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ABSTRACT

Who Founds? An Analysis of University and Corporate Startup Entrepreneurs Based on Danish Register Data*

We compare individuals presently employed either at an university or at a firm from a R&D intensive sector and analyze which of their personal-specific and employer-specific characteristics determine their choice of subsequently founding a startup. Our data set is unusually rich and combines the population of Danish employees with their present employers. We focus on persons who at least hold a Bachelor's degree in engineering, sciences and health and track them over the time period 2001-2012. We show that (i) there are overall little differences between the characteristics of university and corporate startup entrepreneurs, (ii) common factors triggering startup activity of both university and corporate employees are education, top management team membership, previous job mobility and being male, (iii) it is exclusively human capital-related characteristics that affect startup choice of university employees while (iv) the characteristics of the present workplace constitute major factors of entrepreneurial activity.

JEL Classification: L26, I23, O31, O32
Keywords: university startups, corporate startups, founder characteristics

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1 Introduction

While there is increasing and substantial corporate and university startup activity across the world (AUTM 2000; Feldman et al. 2002; Gubitta et al. 2016; O'Shea et al. 2008; Peng 2006) and these startups contribute significantly to technological progress (Franco and Filson 2006; Shane 2004; Lockett et al. 2005; Zahra et al. 2007), little is known about the personal characteristics of the founders of these ventures. Similarly, differences in personal characteristics between corporate and university startup entrepreneurs are hitherto largely unexplored. Such a lack of knowledge is surprising since the characteristics of startup founders map into differences in motives and incentives (Åstebro and Thompson 2011; Shane et al. 2003; Sauermann 2017) and differences in the characteristics of entrepreneurs in turnmay feed into subsequent performance differentials (Arora and Nandkumar 2011; Ding 2011; Klepper and Sleeper 2005; Morton and Podolny 2002; Sauermann 2017). The knowledge gap makes it difficult for human resource managers to design appropiate employee retention and development policies and for policy makers to design appropriate entrepreneurship promotion policies that may need to be different for founders from universities and for founders corporations.

To accurately describe the factors that push scientists, i.e. holders of at least a Bachelor's degree in science, engineering or health, from alternative types of dependent employment into entrepreneurship we use register data that tracks the entire population of Danish residents between 2001 and 2012. We differentiate between (i) "university startup entrepreneurs" (USEs), individuals who found a firm after a spell in university employment and (ii) "corporate R&D startup entrepreneurs" (CSEs), individuals who found out of an employment spell at a firm in R&D intensive industries. Like Wennberg et al. (2011), who use Swedish register data to compare university and corporate spinoffs, our focus is on R&D intensive industries in order to make corporate startup activity as similar as possible to university startup activity. While existing work had to focus on fairly restrictive sets of control variables and even Wennberg et al. (2011) exclusively rely on human capital variables, the richness of our data allows us to include accurate and detailed measures of not only human capital but also of income and wealth, family background and characteristics of the present workplace. The set of variables we consider very closely resembles the type of information contained in CVs that are at the disposal of human resource departments as well as non-governmental and governmental entrepreneuship promotion agencies.

We make three contributions to existing work. First, we add to the literature on the antecedents of transitions into spells of entrepreneurship (Nanda and Sørensen 2010; Sørensen 2007; Stuart and Ding 2006) and the literature on the characteristics of startup founders (Ouimet and Zarutskie 2014; Sauermann 2017) by linking detailed individual-specific and present employer-specific information to entrepreneurial choice. Other studies, like Clarysse et al. (2011a), Colombo and Piva (2008), Ensley and Hmielski (2005) as well as Wennberg et al. (2011) also compare university and corporate startups

but focus on performance only and use data on more mature firms.[1] Second, we compare founders from universities to founders from R&D intensive industries while existing research has to date mainly focused on university startups to the exclusion of corporate startups (Wennberg et al. 2011). If USEs and CSEs indeed differed from one another in terms of their observed personal characteristics, this may partly explain the observed differences between the post entry behavior of firms that originated in the public research domain and high-tech startups (Colombo and Piva 2012; Clarysse and Moray 2004; Ensley and Hmielski 2005; Klepper and Sleeper 2005). If their personal characteristics are similar, performance differences are likely to be driven by "inheritance effects" — tacit and codified knowledge passed on to the entrepreneur by her previous employer (Agrawal et al. 2016; Clarysse et al. 2011b; Wennberg et al. 2011) — or by unobserved (to us) personality traits. Third, we add to the literature by operating with exceptional high-quality data. The entrepreneurship literature and in particular its strand that deals with university startups has long been plagued by data problems, most importantly biased samples, a focus on specific industries, data provided by technology transfer offices and lack of meaningful comparison groups (Elfenbein et al. 2010; Rothaermel et al. 2007).

We find that only few factors have a significant effect on startup activity, despite our large and comprehensive set of explanatory variables. Drivers significantly positively affecting both university and corporate entrepreneurship are top management team (TMT) membership, being male and previous job mobility. A Master's degree in engineering, self-employment experience from secondary employment, the number of patents an individual holds and family wealth constitute additional significant variables for university employees. For CSEs we find a positive relation between self-employment choice and a high relative position in the own employers income distribution as well as father self-employment. Own employer size and own employer patent stock are negatively related to self-employment for corporate scientists. USEs and CSEs are overall surprisingly similar to one another in terms of their observed determinants of becoming an entrepreneur. The only few variables with significantly different effects on self-employment are the field and the length of education, self-employment experience and the number of own patents. Overall, startup activity by both USEs and CSEs is a rare event and it is much rarer than in studies not based on population data as only 0.36 percent of university employees and only 0.64 percent of high tech sector employees found a startup.

Our paper proceeds as follows: Section 2 discusses our data set in greater detail and delivers key definitions. Section 3 provides descriptive statistics and presents logit estimation results for entrepreneurial choice. Section 4 concludes.

[1] Ensley and Hmielski (2005) even use data selected on the performance variable by comparing the fast growing corporate spinoffs to university startups to find that university spinoffs grow faster than corporate spinoffs.

2 Data

Our data backbone is the "Integrated Database for Labour Market Research" (IDA) which has been used by social scientists for decades (e.g. Eriksson 1999; Nanda and Sørensen 2010; Dahl and Sorenson 2012; Sørensen 2007; Sørensen and Sharkey 2014; Christensen et al. 2005; Westergaard and Jensen 1987). IDA is a matched employer-employee register dataset which covers all employers and employees in Denmark from 1980 onwards on an annual basis. It essentially maps persons to their income tax statements, their workplaces and additional registers like the "Entrepreneurship database" which constitutes an additional other pillar of our analysis. The latter data set data has found widespread use among entrepreneurship scholars after its establishment in 2005 (e.g. Dahl and Sorenson 2009, 2012; Dahl et al. 2015). The Entrepreneurship database presently spans the time period 2001 to 2012 and identifies newly started firms whose number of full-time equivalents and turnover exceeds an industry-specific minimum threshold. The dataset is clean of startups that stem from organizational restructuring and hence represents genuinely new organizations.

University startup entrepreneurs

We define university startup entrepreneurs as persons who are employed at an university in year t and appear in the entrepreneurship database in year $t+1$.[2] Our mobility-based definition is well in line with existing studies (Clarysse et al. 2000; Druilhe and Garnsey 2004; Fini et al. 2011; Klofsten and Jones-Evans 2000; Rappert et al. 1999; Smilor et al. 1990; Steffensen et al. 1999; Rogers et al. 2001; Visintin and Pittino 2014). It is, however, much broader than Shane's (2004) or much of the existing literature that requires both a mobility event to occur and the formal transfer of IP from the university to the startups (Clarysse and Moray 2004; Colombo et al. 2010; Nicolaou and Birley 2003a,b; O'Shea et al. 2008; Lockett et al. 2005; Roberts and Malone 1996; Rothaermel et al. 2007; Zahra et al. 2007). This is also why we use the term "startup" instead of "spinoff". A key advantage of our broader definition is that it avoids problems with the definition and transfer of IP and that it does not focus on high-technology industries like software or semiconductors (Buenstorf and Fornahl 2009; Heirman and Clarysse 2007; Klepper and Sleeper 2000), disk drives (Christensen 1993; Franco and Filson 2006), semiconductors (Braun and Macdonald 1982) or, more generally, IP-based startups only.

Universities are defined according to NACE Rev. 1. We restrict attention to sector 80.30, "Higher education".

Corporate startup entrepreneurs

Corporate startup entrepreneurs are analogously defined by a mobility event. CSEs are individuals

[2]Our focus on recent mobility events as in Druilhe and Garnsey (2004) is narrow given that McMullan and Vesper (1987) document lags of up to nine years between leaving MIT and starting a firm that is based on knowledge generated during an employment spell at MIT. In another survey-based study Müller (2010) finds that up to 40 years may elapse between university employment and a related startup with a mass that, however, is between zero and ten years.

with an employment relationship in a firm from a high tech sector in year t who are founders in year $t+1$. We hence again apply a broad startup definition that does not take into account the formal transfer of ownership rights as often considered by existing studies on corporate startups (Parhankangas and Arenius 2003; Lindholm 1997). High tech sectors are defined according to Eurostat as high technology manufacturing industries or knowledge-intensive services.[3]

2.1 Explanatory variables

The richness of our data allows us to draw a detailed and accurate picture of entrepreneurs in Denmark. We consider four main sets of personal characteristics that may explain university startup activity (Shane 2004) and startup activity more generally (Roberts 1991; Sauermann 2017): (i) human capital (Beckman et al. 2007; Blanchflower and Oswald 1998; Davidsson and Honig 2003; Evans and Leighton 1989; Evans and Jovanovich 1983), (ii) income and wealth (Blanchflower and Oswald 1998; Holtz-Eakin et al. 1994; Sauermann 2017), (iii) family background (Davidsson and Honig 2003; Dunn and Holtz-Eakin 2000; Fairlie and Robb 2007) and (iv) other personal information like gender, previous job mobility or immigration status. In addition, we study (v) the extend to which an individual's current workplace matters for future startup activity (Elfenbein et al. 2010; Nanda and Sørensen 2010; Sauermann 2017; Stuart and Ding 2006).

Human capital

The quality of the startup team constitutes an important predictor of entrepreneurial choice and startup success as emphasized by Heirman and Clarysse (2004), Mustar et al. (2006), Hambrick and Mason (1984), Eisenhardt and Schoonhoven (1990, 1996) as well as Shane and Stuart (2006). This quality is empirically often measured by age, education, job function and educational background (Amason et al. 2006; Beckman et al. 2007; Landry et al. 2006) which all are elements of an individual's human capital (Davidsson and Honig 2003).

We consider both the type and the level of formal education as in Elfenbein et al. (2010) and Sauermann (2017). All individuals in our data at least command over a BA so we additionally account for individuals holding a MA or a PhD. Stuart and Ding (2006) show that holding a PhD degree increases the likelihood of becoming an university startup entrepreneur. More education is related to better analytical skills and information about business opportunities as pointed out by Casson (1995) as well as Parker (2009) and provides a larger set of personal opportunities (Gimeno et al. 1997), including a richer set of outside options and promotion opportunities. A meta-analysis by van der Sluis et al. (2005) shows that the majority of studies finds a negative relation between self-employment choice and education. We dinstinguish between three different fields of education (Colombo and Piva 2012; Elfenbein et al. 2010), natural sciences, engineering and health sciences.

[3]Eurostat indicators on High-tech industry and Knowledge-intensive services. URL: `https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf`.

Past working experience constitutes yet another important part of an individual's human capital by endowing individuals with direct training and providing them with professional contacts (Zahra et al. 2007) as well as social ties more generally (Delmar and Shane 2004; Nicolaou and Birley 2003a). Landry et al. (2006) show a positive association between working experience and entrepreneurial activity. We consider an individual's overall years of working experience as well as years of self-employment experience since Shane (2003) associates previous with present startup activity. In addition, we construct a dummy variable that is coded one if a person receives a side-income from self-employment. Such income is typically generated from consultancy side-jobs and we interpret this variable as measuring "some" links to self-employment. The importance of such activities for later entrepreneurship is highlighted by Aldridge and Audretsch (2011) as well as Nicolaou and Birley (2003a). Previous spells of self-employment constitute important heterogeneity among entrepreneurs since much of the earlier literature assumes that the individuals under investigation are creating a venture for the first time (Mosey and Wright 2007).

We also account for employee age in our rich data setting even though Shane (2003, Ch. 2) points out that working experience should be more informatiove than age since the latter explictly embodies learning. The effect of age is unclear a priori since older employers have accumulated more capital but are also more risk averse (Elfenbein et al. 2010; Sauermann 2017) which is why Lévesque and Minniti (2006) include both age and its square and we follow their example. Age did not turn out to have a significant effect on startup acitivity in the studies of Aldridge and Audretsch (2011), Elfenbein et al. (2010) as well as Nicolaou and Birley (2003a).[4]

Our final general human capital variable is employee patenting activity that is shown to be a driver of self-employment by George et al. (2002), Landry et al. (2006), Sauermann (2017), Stuart and Ding (2006) as well as Zucker et al. (1998). The underlying patent data stem from European Patent Office's Patstat data that we merged to individual inventors by Statistics Denmark. Our measure of individual patenting activity and is an individual's patent stock.

While these variables constitute measures for a person's general human capital, we account for years of tenure as a measure for firm-specific human capital as in Elfenbein et al. (2010), Klepper (2001) and Sauermann (2017). We additionally consider a dummy variable that is coded 1 if the individual is looking back to at least three years of employment at the same workplace since this is the point in time when tenure decisions are typically reached at Danish universities. Nicolaou and Birley (2003a) as well as Roberts (1991) show that having tenure is positively related to university spinoff activity. Another firm-specifc human capital variable we consider is membership in a TMT since leadership experience is likely to be useful in a subsequent self-employment spell. We measure TMT membership by a dummy variable based on the ISCO code that is coded 1 if an person performs

[4]Given that we exactly measure education and working experience we can also include age without it being collinear with education and working experience.

leadership work at the highest level (ISCO code 1).

Income and wealth

Income and wealth may play an important role in an individual's decision to become an entrepreneur. Higher income and wealth makes it easier to raise the first funding (Blanchflower and Oswald 1998; Holtz-Eakin et al. 1994; Hochguertel et al. 2005; Sauermann 2017). Wealth also enables pledging collateral for bank loans (Blanchflower and Oswald 1998; Chan and Kanatos 1985; Evans and Leighton 1989; Evans and Jovanovich 1989). Landry et al. (2006) find positive effects of wealth on startup activity while there is no significant association with university spinoff activity in Nicolaou and Birley (2003a). As operationalizations of our income and wealth variables, we include the natural logarithms of (i) personal income, (ii) family income, the total income a family commands over and (iii) total family assets. To not only consider the levels of income but also relative measures, we include dummy variables for the quintiles of the within-firm income distribution and dummy variables for the quintiles of the family assets distribution in the population.

Family background

We include marital status and the number of children as well as a set of variables that measures the occupations of an individual's parents and partner as variables reflecting a person's family background. Davidsson and Honig (2003) consider them as proxies for social capital which else is empirically hard to precisely measure (Parker 2006, Ch. 4.3). Parker (2009, Ch. 4.5.1) and Budig (2006) report a positive association between having children and being self-employed. Davidsson and Honig (2003) do not find significant effects of marital status on nascent entrepreneurship. We also include mother and father self-employment status to account for inter-generational transmissions of self-employment that are well documented in the literature (Dunn and Holtz-Eakin 2000; Fairlie and Robb 2007; Hout and Rosen 2000) and control for present partner self-employment and wage-employment which is motivated by possible similar transmission mechanisms and since the spouse's employment status reduces the propsective entrepreneurs financial risk exposure which in turn makes own entrepreneurial activity more likely (Brown et al. 2006; Parker 2008).

Other personal characteristics

We account for ethnicity by differentiating between Danes and first as well as second generation immigrants, gender and previous job mobility. Ethnicity has long been shown to be highly correlated with entrepreneurship (Aldrich and Waldinger 1990; Borjas 1986; Evans 1989; Hammarstedt 2001; Lofstrom 2002) as has gender (Landry et al. 2006; Minitti and Naudé 2010; Nicolaou and Birley 2003a; Verheul et al. 2012). We also include the number of jobs held in the past five years to account for general person-specific mobility (Folta et al. 2010).

Present employer characteristics

We consider a fairly wide range of employer-specific variables that may determine an individual's decision to become an entrepreneur (Gompers et al. 2005). We include firm size measured by the

number of employees since employees in large firms may be more likely to leave in order to be more independent than in rigid bureaucracies (Chatterji 2009; Sørensen 2007) while employees of small firms may leave because of ability and preferences sorting (Elfenbein et al. 2010; Sauermann 2017). Former co-workers who left one's present employer to become entrepreneurs may also positively influence mobility as shown by Nanda and Sørensen (2010) as well as Stuart and Ding (2006) which is why we account for the share of former co-workers in all workers who left for self-employment at $t-1$. We also consider employer patenting activity since the more active the employer is the more knowledge can possibly transferred to a new workplace (Kaiser et al. 2016; Kaiser et al. 2018). Dummy variables for the geographical location of the own employer (Gompers et al. 2005; Fritsch and Falck 2007; Klepper and Sleeper 2005) as well as for the employer sector of main economic activity (Hause and Du Rietz 1984; Nocke 2006) constitute a final set of employer-related variables. Our specifications also include year dummies.

3 Empirical analysis

3.1 Descriptive statistics

Our empirical analysis departs from descriptive statistics where we compare the characteristics of individuals in year t who found a startup at $t+1$ to individuals who do not start a firm. Table 1 displays the means of the respective variables as well as a test for identity of the respective type of startup entrepreneur and those individuals who remain with their present employer, referred to as "stayer" hereafter. We use t-tests for the continuous variables and test for the equality of proportions for the dummy variables. The table shows the corresponding p-values.[5] Table 1 shows that many differences between both USEs and CSEs and the respective group of styers are statistically significant but economically modest. We hence define differences exceeding 30 percent in absolute values as "economically" (and statistically) significant and discuss them in more detail below.

Table 1 about here

USEs and stayers

For university employees all differences between USEs and stayers relate to human capital variables. In particular, holding a degree in engineering and being a TMT member is more prevalent among USEs than among university stayers. The number of own patents is also higher among USE than among the respective group of stayers. The reverse is true for holding a degree in health and holding a Bachelor's degree as well as being a first generation immigrant and being female. Overall, the formal level of education is higher for USEs than for university stayers which is in line with Wennberg et al. (2011).

[5]Note that some cells in the table do not contain figures since they relate to less than ten observations which would violate Statistics Denmark's secrecy restrictions.

CSEs and stayers

Relating CSEs to corporate stayers shows that overall differences to a much lesser extent correspond to human capital variables compared to university employees. CSEs are less likely to hold a degree in health, to hold a PhD, to be a first generation immigrant, to be female and to be employed in larger and more patent active firms. By contrast, CSEs look back at more years of self-employment and are more likely to be TMT members as well as top income earners within their institution.

Note that the mean numer of patents an USE holds is 0.43 while the related figure for corporate startup entrepreneurs is 0.39. To compare, Bonardo et al. (2011) find that the median number of university spinoff patents is six while that of independent startups is two. Their data does, however, relate to European high-tech SME that went public while we use much broader population data that, most importantly, does not focus on high-tech startups that had an IPO.

Startup entrepreneurs from either university or business and their respective colleagues who remain in dependent employment hence do not appear to differ much with respect to family income, family assets as well as family background but differ mostly in terms of human capital and, for corporate employees, income and employer characteristics.

USEs and CSEs

The comparatively little differences between startup entrepreneurs from university or business and their respective group of stayers are reflected by comparatively little overall differences between USEs and CSEs. USEs are more likely to hold a PhD, belong to the 60-80 percent highest earners within their institution and be employed at a larger and more patent-active institution compared to CSEs. By contrast, CSEs are more likely to hold an engineering degree, be a TMT member and are more likely to have had colleagues who left for self-employment.

Most of these difference — employment at larger and more patent-active institutions, holding a PhD and TMT membership — are directly related to the inherent institutional differences between universities and corporations which in turn implies that the only non-institutional differences between USEs and CSEs are the relative position in the employer's income distribution, the field of study and startup activity by former co-workers.

3.2 Regression analysis

While the univariate statistics discussed above provide a first picture of the characteristics of university and corporate startup entrepreurs, this subsection estimates binary logit models to simultaneously account for our set of personal and employer characteristics. The corresponding coefficient estimates and standard errors are displayed in Table 2.[6]

[6]Corresponding marginal effects are relegated to the Appendix. Note that these are small by construction as they should be interpreted relative to a USE share of 0.36 percent and a CSE share of 0.64 percent. Hence, a marginal effect like the 0.215 percent for female university employees actually constitutes a substantial change in the likelihood of becoming an entrepreneur.

We first estimate two separate logit models for university (columns (1)) and corporate employees (columns (2)) for the propensity to becoming a startup entrepreneur. We secondly estimate a joint model where we interact all explanatory variables with a dummy variable for being a corporate employee. The non-interacted coefficients and standard errors of that model are identical to the coefficient estimates for the separate university employee model (column (1)). The interacted coefficients displayed in columns (3) in the table are deviations from the coefficients for university employees.[7] A positive coefficient means that the respective variable has a larger effect on corporate employees than on university employees (and vice versa).

We include the same set of variables as in our descriptive statistics, Table 1. The omitted base categories of our sets of dummy variables are natural sciences (field of education), holding a Bachelor's degree, lowest quintile in the employer income distribution and lowest quintile in the family wealth distribution. We take the logarithm of annual personal and family income, employer firm size and employer patent stock and include squared terms of total working experience, age, tenure, log annual income and log employer size.

Our estimation results largely reflect the differences between USEs and CSEs and the respective groups of individuals remaining with their employer that we discussed in our descriptive analysis already: university employees who are engineers, hold a Master's degree, have gained some self-employment experience on the side, hold more patents, are TMT members, are male and have switched workplaces more frequently are significantly more likely to become USEs rather than to stay at the university. In addition, being among the top 40-60 percent in the family wealth distribution negatively affects the self-employment decision, indicating that university employees with either lower of higher family wealth are more likely to become founders. For CSEs we find that being a TMT member, earning a high relative income, having a self-employed father, being employed at a small firm with few patents increases the likelihood to leave for self-employment.

The interaction model in column (3) shows that the effects of holding a Master's degree in engineering, having aquired some self-employment experience and holding own patens on the likelihood of starting an own business is statistically significantly smaller for corporate employees than for university employees. We do not find statistically significantly different effects for any of the other variables we consider.

Table 2 about here

[7] The results of the interaction model are to be interpreted in a difference-in-difference estimation sense (Donald and Lang 2007) with the first difference being the initial selection into university vs. corporate employment and the second difference being the selection into entrepreneurial activity.

4 Conclusions

Despite the rising importance of university and corporate startup activity surprisingly little is known about the characteristics of the founder of those ventures and how they compare to individuals who stay with their employer. We study these characteristics using exceptionally rich data that allow us to account for a wide set of explanatory variables on human capital, income and wealth, family background and present employer characteristics. In order to make meaningful comparisons we liken university employees to individuals working in the corporate high-tech sector. Our focus is on all individuals with at least a Bachelor's degree in natural sciences, engineering and health.

We document that there overall are very little differences in the determinants of startup choice between university employees and corporate employees. This suggests that entrepreneurship promotion measures need not to be different between university and corporate scientists. In addition, possible performance differences between university and corporate startups are unlikely to be driven by differences in the observed characteristics of the respective founders which in turn might suggest that performance differences may be caused by inheritence effects documented by Agrawal et al. (2016), Clarysse et al. (2011a,b) as well as Wennberg (2011) who do account for a much narrower set of founder characteristics. Future research should simultaneously consider both these institutional factors and the personal characteristics of the founders to explain possible performance differences between university startup employees and corporate startup employees.

Our estimates show that while university startup activity is primarily linked to general human capital, human capital matters much less for corporate startup activity where present employer characteristics play an important role instead as large and patent-active firms are the least likely to lose employees to entrepreneurial activity. This indicates that such large R&D active corporations constitute on average more attractive workplaces for scientists than a possible own startup since they may offer complementary assets and allow specialization. Given that we also show that the corporate employee most likely to leave for entrepreneurship is in a leadership position with a high within firm income — i.e. a corporation's best employees in terms of rank and pay —, an effective HR policy to prevent those employees from leaving would include increased R&D efforts to improve on the research attractiveness and sustained firm growth to create promotion opportunities. Firm growth and innovation are at the same time common industrial policy targets. In addition, corporate HR that has the goal of retaining employees should focus on male employees with a self-employed father who have frequently switched workplaces and with a degree in health or natural sciences, i.e. information that with the execption of father employment status is readily available to HR managers.

For university scientists we find that engineers with a Master's degree in leadership positions who hold patents, who have gained some self-employment experience via jobs on the side, are TMT members, with either low or high (compared to median) family wealth and who have been mobile in the past are most likely to leave university to form a startup. By contrast, present employer character-

istics do not significantly relate to the startup acitivities of university employees. Even though this may be related to relatively little variation across universities, it in turn implies that the observed characteristics which distinguish future entrepreneurs from those remaining in university employment are beyond the direct scope of human resource management, policy makers and university administration. Except for family wealth, all characteristics with significant effects on the entrepreneurial decisions of university employees are, however, observable in CVs which in turn allows policy makers to target specific individuals and university administrators to establish HR policies geared at a well defined group of university employees.

A finding common to both university and high tech industry entrepreneurship is that women appear to be much less likely to leave for an own startup despite our focus on a set of fairly narrowly defined individuals and on Denmark where there are little differences in overall male and female employment rates. Minnitti and Naudé (2010) wonder if this well documented gender gap in entrepreneurship is mainly driven by education, wealth, family and employment status. Our study does account for such differences and still finds ample evidence for a wide gender gap in entrepreneurship. This in turn may imply the existence of socio-cultural reasons or discrimination (Neumark and McLennan, 1995) or differences in individual preferences (Kanazawa, 2005). The existence of discrimation would call for affirmative action which are most easily implemented at universities. In addition, at least universities could fairly easily enhance female entrepreneurship by offering entrepreneurship training programs targeted at female scientists that may also successfully alter female preferences for dependent employment (Bullogh et al. 2015).

Table 1: Descriptive statistics

		University			Corporate			USE =
		stayer	startup entrepreneur	Identity test p-val.	stayer	startup entrepreneur	Identity test p-val.	CSE
	Dummy	(1)	(2)	(1)=(2)	(3)	(4)	(1)=(2)	(2)=(4)
Education field: Natural sciences	1	0.45	0.42	0.21	0.41	0.44	0.10	0.49
Education field: Engineering	1	0.19	0.31	0.00	0.42	0.44	0.14	0.00
Education field: Health	1	0.36	0.27	0.00	0.17	0.12	0.00	0.00
Education length: Bachelor	1	0.44	0.32	0.00	0.23	0.19	0.00	0.00
Education length: Master	1	0.46	0.60	0.00	0.73	0.78	0.00	0.00
Education length: PhD	1	0.10	0.08	0.26	0.04	0.03	0.02	0.00
Years of self-employment experience	0	0.55	0.40	0.22	0.09	0.13	0.08	0.03
Some self-employment experience	1	0.67	0.74	0.00	0.54	0.58	0.01	0.00
Years of working experience	0	17.99	17.55	0.24	18.48	18.58	0.63	0.02
Age	0	42.31	39.97	0.00	40.15	40.56	0.14	0.31
Number of patents	0	0.20	0.59	0.00	0.39	0.43	0.49	0.22
Years of tenure	0	4.37	4.29	0.78	4.92	4.34	0.00	0.87
"Tenure" (more than 3 years at employer)	1	0.35	0.35	0.93	0.45	0.39	0.00	0.16
Top management team member	1	0.02	0.05	0.02	0.06	0.12	0.00	0.00
Gross annual income in DKK	0	502201	578555	0.08	584770	759323	0.00	0.00
Top 80-100% in employer income distribution	1	0.17	0.16	0.41	0.17	0.12	0.00	0.10
Top 60-80% in employer income distribution	1	0.18	0.17	0.48	0.18	0.12	0.00	0.02
Top 40-60% in employer income distribution	1	0.20	0.20	0.99	0.21	0.17	0.00	0.15
Top 20-40% in employer income distribution	1	0.22	0.18	0.03	0.22	0.23	0.54	0.04
Top 20% in employer income distribution	1	0.23	0.30	0.00	0.22	0.37	0.00	0.01
Gross annual family income in DKK	0	604189	619794	0.53	599469	708266	0.00	0.01
Total family assets in DKK	0	2938753	2965818	0.88	2762192	3661413	0.00	0.02
Top 80-100% in family asset distribution	1	0.15	0.21	0.00	0.17	0.18	0.24	0.17
Top 60-80% in family asset distribution	1	0.19	0.18	0.84	0.17	0.16	0.60	0.38
Top 40-60% in family asset distribution	1	0.19	0.17	0.13	0.22	0.21	0.26	0.05
Top 20-40% in family asset distribution	1	0.20	0.22	0.42	0.24	0.21	0.01	0.65
Top 20% in family asset distribution	1	0.27	0.22	0.02	0.20	0.24	0.00	0.42
Married	1	0.61	0.63	0.54	0.63	0.67	0.01	0.09
# of children	0	0.88	1.07	0.00	1.12	1.16	0.29	0.15
Father self-employed	1	0.05	0.06	0.32	0.06	0.08	0.03	0.31
Father wage-employed	1	0.21	0.25	0.06	0.20	0.20	0.70	0.02
Father unemployed or retired	1	0.24	0.28	0.04	0.33	0.32	0.42	0.20
Mother self-employed	1	0.02	0.04	0.12	0.02	0.03	0.24	0.39
Mother wage-employed	1	0.24	0.28	0.04	0.22	0.20	0.09	0.00
Mother unemployed or retired	1	0.34	0.40	0.00	0.46	0.48	0.19	0.01
Spouse self-employed	1	0.02	n/a	n/a	0.02	0.02	0.26	n/a
Spouse wage-employed	1	0.26	0.30	0.04	0.35	0.38	0.03	0.00
Spouse unemployed or retired	1	0.13	0.11	0.40	0.11	0.14	0.07	0.38
1st generation immigrant	1	0.09	0.05	0.00	0.08	0.06	0.01	0.29
2nd generation immigrant	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Female	1	0.32	0.16	0.00	0.28	0.14	0.00	0.25
# of different workplaces	0	8.75	9.52	0.00	7.51	8.20	0.00	0.00
# employees own employer	0	1242	1108	0.03	191	121	0.00	0.00
# patents own employer	0	143	133	0.29	65	33	0.00	0.00
Share workers who became self-employed at own employer	0	0.05	0.06	0.00	0.09	0.14	0.00	0.00
# obs.		126669	443		168768	1083		

Table 1 displays the means of our explanatory variables for USEs (column (1)) vs. university stayers (column (2)) and CSEs (column (3)) vs. corporate stayers (column (4)). It also shows tests for identity of the respective means. N/a refers to too few observations to be compatible with Statistic Denmark's confidentiality requirements.

Table 2: Logit estimation results

	Corporate spinoff entrepreneurs (1)			University spinoff entrepreneurs (2)			Difference university and corporate spinoff entrepreneurs (3)		
	Coeff.	**S.E.**	**M.E. (in %)**	**Coeff.**	**S.E.**	**M.E. (in %)**	**Coeff.**	**S.E.**	**M.E. (in %)**
Corporate spinoff entrepreneur (d)	—	—	—	—	—	—	-1.499	3.092	-0.561
Education field: Engineering (d)	0.498***	0.134	0.130	-0.161*	0.072	-0.079	-0.659***	0.153	-0.247
Education field: Health (d)	-0.15	0.17	-0.039	-0.068	0.118	-0.033	0.082	0.207	0.031
Education length: Master (d)	0.486***	0.139	0.127	0.129	0.083	0.063	-0.357*	0.162	-0.134
Education length: PhD (d)	0.104	0.2	0.027	-0.016	0.218	-0.008	-0.12	0.296	-0.045
Years of self-employment experience	-0.054	0.077	-0.014	0.224	0.124	0.110	0.278	0.146	0.104
Years of self-employment experience^2	0.004	0.003	0.001	-0.021	0.017	-0.010	-0.025	0.017	-0.009
Some self-employment experience	0.335**	0.136	0.087	-0.01	0.085	-0.005	-0.345*	0.161	-0.129
Years of working experience/10	0.383	0.291	0.100	0.09	0.197	0.044	-0.293	0.351	-0.110
Years of working experience^2/100	-0.137	0.084	-0.036	-0.069	0.059	-0.034	0.067	0.103	0.025
Age/10	0.062	0.538	0.016	-0.204	0.345	-0.100	-0.266	0.639	-0.100
Age^2/100	-0.041	0.057	-0.011	0.02	0.038	0.010	0.06	0.069	0.023
Number of patents/10	0.495***	0.083	0.129	0.068	0.09	0.033	-0.427***	0.123	-0.160
Years of tenure/10	-0.409	0.413	-0.107	0.126	0.285	0.062	0.535	0.502	0.200
Years of tenure^2/100	0.191	0.145	0.050	-0.056	0.112	-0.027	-0.247	0.184	-0.093
"Tenure" (more than 3 years at employer) (d)	0.122	0.217	0.032	-0.215	0.132	-0.105	-0.337	0.254	-0.126
Top management team member (d)	0.536*	0.236	0.140	0.358***	0.104	0.176	-0.179	0.258	-0.067
ln(gross annual personal income in DKK)/10	0.064	0.438	0.017	-0.25	0.274	-0.123	-0.315	0.517	-0.118
Top 60-80% in employer income distribution (d)	-0.041	0.194	-0.011	-0.038	0.128	-0.019	0.002	0.232	0.001
Top 40-60% in employer income distribution (d)	0.037	0.219	0.010	0.087	0.123	0.043	0.051	0.251	0.019
Top 20-40% in employer income distribution (d)	-0.17	0.264	-0.044	0.375**	0.122	0.184	0.545	0.291	0.204
Top 20% in employer income distribution (d)	0.148	0.266	0.039	0.674***	0.123	0.331	0.526	0.293	0.197
ln(gross annual family income in DKK)	0.02	0.136	0.005	0.16	0.217	0.079	0.14	0.256	0.052
ln(total family assets in DKK)	-0.018	0.024	-0.005	0.001	0.027	0.001	0.019	0.037	0.007
Top 60-80% in family asset distribution (d)	-0.274	0.153	-0.071	-0.004	0.106	-0.002	0.27	0.186	0.101
Top 40-60% in family asset distribution (d)	-0.366*	0.161	-0.095	-0.054	0.102	-0.026	0.313	0.191	0.117
Top 20-40% in family asset distribution (d)	-0.114	0.161	-0.030	-0.149	0.108	-0.073	-0.035	0.194	-0.013
Top 20% in family asset distribution (d)	-0.164	0.178	-0.043	0.125	0.119	0.062	0.29	0.214	0.108
Married (d)	0.039	0.147	0.010	0.117	0.106	0.058	0.078	0.181	0.029
# of children	0.069	0.055	0.018	-0.056	0.041	-0.028	-0.125	0.068	-0.047
Father self-employed (d)	-0.025	0.21	-0.007	0.307**	0.123	0.151	0.332	0.243	0.124
Father wage-employed (d)	0.005	0.153	0.001	0.072	0.096	0.036	0.067	0.181	0.025
Mother self-employed (d)	0.4	0.266	0.104	0.1	0.193	0.049	-0.299	0.329	-0.112
Mother wage-employed (d)	0.087	0.161	0.023	-0.125	0.1	-0.061	-0.212	0.19	-0.080
Spouse self-employed (d)	-0.202	0.429	-0.052	0.095	0.236	0.046	0.296	0.49	0.111
Spouse wage-employed (d)	0.047	0.161	0.012	-0.042	0.104	-0.021	-0.089	0.192	-0.033
1st generation immigrant (d)	-0.343	0.242	-0.089	-0.086	0.145	-0.042	0.257	0.282	0.096
2nd generation immigrant (d)	-0.099	0.712	-0.026	0.564	0.338	0.277	0.663	0.788	0.248
Female (d)	-0.825***	0.135	-0.215	-0.611***	0.099	-0.300	0.214	0.168	0.080
# of different workplaces	0.080***	0.014	0.021	0.059***	0.011	0.029	-0.021	0.018	-0.008
ln(employees own employer)	-0.397	0.256	-0.103	-0.131*	0.065	-0.064	0.266	0.264	0.100
ln(# employees own employer^2)	0.031	0.021	0.008	-0.006	0.01	-0.003	-0.036	0.023	-0.014
ln(# patents own employer)	0.003	0.019	0.001	-0.021*	0.009	-0.010	-0.023	0.021	-0.009
Share workers who became self-employed at own employer × 10	0.48	0.257	0.000	0.051	0.039	0.000	-0.429	0.26	0.000
***F*-tests for joint significance**	***F*-stat.**		***p*-val.**	***F*-stat.**		***p*-val.**	***F*-stat.**		***p*-val.**
Specification	317.75		0.000	582.97		0.000	163.53		0.000
Human capital	152.18		0.000	47.04		0.000	77.97		0.000
Education field	15.22		0.000	4.99		0.083	19.60		0.000
Education length	12.38		0.002	2.70		0.259	4.87		0.088
Self-employment experience variables	9.83		0.020	5.72		0.126	8.05		0.045
Years of working experience	3.13		0.209	6.64		0.036	0.90		0.639
Age	12.30		0.002	0.51		0.773	7.54		0.023
Tenure variables	2.48		0.479	6.44		0.092	4.13		0.248
Income and wealth	11.77		0.381	85.31		0.000	20.36		0.041
Income variables	5.07		0.408	59.63		0.000	9.83		0.080
Family asset variables	7.63		0.266	11.59		0.072	8.81		0.185
Family background	5.33		0.722	13.03		0.111	7.77		0.457
Parent and partner employment status	2.61		0.856	9.60		0.143	3.95		0.683
Other personal characteristics	81.27		0.000	84.79		0.000	5.34		0.255
Immigration status	2.02		0.365	3.23		0.199	1.47		0.479
Present employer characteristics	25.32		0.001	134.90		0.000	21.22		0.007
Employer size	2.56		0.278	58.89		0.000	5.90		0.052
Region dummies	8.88		0.064	4.21		0.378	4.68		0.322
Year dummies	13.63		0.254	28.07		0.003	3.63		0.980
# obs.	127122			169851			296973		

Table 2 displays the coeffient estimates as well as the corresponding standard error ("S.E.") and the marginal effects for the dummies variables ("M.E." in percent. Column (1) corresponds to corporate spinoff entrepreneurs, column (2) corresponds to university spinoff entrepreneurs and column (3) to the difference in the coefficient estimates between university and corporate spinoff entrepreneurs. The asteriks' correspond to marginal significances at the 0.1, 1 and 5 percent level. (d) denotes dummy variables.

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