

Ex ante career preferences and sorting into startup employment

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ABSTRACT

Entrepreneurship scholars and policy makers pay increasing attention to individuals who join startups as employees. Established firms also recognize the importance of attracting an entrepreneurial and innovative workforce. It is not clear, however, whether and how individuals with entrepreneurial career preferences sort into different types of employers. In this study, we examine the extent to which individuals' ex ante career preferences explain sorting into employment in startups versus established firms. Using novel panel data on over 1,500 individuals observed during graduate school and again in fulltime employment, we find strong evidence of preference-based sorting. However, a large share of individuals with entrepreneurial career preferences end up in established firms, while startups employ not only "joiners" but also individuals with founder intentions or preferences for working in an established firm. We explore potential reasons for sorting into non-preferred careers including labor market constraints, ability, compensating wage differentials, and individuals' desire to acquire additional skills prior to starting their own firm. Finally, we show that sorting into non-preferred careers may have important consequences, such as higher turnover, which may limit firms' ability to benefit from their human capital. We discuss implications for entrepreneurship research as well as for founders, managers, and policy makers.

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1 Introduction

A large body of literature has studied how the organizational workplace shapes employees' decisions to leave wage employment and enter entrepreneurship. This literature shows that employer characteristics such as firm size, organizational structure, access to opportunities, or strategic choices shape individuals' entrepreneurial activity (Sørensen 2007, Özcan and Reichstein 2009, Elfenbein et al. 2010, Nanda and Sørensen 2010, Astebro et al. 2011, Kacperczyk and Marx 2016). Less attention has been paid to the question why certain individuals work in different types of organizations to begin with – and to what extent they may have sorted into employers based on pre-existing entrepreneurial preferences and traits (Sørensen 2007, Elfenbein, et al. 2010, Roach and Sauermann 2015). A deeper understanding of preference-based employment sorting is relevant for several reasons.

First, the degree to which individuals with entrepreneurial preferences sort into different types of organizations has important implications for the pool of entrepreneurial human capital available to different types of firms. As such, it may help us understand not only why some types of organizations spawn more entrepreneurs than others (Gompers et al. 2005, Sørensen 2007, Özcan and Reichstein 2009, Elfenbein, et al. 2010), but also why some firms may enjoy higher levels of innovation and intrapreneurship (Kacperczyk and Marx 2016). Second, empirical evidence on the relationship between ex ante career preferences and ex post employment outcomes may provide new insights into the role of sorting versus treatment in shaping differences between employees working in different types of organizations (Sørensen 2007, Özcan and Reichstein 2009, Elfenbein, et al. 2010, Ouimet and Zarutskie 2014), as well as inform theories about subsequent transitions from wage employment into entrepreneurship (Kihlstrom and Laffont 1979, Lazear 2005, Sørensen 2007, Sørensen and Sharkey 2014). Finally, attention to individuals' initial sorting into employment in startups and established firms raises questions regarding whether and why some individuals enter jobs that are *not* consistent with their career preferences. For example, why do some entrepreneurial individuals enter employment in established firms, while others who prefer employment in established firms work in startups?

We use novel panel data to compare individuals' career preferences while in graduate school with observed employment in startups and established firms after graduation. Although much of the prior research focuses on founders, we broaden the conceptualization of entrepreneurial career preferences and employment outcomes to include individuals who prefer to join startups as employees rather than as a founder. This approach is consistent with the increasing attention paid to startup employees as important entrepreneurial actors (Neff 2012, Ouimet and Zarutskie 2014), as well as with recent evidence that startup “joiners” differ significantly from established firm employees (Roach and Sauermann 2015).

To ground our empirical analysis, we develop a simple conceptual framework that links ex ante career preferences to subsequent transitions into employment in either startups or established firms. While

this framework takes preference-based sorting as the baseline, it also considers reasons why individuals may sort into jobs that are inconsistent with their preferred career. We also discuss potential implications of (inconsistent) sorting for ex post differences between employees working in startups and established firms as well as for subsequent labor mobility.

Our empirical analysis draws on a sample of over 1,500 science and engineering doctorates observed first during graduate training and then again after transitioning into industry employment in either a startup or an established firm. Consistent with sorting mechanisms, we find that ex ante career preferences are a strong predictor of employment outcomes. At the same time, while individuals with ex ante entrepreneurial career preferences are significantly more likely to work in a startup, the majority are employed in established firms. We also find that roughly one-third of startup employees did not have an ex ante entrepreneurial career preference. Our analyses suggest that possible reasons for sorting into employment that is not consistent with an individual's career preferences include a limited number of positions in startups relative to the potential pool of entrepreneurial employees, as well as individuals' decisions to take positions in non-preferred careers because they dominate available alternatives with respect to particular job attributes such as salary or learning opportunities.

We find that these sorting patterns have important implications for the populations of employees observed in different types of firms. On the one hand, the considerable degree of sorting results in a significantly higher share of entrepreneurial individuals employed in startups. At the same time, inconsistent sorting also implies significant heterogeneity within a given firm type. In particular, startup employees include not only joiner types who prefer to work in startups, but also aspiring founders and established firm types. Established firms, on the other hand, employ established firm types as well as a significant share of individuals with founder and joiner preferences. This heterogeneity within firms has further implications: Different types of employees differ significantly with respect to individual characteristics such as preferences for autonomy and interest in commercialization activities, as well as with respect to their intentions to quit.

Our results have a number of implications for entrepreneurship research. First, our findings suggest that entrepreneurial career preferences prior to entering the labor market are important predictors of employment in different types of firms, providing evidence of preference-based sorting based on panel data. As such, our work highlights the value of considering more explicitly the role of selection – in addition to treatment – when seeking to understand differences in entrepreneurial activity observed across different types of firms. Second, our results suggest that sorting is not perfect and provide suggestive evidence for a number of underlying reasons. As such, economic models that tend to implicitly assume perfect sorting provide an incomplete picture and future work is needed to understand how the matching between employees and employers can be improved. Finally, our work contributes to a growing stream of

work seeking to understand the entrepreneurial workforce (Campbell 2013, Haltiwanger et al. 2013, Ouimet and Zarutskie 2014, Burton et al. 2016) by providing nuanced insights into characteristics of startup employees using survey based measures that are unavailable in prior work. Our results suggest that not all startup employees are similarly “entrepreneurial” and that a considerable share of entrepreneurial human capital can be found in established firms.

Our results may also have important implications for entrepreneurs and managers. Attracting and retaining human capital is a critical hurdle founders face in their efforts to build successful ventures (Baron et al. 2001, Hsu 2009, Wasserman 2012). Our results suggest that the pool of potential employees interested in working in a startup may be greater than the number of startup positions. As such, our results suggest the need for policies that can help direct the supply of entrepreneurial human capital and that facilitate the matching between startups and potential employees. At the same time, our finding that a substantial share of employees working in established firms have strong entrepreneurial interests may also be useful for managers in established firms in their efforts to foster internal ventures or manage employee entrepreneurship and spin-out activity (Campbell et al. 2012, Kacperczyk and Marx 2016).

2 Conceptual framework

2.1 Ex ante career preferences

We start from the premise that prior to entering the job market, individuals have a preference for certain types of careers over others. In this paper, we distinguish three types of careers that differ primarily with respect to the organizational setting and associated job attributes: being a founder, a startup employee, or an established firm employee. While a detailed discussion of these careers has been provided elsewhere (Roach and Sauermann 2015), we briefly highlight key aspects relevant to understanding how these ex ante career preferences relate with ex post employment outcomes.

Being a founder involves setting up a new organization, often to commercialize an entrepreneurial opportunity. In addition to requiring an opportunity, being a founder involves high levels of risk and may require individuals to perform a wide range of technical and managerial tasks (Lazear 2005). At the same time, being a founder involves higher levels of autonomy than working as an employee for someone else (Hamilton 2000, Benz and Frey 2008). Startup firms are young and small organizations that are more likely to fail than established firms (Jovanovic 1982, Carroll and Hannan 2000), exposing employees to a considerable risk of losing their jobs. At the same time, startups tend to have flat hierarchies and offer higher levels of autonomy than established firms. Startups also allow employees to get involved in a broad range of work activities (Elfenbein, et al. 2010) and provide first-hand insights into the entrepreneurial process. Finally, established firms are often large, bureaucratic, tend to be more secure, and pay higher wages than small and young organizations (Oi and Idson 1999, Sørensen 2007). However,

established firms may offer less autonomy to individual employees and typically involve more specialized work activities.

Given such differences in the job attributes offered by different types of employers, individuals' career preferences partly depend on the value placed on these job attributes, e.g., how important job security or autonomy are to a given individual (Rosen 1986, Stern 2004).¹ Applying this idea in the context of entrepreneurship, Roach & Sauermann (2015) studied predictors of STEM graduate students' preferences for the three different types of careers. They find that founder intentions are most strongly related to preferences for autonomy, a tolerance for risk, and an interest in technology commercialization. Individuals with an interest in working in an established firm, on the other hand, exhibited a lower preference for autonomy, higher risk aversion, and an interest in specific functional work activities. This study also found that individuals interested in joining a startup as employees but not in becoming a founder ("joiners") have profiles that are distinct from those of both founders and established firm employees: While they care less about management and autonomy than founders, they are significantly more "entrepreneurial" than those aspiring to positions in established firms in terms of their willingness to bear risk and their interest in commercialization activities.

Given these insights into the predictors of career preferences prior to entry into the labor market, the important next question is whether and how these career preferences translate into actual ex post employment outcomes.

2.2 Preference-based sorting into different employment types

Standard models of career choice suggest that individuals try to find jobs in the career they find most attractive (Rosen 1986).² As such, there should be a strong correspondence between ex ante preferences for particular types of careers and ex post employment outcomes (i.e., preference-based sorting). At the same time, there are several reasons to expect that sorting may not be consistent with individuals' career preferences. In the following, we consider these reasons to discuss the potential sorting of individuals with founder, joiner, and established firm career preferences into startups (§2.2.1) versus established firms (§2.2.2). Table 1 provides a summary of our discussion.

¹ We abstract from the uncertainty decision makers face when predicting job attributes in different types of careers; we assume that they form career preferences based on expected values (Roach and Sauermann 2010).

² One may wonder about sorting with respect to other individual attributes, in particular ability. We conceptualize ability as a potential driver of career preferences, e.g., because small startups provide strong financial incentives that are particularly attractive to high ability individuals (Zenger 1994). As such, we do not consider ability explicitly in our conceptual discussion. However, we will consider proxies for ability in the empirical analysis.

2.2.1 Sorting into startup employment

Consistent with the notion that individuals try to find positions in their most preferred career, we expect that individuals with joiner preferences (“joiner types”) will actively look for a position in a startup and, if offered the opportunity, are more likely to accept an offer from a startup over offers from established firms. As such, joiner types should be more likely to enter employment in startups than in established firms.

Startups may also attract individuals with founder preferences (“founder types”). Although these individuals may prefer to found their own ventures, doing so requires an entrepreneurial opportunity such as a commercializable technology (Eckhardt and Shane 2003). Absent such an opportunity, working in a startup may be more attractive than working in an established firm for at least two reasons. First, individuals with a founder preference have high risk tolerance, place a high value on autonomy, and have an interest in managerial as well as commercialization work activities (Roach and Sauermann 2015). These job attributes tend to be more readily available in startups than in large established firms. Second, startups may provide a training ground for aspiring entrepreneurs who seek to acquire the skills required to succeed as a founder (Gompers, et al. 2005, Elfenbein, et al. 2010). Such additional training may be particularly important for highly trained scientists and engineers who often lack knowledge in areas such as marketing, finance, and strategy. Working in a startup likely exposes individuals to a broader range of non-technical tasks than working in an established firm (Elfenbein, et al. 2010) and thus provides more learning opportunities. Moreover, startup employees can more directly observe a founder in building and directing a new venture, potentially providing learning opportunities and insights specifically into the entrepreneurial process.

Finally, workers with preferences for employment in established firms (“established firm types”) may also enter employment in startups. First, although startups tend to pay less than established firms on average (Haltiwanger, et al. 2013), they may seek to attract some high ability employees who prefer to work in established firms by paying them higher salaries. Similarly, to the extent that small firms are better able to reward high performance (Zenger 1994), financial reasons for taking a startup position may be particularly prominent among individuals at the higher end of the ability distribution. On the other hand, lower ability individuals might be unable to obtain a competitive position in an established firm, and instead their best job option may be in a startup. This may be particularly true for startups that do not have the resources or time to conduct an extensive search for the most qualified employees, but instead seek to quickly fill positions with available candidates. Some of these individuals may have preferences to work in an established firm but may accept a startup position due to a lack of outside options.

Overall, while we expect that individuals with ex ante joiner preferences are most likely to sort into startup employment, startups may also employ a significant share of founder or established firm types.

While the primary goal of our empirical analysis will be to examine the correspondence between ex ante career preferences and startup employment, we will also explore potential mechanisms that may lead individuals with founder or established firm preferences to sort into startups.

2.2.2 Sorting into established firm employment

Consistent with the notion that individuals try to find positions in their most preferred career, we expect that individuals with preferences to work in an established firm will actively look for a position in an established firm and are more likely to accept an offer from such a firm over opportunities in startups.

Established firms may also employ individuals with a joiner preference. First, the number of individuals with an interest in joining startups is quite large (Roach and Sauermann 2015) relative to the small number of available startup positions (Haltiwanger, et al. 2013, Ouimet and Zarutskie 2014), and some may be unable to find a startup position and instead work in established firms. Second, while large employers spend significant resources to advertise open positions (e.g., at career fairs), startups often lack the time and resources to systematically search in the labor market or to publicize available positions and often hire through personal networks. As such, some joiner types may find it difficult to identify existing startup positions and thus accept employment in established firms. Finally, even though individuals with joiner preferences may find established firms generally less attractive than startups, some established firms make explicit efforts to attract entrepreneurial employees by emulating a startup atmosphere and by offering more pay as well as higher degrees of freedom and task variety than other established firms (Rogers 2016). In conjunction with some of the other benefits large firms offer, working in certain established firms may thus be more attractive than working in a startup even for individuals with ex ante preferences to join a startup.

Finally, individuals with founder preferences may also enter employment in established firms. Building on our prior arguments, aspiring founders may decide to join firms as employees if they do not possess an opportunity that allows them to start their own venture. Although founder types may find startup employment more attractive than employment in established firms, startup positions may be relatively scarce and existing positions more difficult to find than jobs in established firms. Aspiring founders may also decide to work in established firms if they believe doing so provides better access to important resources that are useful for later entrepreneurial ventures. Such resources could include experience in particular industries (Gompers, et al. 2005, Chatterji 2009), the ability to accumulate financial wealth through higher pay offered by established firms (Oi and Idson 1999), social networks and affiliation with high status firms such as Google or Apple, and even entrepreneurial opportunities resulting from innovations generated in large firms (Klepper and Sleeper 2005, Sørensen and Sharkey 2014).

2.3 Resulting differences between the human capital in startups and established firms

To the extent that individuals sort according to their career preferences, we should observe systematic differences between the employees working in startups and established firms. Most importantly, startups should have a more “entrepreneurial” workforce than established firms, i.e., a larger share of workers who have preferences to be a founder or a joiner. To the extent that career preferences reflect a number of other individual characteristics, we would also expect differences in these characteristics. In particular, we would expect that startup employees have a higher desire for autonomy, a greater tolerance for risk, and a stronger interest in commercialization than employees working in established firms (Roach and Sauermann 2015). Note that when discussing career preferences and other individual characteristics, we always focus on characteristics individuals had *ex ante*, i.e., as graduate students and before entering particular types of employers. This allows us to examine differences between employee populations that result from sorting rather than potential differences that may result from socialization after individuals have started working in a particular type of firm (Özcan and Reichstein 2009, Elfenbein, et al. 2010).

Just as interesting as the implications of sorting based on *ex ante* preferences are implications of sorting that is inconsistent with an individual’s preferred career. First, if some founder or joiner types enter employment in established firms while some established firm types enter employment in startups, differences in average employee characteristics between firm types may be smaller than one would expect with inconsistent sorting. Moreover, inconsistent sorting suggests that the employee populations working in different types of firms may be more heterogeneous than commonly thought. Thus, while many startup employees may fit the entrepreneurial stereotype (Neff 2012), some startup employees may prefer to work in established firms and have lower desires for risk or autonomy. Conversely, while many employees in established firms are likely to be established firm types, there may also be a significant share of “entrepreneurial” employees - those with preferences for founding or joining startups - who are characterized by higher desires for autonomy and commercialization activities as well as a higher tolerance for risk.

2.4 Sorting and subsequent employee mobility

The degree to which individuals’ employment is aligned with their career preferences may have important implications for firms’ ability to benefit from their human capital. While a complete discussion of such implications is left for future work, we highlight one potential consequence that is particularly salient: Employees who are not in their preferred career may be more likely to leave their current employer than those who have a job in their preferred career.

The intuition is that employees who do not work in their preferred career are likely to continue to search for employment opportunities that are a better match (Jovanovic 1979). This should be particularly

the case for individuals who were unable to find a position in the desired career due to a lack of job options. In contrast, individuals who voluntarily chose a job in a different career (e.g., because it offered higher pay or learning opportunities) may be less likely to look for outside opportunities (see Stenard and Sauermann 2016). More specifically, we would expect that joiner and founder types working in established firms are more likely to leave than employees who prefer to work in an established firm, with founder types moving into entrepreneurship if an opportunity arises. Similarly, established firm types and founder types may be more likely to leave startup employment than individuals with joiner preferences. Some of the founder types may start their own firms if an opportunity arises, especially if startup employment has provided them with opportunities to acquire additional skills and entrepreneurial experience.

Employee mobility is important to employers because it can lead to a loss of valuable human capital and to significant costs of hiring and training new employees (Campbell, et al. 2012). And of course, the mobility decisions of founder types who find themselves employed in startups or established firms are of primary interest for scholars seeking to understand the rates of entrepreneurial activity observed in different types of firms (Özcan and Reichstein 2009, Elfenbein, et al. 2010, Kacperczyk and Marx 2016).

3 Data and Measures

3.1 Data

Our empirical analysis draws on a longitudinal survey of 1,504 science and engineering PhDs with waves at two points in time: first prior to employment while in graduate school and then after graduation during their first full-time employment in either a startup or an established firm. We also searched websites such as LinkedIn to obtain employment outcome data for all survey respondents, including those who did not respond to the second wave of the survey. These data allow us to relate individuals' career preferences and other characteristics while in graduate school to their subsequent employment outcomes. We restrict the sample for this study to individuals who took employment in either a startup or an established firm and exclude doctorates whose first job was in universities or government agencies, as well as founders of startups.

To obtain the initial sample, we identified 39 R1 U.S. research universities with doctoral programs in science and engineering fields by consulting the National Science Foundation's reports on earned doctorates (National Science Foundation 2009). Our selection of universities was based primarily on program size while also ensuring variation in private/public status and geographic region. The 39 universities in our sample produced roughly 40% of the graduating PhDs in science and engineering fields in 2009.

Respondents were contacted through their university email address listed on department websites and invited to participate in an online survey regarding their PhD experience and career preferences. The first wave of the survey was administered to two cohorts of PhD students in 2010 and 2013, respectively, with a response rate of 30%. As part of this first wave, we asked respondents to provide us with a permanent email address (e.g., a Gmail account), which was used to contact respondents three years later (in 2013 and 2016, respectively) with a follow-up questionnaire. If respondents did not provide an email in the first wave (20% of respondents), we used the original university email address. Adjusting for undelivered emails, we obtained a 73% response rate for the second wave of the survey for the sample used in this study.

In addition to the survey data, we also gathered external data on employment outcomes through an exhaustive search of career profile websites such as LinkedIn, as well as university websites and a Google search. To identify respondents, we first searched by name and PhD university, such as “Jane Smith,” “PhD,” and “Duke University.” We then verified the match by comparing field of study and the specific years that a respondent was in the PhD program to the field and time period reported on the survey. This approach yielded external data on employment outcomes for 78% of survey respondents. These data were used to validate survey reported employment outcomes, as well as to supplement employment data for non-respondents to the second wave of the survey. Combining both survey and external data provides employment outcomes for 92% of the first wave survey respondents.

3.2 Measures

3.2.1 Ex ante career preferences

To measure ex ante career preferences, we use a question that was part of a set of questions regarding future employment after graduation. More precisely, we asked respondents: “Putting job availability aside, how attractive or unattractive do you personally find each of the following careers?”, where careers included “startup job with an emphasis on research or development” and “established firm job with an emphasis on research or development”, as well as other careers such as university faculty. Respondents rated each career independently using a 5-point scale ranging from “extremely unattractive” (1) to “neither attractive nor unattractive” (3) to “extremely attractive” (5). By explicitly asking respondents to disregard current labor market conditions, our measure attempts to capture PhD students’ ex ante career preferences independent of factors that may affect career outcomes, such as a limited number of available faculty positions (Stephan 2012). Figure 1 illustrates the distribution of the attractiveness of startup and established firm careers, respectively.

A unique feature of our survey question is that we ask respondents to rate each career independent of other careers. As such, individuals may be indifferent between two careers. This is illustrated in Table 2,

where 37% of respondents reported that careers in both startups and established firms were equally attractive (purple areas), while 13% reported that working in a startup was more attractive than working in an established firm (lower blue area) and 37% reported that working in an established firm was more attractive than working in a startup (upper red area).

We employed a three-step process for coding ex ante career preferences. First, we code individuals who strictly preferred working in a startup over an established firm (i.e., the attractiveness of working in a startup is greater than the attractiveness of working in an established firm) as having a *joiner preference*, while individuals who strictly preferred working in an established firm over a startup were coded as having an *established firm preference*. Respondents who reported that working in a startup and working in an established firm were equally attractive (i.e., both were “extremely attractive” or both were “attractive”) were coded as *indifferent* between the two careers. Second, to identify individuals who have aspirations of becoming a founder we asked respondents: “How likely are you to start your own company?”, using a 5-point scale that ranged from “definitely will not” (1) to “definitely will” (5). We interpret this measure as reflecting individuals’ founder preferences and coded those who reported that they “definitely will” start their own company sometime in the future as having a *founder preference*.³ Finally, we coded employees who reported that neither working in a startup (as founder or joiner) nor working in an established firm were attractive (i.e., ratings of <4) as having an *other career preference*.

Using these measures, we find that prior to graduation approximately 4% of our sample have an ex ante founder preference, 11% have a joiner preference, 36% are indifferent between working in a startup or an established firm, 36% have an established firm preference, and 13% prefer some other career. It is interesting to note that if we combine founder, joiner, and indifferent types, 52% of respondents reported prior to graduation that working in a startup was at least as attractive as working in an established firm, while the remaining 48% preferred either an established firm career or some other career.

3.2.2 Ex post employment outcomes

To measure employment outcomes, we use survey responses and external data sources in a two-step process. First, we asked respondents in the second wave of the survey to state their current employment status as well as the age (i.e., years since founding) and size (i.e., number of employees) of their employer. Individuals who reported that they work for a company that was founded less than 10 years from the date of the survey and had fewer than 500 employees were coded as startup employees. All other individuals were coded as working for an established firm. For individuals who did not respond to the second wave of the survey or for whom firm age and size were missing, we used external data to first

³ Among individuals coded as having an ex ante founder preference, 56% also reported that working in a startup was extremely attractive and 41% reported that it was attractive.

identify their employer name and then searched available data sources including LinkedIn and CrunchBase to ascertain the founding year for each employer. Since data on the number of firm employees were unavailable for many employers, we code all firms founded less than 10 years from the date of the survey as startups and all other firms as established.

Table 3 reports selected summary statistics for the 223 startup employees (15%) and the 1,281 established firm employees in our sample. Among startup employees, 77% were in firms with fewer than 100 employees and 62% were in firms that were less than five years old. In contrast, 78% of the established firm employees were in firms with over 1,000 employees and 43% were in very large firms with over 25,000 employees. In addition, 97% of established firm employees were in firms that were over 10 years in age. We also observe differences in wages, with startup employees earning approximately 12% less than their established firm counterparts. The share of employees who perform R&D work and who are engaged in managerial activities, as well as weekly work hours are roughly comparable.⁴ Finally, the vast majority of startup as well as established firm employees are in firms in technology industries, especially biopharma, IT, and devices, with the most common employers being innovation-intensive firms such as Google, Intel, Microsoft, Dow Chemical, Qualcomm and Samsung.

4 Results

We first examine the extent to which individuals sort into employment in startups or established firms based on their ex ante career preferences (§4.1). We then explore potential reasons why some individuals sort into employment types that do not correspond to their ex ante career preferences (§4.2). We then investigate whether sorting results in systematic differences between startups and established firms with respect to employees' entrepreneurial interests as well as their preferences for different job attributes such as risk or autonomy (§4.3). In §4.4, we examine whether different types of employees working in the same type of firm differ with respect to their intentions to quit. We conclude with robustness checks and supplementary analyses in §4.5.

4.1 Ex ante preferences and ex post employment outcomes

We begin our analysis with a contingency table (Table 4) that compares observed and expected percentages of individuals with different types of career preferences. If individuals entered different employment types randomly, then the observed percentages for each row should be similar to the sample average (15% startup employment and 85% employment in established firms). The extent to which the

⁴ Our sample is rather homogeneous with respect to education (all doctorates), skills (science or engineering), age, and work experience (the vast majority have none, although they vary on whether they did a postdoc or not). Thus, the difference in wages between startup and established firm employees is likely attributable primarily to the type of employer and not to differences in education, skills, or type of work.

observed percentage of individuals with a particular career preference who are employed in a startup is greater (lesser) than 15% provides evidence of sorting into (away from) startup employment.

Table 4 shows that the share of individuals with an ex ante founder preference who work in startups is 53%, providing strong evidence that founder types sort into startup employment. We also find evidence of sorting among individuals with ex ante joiner preferences, with 28% being employed in a startup. We find no evidence of sorting among individuals who were indifferent between employment in startups and established firms, with 15% of them taking employment in startups. Finally, only 9% individuals with a preference for working in an established firm are employed in a startup, suggesting that they sort away from employment in startups. The Pearson χ^2 statistic of 104.54 with four degrees of freedom indicates that the observed sorting patterns are highly significant.

To examine sorting while controlling for factors such as gender, citizenship, science and engineering field, and the year that graduates started their job, Table 5 presents logistic regression results predicting the likelihood of being employed in a startup relative to being employed in an established firm. Model 1 includes the original ex ante career attractiveness measures separately. We find that individuals who reported that working in a startup was attractive are more likely to work in a startup, and this relationship increases with individuals' attraction to startup employment. Individuals who reported that working in an established firm was extremely attractive are significantly less likely to work in a startup. Model 2 includes our primary ex ante career preference measures. Compared to individuals with an established firm preference (omitted category), founder types are nearly thirteen times as likely to sort into startups, while joiner types are roughly three times as likely and indifferent types are twice as likely to go into startups. Since this result depends on the omitted comparison group, Model 3 omits individuals who are indifferent between startups and established firms. We see that individuals with founder preferences and joiner preferences are more likely to sort into startup employment relative to those who are indifferent, while individuals with established firm preferences are more likely to sort into established firms.

Overall, there is strong evidence of sorting by entrepreneurial career preferences. However, this sorting is far from complete - 72% of individuals with ex ante joiner preferences take employment in established firms, while 9% of individuals with established firm preferences sort into startups. In the following section, we explore a range of potential reasons for these sorting patterns, building on our discussion in §2 (summarized in Table 1).

4.2 Potential reasons for the observed sorting patterns

4.2.1 Potential constraints to preference-based sorting

We recognized in our conceptual discussion that not all individuals may be able to find jobs in their preferred career. One conjecture is that individuals of higher ability may receive more job offers and have

more opportunities to select their most preferred employment. To explore this possibility, we include a survey response that asked PhD students to rate their own research ability relative to their peers using a sliding scale that ranged from 1-10 with 5 stated as “average”. Although one might be concerned that a subjective measure of ability might be biased by individual’s overconfidence, this measure is a strong predictor of wages, which are commonly used in studies to proxy for ability.⁵ Model 2 in Table 5 shows that self-assessed ability is not significantly associated with the likelihood of working in a startup. Models 5-7 estimate these regressions separately for the subsamples of individuals with joiner, indifferent, and established firm preferences, respectively.⁶ We find no evidence that higher ability individuals are more likely to sort into the career they most preferred.

Second, individuals’ opportunities to sort based on their entrepreneurial career interests should also depend on the availability of startup jobs. To proxy for the availability of jobs in startups, we use total VC funding, which increased from approximately \$23 billion in 2010 to \$60 billion in 2015.⁷ Indeed, during this period we observe that the share of individuals in our sample employed in startups increases from 5% in 2010 to 20% in 2015. In Model 4, we replace the dummy variables for the year of starting the job with the (log) total amount of venture capital funding in that year. We also control for general macroeconomic factors that may improve the private sector job market overall by including the annual U.S. GDP growth rate. Model 4 shows a strong positive association between VC funding and sorting into startup employment. Models 5-7 show that indifferent and established firm types are more likely to sort into startup employment when VC funding increases, while joiner types are not sensitive to VC funding. This may suggest that joiner types seek out startup employment irrespective of labor market conditions, while those with indifferent or weaker preferences for startup employment are more likely to enter startups primarily when such jobs are easy to come by.

Finally, sorting may be affected by legal constraints. In particular, hiring non-U.S. citizens imposes additional costs on a firm to sponsor employees for either a temporary work visa (H-1B) or a green card. These costs may be harder for startups to bear given their smaller size and resource constraints relative to large established firms. As such, U.S. citizens with entrepreneurial preferences might enjoy more opportunities to sort into startups than foreigners. Consistent with this conjecture, Models 1-4 show that U.S. citizens are more likely to sort into startup employment, even controlling for career preferences.⁸

⁵ For example, a one standard deviation (1.7) increase in self-assessed ability from the mean of 6.7 to 8.4 is associated with 5.6% higher annual wages, or about \$6,000 more.

⁶ We are unable to produce reliable coefficient estimates for founder types due to the small number of observations.

⁷ Venture capital funding data were obtained from PricewaterhouseCoopers MoneyTree (<https://www.pwcmoneytree.com>). 2016 VC funding is the projected total annual funding based on VC funding for the first three quarters of 2016.

⁸ U.S. citizens also have a stronger preference for working in a startup than foreign citizens (12% of U.S. citizens have a joiner preference compared to 8% of non-U.S. citizens). Higher shares of non-U.S. citizens are indifferent between startups and established firms (43% of non-U.S. citizens compared to 33% of U.S. citizens) and equal shares of U.S. and non-U.S. citizens have a preference for an established firm career (36% each).

Model 5-7 show that among the indifferent types, U.S. citizens are more likely to sort into startups, while there is no significant difference based on citizenship for joiner or established firm types. One possible interpretation of these results is that given joiner types' stronger preference for a startup career, non-U.S. citizens with joiner preferences are more persistent in their search for a startup employer who will sponsor a work visa, while non-citizens who are indifferent are deterred by this constraint and take the easier path of working in an established firm.

4.2.2 Sorting based on individual characteristics and job attribute preferences

Another potential reason for incomplete sorting is that career preferences reflect a broad variety of factors and may thus capture only part of the underlying heterogeneity in relevant individual characteristics such as preferences for autonomy or risk. In other words, there may be significant heterogeneity even among individuals with a particular career preference, and this heterogeneity may partly drive sorting patterns. For example, among individuals with a joiner preference, some may be more risk tolerant than others, and the former may be more likely to sort into startups while the latter may end up sorting into established firms.

To examine this possibility, we perform logistic regressions that include a number of individual-level measures that have been shown to relate to career preferences in prior research (Roach and Sauermann 2015).⁹ Model 1 in Table 6 uses the full sample and includes only the individual-level characteristics (without career preferences). Model 2 additionally includes ex ante career preferences. To explore potential sorting within ex ante preference types, Models 3-5 present split-sample regressions for joiner, indifferent, and established firm types, respectively.

Model 1 shows that individuals with a greater tolerance for risk, greater persistence and prior exposure to startups – primarily through internships and student activities – are more likely to work in a startup. In addition, individuals who were encouraged to pursue careers in startups in their prior social context – for our sample their research lab – are more likely to sort into startup employment. We also find that U.S. citizens are significantly more likely to sort into startups than foreign-born STEM doctorates. When including ex ante career preferences in Model 2, we find that several factors such as risk tolerance and social context are no longer significant, which is consistent with the notion that these factors are largely reflected in career preferences. Models 3-5 show that within a given preference type, there is little evidence of sorting with respect to preferences for job attributes or other individual characteristics. Taken together, career preferences appear to capture most of the relevant heterogeneity in underlying characteristics such as preferences for risk and autonomy, and remaining heterogeneity in these

⁹ Please see the appendix for a detailed description of the variable measures.

characteristics does not appear to be the primary reason why individuals enter employment that seems inconsistent with their career preferences.

4.2.3 Stated reasons for choosing current employment

To explore a broader range of reasons behind individuals' employment outcomes, the second wave of the survey asked all employees "When choosing your current job, how important were each of the following factors to you?" These factors included salary, autonomy, intellectual challenge, employer prestige, and preferred job not available and were rated on a 5-point scale. Table 7 shows the share of respondents who rated a particular reason as important or very important (score of 4 or 5) by employment outcome and ex ante career preferences. While this table shows several interesting results, we highlight some that speak most clearly to the question of why some individuals take positions that differ from their ex ante career preferences. First, roughly 24% of employees in established firms indicate that their preferred position was not available, and this share was particularly high among founder types (46%). This compares to only 13% in startups, indicating that startup employees are less likely than employees working in established firms to have been "forced" into their current employment by the lack of job alternatives. We also find that across all career preference types, employer prestige is an important reason for working in an established firm, but far less important for working in a startup. This likely reflects that established firms tend to be perceived as more prestigious than startups. Salary is rated equally important for choosing the current job among startup employees and among those working for established firms, with little difference between individuals with different career preferences. These patterns provide no evidence that potentially higher salaries are a primary reason for joiner types to enter established firms (otherwise we would expect this reason to be more prominent among joiner types going into established firms than among joiner types going into startups). Finally, autonomy was a moderately important factor for both startup employees and those working in established firms. However, among startup employees, those with founder or joiner preferences report autonomy more frequently as an important reason than do individuals with established firm preferences, consistent with the idea that the former care more about autonomy than the latter (Roach and Sauermann 2015). Note that given the framing of the question, the stated reasons may not only reflect individuals' choices to work in established firms versus startups in general, but may also reflect choices between individual startup firms or between individual established firms that offer different levels of job attributes.

To better understand why people choose specifically to work in a startup, we additionally asked startup employees the following question: "Which of the following were important reasons to work for a startup company?" and included items that apply specifically to the startup context. Consistent with sorting by entrepreneurial preferences, founder, joiner, and indifferent types frequently rated "I thought

working in a startup would be a better fit for me than other job options” as an important reason (roughly 75%), while this response was less common among established firm types (48%). Similarly, a preponderance of startup employees – including those with a preference for working in an established firm – reported that they were “interested in the specific technology or industry” of the startup firm. Finally, over 60% of founder types indicated that “I wanted to learn about entrepreneurship to help me start my own company one day” as an important reason, compared to only 37% of joiner types and 19% of individuals who had expressed a preference for working in an established firm prior to graduation.

4.2.4 Compensating differentials

Finally, we explore whether we find evidence of compensating differentials, i.e., that individuals take positions in non-preferred careers because these positions pay significantly higher salaries and thus compensate for less desirable job attributes (Rosen 1986, Stern 2004). In our context, such compensating differentials could be observed in two ways. First, they would imply that individuals with entrepreneurial preferences have to be paid more when working in established firms than when working in startups. Similarly, individuals with established firm preferences would be paid more when working in startups than when working in established firms. Second, compensating differentials might imply that within a given employment setting, employees are paid differently depending on their career preferences: In startup employment, individuals with entrepreneurial career preferences would be willing to accept relatively low wages because they can satisfy their taste for entrepreneurship, while employees with a preference for working in an established firm would be paid higher wages to accept a job that is not in their preferred career. In established firms, individuals with entrepreneurial career preferences would be paid higher wages to compensate for the less desirable work context than individuals with a preference for working in an established firm.

Table 8 shows mean comparisons of the total annual compensation received by different types of employees working in startups and established firms, as reported in the second wave of the survey. We see that regardless of career preference, established firm employees earn more than startup employees, consistent with recent studies using administrative data sources (Elfenbein, et al. 2010, Haltiwanger, et al. 2013, Burton, et al. 2016). However, the wage difference is larger for founder and joiner types (28.6k and 11.2k) than for indifferent and established firm types (\$6.4k and \$5.8k). Thus, comparisons of wages for a given employee type across employment setting are consistent with compensating differentials for founder and joiner types working in established firms, but not for established firm types working in startups.

Comparisons within startups show only small differences in the compensation received by different types of employees; individuals with established firm preferences earn only slightly more (\$1.2k) than

joiner types working in startups. The differences are larger within established firms: Founder types earn \$19.5k more and joiner types earn \$4.2k more than individuals with established firm preferences. These results are again consistent with compensating differentials paid to entrepreneurial types working in established firms but not with compensating differentials paid to established firm types working in startups.

An important caveat is that simple mean comparisons do not account for potential differences in pay levels across fields, or for differences in employee ability. The latter, in particular, is an important concern when estimating compensating differentials (Stern 2004). To partly address these concerns, we estimate a series of regressions that include a broad range of individual controls as well as field fixed effects. The results confirm significantly lower salaries in startups than in established firms for the full sample (Table 9, Model 1) as well as for founder types and indifferent types (Models 2 and 4). Wage differences across employment settings for individuals with joiner or established firm preferences have the same sign and are similarly large as in Table 8 but are not statistically significant. Perhaps most interestingly, the wage difference between startup and established firm employment for founder types is significantly larger than that for indifferent types ($p=0.05$) or established firm types ($p<0.05$). Thus, while all employee types get paid at least the same or more in established firms compared to startups, this difference is largest for founder types, consistent with a compensating differential.

Wage differences between employee types working in established firms (Model 7) and between employee types working in startups (Model 8) are in the same direction as in Table 8 but tend to be smaller and are not statistically significant. Taken together, there is some, although quite weak, evidence of a compensating differential for founder types working for established firms, but there is no evidence of compensating differentials for established firm types working in startups. The lack of larger differences in total compensation across firm types or types of employees is consistent with our analysis of stated reasons above, which suggested that salary is important to most individuals in making their job decisions, regardless of employment sector or career preference.

We note three limitations of this analysis. First, although we asked respondents to report total annual compensation, the reported figures may be noisy, especially with respect to variable pay such as bonuses or stock options. Second, although our sample of PhD graduates from top tier universities is much more homogenous with respect to ability than the general population and we control for additional measures of ability and experience, we cannot rule out remaining unobserved heterogeneity in ability that may be partly responsible for observed wage differences. Finally, although our analysis finds limited evidence of compensating differentials for the average employee working in an employment setting that differs from his or her career preference, it may well be that some individuals take positions outside their preferred career because of higher salaries (while others may take such a position for other reasons, perhaps even

with lower salary). Indeed, our discussion of stated reasons (§4.2.2) illustrated the considerable heterogeneity in the factors that matter to individuals when deciding which positions to enter, suggesting that reasons may be difficult to infer by examining sample averages.

4.3 Differences in employee characteristics across and within firm types

After examining the degree to which individuals sort based on their career preferences and exploring potential reasons, we now turn to implications of sorting. As per our conceptual discussion, a first consequence is that sorting should lead to differences in the characteristics of the human capital working in startups and established firms. While a broad range of human capital characteristics have been explored in the prior literature, our focus is on employees' entrepreneurial interests – as reflected in their preferences for being a founder, joiner, or neither – as well as in employees' preferences for specific job attributes such as autonomy, risk, and commercialization activities.

Table 4, which contrasted ex ante preference with ex post employment outcomes, already provided descriptive insights into the career preferences of employees working in startups versus established firms. Focusing on column percentages (rather than the row percentages we used to examine sorting), we find that startups have a much higher share of founder types than established firms (13% vs. 2%) and also have a much higher share of joiner types (21% vs. 9%). At the same time, they have a lower share of established firm types (22% vs. 38%) and individuals with other career preferences (8% vs. 14%). Since Table 4 does not control for factors such as field or cohort, we estimate regressions using employee types as the dependent variables and include the dummy variable indicating startup employment as the dependent variable (Table 10). These regressions are not meant to estimate a causal relationship but rather to test a difference in means between startups and established firms. Consistent with Table 4, Models 1-5 show that employees in startups are significantly more likely to be founder types or joiner types than employees in established firms, but significantly less likely to be established firm types or to have other career preferences. We find no significant difference in the share of indifferent types, which is consistent with the idea that these individuals should not systematically sort into one type of employment over another, and should thus be represented quite evenly in startups as well as established firms.

If individuals sort with respect to their career preferences, and if career preferences reflect a range of individual characteristics such as risk preferences or preferences for autonomy, then sorting by career preferences may also lead to differences across firms with respect to these underlying individual characteristics. We explore such differences in Table 10, Models 6-10. Controlling for demographic characteristics and field, we find no systematic difference in employees' preferences for autonomy, salary, or commercialization activities between employees working in startups versus established firms. However, startup employees have a significantly higher tolerance for risk than employees working in

established firms (see also Sauer mann forthcoming) and are less interested in managerial work. The lack of differences with respect to other individual characteristics may partly reflect that sorting is far from perfect. Recall from Table 4 that the majority of joiner types (72%) enter established firms and constitute 9% of established firm employees. Similarly, while most established firm types enter established firms, 22% of startup employees are established firm types. As such, differences in employee characteristics across firm types may be muted. At the same time, differences in employee characteristics may emerge between different types of employees working within a given type of employment.

Table 11 explores this conjecture. In particular, we estimate separate regressions for the sample of established firm employees (Models 1-5) and startup employees (Models 6-10). The dependent variables are individual characteristics such as risk tolerance or preference for autonomy, and we include on the right hand side the measures of ex ante career preferences. As expected, we find significant differences within a given employment type. For example, founder types working in established firms have significantly stronger preferences for autonomy, commercialization, and management than their colleagues with established firm career preferences. Within startups, employees who are indifferent between startups and established firms and those with established firm preferences have a significantly weaker preference for autonomy than joiner and founder types.

Taken together, sorting leads to significant differences in the entrepreneurial interests of employees working in startups versus established firms. Differences with respect to other individual attributes are relatively small – with the exception of a significantly higher tolerance for risk among startup employees. Within each employment setting, however, there are employees with different career preferences, and these employees differ significantly with respect to their individual characteristics.

4.4 Intentions to quit

The prior sections examined the degree to which sorting occurs, why sorting may be imperfect, and what implications sorting has for the employee populations observed in different types of firms. Our results in these sections raise the question whether the alignment between career preferences and employment outcomes “matters” for employees’ behavior or performance. While a full exploration of this question is beyond the scope of this paper, we can provide initial evidence by examining implications of sorting for subsequent employee mobility. Mobility is of particular interest because it affects the sustainability of human capital-based competitive advantage, and because high mobility can impose considerable administrative costs on employers (Campbell, et al. 2012). Our intuition is that workers who find themselves in a job that is different from their career preferences may be more likely to leave their employer to find a better “match” (see Jovanovic 1979, Astebro, et al. 2011). Although we do not observe actual mobility, the survey included a measure of intentions to quit. More specifically, we asked

respondents in the second wave “To what extent are you considering quitting your job within the next year?”, using a 3-point scale.

Models 1-3 in Table 12 use the sample of employees working in established firms. Consistent with our expectation, Model 1 shows that joiner types have higher intentions to quit than established firm types (omitted category). It is conceivable, however, that intentions to quit depend partly on the reason why individuals took their current jobs in the first place. As such, Model 2 includes the measures of reasons that were important when choosing the current job (see §4.2.3). We find that intentions to quit are significantly lower among employees who took their job because of employer prestige or intellectual challenge, but significantly higher among employees who stated that the lack of job alternatives was an important reason to take the current job. Controlling for these reasons does not reduce but slightly strengthens the positive coefficient on joiner types. In Model 3, we include interactions between employee types and the dummy variable indicating that the lack of alternatives was an important reason to take the current job. The intuition is that employees whose employment does not “match” with their career preferences are more likely to quit if they were forced into this job by a lack of alternatives than if they chose their job “voluntarily” because of certain desirable job attributes such as employer prestige or intellectual challenge (see Stenard and Sauermann 2016). However, we find no significant interactions, suggesting that joiner types are more likely to consider quitting their jobs in established firms regardless of whether they took those jobs voluntarily or because no other options were available.

Models 4 and 5 estimate similar regressions for startup employees. We find that founder types in startups have significantly higher intentions to quit than joiner types, perhaps reflecting that individuals with a strong desire to be a founder continue to search for opportunities to start their own firm (possibly after acquiring additional skills in startup employment). Startup employees who took their current job because of a lack of alternatives have significantly higher intentions to quit, but controlling for reasons for taking the current job does not change the coefficient for founder types. Unfortunately, we are not able to estimate interaction models in the startup sample due to small sample size and the very small number of startup employees who indicate that they took their current job due to a lack of alternatives.

4.5 Robustness checks and supplementary analyses

Table 13 examines the robustness of our main sorting results. First, given that we observe individuals at different stages in their graduate studies, it is conceivable that students further away from graduation may have changed their career preferences between the time of the first wave of the survey and taking their first employment. To examine this, Model 1 restricts the sample to respondents who were in their last year of graduate school and closest to employment. Individuals with founder or joiner preferences are still more likely to sort into startup employment, but indifferent types are not. Model 2 reports results for

individuals more than one year from graduation, which are highly consistent with the main results in Table 5. Second, since there is a three-year gap between surveys, it is possible that some individuals may have changed jobs since graduation and we do not observe them in the first employment. Model 3 restricts the sample to individuals who reported in the second wave of the survey that their current job was their first job. Again, the results for founder and joiner preferences remain highly significant, while those with indifferent preferences are not more likely to sort into startup employment. Model 4 restricts the sample to individuals who have changed jobs and we find that both founder types and indifferent types are more likely to sort into startup employment. Although we do not know whether their first job was in an established firm or startup, this result suggests that individuals may adjust their employment to better align with their career preferences. Model 5 is most restrictive by using only individuals close to graduation in the first wave and in their first job in the second wave; we continue to find strong evidence of sorting of founder and joiner types into startups.

5 Discussion

A growing body of research studies the impact of organizational characteristics on employees' entrepreneurial activity (Sørensen 2007, Özcan and Reichstein 2009, Elfenbein, et al. 2010, Nanda and Sørensen 2010, Astebro, et al. 2011, Kacperczyk and Marx 2016). We complement this work by exploring the degree to which workers with entrepreneurial interests sort into different types of firms in the first place. Using unique longitudinal data from over 1,400 individuals who were followed from graduate training into their first jobs, we find significant evidence of sorting: Graduates who expressed strong interests in entrepreneurship prior to graduation are significantly more likely to join startup firms three years later, while those who expressed a preference for working for an established firm were significantly more likely to subsequently enter one. At the same time, sorting is far from perfect: Over half of those with "joiner" interests end up working for established firms, and a significant share of established firm types join startups. As a result, differences between the employee populations of startups and established firms are less pronounced than commonly thought, while there is significant heterogeneity with respect to employees' entrepreneurial interests within a given type of organization.

Our findings of significant – but incomplete – sorting have a number of implications. First, they suggest that future work on drivers of entrepreneurial activity in different types of organizations should consider not only treatment due to organizational features, but also more explicitly the role of individuals' pre-existing entrepreneurial interests, and the potential role of sorting. Rather than studying sorting and treatment in isolation, there may be value in considering them jointly; for example, it is likely that employees with different levels of pre-existing entrepreneurial interests respond differently to "treatments" such as exposure to bureaucracy, the arrival of entrepreneurial opportunities that their

current employer is unwilling to exploit, or to co-workers' offers to join a new venture (Roach and Sauermann 2015, Shah et al. 2016). Second, our findings suggest that efforts to compare human capital across different types of employers can be useful (Zenger and Lazzarini 2004, Ouimet and Zarutskie 2014, Sauermann forthcoming), but likely ignores important heterogeneity within. Future work could fruitfully explore this heterogeneity to examine whether joiner and founder types are disproportionately responsible for entrepreneurial activity observed in different types of firms. Third, our results suggest that a deeper understanding of different types of employees, and their "fit" with the employer may have important implications for a broader range of relevant outcomes. While we provided initial evidence with respect to intentions to quit, future work could explore how the degree of fit between career preferences and employer type relates to important outcomes such as labor mobility, job satisfaction, and performance.

In a second set of analyses, we explored a number of different reasons for why individuals may enter types of firms they did not prefer *ex ante*. While we find little evidence of compensating differentials or sorting by ability, we find evidence of a range of other reasons including limited job opportunities in the preferred career, difficulties of getting visa to work in startup firms, individuals' desire to learn and acquire skills, as well as the desire to work on particular technologies or problems, regardless of the type of employer. These insights contribute to an emerging stream of literature trying to understand the entrepreneurial workforce (Campbell 2013, Haltiwanger, et al. 2013, Ouimet and Zarutskie 2014, Burton, et al. 2016) and why certain individuals – both with and without entrepreneurial interests – decide to work for startup firms. At the same time, these findings speak to a more general literature on sorting by highlighting that sorting is typically not complete, and that different reasons for why workers enter employment that does or does not fit with their career preferences can have important implications. Given the broad set of reasons emerging in our study, it appears that multiple theories are required to understand whether and how workers sort, and these theories need to acknowledge the role of both individual factors (e.g., preferences, visa status) but also contextual variables (e.g., job availability).

We acknowledge a number of limitations that provide opportunities for future research. First, our focus is on sorting based on career preferences and our study provides only limited insight into potential sorting with respect to other individual-level characteristics. In particular, while our data include some unique measures of research ability, future research could explore sorting with respect to a broader set of ability measures. Second, our analysis of salaries and compensating differentials was limited in that we had to rely on self-reported salaries that may not capture all aspects of compensation such as stock options or bonuses. While this limitation is shared with most of the literature on wage differences across firm types, better data on compensation would be extremely valuable. Finally, our longitudinal data provide novel insights into the transition from graduate education to first employment but we cannot

speak to longer term outcomes such as employees' performance in their jobs or subsequent mobility. Future work using longer time series could provide important insights into the long term implications of sorting with respect to entrepreneurial preferences.

In addition to implications for research, our results may also have implications for founders, managers, and policy makers. First, several studies show that attracting and retaining human capital is a critical hurdle founders face in their efforts to build successful ventures (Baron, et al. 2001, Hsu 2009, Wasserman 2012). Our results suggest that this may not be due to a lack of individuals who would be interested in working in startups. Rather, these problems may reflect a number of other reasons such as inefficient matching of job candidates and open positions, mismatches in skills, or institutional constraints such as visa restrictions. As such, while efforts to raise interest in entrepreneurship in the general population may be useful, policy makers should consider a broader range of policies that may enable those who are already interested in entrepreneurship – especially as “joiners” – to realize their interests. Second, we found that a significant share of individuals with founder or joiner intentions end up working for established firms. Although future research is needed on the role these individuals play working for these employers, it is likely that managers may benefit from identifying these individuals to leverage employees' entrepreneurial interests but also to shield employers from potential negative consequences. For example, employees with entrepreneurial interests may be particularly open to engaging in corporate entrepreneurship, helping firms' efforts to explore new markets and product domains. On the other hand, failure to understand and address employees' entrepreneurial interests may lead to higher turnover, limiting firms' ability to benefit from employees' human capital and increasing the risk that employees leave to start competing firms (Campbell, et al. 2012). Overall, attention to employees' entrepreneurial interests, and to the role of both sorting and organizational influences promises to enrich our understanding of many interesting and important issues in the areas of entrepreneurship, innovation, and human capital.

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Table 1: Ex ante career preferences and ex post employment outcomes

		Ex post employment outcome	
		Startup employee	Established firm employee
Ex ante career preference	Founder preference	<p>Possible reasons for sorting</p> <ul style="list-style-type: none"> ▪ Lack of founding opportunities ▪ Desire to gain entrepreneurial experience and skills to start own venture in the future ▪ Wage premium that compensates for non-preferred employment setting <p>Potential implications (relative to joiner types working in startups)</p> <ul style="list-style-type: none"> ▪ Higher mobility ▪ Higher likelihood of subsequent founding 	<p>Possible reasons for sorting</p> <ul style="list-style-type: none"> ▪ Lack of founding opportunities ▪ Lack of positions in startups ▪ Lower ability constrains job options ▪ Desire to acquire resources to start own venture in the future ▪ Wage premium to compensate for non-preferred employment setting <p>Potential implications (relative to established firm types working in established firms)</p> <ul style="list-style-type: none"> ▪ Higher mobility ▪ Higher likelihood of subsequent founding
	Joiner career preference	<p>Possible reasons for sorting</p> <ul style="list-style-type: none"> ▪ Sought employment in positions that are most consistent with career preference ▪ If given the choice, accepted position in startup over alternatives in other types of organizations. <p>Potential implications</p> <ul style="list-style-type: none"> ▪ Lower mobility ▪ Wage discount in exchange for preferred employment setting 	<p>Possible reasons for sorting</p> <ul style="list-style-type: none"> ▪ Lack of positions in startups ▪ Lower ability constrains job options ▪ Limited information on available positions ▪ Wage premium to compensate for non-preferred employment setting <p>Potential implications (relative to established firm types working in established firms)</p> <ul style="list-style-type: none"> ▪ Higher mobility
	Established firm career preference	<p>Possible reasons for sorting</p> <ul style="list-style-type: none"> ▪ Lack of positions in established firms ▪ Lower ability constrains job options ▪ Limited search by startup employers ▪ Wage premium to compensate for non-preferred employment setting <p>Potential implications (relative to joiner types working in startups)</p> <ul style="list-style-type: none"> ▪ Higher mobility 	<p>Possible reasons for sorting</p> <ul style="list-style-type: none"> ▪ Sought employment in positions that are most consistent with career preference ▪ If given the choice, accepted position in established firms over alternatives in other types of organizations. <p>Potential implications</p> <ul style="list-style-type: none"> ▪ Lower mobility ▪ Wage discount in exchange for preferred employment setting

Table 2: Cross-tabulation of ex ante career attractiveness measures

		<i>Attractiveness of a career in an est. firm</i>			
		<i>Not attractive</i>	<i>Attractive</i>	<i>Extremely attractive</i>	
<i>Attractiveness of a career in a startup</i>	<i>Not attractive</i>	13%	17%	6%	36%
	<i>Attractive</i>	6%	26%	14%	46%
	<i>Extremely attractive</i>	1%	6%	11%	18%
		20%	49%	31%	

Note: For ease of interpretation, ratings of 1-3 (“extremely unattractive”, “unattractive” and “neither attractive nor unattractive”) were collapsed into the category “not attractive”.

Table 3: Selected summary statistics

	Startups	Established firms
Observations	223	1,281
Firm size (column percentage)		
<10 employees	25.8%	0.7%
11-25 employees	20.6%	2.4%
26-100 employees	30.9%	5.7%
101-500 employees	22.7%	8.2%
501-1,000 employees	0.0%	4.9%
1,001-5,000 employees	0.0%	10.6%
5,001-25,000 employees	0.0%	24.4%
>25,000 employees	0.0%	43.1%
Firm age (column percentage)		
<5 years	61.9%	0.6%
6-10 years	38.1%	2.1%
>10 years	0.0%	97.0%
Job characteristics		
Mean wages (normalized to 2016)	\$106.5	\$119.8
% engaged in R&D work activities	90.2%	84.9%
% engaged in management work activities	46.0%	40.6%
% engaged in both R&D and management	38.9%	30.8%
Mean hours worked per week	48.3	47.8
Industry (column percentage)		
Chemicals	3.3%	5.7%
Computers/Computer systems	5.3%	9.9%
Energy	3.3%	2.7%
Hardware/Machinery	2.1%	7.7%
Instruments/Devices	11.3%	6.0%
Internet/Telecommunications	14.2%	15.4%
Biopharma	33.8%	20.3%
Semiconductors	17.2%	7.4%
Software	0.7%	10.8%
Other industries	8.9%	14.3%

Table 4: Contingency table relating ex ante career preferences to ex post employment outcomes

	Startup employee	Est. firm employee	Baseline
Founder preference			
Observed frequency	30	27	57
Expected frequency	8.5	48.5	57.0
Row percentage	53%	47%	100%
Column percentage	13%	2%	4%
χ^2 contribution	54.9	9.6	64.5
Joiner preference			
Observed frequency	46	121	167
Expected frequency	23.8	142.2	167.0
Row percentage	28%	72%	100%
Column percentage	21%	9%	11%
χ^2 contribution	18.2	3.2	21.4
Indifferent			
Observed frequency	79	461	540
Expected frequency	80.1	459.9	540.0
Row percentage	15%	85%	100%
Column percentage	35%	36%	36%
χ^2 contribution	0.0	0.0	0.0
Est. firm preference			
Observed frequency	50	492	542
Expected frequency	80.4	461.6	542.0
Row percentage	9%	91%	100%
Column percentage	22%	38%	36%
χ^2 contribution	11.5	2.0	13.5
Other career preference			
Observed frequency	18	180	198
Expected frequency	29.4	168.6	198.0
Row percentage	9%	91%	100%
Column percentage	8%	14%	13%
χ^2 contribution	4.4	0.8	5.2
Baseline			
Observed frequency	223	1281	
Row percentage	15%	85%	

Pearson $\chi^2(4) = 104.5394$ Pr = 0.000

Likelihood-ratio $\chi^2(4) = 83.2714$ Pr = 0.000

Table 5: Sorting into startup vs. established firm employment

Dependent variable: Employment in startup (1) or established firm (0)							
					Joiner preference sample	Indifferent preference sample	Est. firm preference sample
Method: Logistic regression	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Startup career attractiveness							
Extremely unattractive	-0.33 (0.49)						
Unattractive	-0.76 (0.42)						
Attractive	0.77*** (0.22)						
Extremely attractive	1.39*** (0.20)						
Est. firm career attractiveness							
Extremely unattractive	-0.50 (0.85)						
Unattractive	-0.49 (0.33)						
Attractive	-0.31 (0.21)						
Extremely attractive	-0.91*** (0.26)						
Career preferences							
Founder preference		2.56*** (0.31)	1.95*** (0.35)	2.58*** (0.31)			
Joiner preference		1.18*** (0.26)	0.57* (0.29)	1.18*** (0.25)			
Indifferent		0.61*** (0.19)		0.63*** (0.18)			
Est. firm preference			-0.61*** (0.19)				
Other career preference		-0.30 (0.28)	-0.91** (0.29)	-0.26 (0.29)			
Individual characteristics							
Self-assessed ability	-0.01 (0.04)	-0.02 (0.04)	-0.02 (0.04)	-0.02 (0.04)	0.01 (0.09)	-0.02 (0.08)	-0.05 (0.08)
U.S. citizen	1.01*** (0.21)	0.96*** (0.21)	0.96*** (0.21)	0.97*** (0.22)	1.14 (0.64)	1.16*** (0.32)	0.59 (0.36)
Male	-0.06 (0.14)	-0.06 (0.15)	-0.06 (0.15)	-0.04 (0.15)	-0.52 (0.42)	0.05 (0.24)	0.62* (0.31)
Age	-0.01 (0.02)	-0.02 (0.03)	-0.02 (0.03)	-0.03 (0.03)	0.04 (0.05)	-0.05 (0.04)	-0.05 (0.06)
Annual U.S. VC funding				1.05*** (0.26)	0.58 (0.49)	1.46** (0.54)	1.36* (0.59)
U.S. GDP growth rate				-0.18 (0.17)	0.53 (0.53)	0.13 (0.33)	-0.91* (0.40)
Year started job (2011-2016)	Y	Y	Y	N	N	N	N
Field fixed effects	Y	Y	Y	Y	Y	Y	Y
Constant	-3.07*** (0.87)	-3.04** (1.04)	-2.43* (0.99)	-5.13*** (1.36)	-5.61* (2.36)	-6.17** (1.97)	-4.27 (2.59)
Obs.	1478	1478	1478	1478	163	529	528
Log Pseudolikelihood	-549.73	-538.18	-538.18	-545.85	-90.79	-202.00	-153.33
Pseudo R2	0.113	0.132	0.132	0.120	0.055	0.094	0.073

Robust standard errors clustered on university reported in parentheses; *** p < 0.001, ** p < 0.01, * p < 0.05.

Table 6: Sorting based on individual characteristics and job attribute preferences

Dependent variable: Employment in startup (1) or established firm (0)

Method: Logistic regression

Sample	Full sample	Full sample with career preferences	Joiner preference sample	Indifferent sample	Est. firm preference sample
Model	(1)	(2)	(3)	(4)	(5)
Preferences for specific job attributes					
Autonomy	0.03 (0.11)	-0.10 (0.12)	0.31 (0.25)	-0.23 (0.17)	-0.04 (0.15)
Income	0.03 (0.14)	-0.01 (0.13)	0.21 (0.30)	-0.01 (0.21)	0.03 (0.14)
Commercialization activities	0.09 (0.08)	-0.08 (0.09)	-0.83** (0.26)	-0.04 (0.17)	-0.27* (0.13)
Managerial activities	-0.20** (0.08)	-0.25** (0.08)	-0.30 (0.26)	-0.15 (0.14)	-0.26* (0.11)
Individual characteristics & traits					
Risk tolerance	0.05* (0.02)	0.03 (0.02)	0.10 (0.07)	0.02 (0.04)	0.05 (0.04)
Persistence	0.22* (0.11)	0.20 (0.11)	-0.04 (0.23)	-0.01 (0.23)	0.04 (0.15)
Self-assessed ability	-0.04 (0.05)	-0.04 (0.05)	0.14 (0.15)	-0.03 (0.08)	-0.01 (0.06)
U.S. citizen	0.98*** (0.21)	0.96*** (0.22)	0.94 (0.59)	1.19*** (0.32)	1.15*** (0.26)
Male	0.17 (0.13)	-0.06 (0.15)	-0.43 (0.50)	0.09 (0.27)	-0.14 (0.18)
Age	-0.04 (0.02)	-0.04 (0.03)	0.02 (0.07)	-0.05 (0.04)	-0.02 (0.02)
Contextual factors					
Entrepreneurial norms	0.41* (0.17)	0.35* (0.17)	0.09 (0.45)	0.46 (0.30)	0.27 (0.24)
Founder role model	0.20* (0.10)	0.19 (0.12)	0.37 (0.45)	0.36 (0.24)	0.38* (0.18)
Ex ante career preferences					
Founder preference		2.77*** (0.35)			
Joiner preference		1.20*** (0.25)			
Indifferent		0.69*** (0.21)			
Other career preference		-0.34 (0.30)			
Annual U.S. VC funding	1.10*** (0.27)	1.01*** (0.28)	0.20 (0.55)	1.47** (0.57)	1.13** (0.40)
U.S. GDP growth rate	-0.13 (0.19)	-0.17 (0.19)	0.74 (0.69)	0.17 (0.36)	0.33 (0.30)
Field fixed effects	Y	Y	Y	Y	Y
Constant	-5.80*** (1.42)	-4.17** (1.46)	-3.23 (3.16)	-5.00* (2.33)	-4.49** (1.74)
Obs.	1462	1462	160	522	682
Log Pseudolikelihood	-568.39	-528.15	-74.53	-195.78	-284.16
Pseudo R2	0.074	0.140	0.208	0.111	0.113

Robust standard errors clustered on university reported in parentheses; *** p < 0.001, ** p < 0.01, * p < 0.05.

Table 7: Reasons for choosing current employment

	Founder preference	Joiner preference	Indifferent	Est. firm preference	Other preference	Total
"When choosing your current job, how important were each of the following factors to you? (5 point scale; share of respondents with rating of 4 or 5)						
Startup employees						
Salary	78%	84%	88%	91%	88%	87%
Autonomy	52%	53%	30%	33%	38%	39%
Intellectual challenge	83%	98%	94%	87%	94%	92%
Employer prestige	26%	31%	40%	44%	38%	37%
Preferred position not available	15%	7%	19%	9%	7%	13%
Established firm						
Salary	86%	82%	88%	91%	81%	87%
Autonomy	31%	39%	43%	42%	47%	43%
Intellectual challenge	71%	92%	91%	90%	92%	91%
Employer prestige	62%	61%	66%	68%	64%	66%
Preferred position not available	46%	21%	24%	19%	33%	24%
"Which of the following were important reasons to work for a startup company? Select all that apply."						
Startup employees only						
Interested in specific technology	71%	70%	75%	68%	64%	71%
Learning about entrepreneurship	64%	37%	34%	19%	36%	37%
Better fit than other options	75%	74%	79%	48%	55%	69%
Better pay than other options	46%	22%	25%	39%	27%	31%

Table 8: Wage comparisons (in thousands, constant 2016 USD)

	Mean wages		Wage difference		
	Startup employees	Estab. firm employees	Within career preference	Within startup vs. joiner types	Within estab. firms vs. estab. types
Founder preference	\$105.6	\$134.2	\$28.6	-\$2.1	\$19.5
Joiner preference	\$107.7	\$118.9	\$11.2	\$0.0	\$4.2
Indifferent	\$104.2	\$110.6	\$6.4	-\$3.5	-\$4.1
Est firm preference	\$108.9	\$114.7	\$5.8	\$1.2	\$0.0
Average	\$106.4	\$114.0	\$7.6	\$0.0	\$0.0

Table 9: Regressions of total starting compensation

Dependent variable: Total starting compensation								
Method: OLS								
Model	Full sample (1)	Founder preference (2)	Joiner preference (3)	Indifferent (4)	Estab. Firm (5)	Full sample (6)	Estab firm employees (7)	Startup employees (8)
Startup employment	-8.423** [2.252]	-36.237* [16.206]	-12.686 [7.011]	-9.915** [3.607]	-7.715 [6.482]			
Founder preference						-0.345 [6.304]	7.489 [12.072]	-0.641 [8.548]
Joiner preference						1.938 [4.773]	4.742 [5.985]	
Indifferent						-0.919 [2.902]	0.028 [3.223]	-2.450 [5.160]
Estab. Firm preference								-0.780 [6.935]
Other career preference						-0.671 [3.368]	0.164 [3.762]	-7.454 [8.606]
Self-assessed ability	2.927** [0.649]	3.252 [4.907]	-0.357 [1.801]	2.773** [0.927]	3.405** [1.086]	2.958** [0.639]	2.954** [0.671]	3.054* [1.357]
Prior patents	5.063** [1.492]	9.042 [5.291]	0.050 [3.133]	5.639** [1.575]	7.558 [4.022]	4.584** [1.569]	6.327** [2.252]	0.445 [1.866]
Prior publications	0.720 [0.517]	0.221 [4.336]	-2.762 [1.638]	0.536 [0.891]	1.443 [0.874]	0.756 [0.496]	0.741 [0.624]	0.240 [1.050]
Male	12.714** [2.045]	20.067 [13.756]	10.830 [8.752]	14.249** [2.850]	5.320 [3.124]	12.455** [2.312]	12.331** [2.596]	15.213** [4.556]
Age	-0.721 [0.471]	-5.313* [2.337]	3.385* [1.460]	-0.951 [0.617]	-0.918 [0.662]	-0.676 [0.478]	-0.909 [0.610]	-0.112 [0.740]
U.S. citizen	2.031 [3.237]	-7.335 [20.554]	12.212 [9.486]	7.279 [3.870]	-2.542 [5.340]	1.170 [3.305]	1.296 [3.626]	8.221 [8.892]
Cohort 2013	19.217** [6.112]	63.753 [32.843]	42.644 [24.157]	4.881 [6.928]	15.613* [6.971]	19.756** [6.030]	18.940** [6.531]	17.836 [12.365]
Prior postdoc experience	0.946 [2.905]	22.895 [21.356]	-10.540 [11.056]	5.745 [3.996]	0.638 [4.404]	0.737 [2.930]	-2.050 [3.226]	14.814* [6.296]
Year started job	-0.504 [1.787]	-10.292 [9.029]	-3.521 [6.386]	1.481 [1.713]	1.725 [2.069]	-0.770 [1.784]	-0.968 [1.930]	1.481 [3.172]
Chemistry	4.655 [4.796]	9.457 [30.694]	15.509 [14.960]	0.370 [4.422]	6.109 [7.914]	5.417 [5.053]	5.069 [5.738]	6.579 [6.029]
Physics	12.707** [3.505]	-25.030 [18.371]	35.535 [20.808]	9.408 [5.583]	17.757** [6.418]	13.783** [3.516]	15.456** [4.158]	-0.849 [6.681]
Engineering	12.332** [3.291]	4.509 [17.927]	29.083** [9.595]	4.868 [3.262]	15.184* [6.665]	13.122** [3.361]	11.572** [4.186]	18.823** [5.348]
Computer sciences	58.155** [5.216]	11.506 [23.059]	79.190** [14.387]	43.314** [7.874]	65.343** [7.843]	58.824** [5.525]	59.568** [6.351]	52.139** [7.075]
Other field	24.539 [12.457]		14.723 [14.701]	10.402 [19.147]	8.330 [17.914]	26.735* [12.447]	25.457* [12.391]	
Constant	1,073.284 [3,594.994]	20,827.893 [18,181.100]	7,121.911 [12,828.540]	-2,914.304 [3,448.024]	-3,409.938 [4,158.692]	1,606.371 [3,588.260]	2,007.939 [3,883.105]	-2,942.086 [6,375.483]
Observations	997	34	127	331	373	997	808	189
R-squared	0.298	0.555	0.298	0.282	0.354	0.292	0.303	0.343

Robust standard errors clustered by university in brackets. ** p<0.01, * p<0.05

Table 10: Differences in employee characteristics between startups and established firms due to sorting

	(1) logit Founder pref	(2) logit Joiner pref	(3) logit Indifferent	(4) logit Est. firm pref	(5) logit Other pref	(6) ologit Autonomy	(7) ologit Salary	(8) ologit Commercialization	(9) ologit Management	(10) OLS Risk
Startup employment	2.207** [0.320]	0.808** [0.241]	0.118 [0.177]	-0.733** [0.146]	-0.907** [0.267]	0.131 [0.152]	-0.062 [0.155]	0.091 [0.135]	-0.305* [0.119]	0.403** [0.141]
Male	0.378 [0.345]	0.745** [0.162]	0.336** [0.112]	-0.371** [0.101]	-0.589** [0.177]	0.014 [0.138]	0.217 [0.122]	0.237* [0.098]	-0.180 [0.102]	0.305* [0.150]
Age	0.085* [0.042]	-0.007 [0.025]	-0.008 [0.018]	-0.023 [0.014]	0.039 [0.021]	0.025 [0.016]	-0.000 [0.016]	0.003 [0.021]	-0.033* [0.016]	0.020 [0.022]
U.S. citizen	-0.028 [0.370]	0.239 [0.249]	-0.349** [0.110]	0.035 [0.091]	0.549** [0.171]	-0.185 [0.101]	-0.326* [0.130]	-0.363** [0.115]	-0.206 [0.134]	-0.905** [0.220]
Cohort 2013	-0.590 [0.592]	1.040** [0.338]	-0.801** [0.242]	0.770** [0.226]	-0.681* [0.314]	-0.391 [0.218]	0.156 [0.224]	0.432* [0.186]	-0.155 [0.188]	-0.021 [0.238]
Prior postdoc experience	-0.933* [0.433]	0.006 [0.187]	0.058 [0.145]	-0.060 [0.118]	0.246 [0.206]	0.650** [0.134]	-0.179 [0.124]	-0.381** [0.113]	-0.198 [0.104]	0.670** [0.174]
Year started job	0.064 [0.119]	-0.071 [0.101]	0.060 [0.064]	-0.141* [0.062]	0.176* [0.078]	0.067 [0.051]	-0.093 [0.053]	-0.195** [0.047]	-0.063 [0.050]	0.004 [0.064]
Main field fe	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
Constant	-133.716 [238.451]	140.359 [203.054]	-121.324 [129.424]	283.073* [125.042]	-355.786* [156.788]					-5.042 [128.270]
Observations	1,478	1,478	1,478	1,478	1,478	1,476	1,477	1,475	1,476	1,478
R-squared										0.047

Robust standard errors clustered by university in brackets. ** p<0.01, * p<0.05

Table 11: Heterogeneity in employee characteristics within startups and within established firms

	Established firm employees					Startup employees				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	ologit	ologit	ologit	ologit	OLS	ologit	ologit	ologit	ologit	OLS
Autonomy	Salary	Commercialization	Management	Risk	Autonomy	Salary	Commercialization	Management	Risk	
Founder preference	0.815*	0.413	2.955**	1.519**	1.061	0.086	0.516	2.044**	1.657**	0.461
	[0.323]	[0.480]	[0.537]	[0.335]	[0.764]	[0.587]	[0.516]	[0.463]	[0.538]	[0.586]
Joiner preference	0.377	-0.195	0.908**	0.456**	0.084					
	[0.271]	[0.275]	[0.156]	[0.173]	[0.252]					
Indifferent	0.359**	-0.067	0.516**	0.230	0.336	-1.143**	0.421	1.208**	1.097**	-0.351
	[0.134]	[0.156]	[0.138]	[0.120]	[0.182]	[0.338]	[0.392]	[0.402]	[0.378]	[0.436]
Est. firm preference						-1.600**	0.273	0.820	0.450	-0.735
						[0.419]	[0.379]	[0.445]	[0.493]	[0.553]
Other career preference	0.724**	-0.943**	-1.344**	-0.568**	-0.150	-0.128	-0.538	-0.158	1.258*	-0.684
	[0.179]	[0.154]	[0.177]	[0.191]	[0.213]	[0.472]	[0.555]	[0.497]	[0.559]	[0.537]
Male	0.009	0.189	0.139	-0.268*	0.258	-0.147	0.066	-0.093	-0.103	0.346
	[0.135]	[0.140]	[0.106]	[0.112]	[0.153]	[0.435]	[0.321]	[0.323]	[0.244]	[0.391]
Age	0.017	-0.001	0.005	-0.035*	0.006	0.045	0.055	0.013	-0.066*	0.098
	[0.017]	[0.017]	[0.021]	[0.016]	[0.025]	[0.043]	[0.048]	[0.042]	[0.025]	[0.066]
U.S. citizen	-0.214*	-0.310*	-0.365**	-0.197	-0.936**	-0.539	-0.204	0.502	-0.123	-0.298
	[0.106]	[0.142]	[0.121]	[0.139]	[0.222]	[0.360]	[0.487]	[0.420]	[0.367]	[0.743]
Cohort 2013	-0.260	0.131	0.467*	-0.060	0.027	-0.371	0.525	0.278	-0.496	0.381
	[0.235]	[0.274]	[0.225]	[0.201]	[0.267]	[0.492]	[0.690]	[0.670]	[0.612]	[0.542]
Prior postdoc experience	0.689**	-0.114	-0.433**	-0.212	0.645**	0.470	-0.488	0.116	0.252	0.834
	[0.145]	[0.138]	[0.132]	[0.122]	[0.165]	[0.297]	[0.353]	[0.374]	[0.345]	[0.439]
Year started job	0.050	-0.069	-0.216**	-0.098	-0.027	-0.007	-0.222	-0.069	0.110	0.083
	[0.052]	[0.067]	[0.057]	[0.052]	[0.067]	[0.123]	[0.154]	[0.186]	[0.149]	[0.157]
Main field fe	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.	incl.
Constant					57.135					-165.345
					[134.758]					[315.895]
Observations	1,257	1,258	1,257	1,257	1,259	219	219	218	219	219
R-squared					0.055					0.103

Robust standard errors clustered by university in brackets. ** p<0.01, * p<0.05

Table 12: Intentions to quit

	Established firm employees			Startup employees	
	(1)	(2)	(3)	(4)	(5)
	ologit considquit	ologit considquit	OLS considquit	ologit considquit	ologit considquit
Founder preference	0.661 [0.543]	-0.205 [0.704]	0.015 [0.221]	1.496** [0.521]	1.495* [0.599]
Joiner preference	0.639* [0.293]	0.809** [0.304]	0.190* [0.082]		
Indifferent	0.273 [0.163]	0.314 [0.193]	0.118 [0.062]	0.460 [0.423]	0.011 [0.392]
Est. firm preference				0.247 [0.599]	-0.257 [0.494]
Other career preference	0.123 [0.211]	-0.088 [0.263]	-0.019 [0.082]	-0.890 [0.914]	-1.785 [1.086]
Reason salary		0.034 [0.233]			1.053 [0.600]
Reason autonomy		0.005 [0.197]			-0.337 [0.448]
Reason challenge		-0.708** [0.268]			-0.652 [0.799]
Reason prestige		-0.409* [0.166]			0.102 [0.494]
Reason preferred not available		1.054** [0.192]	0.359** [0.087]		1.835** [0.441]
Founder preference x pref not avail			-0.019 [0.342]		
Joiner preference x pref not avail			0.187 [0.208]		
Indifferent x pref not avail			-0.116 [0.162]		
Est. firm preference x pref not avail					
Other career preference x pref not avail			-0.081 [0.172]		
Individual controls	incl.	incl.	incl.	incl.	incl.
Main field fe	incl.	incl.	incl.	incl.	incl.
Observations	795	716	723	188	175
R-squared			0.119		

Robust standard errors clustered by university in brackets. ** p<0.01, * p<0.05.

Table 13: Robustness tests

Dependent variable: Employment in startup (1) or established firm (0)					
Method: Logistic regression			First job	Different job	Close to
Sample	Graduate in	Graduate in	since	since	graduation
Model	same year	>1 year	graduation	graduation	+ first job
	(1)	(2)	(3)	(4)	(5)
Career preferences					
Founder preference	2.26*** (0.48)	2.88*** (0.46)	3.02*** (0.40)	1.85* (0.86)	3.17*** (0.64)
Joiner preference	1.05* (0.43)	1.32*** (0.35)	1.28*** (0.31)	0.88 (0.49)	1.34** (0.45)
Indifferent	0.47 (0.30)	0.71* (0.31)	0.46 (0.25)	0.88* (0.42)	0.66 (0.36)
Other career preference	-0.26 (0.43)	-0.22 (0.37)	-0.15 (0.33)	-0.38 (0.64)	0.04 (0.55)
Individual characteristics					
Self-assessed ability	0.05 (0.05)	-0.07 (0.06)	-0.04 (0.08)	0.06 (0.13)	0.00 (0.08)
U.S. citizen	0.69* (0.32)	1.05*** (0.27)	0.83** (0.31)	0.97 (0.58)	0.62 (0.46)
Male	0.07 (0.24)	-0.08 (0.22)	-0.19 (0.19)	0.15 (0.36)	0.02 (0.32)
Age	-0.10** (0.03)	0.01 (0.03)	-0.02 (0.03)	-0.08 (0.07)	-0.09 (0.06)
Annual U.S. VC funding	1.76*** (0.32)	-0.05 (0.49)	-0.05 (0.27)	1.31 (0.90)	1.08** (0.38)
U.S. GDP growth rate	-0.84*** (0.26)	0.68 (0.35)	-0.03 (0.24)	-0.64 (0.69)	-0.08 (0.44)
Field fixed effects	Y	Y	Y	Y	Y
Constant	-4.92** (1.60)	-3.32 (1.73)	-1.11 (1.64)	-4.16 (3.58)	-3.29 (2.30)
Obs.	652	819	884	171	393
Log Pseudolikelihood	-230.12	-305.23	-359.22	-92.27	-157.41
Pseudo R2	.139	0.133	.115	.099	.131

Robust standard errors clustered on university reported in parentheses; *** p < 0.001, ** p < 0.01, * p < 0.05, † p < 0.10

Figure 1: Distribution of career attractiveness measures

