extends the recent attempts to combine the regional and individual characteristics in the study of entrepreneurship (e.g., Sternberg, 2010). In our study, we test the hypothesis that in addition to the individual level, the aggregated level of our specific human capital measure also promotes entrepreneurship, but that a price effect (induced due to a higher local supply of specific human capital) may diminish the relevance of that measure on the individual level.

Findings and Implications

Our findings support the thesis that individual experience in many fields of competence is associated with an increased probability of being a nascent entrepreneur. Furthermore, in addition to finding individual comparative advantages related to human capital diversity sets, we also find that the regional average of the human capital diversity also promotes self-employment activity. Hence, independent of the individual level of diversified experience, having a higher share of people with a broader range of professional experience in a region is associated with a higher probability that an individual becomes a nascent entrepreneur. We interpret this as support for the hypothesis that, in addition to direct individual effects, human capital diversity also relates to external ("social") effects. Furthermore, our results also indicate that a higher supply of specific human capital in one region does not decrease the relative individual returns from having a diverse human capital stock in promoting entrepreneurship, as we expected. The positive effect of the individual's diverse human capital on the likelihood of becoming a nascent entrepreneur remains unaffected by the regional level of diverse human capital. This indicates that the price related to our measurement of specific human capital remains unaffected by the overall level of the human capital measure.

Summing up our findings, the study provides evidence that diverse human capital may be one source of entrepreneurship capital. As we find, the human capital diversity, measured either on the individual or on the regional level, has a positive impact on the likelihood that an individual is engaged in starting a new venture. Furthermore, there is no diminishing effect of the total supply of the human capital diversity on the individual level. Entrepreneurship capital in this sense can be understood as a characteristic that is multilevel-consistent in positively affecting venture activities. In addition, we also see through this investigation that those strategies may be most promising when they focus on increasing only a moderate number of different fields of competence on the individual level instead of focusing on very high numbers. Furthermore, politicians should be aware that this also means that scaling the magnitude of human capital diversity to promote entrepreneurship depends on the existing level of human capital diversity.

Limitations and links to future work

The findings of our research are fairly robust to different statistical model specifications and to different procedures of estimating standard errors. Nevertheless, shortcomings and limitations exist. For instance, some differences exist between high- and low-skilled people, which we study to distinguish the level of complexity in venture creation. For example, the effect that we found related to the regional aggregated level of human capital diversity concentrates on the lower-qualified population. For the better-qualified population, we do not find a significant effect of the aggregated specific human capital measure on entrepreneurship activity. One possible explanation for this finding may be related to opportunity costs that may be dominant for the population of higher-educated people. However, the differences between both groups – as statistically tested – remain negligible.

Nevertheless, these differences need further attention, which also includes a more specific identification strategy to address the complexity in entrepreneurship activity. Furthermore, a general shortcoming of our research is that we have only been able to use cross-sectional data. Panel data would allow controlling for spatial mobility and would also allow a better causal-like assessment of the role of the individual and aggregated specific human capital in the context of entrepreneurship. A particular issue of future work should be concerned with a deeper understanding of the origins and the quality of individual skill diversity. Finally, we assumed that demand for our specific human capital measure is relatively homogeneous across regions. Ongoing research may be able to use data that also allow questioning this assumption.

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Tables and Figures

Table 1: Testing Hypothesis H1, Probability of being a nascent entrepreneur (marginal effects)

model	M1a	M1b	M1c	M1d	M1e
attribute					
	b/(se)	b/(se)	b/(se)	b/(se)	b/(se)
sex (male, i, d)	0.026***	0.017***	0.024***	0.026***	0.027***
	(0.005)	(0.004)	(0.004)	(0.005)	(0.005)
age (i)	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
master craftsman (i, d)	0.016*	0.011*	0.014*	0.017*	0.018*
	(0.008)	(0.006)	(0.007)	(0.008)	(0.008)
academic degree (i, d)	0.029***	0.020***	0.025***	0.029***	0.031***
	(0.006)	(0.004)	(0.005)	(0.005)	(0.005)
no. of taskroles (i)	0.004***	0.003***		0.004***	0.013***
	(0.001)	(0.001)		(0.001)	(0.002)
no. of taskroles (i) sq					-0.001***
					(0.000)
chance (i, d)		0.082***			
		(0.011)			
broad (i, d)			0.018***		
			(0.004)		
region- (fixed effects)				yes	yes
BIC	4019.550	3440.443	4031.839	4088.978	4084.175
N	8761	7817	8761	8761	8761

Notes: The table reports marginal effects related to individual predictors fixed at the median values of the included population; depended variable is the individual's likelihood of being a nascent entrepreneur (0/1)
***, ** and * denote statistical significance at the 99%the 95% and the 90% level;
(r) indicates that the attribute captures the regional average, (i) reflects information in the individual level, (d) reports that the attribute is a dummy variable
REM-Data, 2003; own calculations

Table 2: Testing Hypothesis H2, Probability of being a nascent entrepreneur (marginal effects)

model	M2a	M2b	M2c	M2d
attribute				
	b/(se)	b/(se)	b/(se)	b/(se)
sex (male, i, d)	0.025***	0.025***	0.019***	0.022***
	(0.004)	(0.004)	(0.004)	(0.004)
age (i)	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
master craftsman (i, d)	0.016*	0.016*	0.011	0.014*
	(0.008)	(0.008)	(0.007)	(0.007)
academic degree (i, d)	0.027***	0.025***	0.018***	0.023***
	(0.005)	(0.005)	(0.005)	(0.005)
no. of taskroles (i)	0.012***	0.004***	0.003***	0.003***
	(0.002)	(0.001)	(0.001)	(0.001)
no. of taskroles (i) sq	-0.001***			
	(0.000)			
chance (i, d)			0.090***	
			(0.014)	
prestige (i,d)			0.012***	
			(0.003)	
no. of taskroles (r)	0.022*	0.023***	0.019**	0.018**
	(0.009)	(0.007)	(0.007)	(0.006)
chance (r)		0.021	-0.035	
		(0.023)	(0.023)	
prestige (r)		0.077	0.050	
		(0.040)	(0.042)	
self-employed (r)		-0.034	-0.019	
		(0.066)	(0.068)	
region- (fixed effects)				yes
BIC	4017.287	4040.337	3260.173	4093.471
N	8761	8761	7429	8761

Notes: The table reports marginal effects related to individual predictors fixed at the median values of the included population; depended variable is the individual's likelihood of being a nascent entrepreneur (0/1)
***, ** and * denote statistical significance at the 99%the 95% and the 90% level;
(r) indicates that the attribute captures the regional average, (i) reflects information in the individual level, (d) reports that the attribute is a dummy variable
REM-Data, 2003; own calculations

Table 3: Testing Hypothesis H3, Interaction between regional and individual measure of specific human capital on the Probability of being a nascent entrepreneur

	model		
	logit	rare events logit	ols
attribute			
	b/(se)	b/(se)	b/(se)
no. of taskroles (r)	-0.199	-0.141	0.003
	(0.385)	(0.094)	(0.013)
self-employed (r)	0.351	0.167	0.007
	(4.052)	(1.037)	(0.128)
constant	0.665	0.569*	-0.006
	(0.896)	(0.258)	(0.031)
BIC	40.178	-45.470	-260.890
N	41	38	42

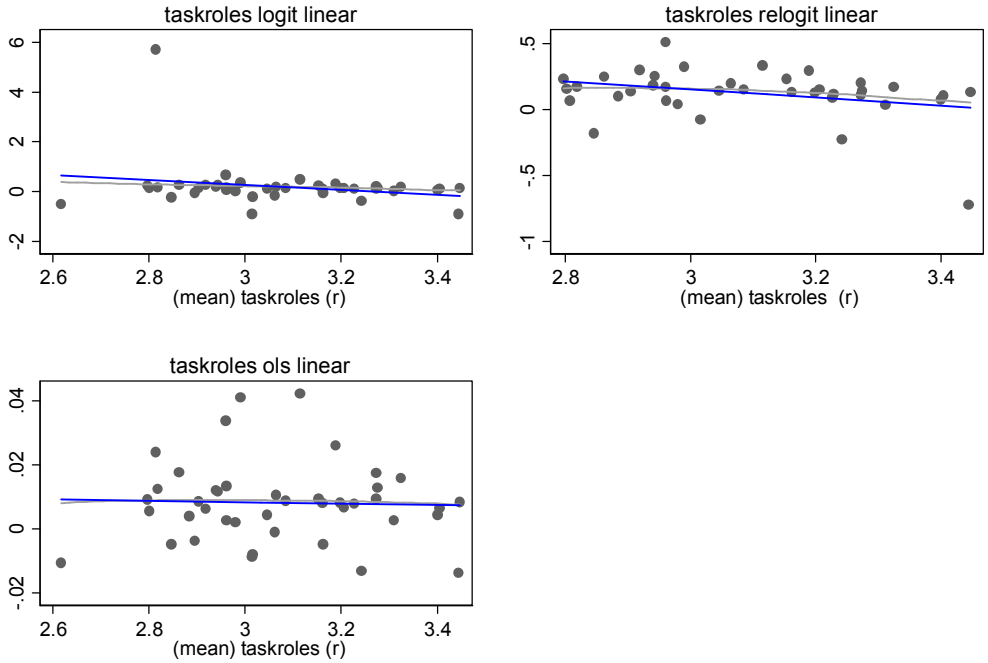
Notes: The table reports the effect of the regional average of dispersed human capital on the beta coefficients of individual number of task roles in affecting the likelihood of being a nascent entrepreneur
***, ** and * denote statistical significance at the 99%the 95% and the 90% level
(r) indicates that the attribute captures the regional average
REM-Data, 2003; own calculations

Table 4: Testing H1 and H2 in the context of complexity

model	attribute			reference model
strong restriction		marginal effect	standard error	
lower qualification	no. of taskroles (i)	0.003	(0.001)***	M1A
	no. of taskroles (r)	0.019	(0.006)***	M2G
higher qualification	no. of taskroles (i)	0.004	(0.001)**	M1A
	no. of taskroles (r)	0.018	$(0.014)^{ns}$	M2G
weak restriction				
lower qualification	no. of taskroles (i)	0.003	(0.001)***	M1A
	no. of taskroles (r)	0.021	(0.006)**	M2G
higher qualification	no. of taskroles (i)	0.004	(0.001)**	M1A
	no. of taskroles (r)	0.0027	$(0.015)^{ns}$	M2G

Notes: The table reports marginal effects related to individual predictors; depended variable is the individual's likelihood of being a nascent entrepreneur (0/1)
***, ** and * denote statistical significance at the 99%the 95% and the 90% level;
high qualified people (n = 3222) include master craftsmen and those who hold a university diploma (low qualified; n = 5539). The weak restriction includes aggregated information related to all observations (n= 8761) while the strong restriction only concentrates on the selected subpopulation.
(r) indicates that the attribute captures the regional average, (i) reflects information in the individual level,
REM-Data, 2003; own calculations

Figure 1: Relationship between the regionally nested "skill-diversity"-coefficient and the local supply of skill diversity



REM-Data, 2003; own calculations reported are estimated coeficients vs regional mean

APPENDIX

Table A1: Definition of the attributes

attribute	definition
nascent entrepreneur	one if the individual reports that he is engaged in starting a new venture
sex (male)	one if the individual is male
age	reports the age of the individual (in years)
master craftsman	one if the individual report that he or she hold a master craftsman degree
academic degree	one if individual report that has an academic degree
no. of taskroles	self- reported number of different professional tasks an individual has ever worked in
chance	one if the individuals sees valuable economic conditions in the region for an entrepreneurial activity
broad	one if the reported number of different professional tasks is greater than the average number of tasks
prestige	one if the individuals associates an entrepreneurial activity with high prestige
fear	one if the individual means that the risk to fail prevents him or she from becoming self-employed
self-employed	one if the individual reports that he or she is self-employed

Notes: all attributes listed above focus on the individual level; variables that address the regional level included aggregated information and focus on the regional average (mean)

Table A2: Descriptive Statistics

attribute	statistics				
	N	mean	stdev	min	max
information on the individual level (i)					
nascent entrepreneur	8761	0,063	0,244	0,00	1,00
sex (male)	8761	0,450	0,498	0,00	1,00
age	8761	41,582	9,022	25,00	60,00
master craftsman	8761	0,075	0,263	0,00	1,00
academic degree	8761	0,304	0,460	0,00	1,00
no. of taskroles	8761	3,100	2,024	0,00	13,00
information an regional level (r)					
no. of taskroles	52	3,054	0,198	2,62	3,45
nascent	52	0,060	0,025	0,00	0,12
chance	52	0,180	0,095	0,03	0,42
fear	52	0,482	0,053	0,34	0,62
prestige	52	0,594	0,051	0,46	0,72
broad	52	0,309	0,047	0,22	0,44
self-employed	52	0,099	0,039	0,00	0,21

REM-Data, 2003; own calculations

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