

Bublitz, Elisabeth; Nielsen, Kristian; Noseleit, Florian; Timmermans, Bram

Working Paper

Entrepreneurship, human capital, and labor demand: A story of signaling and matching

HWWI Research Paper, No. 166

Provided in Cooperation with:

Hamburg Institute of International Economics (HWWI)

Suggested Citation: Bublitz, Elisabeth; Nielsen, Kristian; Noseleit, Florian; Timmermans, Bram (2015) : Entrepreneurship, human capital, and labor demand: A story of signaling and matching, HWWI Research Paper, No. 166, Hamburgisches WeltWirtschaftsinstitut (HWWI), Hamburg

This Version is available at:

<https://hdl.handle.net/10419/113684>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Hamburg Institute
of International
Economics

Entrepreneurship, Human Capital, and Labor Demand: A Story of Signaling and Matching

Elisabeth Bublitz, Kristian Nielsen, Florian Noseleit, Bram Timmermans

HWWI Research

Paper 166

Corresponding author:

Elisabeth Bublitz

Hamburg Institute of International Economics (HWWI)

Heimhuder Str. 71 | 20148 Hamburg | Germany

Phone: +49 (0)40 34 05 76 - 366 | Fax: +49 (0)40 34 05 76 - 776

bublitz@hwwi.org

HWWI Research Paper

Hamburg Institute of International Economics (HWWI)

Heimhuder Str. 71 | 20148 Hamburg | Germany

Phone: +49 (0)40 34 05 76 - 0 | Fax: +49 (0)40 34 05 76 - 776

info@hwwi.org | www.hwwi.org

ISSN 1861-504X

Editorial Board:

Prof. Dr. Henning Vöpel (Chair)

Dr. Christina Boll

© Hamburg Institute of International Economics (HWWI)

July 2015

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without the prior written permission of the publisher.

Entrepreneurship, Human Capital, and Labor Demand: A Story of Signaling and Matching

Elisabeth Bublitz¹, Kristian Nielsen², Florian Noseleit³, Bram Timmermans^{4,2}

Abstract: Contrary to employees, there is no clear evidence that entrepreneurs' education positively affects income. In this study we propose that entrepreneurs can benefit from their education as a signal during the recruitment process of employees. This process is then assumed to follow a matching of equals among equals. Using rich data from Germany and Denmark we fully confirm a matching on qualification levels for high-skilled employees, partially for medium-skilled employees but not for low-skilled employees, suggesting that as skill levels of employees decrease it becomes equally probable that they work for different founders. Founder qualification is the most reliable predictor of recruitment choices over time. Our findings are robust to numerous control variables as well as across industries and firm age.

Keywords: returns to education, labor demand of small firms, human capital, matching, signaling

JEL codes: J23, J24, J21

Addresses for correspondence:

¹ Hamburg Institute of International Economics
Heimhuder Str. 71
20148 Hamburg
bublitz@hwwi.org

³ University of Groningen
Faculty of Economics and Business
Nettelbosje 2
9747 AE Groningen
f.noseleit@rug.nl

² Aalborg University
Department of Business and Management
Fibigerstræde 11
9220 Aalborg
kn@business.aau.dk

⁴ Agderforskning
Gimlemoen 19
463000 Kristiansand
bram.timmermans@agderforskning.no

1 Introduction

Higher levels of education are generally associated with access to better jobs and higher earnings—these stylized facts are backed up with rich evidence for employees. However, when we turn our attention to entrepreneurs the effects of education are far more ambiguous, leaving us puzzled about the role of human capital in nearly all stages of the entrepreneurial process.¹ For example, education has been demonstrated to have both positive and negative impacts on (entry into) entrepreneurship. Furthermore, the returns on entrepreneurial earnings are not straight-forward as existing studies find positive, negative and nonsignificant results. When positive results are found, they tend to be driven by only a handful of entrepreneurs who are able to achieve above average earnings. However, what appears to be rather consistent is that, overall, higher levels of human capital tend to positively correlate with survival and growth (Unger et al., 2011; Nielsen, 2015; Bates, 1985). Also, there are continuing efforts from policy makers to understand how (higher levels of) education effect entrepreneurs in establishing a healthy and thriving new venture, partly due to the ability to influence educational achievement via policy measures.

In this paper we propose that human capital of entrepreneurs works as a signal during matching processes with employees. Specifically, since reliable signals of previous firm performance are not (yet) available, new ventures face the challenge of attracting personnel via other mechanisms (Bhidé, 2000). We argue that the human capital of the entrepreneur serves as a substitute signal for performance, making new ventures founded by higher qualified entrepreneurs more attractive for employees when compared to those ventures founded by entrepreneurs with lower qualification levels. Matching mechanisms steer the allocation process of employees to firms because, for instance, due to limited jobs not all employees can work for high qualified entrepreneurs. Established models predict that workers with similar skill levels (self-matching, Kremer, 1993) allow firms to maximize profit. Accordingly, a matching of equals among equals should be the most promising strategy with a process that is mediated through different signals. In classic signaling theory, potential workers observe firm productivity and potential employers observe worker productivity (Spence, 19973; Hopkins, 2011). However, our paper is more concerned about how employees choose among entrepreneurs with a missing record of past performance.

In our empirical analysis we investigate the existence of the signal (founders' human capital) and the matching process (self-matching) for start-ups and small firms with German and Danish data. The analysis also includes various alternative predictors of labor demand by entrepreneurs. The dual data setup allows us to explore the advantages of each data source and identify empirical regularities in employment choices across two different labor market settings: the Danish labor market comprising flexible employment with strong income security for dependent employees and the German labor market involving institutionalized job protection with notable exceptions only for very small businesses. For Denmark, we rely

¹ See Parker and van Praag (2006), Hartog et al .2010), Unger et al (2011), and Åstebro and Chen (2014) to get an impression on all these different effects.

on the Danish Integrated Database for Labor Market Research (IDA) combined with the entrepreneurship register, both managed by Statistics Denmark. For the German case, we assemble a unique data set on start-ups, consisting of our own survey with personal information about founders and of data from the Establishment History Panel of the German Federal Employment Agency. We estimate the relationship between entrepreneurs' and employees' qualifications separately for firms of different ages. The data allow distinguishing between three formal qualification levels (low, medium, high) for entrepreneurs and employees. The different points in time enable us to assess whether the signal of entrepreneurial human capital weakens because alternative signals—i.e. actual survival and performance—are available to potential employees. The empirical analyses are carried out separately for each country, starting with a baseline model that can be estimated with either data set. In extensions of the baseline model we exploit available country-specific variables to identify additional factors influencing labor demand.

In the baseline model for knowledge-intensive business services (KIBS) and manufacturing, the results of negative binomial regressions show that high-skilled employees are more likely to work for medium- and high-skilled founders than for low-skilled founders for firms aged three to nine. For medium-skilled employees the suggested matching relationship can only be confirmed for German high-skilled founders and Danish medium-skilled founders when compared to low-skilled founders. No consistent evidence is found for low-skilled employees. In the extended analyses psychological characteristics, start-up motivation of the founder, additional knowledge variables, pre-startup income, regional experience, wealth (including spouse and parents) and a dummy for personal ownership of the new venture do not change the basic relationships. Further robustness checks include an extension of the analysis to all industries, still confirming the importance of employer and employee skills for labor demand. When replacing firm age with the time passed since first hire, our results remain robust. From our findings we conclude that decreasing skill levels of employees lower the propensity to observe a matching of equals among equals. High-skilled employees are most likely to work for high-skilled founders while lower-skilled employees have the same chances of working for any founder. This implies that low-skilled founders struggle most in their search for personnel because they are never more likely to hire employees than higher-skilled founders. Hence, the results consistently confirm self-matching for high-skilled employees. Entrepreneurial human capital serves as a reliable signal for matching for this group at all investigated firm ages, that is, no alternative signal appears to serve as replacement at later stages.

The previous literature has already investigated to what degree newly founded firms create jobs (e.g., Fritsch and Weyh, 2006; Sternberg and Wennekers, 2005; Storey, 1994; Wagner, 1994; Birch, 1979). However, research on labor demand of start-ups has primarily focused on the number of jobs created but not on the type or quality of jobs (Baldwin, 1998), as measured for instance by qualification level. The general importance of this topic has been underlined by small business owners who have rated labor shortages and human resource management as major obstacles, regretting the lack of theoretical approaches and empirical

evidence on these issues (Tansky and Henemann, 2006; Cardon and Stevens, 2004; Katz et al., 2000; Heneman, Tansky, and Camp, 2000). Most studies disregard firm age, for instance, as is the case for matching approaches. We know that due to a lack of experience and resources the majority of newly established ventures do not yet have formal human resources strategies and, instead, employers rely on informal recruitment channels to attract employees to their organizations (Cardon and Stevens, 2004; Aldrich and Ruef, 2006). In the decision to recruit new employees these founders are said to follow two, albeit not mutually exclusive, employment decision strategies. The first and presumably most common approach is based on social psychological motives and emphasizes interpersonal fit as well as the need for well-functioning teams while the second approach, which is more normative and preferred in the business strategy literature, focuses on the complementarity and demand of skills necessary to run a successful business (Aldrich and Kim, 2007). We would like to expand this discussion, reasoning that founders' human capital plays a significant role in explaining what type of employees' human capital a founder is able to attract (e.g., Dahl and Klepper, 2015), irrespective of which of the two above-mentioned mechanisms is at play. This reasoning further allows us to contribute to the discussion on the entrepreneurial earnings puzzle (e.g., Åstebro and Chen, 2014; Hyytinen et al, 2013), addressing why entrepreneurs on average appear to earn less than a similar group of employees (based on observable characteristics) because it still remains unknown why entrepreneurial human capital is not consistently positively related with income or performance. To sum up, to our knowledge we are first to investigate (1) the matching approach for young and small firms and (2) the effect of entrepreneurial human capital as signal during the matching process. By doing so, we want to reconcile contradictory findings in the literature in the past on founders' human capital—solving the puzzle of entrepreneurial human capital—and provide a different starting point for future research. We are aware that our analysis does not address causal relationships regarding employment decisions of entrepreneurs or employees but this is not required to report evidence on matching among individuals on the basis of different individual attributes. Even if qualification level proxies an underlying ability, then this should not bias our results in light of the observable signal of human capital. Hence, from our perspective, we can make a significant contribution to the phenomenon of job creation by providing a new theoretical explanation and a detailed cross-country view of empirical regularities in labor demand of start-ups and small firms.

The remainder of the paper is structured as follows. In Section 2, the theoretical background regarding the puzzle of entrepreneurial human capital is presented, including a framework for our analysis. Section 3 presents the data and Section 4 discusses the methodology and results. Section 5 finishes with a summary and implications for future research.

2 The Puzzle of Entrepreneurial Human Capital

2.1 Entrepreneurs' Qualification as a Signal to Reduce Uncertainty

Building on the idea of signaling and the uncertainty regarding new ventures, we suggest that the verifiable qualifications of the founder(s) behind a new venture are crucial for attracting employees. Employees have great opportunities to work for large established firms that are able to offer both higher earnings and more job security, making it difficult for start-ups to meet their labor demand. For instance, Schnabel, Kohaut, and Brixy (2011) demonstrate that employment stability, which is an indicator of job quality, is lower in newly founded ventures than in incumbent firms, confirming that job quality varies across firm sizes and age. Also, a lack of financial resources and other benefits for employees combined with low employment stability might make it difficult to attract employees, in particular high-skilled individuals, to come work in new ventures (Brixy, Kohaut, and Schnabel, 2006; 2007). In addition, entrepreneurs are capital constrained (Van Praag et al., 2005)—caused by asymmetric information between the founder and financier (Shane, 2000)—and half of all new ventures close down within three years (Van Praag, 2005), making employment opportunities in these ventures less attractive for employees, as assessed by extrinsic work characteristics (i.e. not related to the work tasks). However, the existing literature suggests the opposite regarding intrinsic work characteristics (i.e. related to the work tasks). Although, entrepreneurs are found to earn less than employees (Hamilton, 2000), they indicate a higher degree of work satisfaction (Hundley, 2001) which is explained by the difference in intrinsic work characteristics like independence, flexibility and stimulation of skills in the two occupations. Based on the same logic, employees would prefer to work in new ventures if these supplied more attractive intrinsic work characteristics and sufficient extrinsic work characteristics. However, since most of the time already the extrinsic work characteristics vary between large and small firms, entrepreneurs find it difficult to hire personnel, a finding that is for instance supported by Bhidé (2000) for founders with limited verifiable human capital and/or a novel business idea.

This leads to the question what other approaches could explain labor demand of start-ups. In the economics literature, the simplifying assumption of perfect information in many theoretical contributions can be problematic as “the labour market is replete with imperfect and asymmetric information” (Autor, 2001, p. 25). For newly founded firms, asymmetric information can be expected to be especially pronounced as these firms have no or little history to send signals to potential workers. In fact, many new ventures still have to learn about their (endogenous) productivity and inefficient job matches can be costly for (new) firms since then their productivity potential cannot be reached. In this case, the qualification of the entrepreneur can be considered as an important signal to reduce asymmetric information. As highlighted by Devine and Kiefer (1993, p. 8-9), “[t]he basic hypothesis of ‘matching’ models is that employers and workers continue to learn about each other [...]”. In general, many characteristics of a specific job-worker combination are not observable and only the realization of the job-worker combination provides additional information about the match (Jovanovic 1979a, 1979b). In the case of newly founded firms, the initial

observation error in the job-worker match is likely to be relatively large; larger for younger firms than for older firms. For example, workers' future earnings streams are more difficult to assess because of higher failure rates of young firms. When the observation error is large, alternative signals like the entrepreneurs' formal education may be of particular relevance to inform workers about the potential job-worker match. Another interesting aspect can be derived from models that introduce different search costs for workers (Albrecht and Axell, 1984) and that transfer this idea to varying search costs over different types of firms. In the case of young firms, it is likely that workers will face higher search costs as compared to older firms. Search costs do not vary for workers but differ according to the type of firms that are screened. If workers face higher search cost for new firms, qualifications of entrepreneurs may allow reducing these search costs.

In sum, the inherent uncertainty regarding the new venture and the asymmetric information between the founder and stakeholder (financier, employee, etc.) regarding the ability, work ethics, or future decisions of the founder make it hard for the founder to obtain resources like capital and labor. However, verifiable qualifications of the founder, like formal education and training, previous work experiences and performance, could act as a signal to reduce uncertainty regarding the future performance of the new venture to potential stakeholders. Previous work has investigated the role of founders in the process of firm creation and growth, for instance, how founders' existing human capital influences their opportunity recognition and exploitation (see, for instance, Shane and Venkataraman, 2000). Studies find that both education (Unger et al., 2011; Nielsen, 2015) and industry experience from the start-up industry (Van Praag, 2005; Phillips, 2002) have a positive effect on new venture performance. It is known that if the firm survives the critical first three years, the survival curve continues to flatten. This implies that for surviving firms the signal of qualification of entrepreneurs becomes less important as the (job) uncertainty is heavily reduced through past success.

2.2 Sorting of Employees and Entrepreneurs

A prominent approach to explain the sorting of employees and employers are matching models. Most models of job matching are derived on the premises that labor markets consist of heterogeneous firms. These firms offer a variety of jobs that require different skills and experience and, by that, heterogeneous workers who exhibit various skills and experiences. Ideally, positions that require the most skills are held by workers with the highest qualification. Under conditions of perfect information, workers theoretically sort into jobs that allow maximizing aggregate output (Mortensen, 1978). Differences in firm productivity then allow for variations in wage offers (Mortenson, 1990), moderating the matching process. For firms, a suitable match between skills of workers and jobs allows utilizing the skills of workers in order to maximize productivity (Jovanovic, 1979a) and it allows employees to get better paid jobs (Sørensen and Kalleberg, 1981). A mismatch may occur if the supply of skilled workers exceeds that of skilled jobs and vice versa (Sørensen and Kalleberg, 1981; Jovanovic 1979a). Although information asymmetries may impede perfect

matching and maximizing output, the sorting processes are still in place. However, the open question remains which type of jobs are matched with type of workers.

Milgrom and Roberts (1990) put forward the idea that firms decide whether to group together complementary activities. This is described as a supermodular function where similar skills are matched and it stands opposite to a submodular function which consists of cross-matching skills. A popular example of the submodular function was put forward by Rosen (1981). He investigates why wage differentials between highly-talented persons, superstars, and other individuals are observed to be very large. Possible explanations in this case are, first, imperfect substitution, meaning lesser talent cannot substitute for greater talent, which is why talented individuals earn significantly more money. As a second explanatory mechanism he suggests technology, meaning the production costs do not rise in proportion to the served market. Kremer (1993) introduces the O-ring production function which provides an example of a supermodular function. The idea is that workers of similar skills need to be matched together to generate a valuable product and decrease the chances of failure. In this environment, quantity cannot substitute for quality. This implies, similar to Rosen (1981), that hiring several low-skill workers to substitute for one high-skilled worker is not feasible. Kremer actually gives the example of a construction firm looking for bricklayers that match the skills of its carpenters, electricians, and plumbers. A similar approach was suggested in the entrepreneurship literature by Lazear (2004, 2005) when addressing the balance of skills of entrepreneurs. As entrepreneurs need to fulfill a variety of tasks, their success depends on the skill with the lowest skill level. That is why they invest in their weakest skill to avoid that it limits their success. Lazear's idea was empirically confirmed by comparing the generalized skill sets of entrepreneurs and specialized skill sets of dependently employed persons, showing that on average entrepreneurs are more balanced than employees (Wagner 2003, 2006; Hyytinen and Ilmakunnas, 2007; Bublitz and Noseleit, 2014). It appears that Lazear's skill balance approach is a specific example of a one-man enterprise where the O-ring production function works through the skills embodied by one individual. Taking into account the empirical evidence confirming this approach and the peculiarities of newly founded ventures, we believe that the same production and thereby matching function should hold when the first employees are hired. Against this background, it appears reasonable to assume that entrepreneurs try to hire employees that match their own entrepreneurial skill level, self-matching, instead of hiring less or higher skilled individuals, cross-matching.

2.3 In a Nutshell: Signaling and Matching in Newly Founded Ventures

The following equations are to be understood as a succinct summary of our reading of the literature but also as a starting point for more detailed analyses in the future. Note that detailed models for signaling or matching processes are already available in the literature. The goal here is to quickly illustrate how human capital of employees and entrepreneurs jointly determine productivity and thereby serve as a signal during a matching process. In this paper, we limit ourselves to testing only a part of this concept.

From labor market economics we know that human capital effects income and can be summarized as follows for employees:

$$X_t^w = f(H_t^w)$$

where X_t^w , the income of workers, is a function of their accumulated human capital H_t^w . This implies that employees are rewarded by employers according to their qualification level. Other important employee characteristics, as discussed above, are neglected for simplicity but are later included in the empirical analyses.

As for entrepreneurs, their income is determined by the composition of skills in the firm as shown in the following equation:

$$X_t^f = f(H_t^w, H_t^f)$$

where X_t^f describes the income of the founder which is set by the human capital of workers H_t^w and founders H_t^f . Naturally, firm performance is highly correlated with income. To describe the matching process, the expected income of workers $E(X_t^w)$ is determined by the founder's human capital H_t^f and past firm performance X_{t-1}^f in the following form:

$$E(X_t^w) = (H_t^f)^{\alpha_t} (X_{t-1}^f)^{\beta_t}$$

with

$$\alpha_t + \beta_t = 1$$

$$\alpha_t \rightarrow 0 \text{ for } t \rightarrow \infty$$

$$\beta_t \rightarrow 1 \text{ for } t \rightarrow \infty$$

The relative importance of founder's human capital and past firm performance is governed by the weights α_t and β_t which sum up to one. In the beginning, human capital of founders is the most important signal, as indicated by high values for α_t when t is still small. As t increases, α_t decreases and β_t increases, showing that alternative signals, here summarized as past performance X_{t-1}^f , become stronger. In the empirical analysis our focus will not be on determining under what conditions firms and employees maximize output. Instead, we start our investigation by focusing on the matching process and the role of $H_t^{w,f}$ and α_t therein.

3 Data on Start-ups and Small Firms

To investigate employment in start-ups, the majority of studies accesses administrative data. In Germany, the most frequently used data is the Establishment History Panel (BHP) at the Institute for Employment Research of the German Federal Employment Agency (Hethy-Maier and Seth, 2010). This data is collected via an administrative process during which employers are legally required to report information about all employees liable to social

security. Although this data set is highly reliable, it lacks information on firm and employer characteristics. We, thus, collected additional data from 1,105 founders in Germany who are listed in the BHP as having employed at least one worker between 2002 and 2008. Interviews were conducting with a computer-assisted telephone interviewing software. Our survey includes personal information about founders—for example, their educational attainment, work experience, and psychological traits—and information about the firm.

This data set is unique in Germany and fits perfectly to our research question about the labor demand of newly founded ventures because we observe the development of the workforce by qualification categories and can relate it to the characteristics of the founder. The latter information becomes available for the first time in conjunction with the BHP employment statistics. The businesses in our sample are founded between 1990 and 2008 and are active in manufacturing and knowledge-intensive business services (KIBS).² They started to hire employees at the earliest in 2002 and we can observe subsequent employment growth until 2008. Our data therefore reliably captures small and emerging firms and these attributes are indispensable prerequisites for our research question.

For Denmark, we rely on the Integrated Database for Labor Market Research (IDA). IDA is a longitudinal dataset administered by Statistics Denmark and contains detailed information on all firms and individuals in the labor force from 1980 onwards. Employees can be matched to their employer in any given year. Merging this data with the entrepreneurship register makes it possible to identify all new ventures in Denmark, the main founder behind these ventures and the recruits over time. Given the detailed level of the data, it is frequently used in research (Nanda and Sorensen, 2010; Dahl and Sorensen, 2012; see Timmermans (2010) for an introduction to the database). Key variables included in this dataset are education, work experience, and previous income of the main founder. For the recruits, the key variable in the present analysis is education.

The Danish sample consists of all new firms, founded in the period 2001 to 2011, that are included in the entrepreneurship register³ because they have a minimum level of activity set to 0.5 full-time equivalents in the first year and/or an industry-specific sales level—both indicators are defined by Statistics Denmark. All recruits of the years 2001 to 2011 are added to the new firms. Firms that do not hire recruits in a given year during that period are excluded, together with a small number of new firms with more than 20 employees in the founding year. Survival is based on whether the firm still exists during the subsequent years in IDA, requiring again a minimum level of sales activity if no recruits are present. These restrictions result in a total of 60,569 new ventures out of which 13,275 are active in manufacturing and KIBS.

² In a different analysis of the data it was shown that there is only a negligible selection bias into the sample (Bublitz, Fritsch, and Wyrwich, 2015). All manufacturing establishments were contacted if they newly entered the BHP between 2003 and 2008 and were active in 2010 in the sample regions. For KIBS, about 75 to 80 percent of the respective establishments were contacted.

³ Start-ups before 2001 are not included because of a structural break in the entrepreneurship register.

A detailed overview of the two data sets including the construction of variables can be found in Table A 1. Including both datasets in the analysis has the following advantages. For a baseline specification, we can create the same main variables of interest in both samples, allowing a cross-national comparison of labor demand in start-ups. Differences in the data sources are then used for unique sensitivity analyses. The German data allow to specifically identify true founders and to exclude spin-offs, etc. due to a distinct survey design. We have further information on founder characteristics, such as the psychological variables and motivation, and on knowledge variables, such as employee experience, skill balance, and founder teams, which is normally not available in the official statistics for Germany. The Danish data cover all industries, instead of only manufacturing and KIBS, allowing to potentially generalize the identified matching mechanisms. It further includes information on regional experience, wealth, income, and personal ownership.

3.1 Dependent Variables

The central outcome variables in this study reflect the human capital usage of new ventures at different stages during their early development phase. Both data sources allow differentiating between low-, medium-, and high-skilled employees. Accordingly, we generate three count variables that measure the number of employees in each category at different points in time. Low-skilled employees are defined as employees who have not completed secondary school or have no vocational qualification. The group of medium-skilled employees consists of graduates from upper secondary school or with completed vocational qualification. High-skilled employees require as minimum qualification a degree from specialized colleges of higher education or universities.

3.2 Independent Variables

A baseline model containing the same variables for the German and Danish data is initially put forth. For a few of these variables, the construction of the variables differs slightly in the two datasets (see Table A 1). The independent variables in the baseline model can be summarized in the three categories: (1) education and experience, (2) socio-demographic characteristics, and (3) control variables. First, a set of variables captures founders' knowledge present at the time of founding. Formal qualification of the founder is measured in the same way as qualification of employees (low, medium, and high). Since the qualification differences between low, medium, and high levels cannot be considered to be of equal size, we construct dummy variables, as opposed to a count variable, that indicate the qualification of the founder. Experience is measured in three dimensions in the baseline model. Previous self-employment experience (a dummy variable or the number of years) and previous work experience from the start-up industry (a dummy variable or the number of years) and previous unemployment (a dummy variable). We further include a dummy variable for whether the founder had self-employed parents. The second category considers the age of the founder (including age squared) and a dummy variable for male and married founders, respectively. Finally, control dummies for industry, region, and year complete the set of independent variables in the baseline model. These can capture factors like variation in labor supply across space and time.

In addition to the baseline model, an extended model is estimated separately for the German and Danish data. Concerning the knowledge and experience of the founder, the German data allow for the following additional variables: the number of years someone has been dependently employed, a dummy variable with the value of one if the firm was founded by a team, entrepreneurial balance measured as the number of professional fields in which the self-employed person was active before startup, several psychological characteristics of the founder including risk attitude—measured on a Likert-scale from one to seven—as well as a range of start-up motivations including both intrinsic and extrinsic factors (e.g. create something new and earn money). From IDA the following founder-specific measures are included: founder’s pre-startup income, regional experience in years, measures of wealth of the household of the founder and the founder’s parents, and the ownership type of the new venture (a dummy for personal ownership). See Table A 1 for the specific categories on the German and Danish data and Table A 2 and Table A 3 for summary statistics and correlations of the variables.

4 Understanding Employment Decisions of Entrepreneurs in Germany and Denmark

4.1 Workforce Evolution over Time

First, a descriptive overview is provided of the types of jobs created by start-ups in Germany. Figure 1 plots the average number of employees with high (HQ), medium (MQ), and low (LQ) qualification levels as the firm grows older. These averages are based on all firm-year observations available in the data set, implying that the number of observations varies with firm age. When founded, the average firm in the German sample employs 1.28 medium-skilled workers, making this employee group the most important labor input for new ventures. The average number of high-skilled employees amounts to 0.33 and for low-skilled employees it is 0.13, both showing a large difference when compared to medium-skilled employees. Furthermore, on average, the labor inputs of newly founded ventures do not vary substantially when firms grow older. As can be seen in Figure 1, the distribution of qualification groups is relatively stable for new ventures in our sample.

Figure 2 shows the workforce development based on the Danish data. Again, the average number of employees with medium qualification levels is significantly higher than the average number with low or high qualification levels regardless of firm age. However, in the last two years—year nine and ten—the number of high- and medium-skilled employees is almost identical. In the founding year, the average number of medium-skilled employees is 0.9 compared to 0.4 for both low- and high-skilled employees. In contrast to the German data, the average number of employees with high, medium, and low qualification levels increases as the firm gets older, although the average number of low-skilled employees is constant after seven years. When including all industries in the sample, the picture remains similar (see Figure 3). The average number of medium-skilled employees is still largest but it is just slightly greater than the average number of low-skilled employees, leaving a,

average, very low number of high-skilled employees. However, as the firm gets older, the average number of medium- and low-skilled employees increases at a decreasing rate while the average number of high-skilled employees increases at a constant rate. In sum, firms operating in manufacturing and KIBS require more skilled labor when compared to labor inputs in all industries and, over time, the share of high-skilled employees continuously increases in the full industry sample.

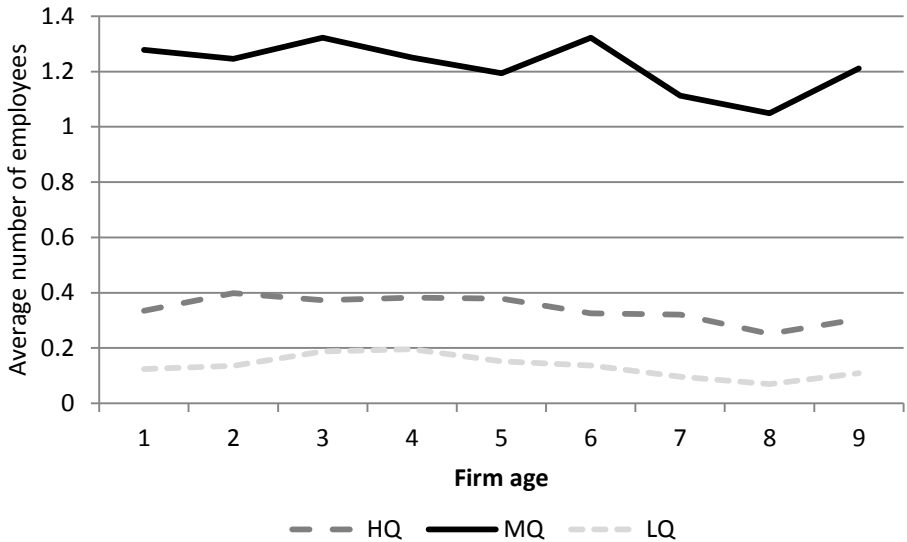


Figure 1: Development of labor inputs with different qualification levels in start-ups in GERMANY (manufacturing and KIBS)

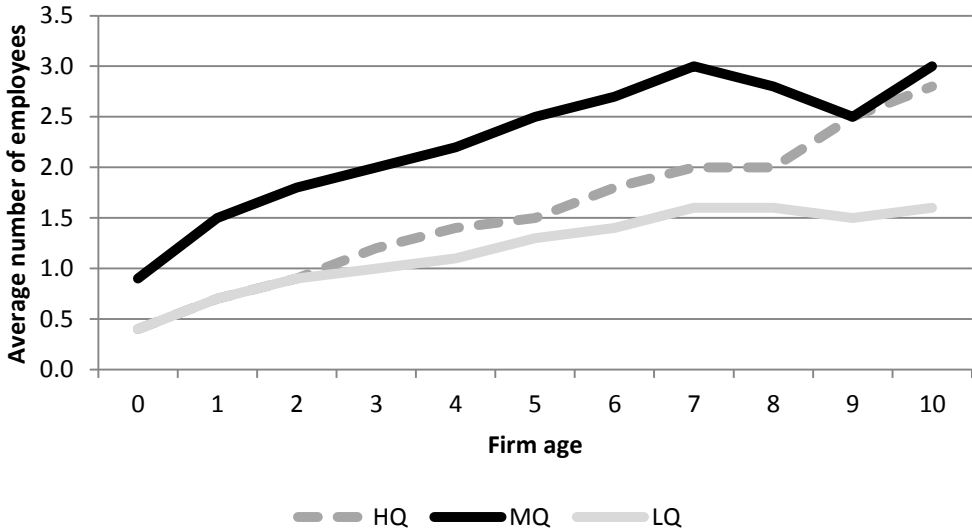


Figure 2: Development of labor inputs with different qualification levels in start-ups in DENMARK (manufacturing and KIBS)

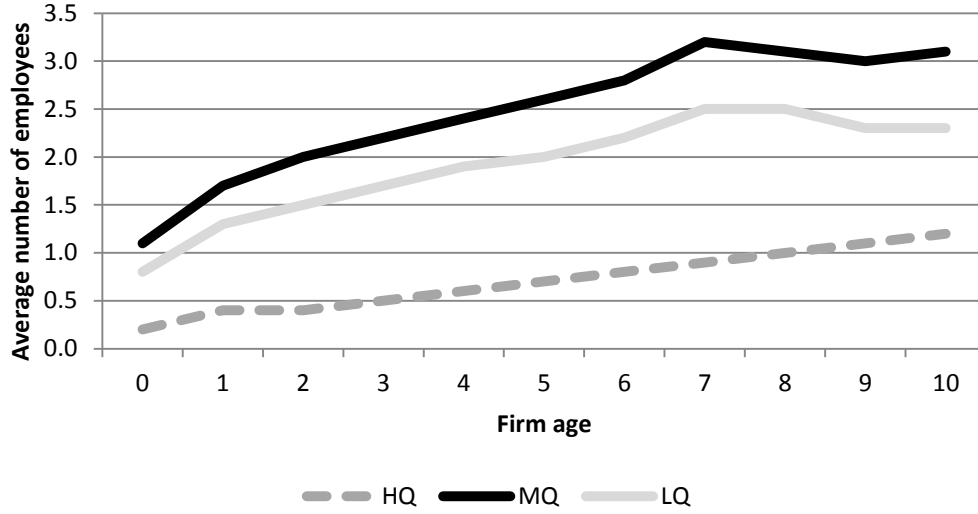


Figure 3: Development of labor inputs with different qualification levels in start-ups in DENMARK (all industries).

4.2 Matching via Employees' and Entrepreneurs' human capital

To test the signaling and matching ideas, we analyze the discussed relationship across qualification levels and for different time periods. Since the qualification is constant, fixed effect panel techniques are not appropriate and, instead, regressions are carried out separately for the variables of interest. To assess the relevance of founders' qualifications for the workforce structure in terms of employee qualification, we regress the formal qualification of the entrepreneur on the number of high-, medium-, and low-skilled employees. These regressions are carried out individually for a firm age of three, six, and nine years to reflect the possibility of the changing importance of the entrepreneurs' formal qualification. The data are restricted to those founders for which information is available for all relevant variables. The decreasing number of observations as firm age increases in the German data cannot be interpreted as failure rates of the observed firms. They entered the sample when they employed workers in 2008, regardless of the year of founding (see Bublitz, Fritsch, and Wyrwich, 2015). Thus, the majority of firms is relatively young and can only be observed for a short period of time. The models are estimated with

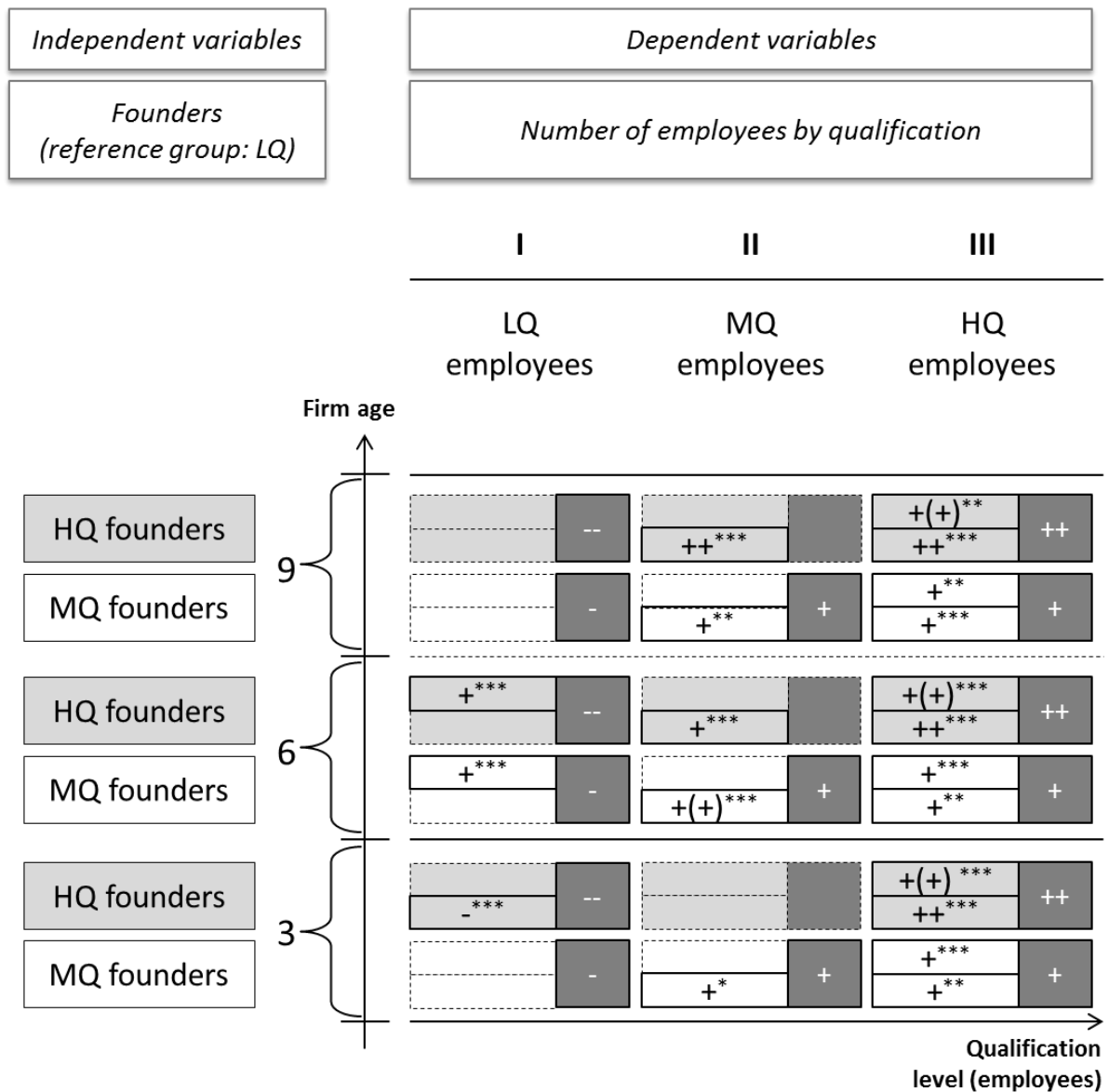
$$Emp_i^{Q,t} = \beta_1^t MQE_i + \beta_2^t HQE_i + \gamma X_i^t + \varepsilon_i^{Q,t}$$

(with $t = 3, 6, 9$ years and $Q = \text{low, medium, high qualification level}$)

where Emp displays the number of employees with qualification Q for all firms i in the sample that are t years old. MQE represents a dummy variable indicating that the founder of firm i has a medium qualification level. HQE represents a dummy variable that identifies founders with high levels of formal qualification. Founders with low levels of formal qualification form the reference group. Additional control variables in the baseline and

extended model are depicted by the vector X . Since our dependent variables are positive count variables, we estimate negative binomial regressions. In the German data, standard errors are bootstrapped to enhance the stability of the findings in light of the small sample. Columns I to III in Table A 7 to Table A 9 (in Table A 10 to Table A 15) in the Annex report regression results for Germany (Denmark), sorted by the qualification level of employees and firm age.

For illustrative purposes and an easier read, Figure 4 provides an overview of our findings from 18 separate regressions, focusing on the main variables of interest, that is, qualification levels and firm age. The figure shows whether the qualification level of the entrepreneur is related to the number of employees with different formal qualification levels, and whether this relationship changes over time. The color code of the figure reads as follows. White and light grey boxes (□/□) document the empirical results. To compare the empirical findings with our theoretical concept, the suggested matching relationships are depicted in dark grey boxes (■). An empty box with dotted lines (□) is used to display the cases with no significant differences, compared to boxes with solid lines representing significant differences. The number of signs inside the boxes with solid lines reflects the magnitude of the association between employees' and entrepreneurs' qualifications. The results have to be interpreted against the reference group of low-skilled entrepreneurs. For example, a positive sign in a box with solid lines indicates that, relative to entrepreneurs with low qualification levels, a medium or high formal qualification level of entrepreneurs is associated with a significantly higher number of employees in the respective employee qualification group. The results for Germany are shown in the top box and for Denmark in the neighboring box directly below. Following the argumentation of a matching of equals among equals, the basic idea is that start-ups primarily employ workers that hold the same qualification level as the entrepreneur. As the difference between entrepreneur's and employee's qualifications increases, less employees of the respective qualification group are found in the firm. In the case that entrepreneurs are less qualified than prospective workers, it becomes more difficult to attract these potential employees to come work for the firm. If entrepreneurs are higher qualified than employees, this prospective worker group is of less interest to the entrepreneur than more qualified personnel. The relationships between entrepreneurs' qualifications and the number of employees by qualification level thus become weaker or even negative with an increasing difference between the qualification levels. Accordingly, for low-skilled employees, Column I shows negative signs (with a larger negative association for high-skilled than for low-skilled entrepreneurs). For high-skilled employees, Column III is positive (with a larger positive association for high-skilled than for medium-skilled entrepreneurs). Lastly, for medium-skilled employees, Column II displays positive signs for medium-skilled entrepreneurs and no significant difference between the other qualification levels.



HOW TO READ THE FIGURE

Germany	Suggested matching relationship	Significant difference relative to LQ founders.
Denmark		No significant difference relative to LQ founders.

Notes: ***, **, * significant at the 1%, 5%, 10% level. The number of signs reflects the magnitude of the association, with (+) < + < ++. LQ is a low, MQ is a medium, HQ is a high qualification level. Dark grey describes the suggested matching relationship. Light grey (white) stands for HQ (MQ) founders. The results are based on 18 separate negative binomial regressions for each country (see Annex).

Figure 4: Relationship between entrepreneurs and the number of employees by qualification levels and firm age for Denmark and Germany (based on baseline regression results in Table A 7 - Table A 12).

Starting with a comparison of the results in Column III, there is evidence for matching on qualification levels in the German and Danish data. We find that both, medium- and high-skilled entrepreneurs, run businesses that employ, on average, more employees with high levels of formal qualification than founders with low formal qualification. Table A 7 (Germany) and Table A 10 (Denmark) confirm that the magnitude of this relationship is significantly larger for high-skilled than for medium-skilled entrepreneurs; however, the differences between the two groups of entrepreneurs are small in Germany and large in Denmark. This result holds independent of firm age. Column II in Figure 4 shows only partial support for the matching idea (see also Table A 8 for Germany and Table A 11 for Denmark). The insignificant results for high-skilled entrepreneurs in Germany are in line with the matching approach. However, there is no evidence for a significant positive relationship between entrepreneurs and employees with medium levels of qualification, which contradicts the matching idea. Instead, the suggested positive relationship is present in Denmark across all years for medium-skilled entrepreneurs. Nevertheless, against the matching prediction we find a positive relationship between entrepreneurs with high skills and employees with medium qualifications in year six and nine. In year nine, the positive effect of founders with high skills is significantly higher than the positive effect of founder with medium skills regarding recruiting medium skilled employees. Thus, the matching idea is only partially supported in Denmark (Germany), namely for medium (high) qualified entrepreneurs and medium qualified employees. As regards low-skilled employees, Column I provides no support for matching in Germany and very limited support for matching in Denmark. Founders with different qualification levels employ a similar number of low-skilled employees when their businesses are three years old in Germany while only founders with high qualification levels employ less low-skilled employees in Denmark (see also Table A 9 for Germany and Table A 12 for Denmark). After six years, firms that have entrepreneurs with medium and high qualification levels even tend to employ more workers with low qualification levels in Germany while there is no significant relationship between founder qualification and recruitment of low-skilled workers in Denmark after six years and in both countries after nine years. Thus, for this employee group very limited support for matching is found in Denmark in the first years and no support for matching in Germany in general.

Regarding the German baseline estimates, none of the other explanatory variables show a robust or systematic relationship with the workforce structure. Very few variables become significant and if so, only for one employee qualification group and a certain firm age. In contrast, our findings suggest that the role of the founder's qualification is always important, as documented above. For Denmark, the control variables in the baseline model show a similar pattern, meaning there are still few significant relationships. For instance, male founders recruit more employees in all three qualifications groups but not in all years.

Founders that were unemployed before the start-up employ significantly fewer workers but not for all firm ages.⁴

4.3 Extended Analyses

Several robustness tests are conducted on the two data sets. Starting with Germany, variables of the following categories are added: additional knowledge variables, psychological characteristics, and start-up motivation of the founder. The results of the extended model are reported in Table A 7 to Table A 9 (columns 4, 5 and 6). As regards knowledge variables, we introduce previous employee experience and a variable indicating if a start-up was founded by a team. Psychological characteristics are measured with a set of the following variables: openness, extraversion, and locus of control. Also, we consider both general and private risk taking propensity. However, we cannot find consistent significant associations to a specific type of employment demand for firms of different ages. Further, we consider two variables measuring work and life satisfaction. Both variables are only occasionally significantly related to our outcome variable, indicating no clear and systematic impact labor demand. The German data also allowed us to introduce motivations of entrepreneurs as an alternative explanation. We measure the importance of four key motivations for entrepreneurs: the importance of independence, the importance of making money, the relevance of creating something new, and the importance of discovering a market niche. Again, we do not find a systematic association between these motivations for starting a business and labor demand of firms. However, the relationships between qualification levels of entrepreneurs and employees remain the same as before, with the exception of now insignificant results for high-skilled employees in firms that are nine years old and low-skilled employees in firms that are six years old. However, these differences in the results do not change our main story. As another alternative, we tested whether replacing firm age with a different time measure would affect the results. One could argue that successful matching depends more on whether founders have already successfully recruited their first employee. In that case, the focus shifts to the development of the workforce and, thus, we use the number of years since the first hire as a proxy for recruiting or human resource experience. However, the results do not change substantially, again confirming the importance of employer qualification (results are available upon request).⁵

⁴ In comparison to the Danish regressions, the coefficients of the qualification levels of founders are relatively large in the German data. Possible explanations could be distortions created by other control variables or country-specific differences in the sample composition. However, the differences between coefficients persist when the right hand side variables are limited to the qualification level of founders or when the Danish data is extended to include all start-ups regardless of their initial size.

⁵ As a further robustness check we estimated the relationship between employees with unknown qualification levels and entrepreneurs' qualification. In terms of our model there should be no significant correlation because the group consists of employees with mixed qualification levels and, therefore, no clear prediction can be made as regards the relationship between entrepreneurs' and employees' qualification. Indeed, this intuition holds for our data with the exception of when we include all possible controls and the models do not converge. Results are available upon request.

Turning to Denmark, the robustness tests are carried out in two steps. First, the baseline model is extended with variables for the founder’s pre-startup income, regional experience, wealth (including spouse and parents) and a dummy for personal ownership of the new venture (for extended model, see Table A 10 to Table A 12—columns 4, 5 and 6). Second, the baseline and extended model are repeated on a sample including all industries instead of limiting the analysis to manufacturing and KIBS (for full industry sample, see Table A 13 to Table A 15). In the extended model, regional experience and personal ownership show a consistent negative relationship with the recruitment of employees on all qualification levels while in most cases previous income exhibits a positive correlation with hiring. Household and parent wealth show no systematic associations. The associations between entrepreneurs’ and employees’ qualification remain robust for high- and low-skilled employees. For medium-skilled employees the matching idea continues to hold only for medium-skilled entrepreneurs in six year old firms but can now additionally be confirmed for high-skilled founders in nine year old firms. Again, these results underline the importance of qualification of entrepreneurs as a signal.

A summary of the main results from the baseline and extended models for *all industries* can be found in Table 1. In the discussion we focus on the role of entrepreneurs’ human capital. It appears that the recruitment of highly qualified employees in manufacturing and KIBS is representative for the whole sample and matching on qualification is supported for this employee group. The matching for medium-skilled employees is only partially supported because although medium-skilled entrepreneurs hire significantly more workers, high-skilled entrepreneurs always hire the most workers with this qualification level. The latter is not in line with the matching approach. Finally, as regards low-skilled employees, entrepreneurs with high qualifications are significantly less likely to hire these (with only one insignificant coefficient in the baseline model). This finding provides more support for the matching idea than the results from the sample of manufacturing and KIBS industries.

Table 1 Relationship between entrepreneurs and the number of employees by qualification levels and firm age in the Danish data including all industries (based on regression Table A 13 to Table A 15)

		EMPLOYEES					
		LQ		MQ		HQ	
FIRMAGE	FOUNDERS	Baseline	Extended	Baseline	Extended	Baseline	Extended
9	HQ	-0.067	-0.205**	0.424***	0.259***	1.226***	1.072***
	MQ	-0.038	-0.074	0.223***	0.187***	0.346***	0.327***
6	HQ	-0.105**	-0.194***	0.374***	0.232***	1.250***	1.025***
	MQ	-0.031	-0.049	0.224***	0.186***	0.348***	0.255***
3	HQ	-0.138***	-0.201***	0.270***	0.153***	1.213***	1.034***
	MQ	-0.027	-0.039*	0.196***	0.156***	0.293***	0.220***
	Support	Partial	Partial	Partial	Partial	Full	Full

5 Conclusions

Our study contributes to a better understanding of the ambiguous findings regarding the role of entrepreneurs' human capital. While existing research failed to document a consistent link between schooling and income of the self-employed, as it did for employees in general, we highlight that education may instead fulfill an important signaling function at the early stages of a new venture that allows attracting qualified employees. Based on data from Germany and Denmark, we find evidence that firms' employment decisions are shaped by qualification levels of entrepreneurs and prospective employees. The results support a matching by qualification levels for high-skilled employees but suggest that other factors interfere with this relationship for lower-skilled employees. In general, low-skilled employees are equally likely to work for any employer group while medium-skilled employees show matching only in selected occasions. Put differently: As the skill level of employees decreases, so does the propensity to observe a matching of equals among equals. These results partly support a matching approach where qualification (of the entrepreneur) serves as a signal. It becomes clear that entrepreneurs' qualification of the entrepreneur is the most reliable predictor of recruitment decisions when matching is observed; especially as we cannot identify alternative explanatory mechanisms among the various variables and sample specifications. Overall, the results indicate that matching by qualification levels partly, but nonetheless more systematically than any other variable, explains employment structures of start-ups.

Our work aims to fill an important research gap with regard to the founding and evolution of new organizations and their labor demand. We present one of the first empirical studies directly assessing the development of the relationship between the qualification of founders and their demand for additional skills over time and across countries. While the contribution of this work cannot completely solve the paradox of schooling investments of entrepreneurs it may help informing future research. More specifically, we suggested that schooling is relevant for entrepreneurs as signaling rather than as a productivity increasing human capital investments. If investments in schooling are neither considered solely a productivity increasing human capital investment nor a pure signal of unobserved ability but rather a continuum with the above options representing two idealized extremes, different labor market groups may occupy different positions in this continuum. In our case, for entrepreneurs the relative weight is assumed to lean more towards signaling. Future research may investigate if such differences may also exist for different occupational groups by testing for signaling differences among other groups of employees (c.f. Lang and Kropp, 1986; Tyler, Murnane and Willet 2000). Future research could also address whether firms maximize their profits under the matching hypothesis. However, we also face problems that cannot be solved with the data made available for this study. For instance, qualification might matter on a more hidden level at which founders hire workers who compensate for their weaknesses (Granovetter, 1973). We encourage research to further work on this topic because it will provide policy makers with information on the specific type of labor that needs to be made available to founders to avoid labor shortages and to encourage new

venture growth. Many new businesses fail and, so far, this has primarily been studied by focusing on founders' and founding teams' characteristics or business environments. What if part of the reason is a lack of access to (adequate) labor?

References

- Albrecht, J. W., Axell, B. (1984). An equilibrium model of search unemployment, *Journal of Political Economy*, 92 (5), 824-840.
- Aldrich, H. E., & Kim, P. H. (2007). Small worlds, infinite possibilities? How social networks affect entrepreneurial team formation and search. *Strategic Entrepreneurship Journal*, 1(1-2), 147-165.
- Aldrich H. E., & Ruef, M. (2006). *Organizations evolving*. SAGE Publications Ltd.
- Åstebro, T.; Chen, J. (2014). The entrepreneurial earnings puzzle: Mismeasurement or real? *Journal of Business Venturing*, 29(1), 88-105.
- Autor, D. H. (2001). Wiring the labour market, *The Journal of Economic Perspectives*, 15(1), 25-40.
- Baldwin, J. R. (1998). Were Small Producers the Engines of Growth in the Canadian Manufacturing Sector in the 1980s? *Small Business Economics*, 10(4), 349-364.
- Bates, T. (1985). Entrepreneur Human Capital Endowments and Minority Business Viability. *The Journal of Human Resources*, 20(4), 540-554.
- Bhide, A. (2000). *The origin and evolution of new businesses*. Oxford University Press.
- Birch, D. L. (1979). *The Job Generating Process*, MIT, Cambridge, MA, 1979.
- Brixy, U.; Kohaut, S.; Schnabel, C. (2006). How Fast Do Newly Founded Firms Mature? Empirical Analyses on Job Quality in Start-Ups. In Fritsch, Michael; Schmude, Jurgen, *Entrepreneurship in the Region. International Studies in Entrepreneurship*. New York; Springer, 96-112.
- Brixy, U.; Kohaut, S.; Schnabel, C. (2007). Do Newly Founded Firms Pay Lower Wages? First Evidence from Germany. *Small Business Economics*, 29(1-2), 161-171.
- Bublitz, E.; Fritsch, M.; Wyrwich, M. (2015): Balanced Skills and the City: An Analysis of the Relationship Between Entrepreneurial Skill Balance, Thickness, and Innovation. *Economic Geography*, forthcoming.
- Bublitz, E.; Noseleit, F. (2014). The skill balancing act: when does broad expertise pay off? *Small Business Economics*, 42(1), 17-32.
- Cardon, M. S.; Stevens, C. E. (2004). Managing human resources in small organizations: What do we know? *Human Resource Management Review*, 14(3), 295-323.
- Dahl, M. S., & Klepper, S. (2015). Whom Do New Firms Hire?. *Industrial and Corporate Change*, Forthcoming.
- Dahl, M. S., & Sorenson, O. (2012). Home sweet home: Entrepreneurs' location choices and the performance of their ventures. *Management Science*, 58(6), 1059-1071.
- Devine, T. J., Kiefer, N. M. (1993), The Empirical Status of Job Search Theory. *Labour Economics*, 1(1), 3-24.

- Fritsch, M.; Weyh, A. (2006). How large are the direct employment effects of new businesses? An empirical investigation for West Germany. *Small Business Economics*, 27(2), 245–260.
- Granovetter, M. S. (1973). The Strength of Weak Ties. *American Journal of Sociology*, 78(6), 1360-1380.
- Hartog, J.; van Praag, M.; van der Sluis, J. (2010). If You Are So Smart, Why Aren't You an Entrepreneur? Returns to Cognitive and Social Ability: Entrepreneurs Versus Employees. *Journal of Economics & Management Strategy*, 19(4), 947-989.
- Heneman, R. L.; Tansky, J. W.; Camp, S. M. (2000). Human Resource Management Practices in Small and Medium-Sized Enterprises: Unanswered Questions and Future Research Perspectives. *Entrepreneurship: Theory & Practice*, 25(1), 11.
- Hethy-Maier, T.; Seth, S. (2010). The Establishment History Panel (BHP) 1975 – 2008 Handbook Version 1.0.2. *FDZ-Methodenreport*, 04/2010, Nürnberg: Research Data Centre (FDZ).
- Hopkins, E. (2011). Job Market Signaling of Relative Position, or Becker Married to Spence. *Journal of the European Economic Association*, 10(2), 290-322.
- Hyytinen, A.; Ilmakunnas, P. (2007). Entrepreneurial Aspirations: Another Form of Job Search? *Small Business Economics*, 29(1), 63-80.
- Hyytinen, A.; Ilmakunnas, P.; Toivanen, O. (2013). The return-to-entrepreneurship puzzle. *Labour Economics*, 20, 57-67.
- Jovanovic, B. (1979a). Job Matching and the Theory of Turnover. *Journal of Political Economy*, 87(5), 972-990.
- Jovanovic, B. (1979b). Firm-specific Capital and Turnover. *Journal of Political Economy*, 87(6), 1246-1260.
- Katz, J. A.; Aldrich, H. E.; Welbourne, T. M.; Williams, P. M. (2000). Special Issue on Human Resource Management and the SME: Toward a New Synthesis. *Entrepreneurship: Theory & Practice*, 25(1), 7.
- Kremer, M. (1993). The O-Ring Theory of Economic Development. *The Quarterly Journal of Economics*, 108(3), 551-575.
- Lang, K. and Krop, D. (1986). Human capital versus sorting: the effects of compulsory attendance laws. *Quarterly Journal of Economics*, 101(3), 609-624.
- Lazear, E. P. (2004). Balanced Skills and Entrepreneurship. *American Economic Review*, 94(2), 208-211.
- Lazear, E. P. (2005). Entrepreneurship. *Journal of Labor Economics*, 23(4), 649-680.
- Milgrom, P.; Roberts, J. (1990). The Economics of Modern Manufacturing: Technology, Strategy, and Organization. *The American Economic Review*, 80(3), 511-528.
- Mortensen, D. T. (1978), Specific capital and labor turnover, *The Bell Journal of Economics*, 9(2), 572-586.
- Nanda, R., & Sørensen, J. B. (2010). Workplace peers and entrepreneurship. *Management Science*, 56(7), 1116-1126.

- Nielsen, K. (2015). Human capital and new venture performance: the industry choice and performance of academic entrepreneurs. *The Journal of Technology Transfer*, 40(3), 453-474.
- Parker, S. C.; van Praag, C. M. (2006). Schooling, Capital Constraints, and Entrepreneurial Performance. *Journal of Business & Economic Statistics*, 24(4), 416-431.
- Rosen, S. (1981). The Economics of Superstars. *The American Economic Review*, 71(5), 845-858.
- Schnabel, C.; Kohaut, S.; Brixy, U. (2011). Employment stability in newly founded firms: a matching approach using linked employer–employee data from Germany. *Small Business Economics*, 36(1), 85-100.
- Shane, S.; Venkataraman, S. (2000). The Promise of Entrepreneurship as a Field of Research. *The Academy of Management Review*, 25(1), 217-226.
- Sørensen, A. B., Kalleberg, A. L. (1981), An Outline of a Theory of the Matching of Persons to Jobs. In Berg, Ivar, ed., *Sociological Perspectives on Labour Markets*, Academic Press.
- Spence, M. (1973). Job Market Signaling. *Quarterly Journal of Economics*, 87 (3), 355-74.
- Sternberg, R.; Wennekers, S. (2005). Determinants and Effects of New Business Creation Using Global Entrepreneurship Monitor Data. *Small Business Economics*, 24, 193-203.
- Storey, D. J. (1994). *Understanding the small business sector*. London: Routledge.
- Tansky, J. W.; Heneman, R. L. (2006). *Human resource strategies for the high growth entrepreneurial firm*. Greenwich, Connecticut: Information Age Pub.
- Timmermans, B. (2010). The Danish integrated database for labor market research: towards demystification for the English speaking audience. *Aalborg: Aalborg University*.
- Tyler, J.H., Murnane, R.J., and Willet, J.B. (2000). Estimating the Labor Market Signaling Value of the GED. *Quarterly Journal of Economics*, 115(2), 431-468.
- Unger, J. M., Rauch, A., Frese, M., & Rosenbusch, N. (2011). Human capital and entrepreneurial success: A meta-analytical review. *Journal of Business Venturing*, 26(3), 341-358.
- Van Praag, M. (2005). *Successful entrepreneurship: Confronting economic theory with empirical practice*. Edward Elgar Publishing.
- van Praag, M.; Wit, G. de; Bosma, N. (2005). Initial Capital Constraints Hinder Entrepreneurial Venture Performance. *Journal of Private Equity*, 9(1), 36-44.
- Wagner, J. (1994). The post-entry performance of new small firms in German manufacturing industries. *Journal of Industrial Economics*, 42(2), 141–154.
- Wagner, J. (2003). Testing Lazear's jack-of-all-trades view of entrepreneurship with German micro data. *Applied Economics Letters*, 10(11), 687-689.
- Wagner, J. (2006). Are nascent entrepreneurs 'Jacks-of-all-trades'? A test of Lazear's theory of entrepreneurship with German data. *Applied Economics*, 38(20), 2415-2419.

Annex

Overview

Table A 1: Data sets and variables	25
Table A 2 Summary statistics and correlations	29
Table A 3 Correlations (GERMANY).....	30
Table A 4 Correlations (GERMANY).....	31
Table A 5: Correlations (DENMARK).....	32
Table A 6 Correlations (DENMARK).....	33
Table A 7: Regression results for the number of high-skilled employees for firms of different age (GERMANY, manufacturing and KIBS).....	34
Table A 8: Regression results for the number of medium-skilled employees for firms of different age (GERMANY, manufacturing and KIBS)	35
Table A 9: Regression results for the number of low-skilled employees for firms of different age (GERMANY, manufacturing and KIBS).....	36
Table A 10: Regression results for the number of high-skilled employees for firms of different age (DENMARK, manufacturing and KIBS)	37
Table A 11: Regression results for the number of medium-skilled employees for firms of different age (DENMARK, manufacturing and KIBS).....	38
Table A 12: Regression results for the number of low-skilled employees for firms of different age (DENMARK, manufacturing and KIBS)	39
Table A 13: Regression results for the number of high-skilled employees for firms of different age (DENMARK, all industries)	40
Table A 14: Regression results for the number of medium-skilled employees for firms of different age (DENMARK, all industries)	41
Table A 15: Regression results for the number of low-skilled employees for firms of different age (DENMARK, all industries)	42

Table A 1: Data sets and variables

	Germany	Denmark
Sample Description		
Number of persons	1083	61,598 firms in all industries and 13,468 firms in manufacturing and KIBS
Number of observations	3311	
Nationality	German self-employed	Danish self-employed
Years	1990-2008 (founding) 2002-2008 (hiring)	2001-2011 (founding and hiring)
Industries	Manufacturing (2-digit NACE2008 industry codes 10-33); Knowledge-intensive business services (3-digit industry NACE2008 codes: 581, 582, 591 without 5914, 592, 601, 602, 611-613, 620, 631, 691, 692, 701, 702, 711, 712, 721, 722, 731, 732). Altogether, data comprise start-ups assigned to 6 different 1-digit NACE2008 industries	All private sector industries and manufacturing and KIBS industries as defined in the German data (see left cell)
Regions	<i>East Germany</i> SR1: Oberes Elbtal/Osterzgebirge (ROR: 1401) SR2: Mittelthüringen+Ostthüringen (ROR: 1601+1603) SR3: Westmecklenburg+Mittleres Mecklenburg/Rostock+Mecklenburgische Seenplatte+Vorpommern (ROR: 1301+1302+1303+1304) <i>West Germany</i> SR4: Hannover (ROR: 307) SR5: Aachen (ROR: 501) SR6: Schleswig-Holstein Nord+ Schleswig-Holstein Mitte + Schleswig-Holstein Ost + Schleswig-Holstein Süd-West (ROR: 101+102+103+105)	Denmark divided into: Copenhagen city, Copenhagen surroundings, North Zealand, Bornholm, East Zealand, West/South Zealand, Funen, South Jutland, East Jutland, West Jutland, North Jutland and other
Variable	Germany	Denmark
<i>Experience & socio-demographic characteristics</i>		
Education	<i>High</i> : minimum qualification a degree from specialized colleges of higher education or universities <i>Medium</i> : graduates from upper secondary school or with completed vocational qualification	<i>High</i> : minimum qualification a degree from specialized colleges of higher education or universities <i>Medium</i> : graduates from upper secondary school or with completed vocational qualification

	<i>Low</i> : not completed secondary school or have no vocational qualification	<i>Low</i> : not completed secondary school or have no vocational qualification
Industry experience	number of years active in the industry before startup	binary variable taking the value one if the founder worked in the same two-digit NACE industry the year before founding the new venture.
Self-employment experience	number of years in self-employment before startup	binary variable taking the value one if the founder is present in the alternative entrepreneurship register* before the founding year.
Unemployment	Unemployed before startup (1 = Yes, 0 = No)	binary variable taking the value one if the founder was registered as unemployed the year before founding the new venture.
Self-employed parents	Had a self-employed parent at the age of 15 (1 = Yes, 0 = No)	binary variable taking the value one if one of the founder's parents is present in the alternative entrepreneurship register* before the founding year.
Male	1 = Male, 0 = Female	1 = Male, 0 = Female
Age	Number of years	Number of years
Married	1 = Married, 0 = Not married	1 = Married, 0 = Not married
<i>Firm variables</i>		
Firm age	Number of years that passed since first revenues	Number of years that passed since registration year
Human resource experience	Number of years passed since first hire	
<i>Controls</i>		
Industry	6 Dummies (1-Digit NACE 2008)	19 Dummies (2-Digit NACE?)
Region	6 Dummies (see above)	12 Dummies (see above)
Year	6 Dummies for year of first hire (2003-2008)	11 Dummies for year of hire (2001-2011)
<i>Personality</i>		
Openness	"In my daily actions I act according to new ideas and experiments instead of established procedures." (1 = does not apply, 7= fully applies)	
Extraversion	"I am communicative. " (1 = does not apply, 7= fully applies)	
Work satisfaction	"I am very satisfied with my work." (1 = does not apply, 7= fully applies)	
Locus of control	"What happens in my life depends on me." (1 = does not apply, 7= fully applies)	
Life satisfaction	"Overall, I am very satisfied with my life." (1 = does not apply, 7= fully applies)	
General risk	"Are you in general a risk-loving or risk-averse person?" (1 = very risk-averse, 7 = very risk-loving)	
Private risk	"Assume that you have won 100,000 € in a lottery. You may use this	

	<p>money for your private benefit but you cannot invest it in your firm. Now you receive the chance to double the money. However, the risk to lose half of the invested money is equally high. How much of your money would you be willing to invest for this risky, but potentially rewarding lottery? 100,000, 80,000, 60,000, 40,000, 20,000 or nothing?" (1 = very risk-averse (invest nothing), 6 = very risk-loving (invest everything))</p>	
<i>Motivation</i>		
Independence	"I want to be independent" (1 = does not apply, 7= fully applies)	
Create something new	"I want to change something in the world, create something new." (1 = does not apply, 7= fully applies)	
Make money	"I want to make money." (1 = does not apply, 7= fully applies)	
Market niche	"I want to use a market opportunity, fill a gap in the market." (1 = does not apply, 7= fully applies)	
<i>Knowledge experience</i>		
Founding team	1 = Yes, 0 = No	
Skill balance	Number of professional fields in which self-employed was active before startup	
Employee experience	Number of years worked as dependently employed before startup	
Region experience		the number of years that the entrepreneur lived in the municipality (categorization after the 2007 reform) of the new venture going 20 years back.
<i>Wealth & Income</i>		
Previous income		the natural logarithm of the wage income the year before founding the new venture.
Household wealth		the natural logarithm to the wealth of the founder and spouse (partner) if married (in registered partnership) the year before founding the new venture.
Parents wealth		the natural logarithm to the wealth of the founder's parent the year before founding the new venture.
Personal ownership		binary variable taking the value one if the new venture is personally owned and zero if it is a limited liability company.

* The alternative entrepreneurship register is created in the period 1981 to 2011 using several of the registers in IDA (Integrated Database for Labour Market Research) managed by Statistics Denmark. The approach is similar to the one taken in Sørensen (2007) and Nanda and Sorensen (2010). Entrepreneurs in each of the year are identified as:

- 1) All individuals with the occupational code of self-employed on the tax records
- 2) All individuals in new workplaces (that cannot be linked to existing firms) if the number of individuals in the workplace is less than or equal to three
- 3) The individuals in new workplaces (that cannot be linked to existing firms) with the occupational code of manager if the number of individuals in the workplace is more than three
- 4) The individuals in the new work places (that cannot be linked to existing firms) with the top three highest incomes in the founding year if the number of individuals in the workplace is more than three and none has the occupational code of manager

Table A 2 Summary statistics and correlations

	GERMANY				DENMARK			
	N	Mean	Median	S.D.	N	Mean	Median	S.D.
<i>Founder Survey</i>					<i>IDA</i>			
Low-skilled founder (1=Yes)	1074	0.028	0	0.165	60,569	0.199	0	0.399
Medium-skilled founder (1=Yes)	1074	0.345	0	0.475	60,569	0.601	1	0.490
High-skilled founder (1=Yes)	1074	0.628	1	0.484	60,569	0.200	0	0.400
Self-employed experience	1074	2.712	0	5.799	60,569	0.495	0	0.500
Industry experience	1074	10.599	10	9.238	60,569	0.438	0	0.496
Self-employed parent	1074	0.204	0	0.403	60,569	0.439	0	0.496
Unemployment	1074	0.044	0	0.205	60,569	0.139	0	0.346
Male (1=Yes)	1074	0.847	1	0.360	60,569	0.765	1	0.424
Age	1074	46.767	46	9.124	60,569	38.678	38	10.015
Age^2	1074	2270.337	2116	890.963	60,569	1596.297	1444	830.135
Married (1=Yes)	1074	0.716	1	0.451	60,569	0.547	1	0.498
Skill balance	1044	2.739	2	2.833				
Founding team	1044	0.352	0	0.478				
Employee experience	1044	12.635	10.5	9.713				
General risk	1044	4.640	5	1.248				
Private risk	1044	1.325	1	1.530				
Openness	1044	4.266	4	1.361				
Extraversion	1044	5.509	6	1.296				
Locus of control	1044	6.254	7	1.092				
Work satisfaction	1044	5.898	6	1.098				
Life satisfaction	1044	5.895	6	0.972				
Motivation independence	1044	6.076	6	1.212				
Motivation create sth. new	1044	4.229	4	1.803				
Motivation make money	1044	5.457	6	1.458				
Motivation market niche	1044	4.281	5	1.872				

	N	Mean	Median	S.D.	N	Mean	Median	S.D.
<i>BHP (Merged data)</i>								
Low-skilled employees	3311	0.353	0	0.918	386,446	1.218	0	3.248
Medium-skilled employees	3311	1.363	1	2.416	386,446	1.561	0	3.603
High-skilled employees	3311	0.158	0	0.561	386,446	0.395	0	1.808
					<i>IDA</i>			
Regional experience					59,225	10.479	11	7.767
Personal ownership					59,225	0.402	0	0.490
Previous income					59,225	247,174	232,405	279,296
Household wealth					59,225	1,964,324	1,098,699	6,661,111
Parents wealth					59,225	1,336,330	460,130	7,663,217

Table A 3 Correlations (GERMANY)

CORRELATIONS [#]	1	2	3
1 High-skilled employees	1		
2 Medium-skilled employees	0.125 (0.000)	1	
3 Low-skilled employees	0.004 (0.809)	0.314 (0.000)	1

[#] Source: BHP. Values in parentheses denote significance levels.

Table A 4 Correlations (GERMANY)

CORRELATIONS [#]	1	2	3	4	5	6	7	8	9	10	11
1 Low-skilled founder (1=Yes)	1										
2 Medium-skilled founder (1=Yes)	-0.1248*	1									
3 High-skilled founder (1=Yes)	-0.2227*	-0.9395*	1	1							
4 Self-employed experience	0.025	-0.0442	0.0348	1							
5 Industry experience	-0.0002	0.0466	-0.0457	0.1997*	1						
6 Self-employed parent	-0.0175	-0.0041	0.0101	0.046	-0.0127	1					
7 Unemployment	0.0231	0.0668*	-0.0737*	-0.0944*	-0.0428	-0.0088	1				
8 Male (1=Yes)	-0.0394	-0.0198	0.033	0.1020*	0.0781*	-0.0076	-0.0496	1			
9 Age	0.0022	-0.1865*	0.1825*	0.2403*	0.4926*	-0.0147	-0.0296	0.0967*	1		
10 Age^2	0.0038	-0.1793*	0.1749*	0.2492*	0.4982*	0.0014	-0.028	0.0965*	0.9924*	1	
11 Married (1=Yes)	0.0573*	-0.1115*	0.0897*	0.0434	0.1644*	0.008	-0.0118	0.0605*	0.2761*	0.2659*	1
12 Skill balance	0.0199	0.0511*	-0.0571*	0.0663*	-0.0203	-0.0246	0.0051	0.0640*	0.0541*	0.0552*	-0.0601*
13 Founding team	0.0175	-0.0783*	0.0709*	0.0521*	-0.0485	0.0035	-0.0997*	0.003	-0.0508	-0.0479	0.0091
14 Employee experience	0.0378	0.0752*	-0.0870*	-0.1134*	0.5088*	-0.0148	0.0283	0.0436	0.5898*	0.5900*	0.1891*
15 General risk	-0.0055	-0.0377	0.039	0.1350*	-0.0194	0.0325	-0.0738*	0.0666*	0.0696*	0.0753*	-0.013
16 Private risk	-0.0553*	-0.0288	0.0474	0.0111	-0.1309*	0.0379	-0.0148	0.0547*	-0.1699*	-0.1632*	-0.036
17 Openness	0.0085	-0.0502	0.0464	0.1033*	0.036	0.016	-0.0401	0.0276	0.1106*	0.1211*	-0.0065
18 Extraversion	0.0166	0.0154	-0.0208	-0.0059	0.0008	-0.0061	-0.0164	-0.1065*	0.0189	0.0268	-0.0089
19 Locus of control	0.023	0.0861*	-0.0925*	0.0516*	0.0191	0.015	0.0283	-0.1516*	-0.0265	-0.0198	0.0158
20 Work satisfaction	0.0004	0.0714*	-0.0703*	0.0398	0.0528*	0.0306	-0.0075	-0.0102	0.0696*	0.0727*	0.1020*
21 Life satisfaction	-0.0580*	-0.0022	0.0222	0.0027	-0.006	0.0094	-0.038	-0.0540*	0.0205	0.023	0.1811*
22 Motivation independence	-0.0013	0.0179	-0.0171	0.1001*	-0.0542*	0.0323	0.0476	-0.0795*	-0.1034*	-0.1028*	0.0112
23 Motivation create sth. new	-0.0218	0.0007	0.0069	0.1270*	0.0152	0.0397	-0.0125	-0.0057	0.0041	0.0137	-0.0510*
24 Motivation make money	0.0169	0.0422	-0.0473	-0.0426	0.0222	0.003	0.0261	-0.0363	-0.0426	-0.0455	0.031
25 Motivation market niche	0.0416	0.0387	-0.0524*	0.0519*	0.0092	-0.0201	0.0292	-0.0095	0.0323	0.0412	0.0126

Table A 4 continued

CORRELATIONS [#]	12	13	14	15	16	17	18	19	20	21	22	23
12 Skill balance	1											
13 Founding team	-0.0074	1										
14 Employee experience	0.0719*	-0.0901*	1									
15 General risk	0.0174	0.0421	-0.0181	1								
16 Private risk	-0.0035	0.0457	-0.1805*	0.1898*	1							
17 Openness	0.0595*	0.0476	0.0435	0.3032*	0.0583*	1						
18 Extraversion	0.0502	0.0021	0.0164	0.1092*	0.0075	0.1090*	1					
19 Locus of control	0.0322	0.0365	0.0171	0.1122*	-0.0081	0.1054*	0.1783*	1				
20 Work satisfaction	0.0071	-0.019	0.0853*	0.0458	-0.0623*	0.1434*	0.2218*	0.2096*	1			
21 Life satisfaction	0.0471	0.0798*	0.0373	0.0382	0.0069	0.0958*	0.2045*	0.3809*	0.4791*	1		
22 Motivation independence	-0.0224	-0.0278	-0.1679*	0.1834*	0.0265	0.1255*	0.1396*	0.1716*	0.1340*	0.1035*	1	
23 Motivation create sth. new	0.0342	0.0612*	-0.0602*	0.2237*	0.0654*	0.2747*	0.1691*	0.0766*	0.1159*	0.0837*	0.1416*	1
24 Motivation make money	-0.0568*	-0.0877*	0.0236	0.0078	-0.0219	-0.0077	0.1498*	0.1162*	0.1125*	0.0759*	0.1779*	0.0641*
25 Motivation market niche	0.003	0.0397	0.0413	0.1668*	0.1004*	0.2092*	0.1687*	0.0477	0.0914*	0.0947*	0.1123*	0.3189*

[#] Source: Founder Survey. Values in parentheses denote significance levels.

Table A 5: Correlations (DENMARK)

CORRELATIONS [#]	1	2	3
1 High-skilled employees	1		
2 Medium-skilled employees	0.4206*	1	
3 Low-skilled employees	0.1620*	0.5859*	1

[#] Source: IDA. N=386,446.

Table A 6 Correlations (DENMARK)

CORRELATIONS [#]	1	2	3	4	5	6	7	8	9	10	11
1 Low-skilled founder (1=Yes)	1										
2 Medium-skilled founder (1=Yes)	-0.6075*	1									
3 High-skilled founder (1=Yes)	-0.2464*	-0.6202*	1								
4 Self-employed experience	-0.0107*	-0.0239*	0.0397*	1							
5 Industry experience	-0.0397*	0.0692*	-0.0453*	0.0754*	1						
6 Self-employed parent	-0.0277*	0.0159*	0.0079	-0.0068	0.0055	1					
7 Unemployment	0.0556*	-0.0025	-0.0518*	-0.1223*	-0.0833*	-0.0070	1				
8 Male (1=Yes)	-0.0851*	0.0579*	0.0133*	0.1188*	0.0851*	0.0096*	-0.1328*	1			
9 Age	-0.0017	-0.0980*	0.1212*	0.2720*	-0.0585*	-0.2828*	-0.0936*	-0.0127*	1		
10 Age^2	0.0094*	-0.0982*	0.1106*	0.2590*	-0.0580*	-0.2946*	-0.0942*	-0.0065	0.9886*	1	
11 Married (1=Yes)	-0.0583*	-0.0200*	0.0819*	0.0993*	-0.0067	-0.0868*	-0.0799*	-0.0063	0.3726*	0.3374*	1
12 Regional experience	0.0361*	0.0459*	-0.0916*	0.0461*	0.0441*	-0.0424*	-0.0021	0.0015	0.2297*	0.2100*	0.1424*
13 Personal ownership (1=Yes)	0.1246*	0.0322*	-0.1623*	-0.2731*	0.0015	-0.0061	0.2055*	-0.2025*	-0.1499*	-0.1414*	-0.1014*
14 Previous income	-0.1025*	-0.0492*	0.1613*	-0.1735*	-0.0453*	-0.0103*	-0.1291*	0.1180*	0.0800*	0.0618*	0.1120*
15 Household wealth	-0.0412*	-0.0209*	0.0662*	0.0973*	-0.0376*	-0.0117*	-0.0581*	0.0092*	0.1694*	0.1696*	0.1133*
16 Parents wealth	-0.0319*	0.0079	0.0219*	-0.0151*	-0.0012	0.0903*	-0.0100*	0.0076	-0.1009*	-0.1001*	-0.0260*

Table A 6 continued

CORRELATIONS [#]	12	13	14	15	16
12 Regional experience	1				
13 Personal ownership (1=Yes)	0.0743*	1			
14 Previous income	-0.0717*	-0.0791*	1		
15 Household wealth	0.0214*	-0.0950*	0.0929*	1	
16 Parents wealth	-0.0349*	-0.0219*	0.0040	0.0665*	1

[#] Source: IDA. N=59,225 (extended model).

Table A 7: Regression results for the number of high-skilled employees for firms of different age (GERMANY, manufacturing and KIBS)

HIGH-SKILLED EMPLOYEES	[1] 3 yrs	[2] 6 yrs	[3] 9 yrs	[4] 3 yrs	[5] 6 yrs	[6] 9 yrs
Medium-skilled founder	14.787*** (1.150)	13.458*** (1.572)	13.175** (6.394)	15.779*** (1.089)	13.486*** (2.287)	11.406 (391.076)
High-skilled founder	16.448*** (0.918)	15.145*** (1.310)	14.092** (6.284)	17.151*** (0.987)	14.839*** (2.159)	11.685 (422.052)
Self-employed experience	0.014 (0.018)	0.029 (0.020)	-0.011 (0.158)	-0.007 (0.025)	-0.005 (0.065)	0.011 (4.058)
Industry experience	-0.024 (0.018)	-0.022 (0.025)	-0.015 (0.074)	-0.025 (0.021)	-0.025 (0.037)	0.001 (3.034)
Self-employed parent	0.098 (0.318)	-0.301 (0.494)	-0.602 (9.620)	-0.013 (0.311)	0.031 (0.594)	-0.556 (29.998)
Unemployment	-15.786 (12.221)	-16.106 (14.289)	-0.631 (24.342)	-16.251* (8.506)	-16.06 (14.023)	0.154 (95.818)
Male	-0.102 (0.490)	-0.513 (0.480)	0.426 (4.046)	0.09 (0.480)	-0.563 (0.649)	0.332 (21.529)
Age	0.184* (0.103)	-0.047 (0.156)	0.035 (0.672)	0.173 (0.143)	-0.061 (0.232)	0.15 (16.281)
Age^2	-0.002* (0.001)	0.000 (0.002)	-0.001 (0.008)	-0.001 (0.001)	0.001 (0.002)	-0.003 (0.195)
Married	0.374 (0.263)	0.917** (0.397)	0.799 (0.689)	0.486 (0.296)	0.769* (0.466)	1.379 (32.324)
Balance				-0.054 (0.086)	-0.058 (0.146)	0.295 (13.855)
Founding team				0.318 (0.332)	0.790* (0.445)	0.563 (24.348)
Employee experience				-0.033 (0.021)	-0.02 (0.051)	0.034 (2.721)
General risk				0.214* (0.120)	0.119 (0.248)	0.296 (11.467)
Private risk				0.032 (0.106)	0.008 (0.176)	0.259 (7.636)
Openness				-0.008 (0.122)	0 (0.208)	-0.447 (10.819)
Extraversion				-0.006 (0.106)	-0.315 (0.276)	0.151 (14.168)
Locus of control				0.074 (0.137)	0.019 (0.296)	0.538 (13.864)
Work satisfaction				-0.119 (0.130)	-0.04 (0.243)	0.014 (29.798)
Life satisfaction				0.122 (0.142)	0.584* (0.340)	0.136 (54.807)
Motivation independence				0.045 (0.144)	-0.146 (0.203)	-0.921 (18.866)
Motivation create sth. new				0.213** (0.088)	0.09 (0.146)	0.315 (4.846)
Motivation make money				-0.144* (0.086)	-0.054 (0.185)	-0.337 (18.113)
Motivation market niche				-0.203** (0.092)	-0.127 (0.184)	0.144 (8.266)
Constant	-37.867*** (4.210)	-15.106 (11.027)	-47.530*** (15.679)	-40.598*** (6.142)	-16.163 (11.692)	-48.8 (266.526)
Log pseudolikelihood	-298.601	-150.131	-72.829	-280.419	-131.221	-54.905
Observations	434	262	127	422	255	123

Note: Negative binominal regression. Bootstrapped standard errors in parentheses (100 replications). Significant at *** p<0.01, ** p<0.05, * p<0.1. All models include a full set of region, year, and 1-digit NACE dummies which are not reported for brevity.

Table A 8: Regression results for the number of medium-skilled employees for firms of different age (GERMANY, manufacturing and KIBS)

MEDIUM-SKILLED EMPLOYEES	[1] 3 yrs	[2] 6 yrs	[3] 9 yrs	[4] 3 yrs	[5] 6 yrs	[6] 9 yrs
Medium-skilled founder	0.332 (1.667)	0.261 (3.060)	-1.074 (1.976)	0.367 (1.703)	0.275 (0.691)	-0.354 (2.354)
High-skilled founder	0.693 (1.715)	0.653 (3.058)	-0.681 (2.053)	0.74 (1.730)	0.417 (0.718)	-0.383 (2.290)
Self-employed experience	0.029* (0.016)	0.022 (0.024)	0.088 (0.057)	0.055*** (0.020)	0.023 (0.030)	0.034 (0.084)
Industry experience	0.011 (0.009)	-0.004 (0.016)	0.032 (0.029)	0.003 (0.010)	-0.011 (0.021)	0.045 (0.046)
Self-employed parent	0.431** (0.198)	0.004 (0.298)	-0.392 (0.566)	0.433*** (0.162)	-0.1 (0.301)	-0.439 (0.766)
Unemployment	-1.072 (3.212)	-0.03 (0.629)	-0.356 (0.874)	-0.943 (1.727)	-0.174 (0.634)	-0.029 (2.846)
Male	-0.589*** (0.187)	-0.279 (0.297)	-0.192 (0.450)	-0.374 (0.260)	-0.36 (0.383)	-0.319 (0.828)
Age	-0.007 (0.061)	-0.061 (0.105)	0.005 (0.321)	-0.026 (0.065)	-0.059 (0.124)	0.166 (0.455)
Age^2	0.000 (0.001)	0.001 (0.001)	0.000 (0.003)	0.000 (0.001)	0.001 (0.001)	-0.002 (0.005)
Married	0.247 (0.188)	0.307 (0.219)	-0.364 (0.514)	0.196 (0.153)	0.248 (0.264)	-0.301 (0.695)
Balance				-0.012 (0.027)	-0.003 (0.062)	-0.082 (0.165)
Founding team				0.042 (0.132)	0.434* (0.259)	0.444 (0.656)
Employee experience				0.023** (0.011)	-0.013 (0.019)	-0.008 (0.051)
General risk				-0.007 (0.054)	-0.001 (0.102)	0.249 (0.223)
Private risk				-0.091 (0.057)	-0.066 (0.080)	0.124 (0.137)
Openness				0.062 (0.052)	-0.085 (0.085)	-0.18 (0.296)
Extraversion				-0.037 (0.055)	-0.161* (0.091)	-0.078 (0.312)
Locus of control				0.072 (0.073)	0.014 (0.092)	0.091 (0.317)
Work satisfaction				-0.163** (0.072)	-0.145 (0.105)	-0.08 (0.309)
Life satisfaction				0.067 (0.104)	0.122 (0.134)	0.059 (0.368)
Motivation independence				0.058 (0.053)	0.174** (0.079)	-0.115 (0.351)
Motivation create sth. new				0.031 (0.040)	0.051 (0.067)	0.273 (0.188)
Motivation make money				-0.015 (0.051)	0.075 (0.060)	0.152 (0.187)
Motivation market niche				-0.052 (0.041)	0.043 (0.068)	-0.082 (0.186)
Constant	-1.729 (2.941)	0.896 (6.212)	-16.895 (10.522)	-1.179 (2.328)	0.094 (5.959)	-19.461 (14.807)
Log pseudolikelihood	-633.048	-386.508	-170.412	-601.905	-368.323	-157.592
Observations	434	262	127	422	255	123

Note: Negative binominal regression. Bootstrapped standard errors in parentheses (100 replications). Significant at *** p<0.01, ** p<0.05, * p<0.1. All models include a full set of region, year, and 1-digit NACE dummies which are not reported for brevity.

Table A 9: Regression results for the number of low-skilled employees for firms of different age (GERMANY, manufacturing and KIBS)

LOW-SKILLED EMPLOYEES	[1] 3 yrs	[2] 6 yrs	[3] 9 yrs	[4] 3 yrs	[5] 6 yrs	[6] 9 yrs
Medium-skilled founder	0.625 (7.092)	14.474*** (2.392)	13.641 (278.012)	0.647 (7.400)	15.974 (27.396)	-20.671 (14.346)
High-skilled founder	0.336 (7.135)	14.051*** (2.354)	14.142 (289.099)	0.522 (7.473)	15.411 (26.367)	-15.47 (12.770)
Self-employed experience	0.042** (0.019)	0.016 (0.072)	0.169 (8.141)	0.028 (0.040)	0.154 (2.785)	0.23 (0.425)
Industry experience	-0.005 (0.020)	0.013 (0.041)	0.11 (2.436)	-0.015 (0.021)	-0.014 (1.465)	0.445* (0.238)
Self-employed parent	0.56 (0.369)	-0.192 (0.545)	1.613 (108.180)	0.682 (0.499)	-0.632 (25.769)	-10.263 (13.457)
Unemployment	-21.711*** (5.789)	-14.752 (23.771)	4.074 (93.371)	-30.239*** (10.270)	-16.478 (39.308)	17.592 (14.536)
Male	-0.923** (0.378)	-0.634 (0.659)	-0.694 (35.300)	-0.838* (0.462)	-0.957 (8.927)	-5.036 (3.636)
Age	-0.009 (0.143)	-0.083 (0.352)	1.327 (79.198)	-0.031 (0.180)	0.075 (5.605)	5.264** (2.106)
Age^2	0.000 (0.001)	0.000 (0.004)	-0.018 (0.909)	0.000 (0.002)	-0.002 (0.059)	-0.061*** (0.022)
Married	0.434 (0.360)	0.336 (0.573)	15.866 (36.614)	0.184 (0.451)	0.169 (8.493)	11.473*** (3.460)
Balance				0.024 (0.072)	-0.277 (4.676)	-0.745 (0.986)
Founding team				0.648 (0.470)	0.239 (7.256)	-10.272 (14.231)
Employee experience				0.04 (0.034)	0.062 (1.568)	-0.439* (0.246)
General risk				0.182 (0.154)	0.307 (4.755)	1.648 (1.230)
Private risk				0.055 (0.142)	0.021 (1.391)	4.184*** (0.852)
Openness				-0.202 (0.177)	-0.098 (5.056)	-2.369*** (0.856)
Extraversion				-0.046 (0.134)	-0.095 (6.079)	-1.386 (1.359)
Locus of control				0.407 (0.326)	-0.154 (6.231)	2.967** (1.324)
Work satisfaction				-0.242 (0.176)	-0.07 (4.451)	-4.071** (1.709)
Life satisfaction				-0.394* (0.232)	0.087 (6.939)	-1.263 (1.375)
Motivation independence				0.435** (0.194)	0.61 (9.206)	1.331 (1.253)
Motivation create sth. new				0.003 (0.144)	-0.042 (3.695)	0.392 (0.722)
Motivation make money				0.054 (0.125)	0.225 (3.210)	-1.072 (0.960)
Motivation market niche				-0.086 (0.112)	0.013 (2.738)	-0.329 (0.800)
Constant	-2.292 (10.323)	-26.933*** (8.334)	-66.692 (1,432.635)	-4.536 (10.122)	-37.794 (153.071)	-80.546 (51.624)
Log pseudolikelihood	-185.112	-94.796	-27.390	-165.983	-81.169	-12.613
Observations	434	262	127	422	255	123

Note: Negative binomial regression. Bootstrapped standard errors in parentheses (100 replications). Significant at *** p<0.01, ** p<0.05, * p<0.1. All models include a full set of region, year, and 1-digit NACE dummies which are not reported for brevity.

Table A 10: Regression results for the number of high-skilled employees for firms of different age (DENMARK, manufacturing and KIBS)

HIGH-SKILLED EMPLOYEES	[1] 3 yrs	[2] 6 yrs	[3] 9 yrs	[4] 3 yrs	[5] 6 yrs	[6] 9 yrs
Medium-skilled founder	0.198** (0.078)	0.291** (0.116)	0.693*** (0.191)	0.152* (0.079)	0.252** (0.115)	0.530*** (0.190)
High-skilled founder	1.017*** (0.080)	1.095*** (0.118)	1.517*** (0.198)	0.896*** (0.080)	0.891*** (0.117)	1.224*** (0.197)
Self-employed experience	-0.014 (0.044)	0.028 (0.065)	-0.035 (0.112)	0.007 (0.047)	-0.012 (0.070)	-0.162 (0.118)
Industry experience	0.051 (0.044)	0.106 (0.065)	0.108 (0.109)	0.093** (0.043)	0.168*** (0.064)	0.087 (0.103)
Self-employed parent	0.011 (0.045)	0.100 (0.069)	-0.094 (0.119)	0.032 (0.045)	0.084 (0.068)	-0.063 (0.112)
Unemployment	-0.338*** (0.079)	-0.480*** (0.118)	-0.715*** (0.228)	-0.172** (0.080)	-0.200 (0.122)	-0.307 (0.231)
Male	0.310*** (0.062)	0.296*** (0.094)	0.143 (0.163)	0.120* (0.062)	0.122 (0.093)	0.127 (0.155)
Age	0.026 (0.017)	-0.037 (0.027)	-0.065 (0.043)	0.022 (0.017)	-0.019 (0.027)	-0.062 (0.042)
Age^2	-0.000* (0.000)	0.000 (0.000)	0.000 (0.001)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.001)
Married	0.141*** (0.049)	0.231*** (0.074)	0.360*** (0.128)	0.067 (0.050)	0.082 (0.075)	0.182 (0.127)
Regional experience				-0.026*** (0.003)	-0.031*** (0.004)	-0.041*** (0.007)
Personal ownership				-1.318*** (0.063)	-1.585*** (0.087)	-1.953*** (0.146)
Previous income				0.026*** (0.004)	0.028*** (0.007)	0.009 (0.011)
Household wealth				0.001 (0.010)	0.005 (0.014)	0.041* (0.023)
Parents wealth				-0.001 (0.005)	0.005 (0.007)	-0.002 (0.011)
Constant	-0.502 (0.359)	0.924* (0.560)	1.998** (0.879)	-0.688* (0.374)	0.697 (0.568)	1.978** (0.873)
Log pseudolikelihood	-10991	-6350	-2475	-10556	-6059	-2330
Observations	8392	4145	1408	8268	4085	1390

Note: Negative binominal regression. Standard errors in parentheses. Significant at *** p<0.01, ** p<0.05, * p<0.1 . All models include a full set of region, year, and 1-digit NACE dummies which are not reported for brevity.

Table A 11: Regression results for the number of medium-skilled employees for firms of different age (DENMARK, manufacturing and KIBS)

MEDIUM-SKILLED EMPLOYEES	[1] 3 yrs	[2] 6 yrs	[3] 9 yrs	[4] 3 yrs	[5] 6 yrs	[6] 9 yrs
Medium-skilled founder	0.095* (0.057)	0.278*** (0.086)	0.293** (0.149)	0.086 (0.057)	0.278*** (0.085)	0.113 (0.149)
High-skilled founder	-0.019 (0.060)	0.267*** (0.090)	0.507*** (0.158)	-0.088 (0.060)	0.163* (0.090)	0.189 (0.161)
Self-employed experience	0.096*** (0.035)	0.074 (0.051)	0.179* (0.095)	0.105*** (0.039)	0.114** (0.057)	0.142 (0.103)
Industry experience	0.119*** (0.035)	0.150*** (0.051)	0.167* (0.091)	0.140*** (0.035)	0.166*** (0.050)	0.177** (0.090)
Self-employed parent	-0.003 (0.036)	0.029 (0.055)	-0.034 (0.102)	-0.007 (0.036)	0.033 (0.054)	0.031 (0.099)
Unemployment	-0.296*** (0.063)	-0.420*** (0.093)	-0.092 (0.186)	-0.198*** (0.063)	-0.224** (0.093)	0.163 (0.186)
Male	0.263*** (0.050)	0.327*** (0.074)	0.208 (0.138)	0.164*** (0.050)	0.219*** (0.073)	0.060 (0.137)
Age	-0.008 (0.013)	0.020 (0.020)	0.008 (0.036)	-0.014 (0.014)	0.006 (0.020)	-0.004 (0.037)
Age^2	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Married	0.185*** (0.039)	0.069 (0.058)	0.042 (0.102)	0.162*** (0.040)	0.049 (0.060)	-0.019 (0.103)
Regional experience				-0.013*** (0.002)	-0.015*** (0.004)	-0.020*** (0.006)
Personal ownership				-0.766*** (0.044)	-0.825*** (0.063)	-1.031*** (0.114)
Previous income				0.019*** (0.004)	0.027*** (0.005)	0.019** (0.009)
Household wealth				-0.011 (0.008)	0.003 (0.011)	0.030 (0.020)
Parents wealth				-0.006* (0.004)	-0.006 (0.005)	0.001 (0.010)
Constant	0.556** (0.282)	0.402 (0.417)	0.366 (0.749)	1.040*** (0.292)	0.729* (0.435)	0.619 (0.762)
Log pseudolikelihood	-15489	-8491	-2779	-15082	-8263	-2691
Observations	8392	4145	1408	8268	4085	1390

Note: Negative binominal regression. Standard errors in parentheses. Significant at *** p<0.01, ** p<0.05, * p<0.1 . All models include a full set of region, year, and 1-digit NACE dummies which are not reported for brevity.

Table A 12: Regression results for the number of low-skilled employees for firms of different age (DENMARK, manufacturing and KIBS)

LOW-SKILLED EMPLOYEES	[1] 3 yrs	[2] 6 yrs	[3] 9 yrs	[4] 3 yrs	[5] 6 yrs	[6] 9 yrs
Medium-skilled founder	-0.091 (0.073)	0.111 (0.100)	0.193 (0.164)	-0.093 (0.074)	0.089 (0.101)	0.085 (0.166)
High-skilled founder	-0.312*** (0.078)	-0.105 (0.106)	0.107 (0.176)	-0.353*** (0.080)	-0.162 (0.108)	-0.111 (0.181)
Self-employed experience	0.131*** (0.047)	0.031 (0.062)	0.018 (0.107)	0.106** (0.053)	0.147** (0.069)	0.060 (0.120)
Industry experience	0.042 (0.046)	0.051 (0.061)	0.333*** (0.102)	0.063 (0.046)	0.092 (0.061)	0.327*** (0.102)
Self-employed parent	0.077 (0.048)	0.112* (0.064)	0.059 (0.113)	0.080 (0.049)	0.144** (0.064)	0.040 (0.114)
Unemployment	-0.147* (0.082)	-0.360*** (0.110)	0.243 (0.202)	-0.110 (0.083)	-0.247** (0.112)	0.398* (0.205)
Male	0.212*** (0.066)	0.064 (0.087)	0.333** (0.155)	0.120* (0.067)	-0.029 (0.088)	0.229 (0.158)
Age	-0.049*** (0.017)	0.029 (0.023)	-0.009 (0.039)	-0.043** (0.018)	0.014 (0.024)	-0.019 (0.041)
Age^2	0.000** (0.000)	-0.000* (0.000)	-0.000 (0.000)	0.000** (0.000)	-0.000 (0.000)	0.000 (0.000)
Married	0.116** (0.052)	0.031 (0.069)	0.102 (0.113)	0.139*** (0.054)	0.118 (0.072)	0.081 (0.119)
Regional experience				-0.009*** (0.003)	-0.019*** (0.004)	-0.024*** (0.007)
Personal ownership				-0.468*** (0.058)	-0.328*** (0.075)	-0.510*** (0.127)
Previous income				0.005 (0.005)	0.019*** (0.007)	0.022** (0.011)
Household wealth				-0.025** (0.011)	-0.009 (0.014)	0.046* (0.024)
Parents wealth				-0.006 (0.005)	-0.004 (0.007)	0.013 (0.011)
Constant	0.602* (0.362)	-0.238 (0.477)	-0.536 (0.816)	0.771** (0.385)	0.138 (0.512)	-0.917 (0.875)
Log pseudolikelihood	-10381	-6064	-2102	-10161	-5944	-2053
Observations	8392	4145	1408	8268	4085	1390

Note: Negative binominal regression. Standard errors in parentheses. Significant at *** p<0.01, ** p<0.05, * p<0.1 . All models include a full set of region, year, and 1-digit NACE dummies which are not reported for brevity.

Table A 13: Regression results for the number of high-skilled employees for firms of different age (DENMARK, all industries)

HIGH-SKILLED EMPLOYEES	[1] 3 yrs	[2] 6 yrs	[3] 9 yrs	[4] 3 yrs	[5] 6 yrs	[6] 9 yrs
Medium-skilled founder	0.293*** (0.039)	0.348*** (0.054)	0.346*** (0.088)	0.220*** (0.039)	0.255*** (0.055)	0.327*** (0.088)
High-skilled founder	1.213*** (0.044)	1.250*** (0.064)	1.226*** (0.106)	1.034*** (0.044)	1.025*** (0.063)	1.072*** (0.103)
Self-employed experience	0.105*** (0.027)	0.136*** (0.038)	0.152** (0.064)	0.037 (0.029)	0.044 (0.042)	-0.016 (0.071)
Industry experience	-0.027 (0.026)	-0.122*** (0.038)	-0.059 (0.063)	0.009 (0.026)	-0.058 (0.037)	-0.022 (0.061)
Self-employed parent	-0.017 (0.027)	0.057 (0.040)	-0.050 (0.067)	-0.004 (0.027)	0.038 (0.040)	-0.050 (0.066)
Unemployment	-0.392*** (0.042)	-0.531*** (0.060)	-0.456*** (0.107)	-0.214*** (0.043)	-0.269*** (0.061)	-0.022 (0.108)
Male	0.254*** (0.034)	0.217*** (0.049)	0.249*** (0.085)	0.042 (0.034)	-0.017 (0.050)	-0.031 (0.084)
Age	0.047*** (0.010)	-0.003 (0.014)	0.008 (0.025)	0.048*** (0.010)	0.019 (0.015)	0.009 (0.024)
Age^2	-0.001*** (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.001*** (0.000)	-0.000 (0.000)	-0.000 (0.000)
Married	0.143*** (0.029)	0.202*** (0.042)	0.142** (0.072)	0.075** (0.030)	0.112*** (0.043)	0.087 (0.072)
Regional experience				-0.020*** (0.002)	-0.025*** (0.003)	-0.022*** (0.004)
Personal ownership				-1.112*** (0.033)	-1.333*** (0.045)	-1.547*** (0.075)
Previous income				0.018*** (0.003)	0.024*** (0.004)	0.016** (0.007)
Household wealth				0.011* (0.006)	0.007 (0.008)	0.024* (0.014)
Parents wealth				0.001 (0.003)	0.003 (0.004)	0.013* (0.007)
Constant	-20.167 (3489.938)	-3.119*** (1.129)	-2.143 (1.345)	-20.526 (5212.733)	-2.362** (1.133)	-1.737 (1.359)
Log pseudolikelihood	-29622	-16868	-6470	-28491	-16136	-6123
Observations	37487	17462	5597	36836	17209	5517

Note: Negative binominal regression. Standard errors in parentheses. Significant at *** p<0.01, ** p<0.05, * p<0.1 . All models include a full set of region, year, and 1-digit NACE dummies which are not reported for brevity.

Table A 14: Regression results for the number of medium-skilled employees for firms of different age (DENMARK, all industries)

MEDIUM-SKILLED EMPLOYEES	[1] 3 yrs	[2] 6 yrs	[3] 9 yrs	[4] 3 yrs	[5] 6 yrs	[6] 9 yrs
Medium-skilled founder	0.196*** (0.020)	0.224*** (0.031)	0.223*** (0.054)	0.156*** (0.020)	0.186*** (0.030)	0.187*** (0.053)
High-skilled founder	0.270*** (0.026)	0.374*** (0.039)	0.424*** (0.071)	0.153*** (0.026)	0.232*** (0.039)	0.259*** (0.070)
Self-employed experience	0.176*** (0.016)	0.153*** (0.023)	0.167*** (0.043)	0.077*** (0.017)	0.068*** (0.026)	0.065 (0.048)
Industry experience	0.137*** (0.015)	0.112*** (0.023)	0.202*** (0.042)	0.153*** (0.015)	0.119*** (0.022)	0.204*** (0.041)
Self-employed parent	0.040** (0.016)	0.048** (0.024)	0.059 (0.045)	0.042*** (0.016)	0.048** (0.024)	0.073* (0.043)
Unemployment	-0.346*** (0.023)	-0.461*** (0.034)	-0.304*** (0.066)	-0.198*** (0.023)	-0.257*** (0.034)	-0.095 (0.065)
Male	0.195*** (0.020)	0.163*** (0.030)	0.165*** (0.057)	0.069*** (0.020)	0.019 (0.030)	-0.033 (0.056)
Age	0.004 (0.006)	-0.008 (0.009)	0.017 (0.016)	0.000 (0.006)	-0.007 (0.009)	0.003 (0.016)
Age^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Married	0.140*** (0.017)	0.142*** (0.025)	0.118** (0.047)	0.089*** (0.017)	0.093*** (0.025)	0.072 (0.046)
Regional experience				-0.006*** (0.001)	-0.008*** (0.002)	-0.005* (0.003)
Personal ownership				-0.754*** (0.017)	-0.873*** (0.025)	-0.951*** (0.047)
Previous income				0.007*** (0.002)	0.013*** (0.002)	0.016*** (0.004)
Household wealth				0.015*** (0.003)	0.015*** (0.005)	0.023*** (0.009)
Parents wealth				-0.002 (0.002)	-0.003 (0.003)	0.007 (0.005)
Constant	-1.053*** (0.369)	-0.222 (0.421)	-0.497 (0.723)	-0.610 (0.372)	0.542 (0.421)	0.031 (0.713)
Log pseudolikelihood	-71775	-36883	-11926	-69657	-35788	-11546
Observations	37487	17462	5597	36836	17209	5517

Note: Negative binominal regression. Standard errors in parentheses. Significant at *** p<0.01, ** p<0.05, * p<0.1 . All models include a full set of region, year, and 1-digit NACE dummies which are not reported for brevity.

Table A 15: Regression results for the number of low-skilled employees for firms of different age (DENMARK, all industries)

LOW-SKILLED EMPLOYEES	[1] 3 yrs	[2] 6 yrs	[3] 9 yrs	[4] 3 yrs	[5] 6 yrs	[6] 9 yrs
Medium-skilled founder	-0.027 (0.023)	-0.031 (0.033)	-0.038 (0.059)	-0.039* (0.023)	-0.049 (0.033)	-0.074 (0.059)
High-skilled founder	-0.138*** (0.031)	-0.105** (0.044)	-0.067 (0.079)	-0.201*** (0.031)	-0.194*** (0.044)	-0.205** (0.080)
Self-employed experience	0.191*** (0.018)	0.132*** (0.026)	0.088* (0.048)	0.115*** (0.021)	0.112*** (0.029)	0.040 (0.054)
Industry experience	0.136*** (0.018)	0.149*** (0.025)	0.236*** (0.046)	0.132*** (0.018)	0.141*** (0.025)	0.226*** (0.046)
Self-employed parent	0.071*** (0.018)	0.079*** (0.026)	0.187*** (0.049)	0.077*** (0.018)	0.085*** (0.026)	0.166*** (0.049)
Unemployment	-0.206*** (0.026)	-0.324*** (0.037)	-0.188*** (0.072)	-0.129*** (0.026)	-0.211*** (0.038)	-0.058 (0.073)
Male	0.034 (0.023)	-0.021 (0.033)	0.181*** (0.062)	-0.043* (0.023)	-0.109*** (0.033)	0.037 (0.062)
Age	0.007 (0.006)	0.014 (0.009)	0.012 (0.018)	0.014** (0.007)	0.016* (0.010)	0.010 (0.018)
Age^2	-0.000** (0.000)	-0.000*** (0.000)	-0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000 (0.000)
Married	0.082*** (0.019)	0.098*** (0.028)	0.119** (0.051)	0.081*** (0.020)	0.096*** (0.029)	0.078 (0.052)
Regional experience				-0.006*** (0.001)	-0.011*** (0.002)	-0.013*** (0.003)
Personal ownership				-0.453*** (0.020)	-0.497*** (0.028)	-0.583*** (0.052)
Previous income				0.001 (0.002)	0.012*** (0.003)	0.012** (0.005)
Household wealth				-0.006 (0.004)	0.004 (0.006)	0.031*** (0.010)
Parents wealth				-0.005** (0.002)	-0.001 (0.003)	0.010* (0.005)
Constant	-0.838** (0.395)	-0.128 (0.428)	0.030 (0.741)	-0.464 (0.406)	0.260 (0.437)	0.103 (0.740)
Log pseudolikelihood	-61196	-31950	-10395	-59844	-31309	-10163
Observations	37487	17462	5597	36836	17209	5517

Note: Negative binominal regression. Standard errors in parentheses. Significant at *** p<0.01, ** p<0.05, * p<0.1 . All models include a full set of region, year, and 1-digit NACE dummies which are not reported for brevity.

The **Hamburg Institute of International Economics (HWWI)** is an independent economic research institute, based on a non-profit public-private partnership, which was founded in 2005. The University of Hamburg and the Hamburg Chamber of Commerce are shareholders in the Institute .

The HWWI's main goals are to:

- Promote economic sciences in research and teaching;
- Conduct high-quality economic research;
- Transfer and disseminate economic knowledge to policy makers, stakeholders and the general public.

The HWWI carries out interdisciplinary research activities in the context of the following research areas:

- Economic Trends and Global Markets,
- Regional Economics and Urban Development,
- Sectoral Change: Maritime Industries and Aerospace,
- Institutions and Institutional Change,
- Energy and Raw Material Markets,
- Environment and Climate,
- Demography, Migration and Integration,
- Labour and Family Economics,
- Health and Sports Economics,
- Family Owned Business, and
- Real Estate and Asset Markets.

Hamburg Institute of International Economics (HWWI)

Heimhuder Str. 71 | 20148 Hamburg | Germany

Phone: +49 (0)40 34 05 76 - 0 | Fax: +49 (0)40 34 05 76 - 776

info@hwwi.org | www.hwwi.org