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Beyond scientific excellence: Are internationally mobile researchers more likely to become academic entrepreneurs?

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Abstract

This paper extends a growing body of literature on high-value immigrant entrepreneurship to a non-Anglo-Saxon setting. We ask whether there is a premium or discount for immigrants in terms of entrepreneurial entry. Answering this question in the context of academia and comparing immigrants to natives with international experience, returnees, we reduce the potential for confounding effects of education as well as international mobility experience per se as compared to previous studies. We draw on a unique dataset that combines a representative survey of academics in Denmark, their life-time publication records, and information from the Danish business registry. We find evidence that even after controlling for scientific field, performance, and personality traits, immigrant academics in Denmark are significantly less likely to start a company than are Danish returnees. This difference of 6% to 8% suggests that there exist substantial barriers for foreign academics to engage in academic entrepreneurship.

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Abstract

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Key Words: Highly-skilled migration; academic entrepreneurship; scientist mobility; immigrant entrepreneurship

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1 Introduction

Across advanced economies, the number of highly educated immigrants has increased rapidly over the past decade. This has important positive implications for productivity and innovation (OECD, ILO, & The World Bank, 2015). Despite these potential benefits, many countries are exhibiting ambiguous reactions to the growing numbers of immigrants. On the one hand, rising populist movements advocate strong limitations to migration (for example, Trump’s travel ban affecting citizens of seven countries, including Iran and Syria), while on the other hand demographic pressures require developed countries to be able to attract global talent to their local workforce in the hope of ultimately increasing economic growth and innovation (Moretti & Wilson, 2017).

As part of this larger phenomenon, immigrant entrepreneurship is increasingly at the center of public policy discussion (Kerr et al., 2017). Noteworthy anecdotes, such as the role of Sergej Brin as a co-founder of Google, have fueled the idea that immigrants are better able to create innovative and successful companies than a country’s native-born citizens. Scholarly research has also investigated the potential contribution of highly skilled immigrants to high-tech entrepreneurship, finding an over-representation of immigrants as founders of high-tech start-ups (Anderson & Platzer, 2006; Hunt & Gauthier-Loiselle, 2010; Hart & Acs, 2011; Saxenian, 2000; Wadhwa et al., 2007).

While these contributions suggest an important role for immigrants in U.S. high-tech entrepreneurship, there are still important issues to be investigated in order to draw more general conclusions about the existence of an immigrant premium in knowledge-intensive entrepreneurship. First of all, studies regarding immigrants’ participation in high-tech entrepreneurship tend to focus only on the realized events, namely the companies they have created, while not observing the individuals who could have started a company but did not. This means that we will not be able to gauge the actual rate of participation of foreigners from those papers. Second, the literature has highlighted an overall positive relationship between education and business ownership (see for example Unger et al., 2011); as in the United States context, immigrants are often disproportionately represented in

higher education, particularly in fields believed to be conducive to knowledge-intensive entrepreneurship such as science and engineering, it is difficult to disentangle education as a potential source of advantage in high-tech entrepreneurship (Kerr & Kerr, 2016). Finally, most of the existing research focuses on the United States and especially Silicon Valley (Breschi et al., 2015), while similar analysis is lacking for European countries. Broadening the context of this research is important in order to illuminate our research questions, as we need to understand what is the potential for immigrants to contribute to local entrepreneurship and what are the possible barriers they face when entering entrepreneurship, not only in terms of policies but also in terms of language and culture.

In this paper, we seek to understand whether there is a premium or a discount for highly skilled immigrants in entrepreneurial entry by examining a population of highly educated individuals in a non-Anglo-Saxon context. We do so by exploiting a unique dataset that allows us to analyze the entrepreneurial activities of highly skilled immigrants and natives in Denmark. We focus on a specific population, namely university researchers. Academics are an ideal population for this analysis as they are all at the top of the distribution in terms of educational attainment; they are active in research and are therefore likely to establish companies that can disseminate their professional knowledge. Moreover, academics represent a relatively internationally mobile group of workers (Franzoni et al., 2012). As evidenced in this paper, there are a number of immigrant academics in Denmark working in a variety of higher education and research fields. Also, a sizable number of Danish-born academics now working in Denmark spent extended periods working abroad, representing instances of return migration that are crucial for our approach to disentangling the differences in entrepreneurial propensity between highly skilled immigrants and natives.

Within a representative sample of more than 3,400 academics employed in Danish universities in 2017, we are able to distinguish individuals by their country of birth and by their professional experiences abroad. When we first replicate the baseline comparison between immigrants and natives found in previous literature, we do not find any significant difference between these groups in terms of the likelihood of starting a company. We then

proceed to compare foreigners with a subset of natives, namely those with professional experiences abroad (returnees), and we find the former to be *less* likely to start a company in Denmark. This negative difference remains robust even after controlling for researchers' demographics, personality characteristics, and academic performance, strongly suggesting that there are significant barriers that prevent highly skilled immigrants from starting a company in Denmark.

Our paper contributes to the literature in three important ways. First, we provide one of the first population-wide studies on the participation of foreigners in high-value entrepreneurial activities, controlling at the same time for education as a confounding factor. Second, we make use of a population that is widely studied in development economics, namely returnees, in order to obtain a cleaner estimation of the effect of being a foreigner on the likelihood of starting a company, beyond the selection effect of individuals who choose to be internationally mobile. Third, we contribute to the literature on academic entrepreneurship by investigating the role of international experience in spurring venture creation by university researchers.

The remainder of the paper proceeds as follows. Section 2 presents our theoretical framework highlighting the possible sources of a difference in entrepreneurial entry between immigrants and native-born Danes. Section 3 briefly reviews the literature on academic entrepreneurship and international mobility of scientists. Section 4 describes the data and our empirical framework, and Section 5 discusses the results. Section 6 concludes and discusses the policy implications of our study.

2 Immigrant vs. Native Entrepreneurs

The topic of immigrant entrepreneurship is central to policy debates, and there is a large body of literature (mostly focused on Anglo-Saxon countries) documenting higher general rates of business ownership of immigrants compared to natives (Borjas, 1990; Clark & Drinkwater, 2006; Lofstrom, 2002). Only recently have scholars started examining the impact of immigrant entrepreneurs on job creation (Fairlie & Lofstrom, 2015; Kerr et al., 2017).

Particularly interesting for immigration policy is the role of highly skilled migrants in the creation of entrepreneurial ventures. Several streams of literature relate to this issue. The first research stream focuses on immigrant entrepreneurship in the high-tech sector. [Saxenian \(2000\)](#) documented the presence of immigrants as founders of high-tech start-ups in Silicon Valley in the 1980s and 1990s, finding that they accounted for about 24% of founders. [Anderson and Platzer \(2006\)](#) found that in the period 1990-2005, immigrants started 40% of public venture-backed companies in the United States operating in the high-technology space. [Wadhwa et al. \(2007\)](#) interviewed 144 engineering and technology companies founded between 1995 and 2005 and found that 25% had foreign-born CEOs or CTOs. [Hart and Acs \(2011\)](#) found that about 16% of the companies in their sample reported at least one founder who was foreign-born. The second stream relates to the role of immigrants as knowledge creators and transmitters and their subsequent effect on growth and development. In particular, recent work has investigated the role of highly skilled migrants in diffusing knowledge across regional ([Marx et al., 2015](#)) or national borders and in influencing host-country productivity ([Canello, 2016](#)) and innovative capacity ([Filatotchev et al., 2011](#); [Gibson & McKenzie, 2014](#); [Qin, 2015](#)).

Notwithstanding the important insights offered by the literature on immigrants' participation in high-tech entrepreneurship activities and in science, a number of aspects still require further investigation. First, as observed by [Hunt \(2011\)](#), immigrants tend to be disproportionately represented in higher education, especially in the science, technology, engineering, and mathematics (STEM) disciplines. In that case, it is difficult to disentangle the effect of being a foreigner from the effect of being highly educated on the likelihood of starting a company, as this would require adjusting the observed participation rates by the relative participation in higher education of migrants versus natives. [Kerr and Kerr \(2016\)](#) highlight this problem in the context of Silicon Valley, where more than half of high-tech entrepreneurs are of immigrant origin, which is also true for the share of undergraduate students in surrounding universities. Second, a large share of literature in this area focuses on Anglo-Saxon countries, mostly the United States and the United Kingdom. This may be problematic in terms of generalizability of results as these coun-

tries may represent a particularly favorable environment for foreigners to start companies. To begin with, these countries are ethnically diverse; therefore, foreigners may “blend in” with the population more easily than in more ethnically homogeneous countries. Furthermore, as the main language spoken in these countries is English, this may facilitate highly skilled immigrants who may face lower barriers in terms of communicating with natives and understanding rules and regulations. Finally, both the United States and the United Kingdom have well-established institutions in place to support aspiring entrepreneurs (such as professional networks, mentorship programs, venture capital, etc.), making starting a company a more accessible endeavor ([The World Bank, 2018](#)).

These concerns aside, the theoretical arguments underpinning the majority of this literature tend to hold that the factors that predict over-representation of highly skilled immigrants will dominate those that predict under-representation. If the observation that foreigners are indeed over-represented in knowledge-intensive entrepreneurial activities is correct, we could expect it to be the result of immigrants holding an advantage over natives in terms of their predisposition to engage in entrepreneurial activities. As the decision to migrate involves balancing relatively high risks and uncertain future returns, international mobility may indeed positively select individuals with strong entrepreneurial abilities and motivations ([Borjas, 1987](#); [Lin, 2010](#); [Zucker & Darby, 2007](#)). The main argument of this stream of literature is therefore that the observed immigration premium can be attributed to positive selection of migrants ([Borjas, 1987](#)). Moreover, an important prerequisite to entrepreneurship is the recognition of an adequate opportunity ([Shane, 2000](#)). This process of opportunity recognition itself relies heavily on prior knowledge and successful recombination of such knowledge ([Baron, 2006](#)). Thus, it can be argued that immigrants’ international experience may give them access to more distant and diverse knowledge, making them more effective in problem-solving or generating new ideas ([Page, 2007](#); [Berliant & Fujita, 2009](#)), especially in research-intensive activities ([Fujita & Weber, 2004](#)). For example, immigrants may be more alert to opportunities than native-born researchers: [Florida \(2002\)](#) suggests that immigrant entrepreneurs in high-tech are indeed able to recognize different business opportunities than their native counterparts.

This is also empirically shown by [Neffke et al. \(2018\)](#), who demonstrate that non-local entrepreneurs tend to start businesses in industries that are less related to the incumbents in a specific region.

What is largely missing in the current literature, however, is a consideration of the possible negative effects of being a foreigner on the likelihood of starting. The first element that may suggest a negative effect of “foreignness” in terms of participation in entrepreneurship relates to institutional barriers. Immigration policies, such as those described in the Introduction, may formally limit immigrants (or at least some of them) from being allowed to start their own business. Local culture and language may also act as barriers to entrepreneurship. It has indeed been observed that language proficiency is one of the most important determinants of labor market success for immigrants ([Borjas, 1999](#)). Second, exploiting entrepreneurial opportunities requires individuals not only to draw on their personal attributes and resources but also to mobilize their social capital in order to acquire the resources and expertise they need to establish their business ([Davidsson & Honig, 2003](#)). An entrepreneur’s social capital is determined by the network in which he/she is embedded, and it is often highly dependent on the location in which they want to start their activities ([Stuart & Sorenson, 2007](#)). In this respect, foreign entrepreneurs may be disadvantaged compared to native entrepreneurs as they may not have access to local business networks.

Based on these elements, we believe it would be extremely difficult to disentangle the sources of either over- or under-representation of immigrants in knowledge-intensive entrepreneurship from a baseline comparison of immigrants and natives, as a number of different drivers will be confounded in this direct comparison. To solve this enigma, we turn to a select group of natives: returnees. They have been internationally mobile and, upon returning to their native country, they may participate in local entrepreneurial activities. This group of migrants has received attention mainly in the context of emerging countries (e.g., [Batista, McIndoe-Calder, & Vicente, 2017](#); [Filatotchev et al., 2011](#); [Hausmann & Nedelkoska, 2018](#); [Wahba & Zenou, 2012](#)). These studies are mainly concerned with the phenomenon of “brain circulation,” which entails the knowledge and capabilities

migrants acquire while abroad, which they subsequently employ in their home country, following the work by [Saxenian \(2000\)](#). In the context of entrepreneurship, [Batista et al. \(2017\)](#) found a positive effect of return migration in the context of Mozambique. [Wahba and Zenou \(2012\)](#) also found that, even after accounting for endogeneity, return migrants are more entrepreneurial than non-mobile natives. These findings provide additional evidence that a baseline comparison of immigrants and all natives may be confounded by different mobility experiences among the compared groups.

While much less has been said about returnees within an advanced economy context, the arguments suggest that we can make use – theoretically and empirically – of this select group of natives in analyzing the immigrant premium. Returnees share their nationality, culture, and language with other natives, while they have also engaged in migration decisions at some point in time, and they have accumulated international experiences, similar to immigrants. We therefore expect the sources of any difference in entrepreneurial entry to be easier to disentangle when comparing immigrants with returnees, as returnees will not face some of the barriers (similar to other natives) while they benefit from the migration-related advantages (similar to foreigners).

If we compare immigrants with returnees, we can assume that both groups exhibit comparable entrepreneurial predisposition, as proxied by their decision to move to a foreign country at some point in time, and that they may have gained similarly useful knowledge from their experiences abroad. However, returnees do not face any institutional, cultural, or language barriers, as they are operating in their country of birth. Moreover, even if they have been abroad for an extended period, their familiarity with their country of origin will help them to enter domestic professional networks more easily, and therefore they will not be disadvantaged compared to other natives in terms of local social capital, giving them an edge compared to foreigners.

3 Academic Migration and Entrepreneurship

We answer our research questions in the context of academia. There are several reasons this context is particularly suited for our purpose. First of all, there is a large body of lit-

erature documenting how more educated entrepreneurs found more successful businesses and generate more innovations (e.g., [Unger et al., 2011](#)). Several studies have also shown that immigrants tend to be over-represented in highly educated populations, especially in science and technology, which may create inference problems in trying to estimate the sources of differences between immigrants and natives in entrepreneurial activities, as they may be confounded by educational effects ([Kerr & Kerr, 2016](#)). By looking at university scientists, we are focusing only on the very right tail of the educational attainment distribution of the general population, and we can therefore disregard differences in levels of education and make a more meaningful comparison between foreigners and locals.

Second, it is in general very difficult to measure objectively the performance of knowledge workers ([Ernst & Vitt, 2000](#)) and therefore to make inferences about the quality of their human capital. The university context, however, allows observation of meaningful and quantifiable knowledge production outcomes over time. While publications are not perfect carriers of information ([Lissoni et al., 2013](#)), they are undoubtedly the main measure of individual performance in academia ([Stephan, 1996](#)). Moreover, publications in peer-reviewed journals can be evaluated following widely accepted and objective measures, such as the number of citations received or the impact factor of the journal in which the publication appears. This means that we possess a range of measures that can contribute to the evaluation of the quality of the human capital of the individuals we study.

Third, there is a well-established body of literature dealing with academic entrepreneurship (for reviews see [Perkmann et al., 2013](#); [Rothaermel et al., 2007](#)). Here we define academic entrepreneurs as researchers who actively participate in the founding of new companies while retaining their employment at their university. Looking at different countries, on average 10% of university researchers could be classified as academic entrepreneurs according to this definition ([Perkmann et al., 2013](#)). While scholars have studied multiple factors affecting the propensity of researchers to become entrepreneurs, including gender, academic age, position, scientific discipline, and quality of the university of affiliation ([Perkmann et al., 2013](#)), more work is needed to investigate the role international experience through migration. [Yasuda \(2015\)](#) investigates the role of different

forms of mobility for academic entrepreneurship. In this study on Japanese scientists, international mobility was strongly correlated with academic entrepreneurship.

Finally, academics act as important transmitters of knowledge across geographical distances (see for example [Moser et al., 2014](#)). There is strong evidence linking international mobility of scientists with superior scientific performance. [Stephan and Levin \(2001\)](#) investigated whether foreign-born and foreign-educated scientists are overrepresented among those scientists making exceptional contributions. They find that they are more often elected to the National Academy of Sciences and also tend to author more highly cited papers. Also [Franzoni et al. \(2014\)](#) found that mobile scientists outperform local ones in terms of impact. This link is important as the literature has also shown that the most scientifically productive academics possess intellectual human capital of extraordinary scientific and pecuniary value ([Zucker & Darby, 1996](#)) and may therefore also contribute disproportionately to innovation and growth if engaged in entrepreneurial activities.

4 Data and Empirical Framework

In order to answer our research questions, we employed a unique dataset covering the entrepreneurial and scientific activities of 3,477 researchers with known migration status who are currently employed in academic institutions in Denmark. The dataset consists of two main parts: the first one was collected through a survey addressed to the entire academic population active in Denmark in 2017; the second one contains detailed bibliographical information about the lifetime production of all researchers who have published at least once in the period from 1970 to 2018 with a Danish affiliation. Other datasets complemented the main datasets, notably a repository of Ph.D. dissertations (“Forskningss databasen”) and the Danish business registry, which facilitated a robustness check to validate the start-ups reported in the survey of academics.

4.1 The Danish Context

Denmark is a small European country with an advanced economy. It has a business-friendly regulatory environment as measured by the World Bank’s “Ease of doing business” indicator:¹ Denmark is ranked 3rd, behind New Zealand and Singapore, in 2018, ahead of the United States and the United Kingdom, which are in 6th and 7th place, respectively. The general “Ease of doing business” indicator takes into account a broad set of business regulations within a country, including registering property, resolving insolvency, obtaining credit, etc. When comparing specifically in terms of conditions for starting a business, Denmark ranks 14th, in between the United Kingdom (7th place) and the United States (49th place).

Overall, according to the OECD,² around 9% of the Danish workforce is self-employed (compared to 6% in the United States and 15% in the United Kingdom). There are notable differences between the self-employment rates of immigrants and natives. According to an [OECD](#) report, in 2010, 7% of native Danes were self-employed as compared to 9.6% of the foreign-born. This measure, however, is very inclusive and would also include many small businesses as well as necessity-driven entrepreneurs. When looking only at academic entrepreneurship, about 12% of our respondents indicated involvement in setting up a company. This number closely resembles the academic entrepreneurship rates in other advanced economies, such as Sweden ([Klofsten & Jones-Evans, 2000](#)) or the United Kingdom ([D’Este & Perkmann, 2011](#)).

In terms of formal regulations, there are no differences in the rules for business registration that apply to residents in Denmark based on their citizenship. Hence, the same rules apply to all respondents in our survey, who, as employees of Danish universities, are most likely also residents of Denmark.

In the context of academic entrepreneurship, there are some aspects of public regulation that could potentially affect the possibility of immigrant academics starting a company while remaining employed at a Danish university. Most immigrant researchers

¹World Bank/IBRD: Doing Business 2018 Reforming to Create Jobs.

²<https://data.oecd.org/emp/self-employment-rate.htm>

are staying in Denmark on academic work permits sponsored by their university.³ For EU citizens, there are no public regulations with regard to having side jobs or starting up a company. For non-EU citizens, there has been a presumption that immigrant researchers were allowed to have side jobs (and by extension, to start a firm) if that activity was related to their academic work at the sponsoring university. Still, any institutional uncertainty about restrictions implied by work permit regulations on start-up activities could have acted as a deterrent to setting up a company for resident non-EU citizens.⁴

As noted earlier, language may act as a barrier to entrepreneurship for immigrants. Denmark is consistently highly ranked in terms of its population's average English proficiency (ranked third among non-English speaking countries in Europe according to the EF English proficiency index).⁵ Still, Danish is the official administrative language and while official websites have increasingly become available in English, for example, for dealing with the immigration authority⁶ or for business registration purposes,⁷ a lack of proficiency in Danish may have hampered entrepreneurial aspirations for immigrants during much of the period covered by our data.

4.2 Data

The survey was sent out in October 2017 to all academics working at any of the eight Danish universities. The population is defined to include active researchers who conducted research work within the last five years for which a PhD or equivalent degree would usually be required. Thus, PhD students, technicians, and administrative staff as well as inactive researchers are excluded. A total of 4,836 faculty members responded to the survey, equivalent to an overall response rate of 38%, higher than the response rate

³<https://nyidanmark.dk>

⁴The institutional uncertainty became evident and was resolved after some high-profile public cases during 2017 in which academics with non-EU citizenship were fined for performing, for instance, consulting activities and for grading at other Danish universities (<https://www.insidehighered.com/news/2017/11/28/american-professor-denmark-says-shes-being-targeted-immigration-officials-delivering>). Following those cases, it was finally mandated by law in June 2018 that non-EU citizens can legally perform university-related side activities while on a researcher work permit.

⁵<http://www.ef.com/epi/>

⁶<https://nyidanmark.dk/en-GB>

⁷<https://danishbusinessauthority.dk/business-denmark>

to previous surveys in Denmark and abroad⁸ Although the survey represents a cross-section of academics in Denmark at a given point in time, the collected data includes rich longitudinal information on respondents' migration histories and their professional experience. To minimize the importance of any of the method biases often associated with surveys, such as recall bias or common source bias (Podsakoff et al., 2003), we triangulated our findings with measures of start-up activity derived from other sources.

To obtain information about the academic performance of the respondents, we linked the survey with publication and citation data from Scopus. The link was established via a name-matching algorithm that also took into account the scientific field and affiliation. We also did manual lookups of researcher CVs available at university homepages to resolve any ties. Of the total of 4,836 respondents, we matched publication histories to 4,332 researchers (89.6%). The unmatched respondents include both people who could not be matched due to problems such as name changes or misspellings and researchers with no publications in journals indexed in Scopus.

4.3 Variables

This rich data set enables us to reconstruct the career trajectory of each academic. From the survey, we can identify the country of birth, and we define those born outside of Denmark as *immigrants*. Further, the survey allows us to differentiate between two groups of Danish-born academics, namely *returnees* and other natives, whom we term *stayers*. We define the former group as those who went abroad for at least one year after starting their career. This implies that we can assume that the move was initiated by the academics themselves (and not, e.g., by their parents) and that they obtained professional experience abroad. In order to define whether a mobility event happened after the career start or not, it was necessary to define the year of career start. As we investigate academics, we define the career start as the year in which a PhD was obtained minus four years.⁹

⁸For further information about the representativeness of the survey, see [Blinded].

⁹While this information is available from the survey for all respondents who obtained their PhD outside of Denmark, we had to complement this information for those who obtained it at a Danish institution. To do so, we made use of the Danish PhD data base ("Forskningsdatabasen") and linked the information based on name and scientific field. For unmatched respondents, we inferred the year of the career start based on their first publication minus four years (or their first research-based company minus one year).

The survey further contains information about international mobility for academic as well as non-academic purposes, such as attending high school, volunteering, or working at a university. For each stay abroad, we also know the start year as well as the duration and the destination country. Overall, our sample contains 977 immigrants, 494 returnees, and 1,788 stayers.

Our main measure of entrepreneurial activity is derived from the survey. We asked respondents if they, at some point in their academic career, had been involved in starting a company based on their research. Compared to a registry-based analysis, this measure has the advantage that it also allows us to observe entrepreneurial activities outside of Denmark. The academic survey is also our source of demographics such as academic position, academic field, and country of birth. Gender was determined based on given name using the code available at the homepage genderize.io. Further, there is a large body of literature linking personality traits to entrepreneurial outcomes (for an overview, see [Kerr et al., 2018](#)). Therefore, we also administered a set of questions to measure *Big Five* personality characteristics ([Rammstedt & John, 2007](#)) as well as risk tolerance ([Charness et al., 2013](#)) and information about attitudes towards the commercialization of their research.

4.4 Empirical method

Our empirical analysis seeks to answer the question of whether there is an immigration premium or discount for science-based entrepreneurship in Denmark and what the likely drivers of this difference are. To decompose the difference, we first reconstruct the standard baseline comparison between immigrants and all natives (e.g., [Fairlie & Lofstrom, 2015](#)), regardless of their international mobility status (Model 1). In a subsequent analysis, we compare immigrants to internationally mobile natives only, namely the returnees (Model 2). In both models, we control for a set of personal and professional characteristics. For ease of interpretation of our results, we apply ordinary least squares (OLS) to estimate the marginal effects despite the fact that our dependent variable has a binary outcome. However, to ensure that our estimator is not biased, we also employed logit

estimations and show in the section on robustness checks that the results are in fact fully robust.

The estimated models are as follows:

$$\begin{aligned} EntrDKA_i = & \beta_1 Immigr_i + \beta_2 Years\ in\ DK_i + \beta_3 DEMO_i \\ & + \beta_4 DISP_i + \beta_5 PERF_i + \varepsilon_i \quad (1) \end{aligned}$$

In Model 1, the binary dependent variable, *EntrDKA*, takes a value 1 if the academic *i* has been involved in starting a company in Denmark and 0 otherwise. The variable *Immigr* is a dummy variable that indicates whether the academic is foreign-born, and *Years in DK* indicates the number of years the academic has spent in Denmark since starting his or her career. This is our measure of the “time at risk” of starting a research-based company in Denmark. *DEMO* is a vector of demographic characteristics, including *gender*, the *academic age at risk start*, and the *scientific field*. By controlling for the years at risk of starting a company in Denmark and their academic age, we are able to control for the seniority of academics at the same time. Further, *DISP* is a vector of variables approximating the entrepreneurial predisposition and personality characteristics of the researcher, such as *risk tolerance* and *openness*, as well as attitudes such as whether they perceive their research as not being relevant to anyone outside of academia and whether they consider it important to strengthen the utilization and commercialization of their research. Of these, *openness* has consistently been positively associated to starting entrepreneurial ventures (Kerr et al., 2018). Finally, we control for academic performance, *PERF*, by adding the average number of citations that an academic’s publications received within a three-year window following the publication year.

The second model we consider is tailored to the comparison of immigrants and returnees. Importantly, it allows us to account for any start-up activity that happened before entering Denmark in the case of immigrants or before re-entry into Denmark in the case of returnees.

$$\begin{aligned}
EntrDKAM_i = & \beta_1 Immigr_i + \beta_2 PrevAeExp_i + \beta_3 Years\ after\ (re-)entry_i \\
& + \beta_4 DEMO_i + \beta_5 DISP_i + \beta_6 PERF_i + \varepsilon_i \quad (2)
\end{aligned}$$

Model 2 is largely the same as Model 1, although a few adaptations are made to account for the mobility of returnees. Firstly, the outcome variable, *EntrDKAM*, now only considers post-mobility entrepreneurial activities. To account for any pre-mobility entrepreneurial activity, a dummy for previous entrepreneurial experience (*PrevAeExp*) is added. As we now only look at post-mobility events, it is also necessary to adjust the risk variables for returnees. Thus, their *Years after (re-)entry* will be adjusted so that they are calculated from the year they returned to Denmark and their academic *age at risk start* is adjusted accordingly and now denotes their academic age in the year they returned to Denmark. Model 2 is estimated for the sub-sample that consists of immigrants and returnees only.

The basic descriptive statistics and the correlation coefficients for the variables of the two models are found in Table 1 for the full estimation sample and in Table 2 for the immigrants-and-returnees sub-sample.

[INSERT TABLE 1+2 HERE]

5 Results

In Table 3, we compare immigrants and natives across the characteristics that may influence their likelihood of starting a company. This baseline comparison considers the two groups usually found in the literature, namely immigrants (foreign born) and natives (born in the focal country). We find significant differences between the groups that might relate to entrepreneurial propensity. First, the importance of taking time at risk into account is evident as native academics are at risk of starting a firm at any point during their careers, while immigrants are assumed to be at risk of setting up a firm in Denmark

only after having immigrated to the country. As expected, immigrants are significantly more open to experience than the average native, while we find no statistical difference in terms of risk tolerance. Immigrants are more likely than natives to consider their research not relevant to external organizations and therefore perceive it as a barrier to commercialization, while there is no difference in terms of the importance given to commercialization as a motivation to engage with industry. Gender distribution is balanced across the two groups. Finally, researchers' scientific performance, measured as the average number of citations received by each paper within three years after publication, are on average higher for immigrants than for natives.

[INSERT TABLE 3 HERE]

Table 4 presents the baseline regression comparing the entrepreneurial activities in Denmark of immigrants versus natives.¹⁰ As would be expected, the number of years in Denmark and the age at risk start show a fairly high correlation, whereas the remaining correlations are small. Overall, there is a low level of multicollinearity in this regression, and the variance inflation factors remain well below any critical level (Belsley & Kuh, 1980).

[INSERT TABLE 4 HERE]

As described in the previous section, we run a cross-sectional regression of the indicator of having established a firm in Denmark based on the researcher's own research at any time during his/her academic career in Denmark (four years before PhD or later). Column (1) shows an unadjusted differential of a negative 7% between immigrants and natives, that is, an immigrant discount in contrast to the immigrant premium often found in the literature. The coefficient is statistically strongly significant. In Column (2), we control for time at risk, the number of years spent professionally as an academic in Denmark, as by definition natives on average spend a longer portion of their career in Denmark than immigrants. The coefficient estimate suggests that academics on average gain in terms of entrepreneurial propensity at the rate of 0.6 percentage points per year in which they

¹⁰Table 1 shows the correlation matrix for the independent variables in this regression.

are active in Denmark, while in this specification there is no longer a statistically significant coefficient differentiating immigrants from natives in terms of their entrepreneurial activities. Column (3) further corrects for different compositions of immigrant and native pools of academics in terms of demographic characteristics. As expected from previous studies (Clarysse et al., 2011), we find men to be more entrepreneurial than women. To control for any life-cycle effects, we include the academic age at which researchers become at risk of starting a firm. The results show that academic age has no significant effect on entrepreneurial propensity over and above the increased time at risk that accompanies higher academic age. As different disciplines may be more conducive to being commercialized (Perkmann et al., 2013), we include scientific field dummies. We find that engineers and social scientists are significantly more likely to engage in knowledge-intensive entrepreneurial activity than the base category (agricultural scientists).

In Column (4), we account for inherent differences between researchers in terms of measures of entrepreneurial disposition and opportunity recognition. A greater degree of openness¹¹ to experience and higher motivation to commercialize one's research matter positively and significantly for the propensity to set up a firm. Risk tolerance and being unable to see the relevance of one's research to non-academic organizations, in contrast, are found to be largely unrelated to academic entrepreneurship. This finding is somewhat surprising, as the literature usually claims that entrepreneurs are more risk tolerant (e.g., Hvide & Panos, 2014). Finally, in Column (5) we control for the scientific performance of the researcher in terms of the average number of citations received by his/her publications within a three-year window. This variable shows no significant correlation with academic entrepreneurship. Looking across the models in this table, we find that, controlling for a broad set of demographics as well as measures of entrepreneurial disposition and academic performance of the researcher, the immigrant discount diminishes to less than three percentage points and becomes statistically insignificant.

As discussed in Section 2, the baseline comparison between immigrants and all natives contained in Table 4 is likely confounded by the fact that all immigrants by definition

¹¹In unreported results, we also controlled for other Big-5 personality traits but did not find any effect.

have been internationally mobile, whereas many natives have not. With one group experiencing international mobility by construction, there is the risk that the groups differ in terms of some characteristics that are correlated at the same time with international mobility and entrepreneurship. Correcting for personal characteristics is a partial remedy for this. However, mobility and entrepreneurship decisions, in addition to being correlated with researchers' observable characteristics, are also likely to depend on unobserved factors that differ between mobile and non-mobile researchers in systematic ways. This would confound the interpretation of the estimated immigrant discount as an effect of "foreignness." To avoid confounding by differential mobility status, we now compare the immigrants to another internationally mobile group, namely returnees. For the reasons noted above, we expect this comparison to produce a cleaner measure of the effect of "foreignness" on academic entrepreneurship.

[INSERT TABLE 5 HERE]

In Table 5 we compare the subpopulations of immigrants and returnees. As observed in Table 3, time at risk is significantly higher for researchers born in Denmark than for immigrants, even if the returnees spent a period abroad. A higher proportion of returnees than immigrants are men, whereas the scientific performance of the two groups is very similar. However, differences in all other dimensions have been reduced in comparison to Table 3. As expected, immigrants are overall more comparable to returnees than to the comprehensive group of all native researchers on the basis of their observable characteristics.

Table 6 presents the regression Model 2 comparing the entrepreneurial activities in Denmark of immigrants with those of returnees. As we aim at isolating the effect of "foreignness" from that of international mobility, the dependent variable in this regression accounts for entrepreneurial activity in Denmark after the mobility event (namely immigration to Denmark for immigrants and return to Denmark after a period abroad for returnees).

[INSERT TABLE 6 HERE]

Looking at Column (1), the gross differential is now a negative 9%, that is, there is an even larger discount for the immigrant population. Column (2) introduces the time at risk. Focusing on returnees allows us to make a cleaner comparison regarding the relevant period in which to compare entrepreneurial activity. For immigrants, it is again the time since entry into Denmark. For returnees, it is the time since they re-entered Denmark following their (first) significant stay abroad.¹² Model 2 also allows us to account for any start-up activity that pre-dates the period at risk. Hence, Column (2) also includes a dummy for having previous (prior to the mobility event) science-based start-up experience. Once we correct for the length of time for which researchers have been at risk of becoming entrepreneurs in Denmark, and any previous experience, the immigrant discount is significantly reduced to around 5%. Columns (3) to (5) successively introduce into the model demographic characteristics, measures of entrepreneurial predisposition, and opportunity recognition as well as scientific performance. Coefficients of these control variables are similar to those in Table 4 in terms of sign and significance. Controlling for these factors leaves the immigrant discount between 6% and 8% and statistically strongly significant.

5.1 Robustness Checks

We conducted a set of robustness checks for the full specification of the immigrants versus returnees model in Table 7. The main results from Column (5) of Table 6 are reproduced in Column (1) for ease of reference.

First, acknowledging that our outcome variable is binary, we re-ran our model as a logit regression, reporting the coefficients in Column (2) and the marginal effects in Column (3) of Table 7. While the estimate of the immigrant discount is slightly lower in the logit and the marginal effect of time at risk accrues at a slightly lower rate than it does according to the OLS results, all results remain qualitatively the same.

[INSERT TABLE 7 HERE]

¹²A number of returnees experienced multiple mobility events (23.7%): for those, we only consider their first international experience and the time spent in Denmark before they leave the country again.

Second, as our outcome variable is survey-based and retrospective, it may be subject to recall bias. To rule out that our results are driven by the respondents reporting founding a company when they were not actually directly involved in setting it up, we matched the respondents in our sample to the Danish business registry. We matched by researcher’s name and did manual lookups on the researcher’s university webpage (and LinkedIn profile, if available) to ascertain their role in the start-up. Based on this, we refined our outcome variable to only consider as entrepreneurs those respondents who were also linked to a company in the business registry.¹³ Hence, in the immigrants versus returnees sample that we consider in Table 7, the overall number of researchers who could be categorized as entrepreneurs fell from 148 to 107. Despite the refinement of the dependent variable, the results are again qualitatively similar to the main results in Column (1).

As a final robustness check, and in line with the literature on high-tech entrepreneurship and STEM researcher migration, we ran the model on a sub-sample that included only STEM-field researchers (Column (5)). While this reduces the available number of respondents by about a quarter, leaving out Arts and Humanities as well as Social Sciences, all results stay within a close range of the main results, confirming the existence of a significant immigrant discount and, overall, no qualitative change of results.

6 Discussion

Our analysis suggests that immigrants are under-represented in knowledge-intensive entrepreneurship activities among academics employed in Denmark. In contrast to findings in previous studies on the share of immigrants among high-tech entrepreneurs, we show that when educational attainment and international mobility are taken into account, immigrants seem to face specific barriers to establishing new ventures. In particular, we show that when comparing foreign-born academics to returnee academics (Danish-born researchers who have spent a considerable period abroad before returning to Denmark),

¹³We were not able to implement similar refinements in terms of pre-move entrepreneurial experience of immigrants, which would most likely relate to a foreign firm. The dummy variable for pre-move experience in Column (4) of Table 7 hence still relies on the survey information.

the “foreignness” discount is between 6% and 8%. Considering that the overall rate of entrepreneurship in our sample is 12%, this is indeed a sizable discount.

This comparison arguably allows for a cleaner measure of the cost of “foreignness” in terms of academic entrepreneurship. Accounting for mobility – comparing immigrants to internationally mobile natives – and for education – all subjects in our analysis are highly educated university researchers – suggests that the finding in the literature of an immigrant premium in knowledge-intensive entrepreneurship is liable to be positively confounded by educational attainment and by failure to account for differences between groups in terms of international experience.

An alternative explanation for the entrepreneurial discount of immigrants may be that foreign-born academics are negatively selected. While we do not have the data to rule this out for each country of origin, we can infer their academic performance as compared to native Danes. In terms of our publications citation measure, we can note that foreign academics perform as well as internationally mobile Danish academics and significantly outperform the broader group of all native academics. This finding is in line with previous findings by researchers such as [Franzoni et al. \(2014\)](#). Our analyses also allow us to conclude that the results are not driven by any difference between immigrants and natives in terms of their entrepreneurial abilities. Thus, in Table 6 we show that when considering only pre-mobility entrepreneurial activities, there is no statistical difference between immigrants and returnees. Over all, we are unable to find any evidence that immigrant academics in Denmark are negatively selected, which supports our interpretation that the immigrant premium is indeed caused by “foreignness” and not by negative selection of immigrants.

Our findings carry important implications for the wider research field on migration and innovation. More specifically, we contribute to the literature on immigration and high-value entrepreneurship by overcoming technical shortcomings of previous studies. Regarding this, we employ a sampling strategy that allows us to circumvent education as a confounding factor ([Hunt, 2010](#)) as well as avoiding selection on the outcome variable ([Hart & Acs, 2011](#)). Specifically, we draw our sample from the population of Danish

academics rather than looking at actual founders or founding teams only. Looking at academics also has the advantage that all respondents are by definition drawn from the right tail of the education distribution. An additional advantage of investigating academics is that we are able to observe professional performance dimensions that would otherwise be unobserved. Further, we draw on insights from the development economics literature and introduce returnees as a more adequate control group. In so doing, we confirm the widely positive effects of return-migration (e.g., [Hausmann & Nedelkoska, 2018](#); [Wahba & Zenou, 2012](#)) in the context of a developed country. This creates opportunities for further research on the effects of return migration and unpacking what migrants gain while remaining abroad. Finally, we study immigrant entrepreneurship in an advanced country and non-Anglo-Saxon context, which has important implications for a wider set of countries, as it may uncover previously unobserved practical barriers, for example related to language.

Further, we contribute to the more general literature on academic entrepreneurship. Very few previous studies investigate the link between international mobility and academic entrepreneurship (e.g., [Yasuda, 2015](#)). With our study, we provide additional evidence for a positive relationship between international mobility of native scientists and academic entrepreneurship. Additionally, we find evidence for the importance of accounting for nationality in the context of academic entrepreneurship, especially against the background of a rapidly increasing share of foreign faculty members at universities in Denmark and elsewhere.

6.1 Policy Implications, Limitations, and Future Research

Our findings also speak to a wider policy discourse. Many governments are actively incentivizing migration of high-skilled people to their countries ([OECD, ILO, & The World Bank, 2015](#)), anticipating large contributions to the economy. The Danish Government runs the “Start-up Denmark” program, a visa scheme launched “to allow talented entrepreneurs to relocate and grow high-impact start-ups in Denmark.”¹⁴ Our findings,

¹⁴<http://www.startupdenmark.info/>

however, suggest that immigrants face substantial barriers that prevent them from contributing fully to society. Actively lowering such barriers should be a priority in the design of immigration policies, as it would increase the societal benefits of high-skill immigration. In addition, universities may have an important role in facilitating foreign faculty to commercialize their research via the establishment of a company. This could be achieved, for instance, through dedicated efforts of technology transfer offices.

Our study assigns an important role to native returnees in identifying the role of “foreignness” in local entrepreneurship. While return migrants have been at the center of an extensive policy discussion related to emerging economies (see [Lissoni, 2018](#)), our results open a range of potential policy issues in the context of advanced economies. Specifically, we find that academic returnees upon their return are likely to be contributors to the local economy in terms of research-based start-ups. This is an aspect of academic mobility that goes beyond scientific excellence in a narrow sense. However, it should be taken into account when considering the merits of public support of, for instance, international postdoctoral grants or academic exchange, both of which are currently supported by the Danish government (through the Independent Research Fund Denmark).¹⁵

Our study should be interpreted within the confines of a couple of limitations. First, while we have intentionally ventured outside the predominantly Anglo-Saxon context of existing studies, our results are based on a specific institutional set-up. This may of course have implications for further generalizability of our results. Second, we look at the phenomenon of immigrant entrepreneurship in the context of academia. While this allows us to overcome the effect of some confounding variables, it is also connected to a set of shortcomings. Thus, certain personality traits that are commonly considered as crucial for entrepreneurship may play a different role in the context of academia. Take for example risk tolerance – starting a company as an academic is connected to much less risk in the traditional sense, as most individuals have fixed employment they do not have to give up in starting up a company. It is rather a decision of how to allocate time and resources. Closely connected to this is the limitation that our analysis builds on survey

¹⁵<https://dff.dk/>

data. This implies that we are unable to observe individuals who have left academia because they became successful entrepreneurs. Further, we cannot exclude that survey responses are biased towards an academic's most recent and most successful ventures. Finally, we are not able to observe where exactly academics went and what they were doing while abroad. This might be important to know, as it would inform us about the potential entrepreneurial benefits they gained while abroad.

Our analysis stops short of a full decomposition of the potential barriers to immigrant entrepreneurship, in particular with regard to the extent to which these barriers may be related to policy regulations, networks, or culture. With regard to regulations, we investigated whether there is any difference between immigrants with EU citizenship and those without. As previously pointed out, the former group of researchers should face no formal regulations that do not also apply to natives, whereas for the latter group, there has been a recent period of institutional uncertainty related to work permits, which could potentially be perceived as a barrier to entrepreneurship. We hence ran an extension of our full model, Model (5) in Table 6, in which we split the *Immigr* dummy into separate dummies for EU and non-EU citizens. While the results show a somewhat higher discount for non-EU researchers, the difference is not significant, indicating perhaps that the effects of institutional uncertainty are quite limited.

These limitations open avenues for future research. Thus, it would be of importance to disentangle the entrepreneurial effect of international mobility in greater detail. Asking the question whether all migration instances are equal or whether it is rather the exposure to an entrepreneurial culture that promotes subsequent entrepreneurship ([Bercovitz & Feldman, 2008](#)) should be a first priority. Additionally, it is also of utmost importance to understand what barriers foreign academics actually face in starting up a company. Do these barriers relate rather to formal barriers connected to legal regulations, such as visa regulations and other formal requirements that may apply to foreign citizens in a focal country? Or are they informal barriers, such as cultural or linguistic distance, which make it more difficult to build the local network required to understand local market conditions and the institutional context to start a company? Further evidence on the importance of

either is required to guide public policy and to realize the full potential of immigrants to contribute to innovation and growth in the domestic economy.

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Tables

Table 1: Correlation Matrix – Immigrants versus All Natives

| | mean | sd | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|-----------------------|--------|--------|-----------|-----------|----------|----------|---------|---------|----------|--------|-----|
| (1) Immigr | 0.297 | 0.457 | 1 | | | | | | | | |
| (2) Years in DK | 18.019 | 11.400 | -0.415*** | 1 | | | | | | | |
| (3) Age Risk Start | 1.902 | 4.732 | 0.618*** | -0.314*** | 1 | | | | | | |
| (4) Male | 0.671 | 0.470 | 0.036 | 0.142*** | 0.057** | 1 | | | | | |
| (5) Risk Tolerance | 3.578 | 1.894 | -0.039 | -0.013 | 0.009 | 0.099*** | 1 | | | | |
| (6) Openness | 3.541 | 0.751 | 0.087*** | -0.017 | 0.086*** | 0.046* | 0.051* | 1 | | | |
| (7) Irrelevance | 0.109 | 0.311 | 0.078*** | -0.126*** | 0.028 | -0.041* | -0.032 | -0.035 | 1 | | |
| (8) Commercialization | 0.457 | 0.498 | 0.038 | -0.057** | -0.018 | -0.005 | 0.064** | 0.062** | -0.043* | 1 | |
| (9) Citations | 9.915 | 12.530 | 0.074*** | -0.097*** | 0.041* | -0.022 | 0.003 | -0.000 | 0.080*** | -0.015 | 1 |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

$N = 2376$

Table 2: Correlation Matrix – Immigrants versus Returnees

| | mean | sd | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|-----------------------|--------|--------|-----------|-----------|----------|----------|--------|--------|---------|--------|--------|------|
| (1) Immigr | 0.635 | 0.482 | 1 | | | | | | | | | |
| (2) Years in DK | 16.451 | 12.428 | -0.330*** | 1 | | | | | | | | |
| (3) Age Risk Start | 4.065 | 6.250 | -0.161*** | -0.106*** | 1 | | | | | | | |
| (4) Male | 0.715 | 0.452 | -0.053 | 0.099*** | 0.094** | 1 | | | | | | |
| (5) Risk Tolerance | 3.526 | 1.886 | -0.043 | -0.015 | 0.061* | 0.087** | 1 | | | | | |
| (6) Openness | 3.600 | 0.733 | 0.075* | -0.009 | 0.029 | -0.001 | 0.051 | 1 | | | | |
| (7) Irrelevance | 0.130 | 0.336 | 0.064* | -0.113*** | -0.035 | -0.035 | -0.018 | -0.029 | 1 | | | |
| (8) Commercialization | 0.468 | 0.499 | 0.048 | -0.061* | -0.068* | -0.031 | 0.044 | 0.040 | -0.061* | 1 | | |
| (9) PrevAeExp | 0.040 | 0.195 | -0.019 | -0.027 | 0.267*** | 0.108*** | 0.054 | 0.042 | -0.051 | 0.032 | 1 | |
| (10) Citations | 11.062 | 13.451 | 0.027 | -0.124*** | 0.006 | -0.003 | 0.038 | 0.005 | 0.043 | -0.006 | -0.033 | 1 |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

$N = 1112$

Table 3: T-tests Immigrants versus All Natives

| | Immigrants | Natives | Difference |
|-------------------|------------|---------|------------------------|
| Years in DK | 10.740 | 21.100 | -10.360*** (-22.32) |
| Age Risk Start | 6.389 | 0.000 | 6.389*** (38.42) |
| Male | 0.695 | 0.661 | 0.034 (1.637) |
| Risk Tolerance | 3.464 | 3.626 | -0.162 (-1.914) |
| Openness | 3.639 | 3.498 | 0.141*** (4.196) |
| Irrelevance | 0.145 | 0.0922 | 0.053*** (3.829) |
| Commercialization | 0.484 | 0.445 | 0.039 (1.740) |
| Citations | 11.310 | 9.276 | 2.030*** (3.636) |

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: OLS – Immigrants versus All Natives

| | (1) | (2) | (3) | (4) | (5) |
|----------------------------|----------------------|--------------------|--------------------|--------------------|--------------------|
| Immigr | -0.067*** (-5.94) | -0.010 (-0.81) | -0.030* (-1.99) | -0.026 (-1.60) | -0.027 (-1.51) |
| Years in DK | | 0.006*** (9.32) | 0.006*** (9.08) | 0.006*** (9.04) | 0.006*** (8.11) |
| Male | | | 0.039*** (3.48) | 0.039*** (3.31) | 0.048*** (3.74) |
| Age Risk Start | | | 0.001 (0.79) | 0.001 (0.65) | 0.001 (0.76) |
| Arts and Humanities | | | 0.003 (0.10) | 0.006 (0.22) | -0.001 (-0.03) |
| Engineering | | | 0.140*** (4.43) | 0.136*** (4.20) | 0.139*** (4.15) |
| Medical and Health | | | 0.024 (0.91) | 0.060* (2.17) | 0.077** (2.70) |
| Natural sciences | | | 0.031 (1.15) | 0.044 (1.60) | 0.050 (1.77) |
| Social sciences | | | 0.078** (2.86) | 0.100*** (3.53) | 0.115*** (3.86) |
| Risk Tolerance | | | | 0.003 (0.83) | 0.005 (1.33) |
| Openness | | | | 0.038*** (4.75) | 0.039*** (4.34) |
| Irrelevance | | | | -0.012 (-0.82) | -0.010 (-0.60) |
| Commercialization | | | | 0.085*** (6.74) | 0.093*** (6.67) |
| Citations | | | | | 0.000 (0.24) |
| <i>N</i> | 3081 | 3081 | 3071 | 2765 | 2376 |
| adj. <i>R</i> ² | 0.009 | 0.045 | 0.065 | 0.091 | 0.090 |

t statistics in parentheses. The constant was included in the model but is not reported.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: T-tests Immigrants versus Returnees

| | Immigrants | Returnees | Difference |
|------------------------|------------|-----------|-----------------------|
| Years after (re-)entry | 10.750 | 17.770 | -7.020*** (-11.64) |
| PrevAeExp | 0.037 | 0.044 | -0.008 (-0.618) |
| Male | 0.697 | 0.746 | -0.049 (-1.758) |
| Age Risk Start | 6.402 | 8.603 | -2.201*** (-5.446) |
| Risk Tolerance | 3.465 | 3.633 | -0.168 (-1.434) |
| Openness | 3.642 | 3.527 | 0.115* (2.515) |
| Irrelevance | 0.146 | 0.101 | 0.050* (2.150) |
| Commercialization | 0.486 | 0.436 | 0.050 (1.605) |
| Citations | 11.340 | 10.580 | 0.755 (0.901) |

Table 6: OLS – Immigrants versus Returnees

| | (1) | (2) | (3) | (4) | (5) |
|----------------------------|----------------------|--------------------|---------------------|---------------------|----------------------|
| Immigr | -0.094*** (-4.92) | -0.050* (-2.49) | -0.060** (-2.92) | -0.062** (-2.89) | -0.077*** (-3.43) |
| Years after (re-)entry | | 0.005*** (5.09) | 0.005*** (4.91) | 0.006*** (5.29) | 0.005*** (4.41) |
| PrevAeExp | | 0.235*** (3.70) | 0.244*** (3.74) | 0.209** (3.14) | 0.220** (3.09) |
| Male | | | 0.022 (1.41) | 0.021 (1.29) | 0.029 (1.54) |
| Age Risk Start | | | -0.002 (-1.63) | -0.002 (-1.23) | -0.002 (-1.32) |
| Engineering | | | 0.087** (2.68) | 0.084* (2.33) | 0.092* (2.29) |
| Medical and Health | | | 0.064* (2.06) | 0.070* (2.04) | 0.086* (2.24) |
| Natural sciences | | | 0.041 (1.52) | 0.039 (1.27) | 0.045 (1.28) |
| Social sciences | | | 0.079** (2.68) | 0.095** (2.78) | 0.112** (2.84) |
| Risk Tolerance | | | | 0.003 (0.68) | 0.004 (0.90) |
| Openness | | | | 0.046*** (3.93) | 0.052*** (3.88) |
| Irrelevance | | | | -0.002 (-0.12) | 0.004 (0.17) |
| Commercialization | | | | 0.059*** (3.37) | 0.072*** (3.70) |
| Citations | | | | | -0.000 (-0.24) |
| <i>N</i> | 1411 | 1411 | 1405 | 1277 | 1112 |
| adj. <i>R</i> ² | 0.020 | 0.067 | 0.074 | 0.095 | 0.094 |

t statistics in parentheses. The constant was included in the model but is not reported.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Robustness Checks

| | Logit | | | | |
|------------------------|----------------------|----------------------|---------------------------|-----------------------------|----------------------|
| | (1) Main | (2) Coefficient | (3) Marginal Effect | (4) Business Registry | (5) STEM |
| Immigr | -0.077*** (-3.43) | -0.760*** (-3.38) | -0.068*** (-3.39) | -0.072*** (-3.53) | -0.076** (-3.00) |
| Years after (re-)entry | 0.005*** (4.41) | 0.045*** (4.52) | 0.004*** (4.57) | 0.004*** (4.26) | 0.00497*** (3.94) |
| PrevAeExp | 0.220** (3.09) | 1.528*** (3.87) | 0.136*** (3.93) | 0.310*** (4.41) | 0.150 (1.91) |
| Male | 0.029 (1.54) | 0.318 (1.25) | 0.028 (1.25) | 0.020 (1.29) | 0.047* (2.20) |
| Age Risk Start | -0.002 (-1.32) | -0.021 (-1.19) | -0.002 (-1.19) | -0.002 (-1.62) | -0.002 (-0.96) |
| Arts and Humanities | -0.029 (-0.74) | -0.069 (-0.06) | -0.002 (-0.06) | -0.054 (-1.59) | |
| Engineering | 0.092* (2.29) | 1.498 (1.42) | 0.098* (2.20) | 0.050 (1.40) | 0.091* (2.22) |
| Medical and Health | 0.086* (2.24) | 1.476 (1.41) | 0.096* (2.28) | 0.062 (1.76) | 0.089* (2.26) |
| Natural sciences | 0.045 (1.28) | 1.016 (0.97) | 0.055 (1.40) | 0.021 (0.66) | 0.041 (1.16) |
| Social sciences | 0.112** (2.84) | 1.718 (1.64) | 0.123** (2.77) | 0.059 (1.65) | |
| Risk Tolerance | 0.004 (0.90) | 0.054 (0.99) | 0.005 (1.00) | 0.006 (1.47) | 0.006 (1.12) |
| Openness | 0.052*** (3.88) | 0.558*** (3.85) | 0.050*** (3.87) | 0.030* (2.46) | 0.058*** (3.74) |
| Irrelevance | 0.004 (0.17) | -0.014 (-0.04) | -0.001 (-0.04) | 0.003 (0.14) | 0.014 (0.50) |
| Commercialization | 0.072*** (3.70) | 0.812*** (3.83) | 0.072*** (3.84) | 0.047** (2.85) | 0.085*** (3.79) |
| Citations | -0.000 (-0.24) | -0.001 (-0.15) | -0.000 (-0.15) | -0.001 (-1.65) | -0.000 (-0.14) |
| N | 1112 | 1112 | 1112 | 1112 | 820 |
| adj./ pseudo R^2 | 0.094 | 0.144 | | 0.119 | 0.094 |

t statistics in parentheses, for marginal effects, the z statistics are reported.

The constant was included in the model but is not reported.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$