People or Place? Founder Intentions, Entrepreneurial Regions, and Technology Startups

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While prior research has focused on the effects of entrepreneurial regions such as Silicon Valley on firm founding rates, the extent to which these regions might attract aspiring entrepreneurs prior to founding has been overlooked. We take a first step at teasing apart whether entrepreneurial regions *attract* or *create* founders by using survey responses on the pre-existing stated founder intentions of STEM PhDs during graduate school and following their early careers into industry employment in different U.S. regions and their subsequent founding activity. We report three key findings. First, although one-third of aspiring founders move to entrepreneurial regions for their first industry job after graduation, this is only slightly higher than the share of individuals without founder intentions who also move to entrepreneurial regions. We show that this is because workers move to entrepreneurial regions for different reasons, with founder types doing so to work in startups while established firm types do so to work in large technology firms that offer attractive jobs. Second, we show that employees in entrepreneurial regions who become founders are disproportionately among those with pre-existing founder intentions. Additional analyses suggest that this is due in part to the combination of the right people (aspiring founders) being in the right place (entrepreneurial regions) with the resources that facilitate founding. Third, we find no evidence that entrepreneurial regions make individuals without founder intentions more entrepreneurial. Instead, our findings suggest that the higher founding rates in entrepreneurial regions are due in part to aspiring founders self-selecting into these regions to work in startups prior to founding their own startups.

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1. Introduction

Regions such as Silicon Valley and Boston are often viewed as engines of innovation and startup creation, supported by deep pools of talent, concentrated venture capital, and a culture that celebrates risk-taking and experimentation (Audretsch and Feldman 1996, Stuart and Sorenson 2003, Lerner 2009, Delgado et al. 2010, Dahl and Sorenson 2012, Kerr and Robert-Nicoud 2020, Moretti 2021, Guzman 2024). Building on this view, a substantial body of research has attributed higher founding rates in such regions to both structural mechanisms—such as access to financial, human, and technological resources— (Stuart and Sorenson 2003, Audretsch and Lehmann , Delgado et al. 2010) and social mechanisms, including peer effects and local culture that legitimize entrepreneurial behavior (Saxenian 1994, Feldman 2001, Stuart and Sorenson 2003, Hayton and Cacciotti 2013, Kacperczyk 2013).

While the emphasis of much of the research on entrepreneurial ecosystems is on the *place* (Guzman et al. 2024), a central question about the *people* remains unresolved: Do entrepreneurial regions create entrepreneurs, or do they attract aspiring founders and provide them with the right environment to become entrepreneurs? While much of the literature has implicitly assumed a relatively homogeneous treatment effect of entrepreneurial regions—namely, that by virtue of being embedded in an entrepreneurial context all individuals are more likely to become an entrepreneur (Stuart & Sorenson, 2003; Audretsch & Lehmann, 2005)—this framing risks conflating treatment with selection. For example, a growing body of research shows that many startups move to entrepreneurial regions after founding (Conti and Guzman 2023, Guzman 2024), in part to have greater access to resources and to be in a more innovative environment. We go one step earlier to examine whether *individuals* with founder intentions move to entrepreneurial regions first as employees, and whether this self-selection may partially explain their subsequent founding activities in entrepreneurial regions.

Our conceptual framework distinguishes between how individuals' ex ante career intentions shape where they choose to work on the one hand, and how the region where they work shapes whether they become a founder or not on the other. To the extent that individuals with pre-existing founder intentions select into entrepreneurial regions to further their founder ambitions, then the treatment effect of these regions on startups may be in providing greater access to resources and opportunities. In other words, higher startup founding rates in

entrepreneurial regions may be the combination of the right people being in the right place. Individuals without founder intentions, on the other hand, likely move to entrepreneurial regions for reasons unrelated to entrepreneurship, perhaps for better jobs in large innovative firms. If so, then resources and opportunities alone are likely insufficient to spur them to become founders. Instead, the social influence of working in an entrepreneurial region is needed to change their founder intentions, suggesting that regions make people more entrepreneurial. Together these imply heterogeneity in both why individuals select into entrepreneurial regions as well as the potential treatment effects of working in these regions.

This distinction between the role of entrepreneurial regions in *creating* and *attracting* founders is conceptually important but empirically difficult to examine. Empirical studies often observe individuals only *after* they have become entrepreneurs, making it difficult to determine whether entrepreneurial behavior was shaped by the regional environment or whether it reflects founder intentions formed long before. Without data on individuals' motivations prior to labor market entry, it is challenging to separate individual selection from regional treatment effects.

To address this empirical challenge, we leverage a unique longitudinal dataset of 1,962 STEM PhD students from U.S. research universities. The dataset includes direct survey measures of individuals' stated founder intentions during graduate school and prior to labor market entry. We then track their post-graduation career histories using matched survey and LinkedIn data. This research design allows us to observe both whether individuals with founder intentions are more likely to select into entrepreneurial regions, and whether working in those regions subsequently increase the likelihood of founding a company after accounting for self-selection. Moreover, to the extent that individuals without founder intentions choose to work in entrepreneurial regions for reasons other than to become a founder, then this quasi-random sorting provides us with a unique opportunity to tease apart individual self-selection from heterogeneous regional treatment effects in explaining entrepreneurship.

Focusing on PhDs who take R&D-oriented jobs in industry, we examine two primary questions. First, are individuals with pre-existing founder intentions more likely to select into entrepreneurial regions? Second, do entrepreneurial regions increase the likelihood of founding, and does this effect vary by individuals' pre-existing founder intentions?

To guide our analysis, we contrast two mechanisms through which entrepreneurial regions might shape outcomes. On one hand, if entrepreneurial regions function primarily by

enabling aspiring founders to act – by offering greater access to funding, talent, or startup opportunities – then we would expect stronger founding outcomes among those with pre-existing founder intentions working in entrepreneurial regions compared to others. On the other hand, if entrepreneurial regions operate through socialization, then we might expect that all individuals in these regions – including those without founder intentions – will be more likely to found startups than those outside these regions.

Our analysis yields three main findings. First, while roughly one-third of individuals with founder intentions take jobs in entrepreneurial regions after graduation, a similar share of those with intentions of joining startups as employees and of working in established firms also work in these regions. Drawing upon survey questions that asked about important reasons for choosing their first job, we find that this high inflow of talent to entrepreneurial regions is associated with choosing better jobs that offer greater mobility and the opportunity to work on cutting-edge R&D projects. At the same time, we find that individuals with founder and joiner intentions also move to entrepreneurial region to work in startups and employers with an entrepreneurial culture. This suggest that many high-skilled workers move to entrepreneurial regions but for different reasons, with individuals with founder intentions doing so to be in entrepreneurial firms and those without founder or joiner intentions to work in large innovative firms. We exploit this quasi-random sorting of individuals without founder intentions into entrepreneurial regions to isolate potential heterogeneous regional treatment effects on different types of individuals.

Second, a naïve regression confirms that individuals working in entrepreneurial regions are indeed more likely to become founders, consistent with prior research. However, once we include pre-existing founder intentions, we find that a general region effect disappears, suggesting that the higher founding rates observed in entrepreneurial regions may be driven in part by individuals with founder intentions who self-select into these regions. When examining the interplay between career intentions and location we find that individuals with founder intentions are more likely to become a founder in entrepreneurial regions, although they also exhibit a high likelihood of becoming a founder in other regions as well. This effect is even stronger for individuals with degrees in engineering and computer science relative to the physical sciences, perhaps because science-based startups require a proprietary technology that is likely owned by the employer compared to software and device startups that may originate with the founders' own ideas. Together these results suggest that founding is greatest when there is the

combination of the right people with founder intentions being in the right place with resources and other factors that support entrepreneurship.

Third, individuals without pre-existing founder intentions – whether they prefer to join startups as employees or work in established firms – are not significantly more likely to become founders simply by being in entrepreneurial regions. Using questions from the survey while employed we find that working in an entrepreneurial region does not make individuals without pre-existing founder intentions more entrepreneurial. At the same time, we find that individuals lacking pre-existing founder intentions who work in startups are more likely to become more entrepreneurial, suggesting that social influence may occur at the organization rather than region level. This may imply that entrepreneurial regions are fertile environments to birth and grow startups, including those that move there after founding, and that working in these startups rather than in the entrepreneurial region per se shapes employee entrepreneurial activity.

These findings challenge the narrative that entrepreneurial regions uniformly produce entrepreneurs. Instead, our results suggest that such regions amplify pre-existing entrepreneurial intentions rather than create it: they enable those with founder ambitions to act while exerting minimal influence on those without such aspirations.

We contribute to research on entrepreneurial ecosystems, regional innovation, and the micro-foundations of entrepreneurship in several ways. First, by leveraging pre-employment data on founder intentions, we provide a rare empirical test of the selection versus treatment mechanisms that shape regional founding rates—a challenge that has constrained prior work. Second, we show that the effects of entrepreneurial regions are not uniform but rather vary systematically depending on individuals' prior entrepreneurial aspirations. This highlights the importance of accounting for heterogeneity in both preferences and context sensitivity in models of regional entrepreneurship. Finally, by showing that entrepreneurial regions are more likely to enable than to create, we offer a more nuanced view of entrepreneurial ecosystems: not as transformative environments that convert the unwilling, but as resource-rich platforms where those already inclined can act.

2. Conceptual Framework

We draw upon two streams of literature to develop a guiding conceptual framework to examine worker selection into entrepreneurial regions and the subsequent influence of regions on founding. First, we review the literature on entrepreneurial region effects, which have largely focused on two primary drivers of founding: access to resources and social influence. This literature has implicitly assumed that regions exert a homogenous treatment effect, raising the propensity to become an entrepreneur for all workers within a region. We then introduce how different types of individuals – specifically founder types – might self-select into entrepreneurial regions to advance their founder aspirations. These differences imply the potential for heterogeneous regional treatment effects in which some individuals are influenced by working in an entrepreneurial region while other are not. For example, absent founder intentions, many individuals working in entrepreneurial regions will not be influenced to become an entrepreneur. One key implication is that entrepreneurs may arise from the combination of founder intentions and resources, and absent one or the other the propensity to become an entrepreneur may be greatly diminished.

2.1. Entrepreneurial Region Effects

The impact of regional characteristics on entrepreneurial activity has been extensively studied to explain variations in new venture creation across different geographic areas (Audretsch and Feldman 1996, Stuart and Sorenson 2003, Delgado et al. 2010, Dahl and Sorenson 2012). Researchers have discussed mainly two broad mechanisms through which regions influence individuals' capacity and intention to engage in entrepreneurship: access to resources and socialization effects. By providing critical resources such as financial and human capital, as well as fostering a supportive entrepreneurial culture through socialization and peer interactions, regions can significantly impact individual decisions to pursue entrepreneurship. Together these suggest a (homogeneous) regional treatment effect such that individuals who work in entrepreneurial regions are more likely to become entrepreneurs.

2.1.1. Access to Resources

A rich literature has delved into the role of access to resources for the growth and success of startups within a region. Entrepreneurial regions offer superior access to resources such as human

capital, financial resources, and technological innovations, collectively creating a supportive environment for new ventures.

Entrepreneurial regions typically have a high concentration of skilled workers and professionals. This abundance of human capital provides new ventures with access to a diverse talent pool, essential for innovation and growth. The labor pooling effect in such regions not only facilitates recruitment but also fosters a competitive environment that encourages continuous skill development (Sorenson and Audia 2000). Access to venture capital and other forms of financing is crucial for startups, especially in their early stages. Regions with robust venture capital networks offer significant advantages to aspiring entrepreneurs by providing the necessary funds to develop, scale, and commercialize their innovations. The presence of active financial institutions and venture capitalists can also attract more entrepreneurial talent to the region (Spigel 2017, Autio et al. 2018). Finally, technological innovations are a vital component of high-growth entrepreneurship. The proximity to universities, research institutions, and innovative firms facilitates the exchange of ideas and technologies. This environment accelerates innovation and the commercialization of new ideas, providing a fertile ground for entrepreneurial opportunities (Delgado et al. 2010, Glaeser et al. 2010).

These resources are more easily accessible to individuals residing in entrepreneurial regions due to their local social interactions and networks. These networks offer mentorship, advice, and collaboration opportunities, which are crucial for navigating the challenges of starting and growing a business. Being embedded in these networks provides access to valuable resources and knowledge, enhancing the likelihood of entrepreneurial success (Stuart and Sorenson 2003, Michelacci and Silva 2007, Dahl and Sorenson 2009). The informal exchange of knowledge can lower the barriers to entry for new entrepreneurs and provide them with insights that are crucial for success (Sorenson & Audia, 2000).

2.1.2. Social Influence

Another stream of research argues that individuals may choose to work in entrepreneurial regions because of their impact on individuals' entrepreneurial aspirations—namely, the attitudes and behaviors of individuals to pursue entrepreneurial opportunities. The entrepreneurial culture and peer effects can motivate individuals to pursue entrepreneurial opportunities, even if they did not initially have founder intentions (Feldman 2001, Hayton and Cacciotti 2013, Kacperczyk 2013).

Peer effects play a significant role in shaping individuals' entrepreneurial aspirations and actions. In entrepreneurial regions, individuals are surrounded by peers who are engaged in entrepreneurial activities, which can have several positive influences. For example, when entrepreneurship is prevalent among peers, it becomes a normative behavior, setting a standard that encourages others to follow. Seeing peers succeed in entrepreneurial ventures can normalize the idea of starting a business and reduce the perceived risks associated with entrepreneurship (Kacperczyk, 2013). Being part of a community where peers are actively involved in entrepreneurship can provide emotional support and encouragement. This support can boost individuals' confidence and resilience, helping them to overcome challenges and persist in their entrepreneurial endeavors (Hayton & Cacciotti, 2013). Alternatively, the effect may stem from socialization within the cultural environment. Entrepreneurial regions often have a culture that values innovation, risk-taking, and entrepreneurial success. This culture is reinforced through social norms, local policies, and the presence of role models. Such an environment can inspire and motivate individuals to pursue entrepreneurial paths, even if they were initially inclined towards traditional career roles (Stam, 2015; Spigel & Harrison, 2018). For example, Roach and Sauermann (2015) find that entrepreneurial norms in academic context may shape interests in joining a start-up as an employee in individuals who lack preferences for entrepreneurial job attributes.

2.2. Founder Intentions and Self-Selection

Investigating these mechanisms through which regions influence venture foundation is complicated by the fact that certain people may self-select into entrepreneurial regions. In other words, individuals who already intend to start their own ventures might intentionally locate in entrepreneurial regions to access resources that support their future ventures. Conceptually we distinguish between individuals with founder and established firm career intentions, or different career types. First, some individuals possess a pre-existing intention to become an entrepreneur prior to taking steps to start a venture, who we label as *founder types*. *Established firm types*, on the other hand, do not have pre-existing founder intentions (although it is conceivable that they have latent intentions that simply haven’t been self-realized yet). We also build upon a growing body of research on individuals who are attracted to joining startups as employees rather than as founders, or *joiner types* (Roach and Sauermann 2015, Roach and Sauermann 2024). This creates

potential joint effects of individual preferences and regional characteristics. Disentangling the self-selection effect of sorting into entrepreneurial regions and the treatment effect of being in those regions is an important inquiry, yet it has not been addressed in prior studies due to empirical challenges in capturing individuals' prior intentions to found their ventures in the future.

Existing studies have explored the factors influencing individuals' intentions to become entrepreneurs and their transition from paid employment to founding a venture (Elfenbein et al. 2010, Åstebro et al. 2011, Braguinsky et al. 2012, Roach and Sauermann 2015). One stream of research highlights the role of ability, suggesting that highly skilled individuals are more inclined to pursue entrepreneurship due to the potential for greater financial rewards by leveraging their abilities through an equity stake in the business (Åstebro et al. 2011, Braguinsky et al. 2012, Hegde and Tumlinson 2021).

On the other hand, research has emphasized the significance of personal preferences and non-monetary rewards in the decision to establish a company. Individuals who value autonomy, are more tolerant of risk, and prefer diverse tasks are more likely to become entrepreneurs, indicating that they derive satisfaction from these non-financial aspects of founding, which can compensate for potentially lower income compared to salaried positions (Hamilton 2000, Lazear 2005, Elfenbein et al. 2010, Åstebro et al. 2011, Roach and Sauermann 2015).

The growing body of research, including the recent contributions of Roach and Sauermann (2024), highlights the complex interplay of ability, preferences, and career intentions in shaping individuals' decisions to become a founder or join startups as employees. They find that the combination of high ability and founder intentions is the strongest predictor of individuals joining early-stage startups as employees. Looking at the role of founder intentions in self-selection into startups, they find that those with founder intentions choose to work in startups partly to acquire skills and knowledge that can facilitate their future transition to entrepreneurship.

Less examined in the entrepreneurship literature is whether aspiring founders choose to work in entrepreneurial regions. Recent research by Guzman (2024) shows that startups founded in other regions are more likely to move to Silicon Valley to be closer to the resources needed to grow their ventures. Taking this logic back one step prior to founding, we argue that aspiring founders are more likely to choose jobs in entrepreneurial regions to be closer to resources including venture capital, opportunities, talent, and mentors that will increase their likelihood of starting a venture. If so, then this selection could partially explain higher founding rates in entrepreneurial regions.

Joiner types are also more likely to take jobs in entrepreneurial regions because that is where the startup jobs are rather than to increase their chances of becoming a founder. Established firm types, on the other hand, should choose jobs in entrepreneurial regions for reasons other than to found a venture. This may be because entrepreneurial regions like Silicon Valley and Boston are also large metropolitan areas with many high-quality jobs in large innovative firms.

Building these insights around the interplay of individual ability and preferences, we examine the interplay between the regional environment and individuals' preferences to become founders or not.

2.3. Joint Selection and Treatment Effects

The key predictions from the literature are summarized in Fig. 1. First, individuals who work in entrepreneurial regions are more likely to become entrepreneurs because of greater access to resources and because of social influence, which we consider a regional treatment effect. If the regional effect primarily provides access to resources or opportunities, we expect that aspiring entrepreneurs in more entrepreneurial regions will be more likely to become founders than those in less entrepreneurial regions. This perspective views the region as an enabler, providing necessary resources to individuals who already have a predisposition for entrepreneurship. Conversely, if the regional effect operates through social influence, legitimizing entrepreneurship, and making it seem more feasible, individuals working in more entrepreneurial regions should find entrepreneurship more attractive. This increased attractiveness would make them more likely to become founders than those in less entrepreneurial regions. Here, the region acts as a social catalyst, changing preferences and making individuals more entrepreneurial.

Second, founder types are more likely to select into entrepreneurial regions to advance their aspirations, while joiner types are more likely to select into entrepreneurial regions to work in startups. Established firm types, on the other hand, choose jobs for reasons other than being in an entrepreneurial region. Thus, we expect strong selection effects for founder types, partial selection for joiner types, and no selection for established firm intentions.

For entrepreneurship to thrive, it is likely that both intentions and resources are necessary. If access to resources is the primary mechanism, entrepreneurial intentions should remain stable, and those who already have founder intentions would be most likely to start companies. However, if socialization is also a significant mechanism, we should observe an increase in entrepreneurial

intentions across the board, with no significant difference between ex ante and ex post founder types—both groups would be more likely to start companies than established firm types.

Both mechanisms likely jointly contribute to entrepreneurial activity in a region. Founder types are more likely to start companies due to the availability of regional resources, while socialization processes can transform some individuals into founders, increasing their likelihood of starting a company. This dual influence underscores the complex interplay between resource availability and social dynamics in fostering entrepreneurial ecosystems.

Consider the joint effects of both individual preferences and regional characteristics yields novel predictions that allow us to tease apart selection and treatment effects (Fig. 1). First, founding may require the presence of both founder intentions and entrepreneurial resources. If so, then we expect that founder types in entrepreneurial regions will be more likely to become an entrepreneur than founder types in non-entrepreneurial regions who have lesser access to resources. Indeed, we expect that founder types in entrepreneurial regions will be the most likely to become a founder of all conditions. An important implication of this is that the effect of regions on founder types is access to resources rather than social influence. That is, given their pre-existing founder intentions, founder types are already predisposed to entrepreneurship and only require the resources to realize their aspirations. This also implies that regions exert heterogeneous treatment effects that increase the likelihood of becoming an entrepreneur for founder types but less so for other types.

Similarly, if entrepreneurial regions have more startups and, thus, more startup jobs, then we expect that joiner types in entrepreneurial regions will be more likely to work in startups than joiner types in non-entrepreneurial regions. Since joiner types have preferences for working in startups and not becoming founders themselves (Roach and Sauermann, 2015), we do not expect that they will become founders are rates higher than founder types. However, their experience in startups may have some effect on their likelihood of becoming an entrepreneur in the future.

Finally, we expect different outcomes for established firm types in different regions. These expectations are based on the assumption that individuals without founder intentions do not self-select into entrepreneurial regions to increase their chances of becoming an entrepreneur. For example, they may choose to work at Google in Mountain View because it is the best job but not because it is in an entrepreneurial region. This assumption is important to enable us to tease apart different treatment effects. First, if higher founding rates are the joint effect of founder intentions and access to resources then given their lack of founder intentions established firm types should

Figure 1: Joint effects of individual selection and entrepreneurial region treatment effects

	Entrepreneurial region Greater resources/opportunities & social influence (*treatment*)	**Non-entrepreneurial region** Less resources/opportunities & no/less social influence (*no treatment*)
Founder types Choose jobs in entrepreneurial regions to realize entrepreneurial intentions (*selection*)	Most likely to become founder (intentions + resources/ opportunities regardless of social influence)	Less likely to become founder relative to founder types in entrepreneurial regions (intentions but less resources/opportunities)
Joiner types Choose jobs in startups, which are in entrepreneurial regions; most susceptible to social influence (*potential selection*)	More likely to become founder relative to joiner types in non-entrepreneurial region and relative to established firm types (possible intentions + resources/opportunities & social influence)	Less likely to become founder relative to founder types and those in entrepreneurial regions (possible intentions but less resources/ opportunities and no social influence)
Established firm types Choose job for reasons other than being in entrepreneurial region; least susceptible to social influence (*no selection*)	More likely to become founder relative to joiner or established firm types in non-entrepreneurial region (no intentions + resources/ opportunities & social influence)	Least likely to become founder (no intentions + less resources/ opportunities and no social influence)

not exhibit higher founding rates in entrepreneurial regions compared to established firm types in non-entrepreneurial regions. In other words, because they lack the intention to become an entrepreneur, being in an entrepreneurial region will *not* make them more entrepreneurial. On the other hand, if working in entrepreneurial regions exert social influence that increases individuals' desire to become an entrepreneur, then we expect that established firm types working in entrepreneurial regions should be more likely to become a founder than established firm types working in non-entrepreneurial regions.

Together, these joint effects predict that founder types in entrepreneurial regions will be the most likely to become a founder, while established firm types in non-entrepreneurial regions will be the least likely. To the extent that entrepreneurial regional effects act primarily to provide access to resources then we expect little difference between established firm types regardless of their region because access to resources itself is not sufficient to change their lack of founder intentions. However, to the extent that entrepreneurial region effects are both resources and social influence

then we expect established firm types in entrepreneurial regions will change their attitudes toward entrepreneurship, and thus they will be more likely to become a founder relative to established firm types in non-entrepreneurial regions.

3. Data and Measures

Teasing apart founder selection and regional treatment effects faces two critical empirical challenges: founder intentions are often unobserved, and most data sources identify founders only after starting a company. As a result, inferring founder intentions after founding makes it difficult to distinguish selection into different regions from the treatment effects of entrepreneurial regions and employment context (Sørensen 2007, Elfenbein et al. 2010). For example, in most existing data sources it is difficult to discern whether individuals chose to work in entrepreneurial regions due to their founder intentions or whether working in entrepreneurial regions made them more entrepreneurial.

We overcome these challenges through a longitudinal survey that includes direct measures of individuals' stated founder intentions *prior* to entry into the labor market. This novel research design allows us to directly examine and account for the role of pre-existing preferences in explaining first-time employment outcomes and subsequent transitions to entrepreneurship. Although our data have their own limitations, they allow us to provide valuable insights on aspiring founders sorting into different regions and to better identify potential region treatment effects on subsequent transitions to entrepreneurship.

Our survey follows a cohort of science and engineering PhDs at 39 top-tier U.S. research universities from graduate school through their early industry careers. Respondents were first surveyed in 2010 or 2013 while in graduate school (*graduate school survey*, 10,781 respondents, 30% adjusted response rate) and then again after graduation in 2013, 2016, and 2019 after they had transitioned into full-time employment (*employment survey,* 73% adjusted response rate). Together, the *PhD* and *employment surveys* provide detailed micro data on individuals' stated preferences and characteristics several years prior to their first industry employment, as well as information on their employment histories.

To ensure comprehensive data on employment outcomes, we supplemented the *employment survey* with career profile data from LinkedIn and a Google search for respondents to the *PhD*

survey. We first searched for respondents by name and PhD university and then verified a match by comparing the field of study and the specific years in the PhD program as reported in the *PhD survey*. We recorded career histories from the year of their first industry job through the end of 2019 and prior to the COVID-19 pandemic. These external career profile data provide employment outcomes for non-respondents to the *employment survey*, as well as more detailed data on job title and employer characteristics for all respondents.

We restrict the sample to full-time employees in R&D-related occupations to focus on workers who were not founders at graduation to avoid including PhDs who move to entrepreneurial regions to start their companies. R&D-related occupations are identified based on either survey-reported work activities (i.e., respondents who reported that they spend 40-100% of their time on basic research, applied research, and/or development work activities) or the LinkedIn job title (e.g., research scientists, research engineer, data scientist, etc.).

The sample for this study is 1,962 industrial scientists whose first industry job was between 2010-2019. While studies employing administrative data such as the U.S. Census or Statistics Denmark typically rely upon indirect proxies of founder status such as being among the first or highest-paid employees (Sørensen 2007, Azoulay et al. 2020), we are able to directly identify individuals who are founders or startup executives (e.g., CTO) prior to full-time employment and exclude them from our sample of employees.

Entrepreneurial regions. To measure *entrepreneurial region*, we used survey responses and LinkedIn data to identify individual's first employment location (zip code, city/state, or metro area) and aggregated them to the Metropolitan Statistical Area (MSA). We code as entrepreneurial regions employment in the Boston or Silicon Valley/San Francisco MSAs, the two largest entrepreneurial regions in the U.S. In our sample, 32.4% of PhDs' first industry jobs were in either the Boston (9.2%) or Silicon Valley (23.2%) areas.

Founder. To measure *founders,* we used both survey responses and LinkedIn data on whether an individual self-identified as the (co)founder of a startup. We also coded individuals as founders if their LinkedIn job title included CEO, CTO, or CSO in the year their startup was founded, even if they did not explicitly list being a founder on their profiles. We further restricted founders to those who started potential high-growth businesses, excluding self-employment and small businesses. Given that we examine the impact of entrepreneurial regions on founding, we exclude individuals who started a company while in graduate school or at the time of graduation. In our

sample, 4.2% of PhDs become founders within 10 years after taking their first industry job, with the average time being 3.6 years.

Career intentions. To measure pre-existing founder intentions, we categorized individuals into three categorical variables: *Founder types, joiner types, and established firm types*. Our *PhD survey* asked respondents "How likely are you to start your own company?", using a 5-point scale ranging from "definitely will not" (1) to "definitely will" (5). We coded *founder types* as 1 if an individual reported that s/he "will" (4) or "definitely will" (5) start her/his own company and 0 otherwise. For joiner and no entrepreneurial intentions, we use a *graduate school survey* question about career preferences for working in a startup or an established firm (Roach and Sauermann 2015, Roach and Sauermann 2024). Specifically, the survey asked "Putting job availability aside, how attractive 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 not considered in this study, such as university faculty. For individuals without founder intentions (i.e., those coded as 0 for *founder types*), we coded them as being *joiner types* if they reported that working in a startup was "attractive" (4) or "extremely attractive" (5) and was at least as attractive to working in an established firm. Individuals were coded as being *established firm types* if the attractiveness of working in an established firm was greater than becoming a founder or working in a startup. For example, individuals who reported that working in an established firm was "extremely attractive" (5) while working in a startup was "attractive" (4) were coded as having established firm intention. Given that *established firm types* are our comparison group, we also include in this group individuals who were not attracted to either founding or joining a startup and thus do not have any entrepreneurial intentions.[1] In our sample, 12.4% of respondents have founder intentions, 41.9% have joiner intentions, and 45.8% have established firm intentions.

Startup employment. An alternative explanation to entrepreneurial region effects is the employer effects of working in startups, often referred to as the small firm effect (Gompers et al. 2005, Sørensen 2007, Elfenbein et al. 2010). If individuals who work in entrepreneurial regions are also more likely to work in a startup, then higher founding rates may be due more to employer rather than region effects. To identify whether an individual's first industry job was in an early-

[1] Among these individuals, 25.8% were not attracted to working in an established firm and instead were more attracted to careers in academia.

stage startup, we rely upon the *employment survey* and LinkedIn data in a two-step process. First, we asked respondents in the *employment survey* to state their first employer's age (years since founding) at the time they started employment. For individuals who did not respond to the *employment survey* or for whom firm age is missing, we used LinkedIn data to ascertain employer age in the year they started their jobs. We code individuals as working in an early-stage startup if their employer was founded within 5 years prior to the year they started employment. All other individuals were coded as working in an "established" firm, which includes large established firms (e.g., Google) and corporate spinoffs (e.g., Google Life Sciences spinoff Verily). In our sample, 28% of employees in entrepreneurial regions worked in a startup compared to 14% of employees in other regions.

Control variables. We control for several individual demographic characteristics, including ability, gender, citizenship, and whether respondents did postdoctoral training prior to industry employment. We measure *ability* using PhD students' university department ranking (Agarwal and Ohyama 2013, Roach and Sauermann 2015, Cohen et al. 2020, Roach and Sauermann 2024), which is a useful proxy in our setting given that highly ranked departments are more selective in admitting PhD students and provide more rigorous scientific training. PhD department ranking is also an observable signal to employers of a worker's potential ability and should be particularly important when examining employment outcomes (Spence 1973, Agarwal and Ohyama 2013, Hegde and Tumlinson 2021, Roach and Sauermann 2024). We matched respondents' university departments to the National Research Council's (NRC) survey-based rankings of doctoral programs, which reflect aspects such as research funding, faculty publication productivity, and student research activity (National Research Council 2010). To facilitate interpretation, we reverse-coded NRC rank so that positive regression coefficients indicate a positive relationship between ability and the outcome variable. We also control for whether they did their PhD in an entrepreneurial region (i.e., Berkeley, Stanford, UCSF, Harvard, and MIT), 14 degree-field fixed effects, and the year of their first industry job.

4. Empirical Analyses

Our empirical strategy is to first examine whether founder types are more likely to self-select into entrepreneurial regions and then to examine the effect of working in an entrepreneurial region on

founding while accounting for pre-existing founder intentions. Our first set of analyses regress employment in an entrepreneurial region onto stated founder intentions prior to first employment while controlling for individual characteristics and degree and job year fixed effects as described above. Our second set of analyses regress subsequent founding activity onto employment in an entrepreneurial region while controlling for founder intentions, whether their first employer was a startup, individual characteristics, and degree and job year fixed effects. We also perform additional analyses to examine the robustness of our results and to rule out alternative explanations.

4.1. Selection into Employment in Entrepreneurial Regions

We first report that nearly one-third (32.8%) of all PhDs' first job is in the Silicon Valley or Boston areas, with the share of both founder and joiner types being slightly higher than the share of established firm types (33.6% and 34.7%, respectively, compared to 30.7%). Although many of the PhDs who earned their degrees from universities in these regions remained in these regions (66.8% remained and 33.2% moved to other regions), most PhDs working in these regions (69.6%) earned their degrees at university outside these regions and moved there after graduation. Moreover, the share of founder and joiner types who moved into entrepreneurial regions (28.6% and 27.5%, respectively) is slightly higher than the share of established firm types who moved (25.6%). These patterns indicate that a very large share of PhDs move to entrepreneurial regions for their first job, with founder and joiner types doing so at a slightly higher rate.

Table 1: Share of employees in entrepreneurial regions by career intentions (column percentages)

Cluster	Founder types	Joiner types	Est. Firm types
SF & Boston	33.6%	34.7%	30.7%
Rest of U.S.	66.4%	65.3%	69.3%

To examine these differences systematically, Models 1 and 2 in Table 2 present results from a series of linear probability regressions with entrepreneurial region as the dependent variable. Model 1 shows that founder types are not more likely than established firm types (omitted group) to work in entrepreneurial regions, nor are joiner types. We do find, however, that PhDs from higher ranked university departments, our measure of ability, are more likely to work in entrepreneurial regions. This may suggest that entrepreneurial regions, which often also include large innovative firms, may offer better jobs that attract better workers, regardless of their founder

Table 2: Selection into Entrepreneurial Regions

	(1)	(2)	(3)
Dependent variable	SFO+BOS	SFO	ln(MSA VC funding)
Founder types	0.012	0.046	0.336
	(0.039)	(0.034)	(0.186)
Joiner types	0.032	0.027	0.302**
	(0.019)	(0.016)	(0.093)
Est. firm types	Omitted	Omitted	Omitted
Ability	0.042***	0.028	0.406***
	(0.012)	(0.015)	(0.059)
Male	0.010	0.003	-0.065
	(0.020)	(0.022)	(0.107)
Foreign worker	0.084**	0.066*	0.293
	(0.030)	(0.026)	(0.164)
PhD university in entr. region	0.355***	0.227*	1.046***
	(0.044)	(0.096)	(0.182)
Postdoc experience	0.003	-0.011	0.157
	(0.026)	(0.022)	(0.131)
First job year FE	Y	Y	Y
Degree field FE	Y	Y	Y
Observations	1977	1977	1977
R^2	.162	.128	.190

NOTES: OLS coefficients reported. Model 1 entrepreneurial region (DV) is 1 if first job is in the San Francisco or Boston areas, 0 otherwise. Model 2 entrepreneurial region (DV) is 1 if first job is in the San Francisco area, 0 otherwise. Model 3 entrepreneurial region (DV) is the log of annual MSA early-stage VC funding. First job year fixed effects (2010-2019). Degree field fixed effects for 14 fields of life sciences, chemistry, physics, engineering, and computer science. Robust standard errors clustered on university in parentheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

intentions. Model 2 includes a variable that is one if an individual did their PhD at a university in an entrepreneurial region, which significantly predicts working in an entrepreneurial region.

We examine the robustness of these results using CrunchBase data to construct measures of total early-stage funding (angel, seed, and Series A) for each MSA region-year, matching this to the year an individual started working in a region. This provides both an alternative continuous measure of the entrepreneurial activity across all regions as well as allows us to examine more directly the access to resources mechanism. Model 3 replaces the categorical dependent variable with the log of annual early-stage VC funding across MSAs with results that are largely consistent

with Models 1 and 2 with no difference between individuals with founder and established firm intentions.

Although it may seem surprising that founder types are not more likely to work in entrepreneurial regions, these regions also include large innovative firms that offer attractive jobs to all workers, even those without founder intentions. This suggests that workers may choose jobs in entrepreneurial regions for different reasons. To investigate these differences in the reasons for choosing one's first job, we analyze responses from our employment survey that asked respondents to select from a list of "very important reasons for choosing their first job." Table 3 shows the share of respondents who reported that a given reason was important by career intentions and entrepreneurial region. We see that across all types a significantly higher share of individuals working in entrepreneurial regions reported that opportunities for job mobility and to work on cutting-edge R&D projects with only modest differences across career interests. For example, among individuals who work in an entrepreneurial region 65% of founder types reported that an important reason for choosing their job was to work on cutting-edge projects compared to 57% of established firm types. The employer's entrepreneurial culture was also an important reason for choosing their first job for individuals in entrepreneurial regions, with the share of founder types (32%) and joiner types (60%) being notably higher than established firm types (18%). Thus, we find that while there are some shared reasons for taking jobs in entrepreneurial regions, both founder and joiner types do it for reasons associated with entrepreneurship while established firm types do not.

Table 3: Mean differences in important reasons for choosing first job by location and career intentions

	Founder Type (n=237)				Joiner Type (n=893)				Est. Firm Type (n=583)			
	Startup region				Startup region				Startup region			
	Yes	No	t-stat	p-value	Yes	No	t-stat	p-value	Yes	No	t-stat	p-value
Higher Pay	0.44	0.42	-0.292	0.385	0.40	0.40	0.154	0.561	0.36	0.42	1.265	0.897
Career advancement	0.59	0.47	-1.686	0.047	0.55	0.54	-0.552	0.291	0.50	0.50	0.027	0.511
Job mobility	0.36	0.17	-3.230	0.000	0.30	0.21	-2.926	0.002	0.29	0.19	-2.727	0.003
Job security	0.20	0.17	-0.623	0.267	0.17	0.26	3.138	0.999	0.24	0.33	2.308	0.989
Cutting edge work	0.65	0.49	-2.309	0.011	0.60	0.46	-3.990	0.000	0.57	0.39	-4.043	0.000
Task variety	0.23	0.30	1.209	0.886	0.35	0.35	0.139	0.555	0.37	0.40	0.704	0.759
Entrepreneurial culture	0.32	0.17	-2.571	0.005	0.27	0.15	-4.297	0.000	0.18	0.07	-3.910	0.000
Employer prestige	0.49	0.35	-2.178	0.015	0.35	0.36	0.287	0.613	0.38	0.32	-1.514	0.065
Family considerations	0.23	0.38	2.299	0.989	0.32	0.40	2.442	0.993	0.34	0.46	2.650	0.996

Table 4 examines for differences by region and career intentions for three key reasons: job mobility, working on cutting-edge projects, and employer entrepreneurial culture. For each reason

Table 4: Important reasons for choosing first job by location and career intentions

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
Dependent variable	Job Mobility		Cutting-Edge Project		Emplr. Entr. Culture		Startup Employee	
Entrepreneurial region	0.104***		0.137***		0.102***		0.131***	
	(0.023)		(0.032)		(0.027)		(0.027)	
Founder types		0.023		0.040		0.119*		0.125*
		(0.058)		(0.080)		(0.058)		(0.049)
Joiner types		0.011		0.036		0.079*		0.088
		(0.037)		(0.036)		(0.035)		(0.047)
Est. firm types		Omitted		Omitted		Omitted		Omitted
Individual controls	Y	Y	Y	Y	Y	Y	Y	Y
First job year FE	Y	Y	Y	Y	Y	Y	Y	Y
Degree field FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1694	544	1694	544	1694	544	1977	653
R^2	0.037	0.080	0.071	0.065	0.049	0.081	0.068	0.114

NOTES: OLS coefficients reported. Individual contols are ability, gender, foreign worker, postdoc experience, and PhD in entrepreneurial region. First job year fixed effects (2010-2019). Degree field fixed effects for 14 fields of life sciences, chemistry, physics, engineering, and computer science. Robust standard errors clustered on university in parentheses.
* p < 0.05; ** p < 0.01; *** p < 0.001.

we first present results from a simple specification to examine for significant differences between individuals whose first job is in an entrepreneurial region or not, followed by specification for the subsample of individuals who work in entrepreneurial regions to examine for significant differences by career intentions. Across Model 1-3, individuals who work in entrepreneurial regions are more likely to report that job mobility, working on cutting-edge projects, and the employer's entrepreneurial culture were important reasons for choosing their job. This suggests that entrepreneurial regions offer more attractive jobs. Within these regions, we find no difference by career intentions for job mobility or working on cutting-edge projects. However, we find in Model 3b that founder and joiner types are significantly more likely to report that the employer's entrepreneurial culture was an important reason compared to established firm types.

Another important difference may be whether individuals work in a startup or not. Given that entrepreneurial regions by definition have more startups, then it may be that founder and joiner types who work in these regions are more likely to work in startups. Indeed, the results in Model 4a shows that individuals who work in entrepreneurial regions are significantly more likely to work in a startup, and in Model 4b among these founder types are significantly more likely to work in a startup.

Together these results suggest that entrepreneurial regions attract individuals with and without founder intentions, but for different reasons. Founder types – and to a lesser extent joiner types –

appear to work in entrepreneurial regions in startups and more entrepreneurial employers, while established firm types appear to work in these regions for better jobs.

Given that nearly one-third of all PhDs in our sample work in the Boston and Silicon Valley areas, this provides a unique feature that allows for better identification of possible regional treatment effects on established firm types. More precisely, this allows for quasi-random sorting of established firm types into entrepreneurial regions. For example, if established firm types choose to work in entrepreneurial regions for jobs at big firms and not due to founder intentions, then any subsequent transition to entrepreneurship can be more directly attributed to the influence of regions making individuals more entrepreneurial rather than self-selection. However, if established firm types who work in entrepreneurial regions are not more likely to become entrepreneurs, this would be evidence that simply working in an entrepreneurial region is not enough to make individuals who lack founder intentions into entrepreneurs.

4.2. Entrepreneurial Region Effects on Founding

We now turn our attention to examining whether working in an entrepreneurial region exhibits heterogeneous treatment effects on becoming a founder. Across our sample, 4.2% of individuals transition from wage employment to founding a technology startup early in their career, with the average time to founding being 3.9 years. Founding rates are higher in the entrepreneurial regions of San Francisco and Boston (5.3%) compared to other regions (3.6%). At the same time, the share of founder types who become founders (10.9%) is considerably higher than that of joiner types (3.8%) and established firm types (2.7%), indicating that pre-existing founder intentions may play a key role in subsequent founding activity.

Table 5: Share of founders by region and career intention

	Entr. region	Non-entr. region
Founder types	13.3%	9.8%
Joiner types	4.8%	3.3%
Established firm types	3.6%	2.4%

Table 6 presents results from linear probability regressions predicting who becomes a founder. Model 1 is a naïve specification that includes whether the first job was in an entrepreneurial region and year of first job fixed effects, showing that PhDs who work in an entrepreneurial region are significantly more likely to become a founder. Model 2 includes individual controls along with

Table 6: Impact of Working in Entrepreneurial Region on Founding

	(1)	(2)	(3)	(4)
Entrepreneurial region	0.020*	0.009		
	(0.009)	(0.010)		
ln(MSA VC funding)			0.004**	0.002
			(0.002)	(0.002)
Founder types		0.072**		0.072**
		(0.023)		(0.023)
Joiner types		0.004		0.003
		(0.010)		(0.010)
Est. firm types		Omitted		Omitted
Startup employee		0.045**		0.045**
		(0.014)		(0.014)
Ability		0.006		0.005
		(0.005)		(0.005)
Male		0.014		0.014
		(0.009)		(0.009)
Foreign worker		-0.025*		-0.024*
		(0.012)		(0.012)
PhD university in entr. region		-0.006		-0.004
		(0.016)		(0.016)
Postdoc experience		0.007		0.006
		(0.011)		(0.011)
First job year FE	Y	Y	Y	Y
Degree field FE	Y	Y	Y	Y
Observations	1977	1977	1977	1977
R^2	.014	.047	.014	.047

NOTES: OLS coefficients reported. Dependent variable is 1 if founder of technology startup, 0 if employee. First job year fixed effects (2010-2019). Degree field fixed effects for 14 fields of life sciences, chemistry, physics, engineering, and computer science. Robust standard errors clustered on university in parentheses. * p < 0.05; ** p < 0.01; *** p < 0.001.

pre-existing founder intentions. We find that founder types are significantly more likely to become a founder, but the effect of entrepreneurial regions is no longer significant. We also see that startup employees are more likely to become a founder. This is consistent with prior studies on the small firm effect (Gompers et al. 2005, Elfenbein et al. 2010) and may suggest that workplaces effects are stronger than regional effects. Models 3 and 4 replace the categorical measure of entrepreneurial regions with the log of annuarl early-stage VC funding within an MSA with nearly

identical results. Together these results suggest that both people and place matter, but in different ways.

We also find important results regarding immigrant entrepreneurs. As shown in Table 2, foreign-born doctorates are more likely to work in entrepreneurial regions than U.S. citizens. This result may be because foreign-born doctorates tend to work at big tech firms in entrepreneurial regions, such as Google and Meta, which sponsor work visas (Roach and Skrentny 2021). However, Table 6 shows that foreign-born doctorates are less likely to be a founder than U.S. citizens. This may because foreign workers are likely on a temporary work visa such as an H-1B, making it difficult for them to leave sponsored employment to become a founder (Roach and Skrentny 2021). Considering that foreign-born PhDs are more likely to have founder intentions than U.S. citizens (Roach et al. 2020), these findings suggest that temporary work visas may be a barrier to foreign-born doctorates to become entrepreneurs, at least until they receive permanent residency later in their careers (Roach and Skrentny 2019). This also implies that visa constraints may inhibit the effects of entrepreneurial regions on immigrants becoming founders.

Although our results suggest that founder intentions play a large role in explaining founding, we attempt to gain deeper insights into whether regional effects might differ between individuals with and without founder intentions. More specifically, if entrepreneurial regions facilitate startup formation by providing greater access to resources, then founder types in these regions should be the most likely to become a founder. On the other hand, if entrepreneurial regions socialize individuals into become more entrepreneurial, then we should find that established firm types in these regions will be more likely to become a founder than individuals in other regions. To do this we constructed categorical variables for each combination of working in an entrepreneurial region or not and being a founder, joiner, or established firm type. The results are in Table 7.

Model 1 in Table 7 show that founder types in entrepreneurial regions are significantly more likely to become a founder relative to established firm types not in entrepreneurial regions (i.e., the omitted group), while joiner and established firm types in entrepreneurial regions are not significantly different. Founder types not in entrepreneurial regions also have a significantly greater probability of becoming a founder, while joiner types show no significant difference.

To put these numbers into context, within entrepreneurial regions the estimated probability of becoming a founder is 11.9% for founder types, compared to 4.2% for joiner types and 3.6% for established firm types (see Fig. 2). Among employees outside entrepreneurial regions, the

Table 7: Interplay between Career Intentions and Entrepreneurial Region on Founding

	(1) Full sample	(2) Life, Chem. Physics	(3) Engr. & CS
Entr. region + Founder types	0.089*	0.040	0.127**
	(0.036)	(0.051)	(0.038)
Entr. region + Joiner types	0.012	0.008	0.011
	(0.022)	(0.022)	(0.033)
Entr. region + Est. firm types	0.006	-0.001	-0.001
	(0.017)	(0.022)	(0.026)
Not entr. region + Founder types	0.067*	0.073	0.045
	(0.030)	(0.067)	(0.033)
Not entr. region + Joiner types	0.003	0.006	-0.004
	(0.010)	(0.011)	(0.021)
Not entr. region + Est. firm types	Omitted	Omitted	Omitted
Individual controls	Y	Y	Y
First job year FE	Y	Y	Y
Degree field FE	Y	Y	Y
Observations	1977	947	802
R^2	0.047	0.043	0.049

NOTES: OLS coefficients reported. Dependent variable is 1 if founder of a technology startup, 0 if employee. ndividual contols are ability, gender, foreign worker, postdoc experience, and PhD in entrepreneurial region. First job year fixed effects (2010-2019). Degree field fixed effects for 14 fields of life sciences, chemistry, physics, engineering, and computer science. Robust standard errors clustered on university in parentheses. * p < 0.05; ** p < 0.01; *** p < 0.001.

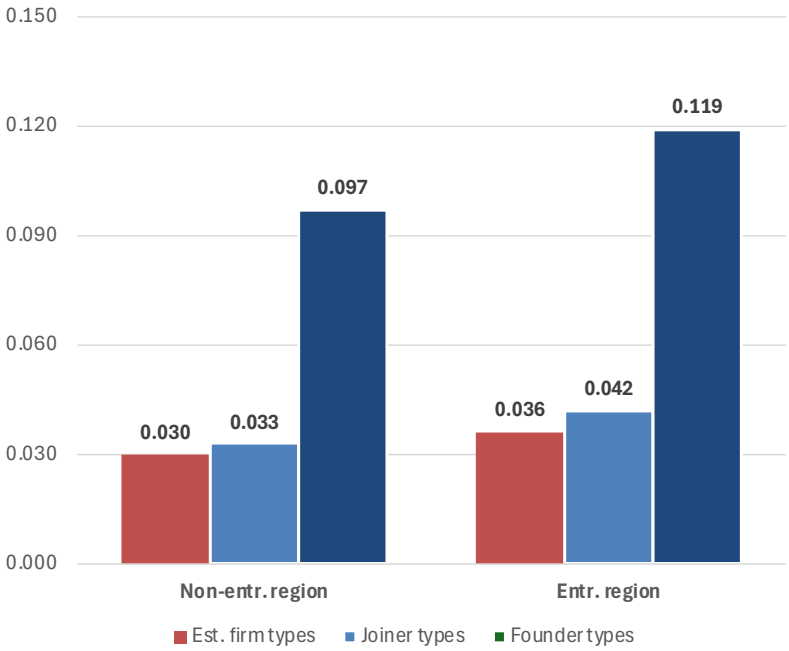


Fig. 2: Predicted Probabilities of Founding a Technology Startup by Career Intentions

estimated probability of becoming a founder is 9.7% for founder types, 3.3% for joiner types, and 3.0% for established firm types. The higher founding rate among founder types in entrepreneurial regions is suggestive evidence in support of the mechanism that entrepreneurial regions facilitate founding by providing access to resources to aspiring entrepreneurs (i.e., founder intentions).

While the founding rates of joiner and established firm types are slightly higher in entrepreneurial regions than for those not in entrepreneurial regions, the differences are not statistically significant. Several explanations may account for this finding. One possibility is that they co-founded their startups with founder types who, as we showed above, are more concentrated in entrepreneurial regions. The intuition is that entrepreneurial regions may not make established firm types more entrepreneurial, but instead being in a region with more founder types may provide them with more opportunities to co-found a startup with those who are more entrepreneurial. For example, Steve Wozniak famously wanted to stay at Hewlitt-Packard and be "an engineer for life" but was persuaded by Steve Jobs to leave HP to co-found Apple.

Alternatively, it is just as conceivable that entrepreneurial regions make individuals more entrepreneurial, but we do not observe this effect in our sample of early career STEM PhDs. Perhaps socialization into entrepreneurship takes longer for individuals without founder intentions, and our window of observation is too short to observe it. It could also be that STEM PhDs face a higher bar for entrepreneurial opportunities relative to other high-skilled workers, resulting in lower founding rates. For example, STEM PhDs maybe need for startups to commercialize a new proprietary technology which are more difficult to discover, while others may pursue market-oriented opportunities that are easier to discover such as a consumer-facing app.

To examine for possible differences in the ease of starting a teachnology company, Models 2 and 3 in Table 7 split the sample between PhDs with degrees in the life sceinces, chemistry and physics (Model 2) and those with degrees in engineering and computer science (Model 3). The intuition is that science-based startups in biotechnology and materials science require a proprietary breakthrough that is likely owned by a university or their employer, thereby constraining their ability to start their own company based on their research. PhDs in engineering and computer science, on the other hand, may discover ideas that lead to software or electronic device startups that are easier to found on their own. Indeed, we find that engineering and computer science PhDs who are founder types and who work in entreprenuerial regions are significantly more likely to become a founder than all other PhDs. As illustrated in Fig. 3, the predicted probability of these

individuals becoming a founder is 16.7%, which is roughly twice the likelihood of all other founder types. This is the strongest evidence that both it is the combination of people with founder intentions being in a place with entrepreneurial resources that contribute most to founding technology startups.

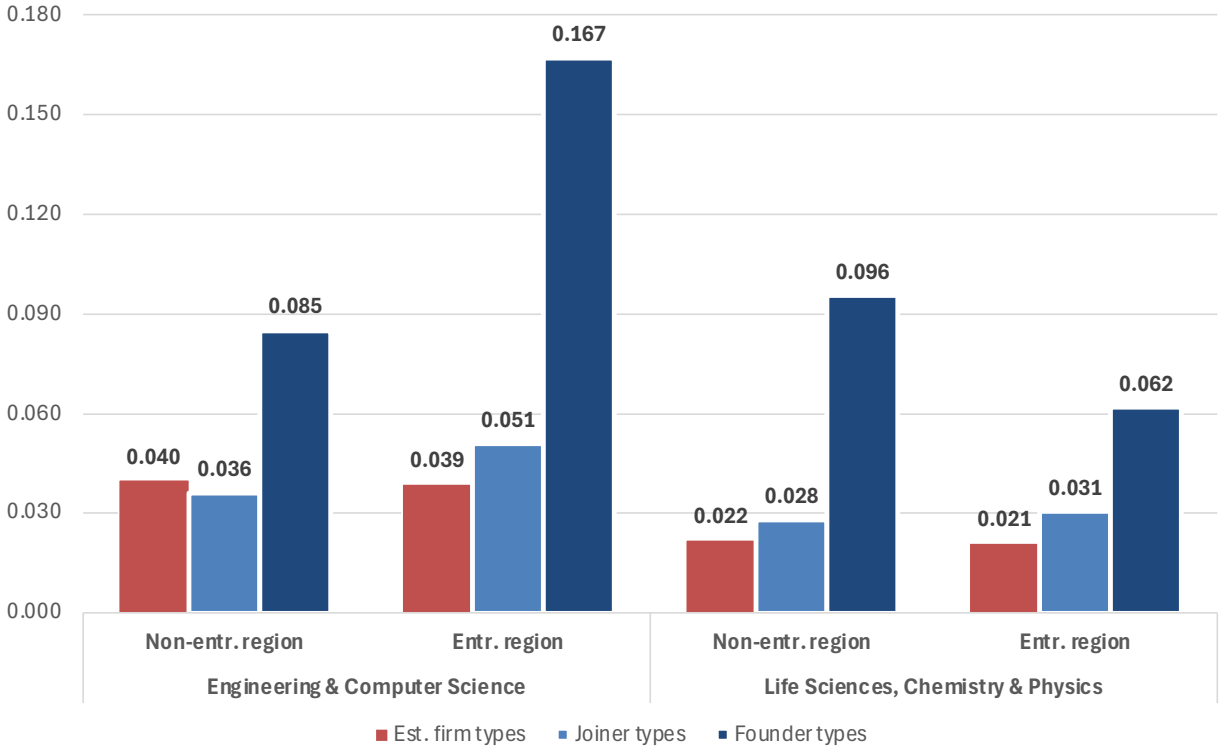


Fig. 3: Predicted Probabilities of Founding a Technology Startup by Career Intentions and Degree Field

4.3. Entrepreneurial Region Effects on Founder Intentions

Although our results show that working in entrepreneurial regions do not make individuals who lack founding intentions into founders, it is conceivable that social influence takes longer to manifest in founding activity than the early-careers that we observe in our data. For example, it could be that working in entrepreneurial regions creates founder intentions across a wider range of people but it just takes them longer to become a founder. To examine this possibility, we draw upon a question in the employment survey that asked about the attractiveness of different careers, including being the "founder of my own company". Note that this question is different than the question in the graduate student survey used to code founder intentions, diminishing our ability to

compare for changes over time. However, we can use this question to examine whether ex post individuals express founder intentions after working in an entrepreneurial region.

To do this, we code anyone who reports that being the founder of their own company is "extremely attractive" (5 on the five-point Likert scale) as having founder intentions. Since actually becoming a founder will directly influence individuals' response to this question, we exclude founders from this analysis (n=1,445). Descriptively we find that 13.7% of employees working in entrepreneurial regions now express founder intentions, compared to 11.7% of employees working in other regions. Among individuals with pre-existing joiner intentions, 13.3% of those working in entrepreneurial regions now have founder intentions compared to 11.1% who work in other regions. Similarly, among individuals with pre-existing established firm intentions, 8.8% who work in entrepreneurial regions now express founder intentions compared to 6.6% of those in other regions. Descriptively the share of individuals who now have founder intentions is slightly higher in entrepreneurial regions, but the patterns do not suggest strong regional treatment effects that create founder intentions.

Table 8 examines these effects systematically in a series of linear probability models with ex post founder intentions as the dependent variable. Model 1 reports results from the full sample – excluding those who become founders – and shows that working in an entrepreneurial region does not predict founder intentions. Models 2 and 3 split the sample by pre-existing career intentions to examine more directly for regional treatment effects. We see that for pre-existing joiner (Model 3) and established firm (Model 4) types that working in an entrepreneurial region does not predict current founder intentions. Working in a startup, however, is a strong predictor, suggesting that workplace effects, rather than regional effects, may have a strong influence on shaping founder intentions. Thus, to the extent that there is any regional treatment effect on individuals without pre-existing founder intentions it may be through working in a startup. In other words, entrepreneurial regions have more startups, and it appears that working in a startup rather than working in an entrepreneurial region per se shapes founder intentions and subsequent founding activity.

Table 8: Impact of Working in Entrepreneurial Region on Founder Intentions

	(1)	(2)	(3)	(4)
Sample	Full	Founder types	Joiner types	Est. Firm types
Entrepreneurial region	0.017	-0.057	0.021	0.031
	(0.026)	(0.083)	(0.038)	(0.030)
Startup employee	0.078***	0.061	0.079**	0.063*
	(0.021)	(0.101)	(0.029)	(0.030)
Ability	-0.003	-0.002	-0.013	0.019
	(0.011)	(0.050)	(0.016)	(0.014)
Male	0.092***	0.137	0.107**	0.015
	(0.024)	(0.107)	(0.037)	(0.026)
Foreign worker	0.119***	0.208	0.048	0.150***
	(0.031)	(0.104)	(0.036)	(0.040)
PhD university in entr. region	-0.045	0.164	-0.022	-0.105**
	(0.041)	(0.149)	(0.062)	(0.037)
Postdoc experience	-0.029	-0.123	-0.019	-0.021
	(0.021)	(0.087)	(0.033)	(0.019)
First job year FE	Y	Y	Y	Y
Degree field FE	Y	Y	Y	Y
Observations	1493	178	617	698
R^2	0.075	0.189	0.061	0.095

NOTES: OLS coefficients reported. Dependent variable is 1 if ex post founder types, 0 otherwise. First job year fixed effects (2010-2019). Degree field fixed effects for 14 fields of life sciences, chemistry, physics, engineering, and computer science. Robust standard errors clustered on university in parentheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

5. Discussion

Although preliminary, the evidence presented in this study suggests that individual founder intentions are the primary predictor of whether one becomes a founder. Entrepreneurial regions, on the other hand, play only a modest role by providing access to resources and opportunities to work in startups. We do not find significant evidence that entrepreneurial regions have a socialization effect on individuals without founder intentions, at least early in their careers. There are, however, some important caveats to our preliminary findings. First, it is conceivable that STEM PhDs tend to found science and technology-based companies in areas such as autonomous vehicles, machine learning, and renewable energy, which have a higher bar for entry. In contrast, individuals without PhDs might pursue opportunities with lower barriers, such as consumer-facing apps. If so, then it may take PhDs longer to discover entrepreneurial opportunities, resulting in lower observed founding rates in our sample of early-career employees. In addition, given the higher entry barriers for PhDs founding technology startups, we may be less likely to observe the

socialization effect of entrepreneurial regions that could be more apparent in the founding of less technical startups. Second, while our preliminary results focus on who becomes a founder, it is possible that entrepreneurial regions have a greater effect on startup performance. We will investigate these and other alternative explanations more deeply in future research.

REFERENCES

Agarwal, R, Ohyama, A (2013) Industry or Academia, Basic or Applied? Career Choices and Earnings Trajectories of Scientists. *Management Science* 59(4):950-970.

Åstebro, T, Chen, J, Thompson, P (2011) Stars and Misfits: Self-Employment and Labor Market Frictions. *Management Science* 57(11):1999-2017.

Audretsch, DB, Feldman, MP (1996) R&D Spillovers and the Geography of Innovation and Production. *American Economic Review* 86(3):630-640.

Audretsch, DB, Lehmann, EE (2005) Does the Knowledge Spillover Theory of Entrepreneurship Hold for Regions? *Research Policy* 34(8):1191-1202.

Autio, E, Nambisan, S, Thomas, LD, Wright, M (2018) Digital Affordances, Spatial Affordances, and the Genesis of Entrepreneurial Ecosystems. *Strategic Entrepreneurship Journal* 12(1):72-95.

Azoulay, P, Jones, BF, Kim, JD, Miranda, J (2020) Age and High-Growth Entrepreneurship. *American Economic Review: Insights* 2(1):65-82.

Cohen, WM, Sauermann, H, Stephan, P (2020) Not in the Job Description: The Commercial Activities of Academic Scientists and Engineers. *Management Science* 66(9):4108-4117.

Conti, A, Guzman, J (2023) What Is the Us Comparative Advantage in Entrepreneurship? Evidence from Israeli Migration to the United States. *Review of Economics and Statistics* 105(3):528-544.

Dahl, MS, Sorenson, O (2009) The Embedded Entrepreneur. *European Management Review* 6(3):172-181.

Dahl, MS, Sorenson, O (2012) Home Sweet Home: Entrepreneurs' Location Choices and the Performance of Their Ventures. *Management Science* 58(6):1059-1071.

Delgado, M, Porter, ME, Stern, S (2010) Clusters and Entrepreneurship. *Journal of Economic Geography* 10:495-518.

Elfenbein, DW, Hamilton, BH, Zenger, TR (2010) The Small Firm Effect and the Entrepreneurial Spawning of Scientists and Engineers. *Management Science* 56(4):659-681.

Feldman, MP (2001) The Entrepreneurial Event Revisited: Firm Formation in a Regional Context. *Industrial and Corporate Change* 10:861-891.

Glaeser, EL, Kerr, WR, Ponzetto, GA (2010) Clusters of Entrepreneurship. *Journal of Urban Economics* 67(1):150-168.

Gompers, P, Lerner, J, Scharfstein, D (2005) Entrepreneurial Spawning: Public Corporations and the Genesis of New Ventures, 1986 to 1999. *The Journal of Finance* 60(2):577-614.

Guzman, J (2024) Go West Young Firm: The Impact of Startup Migration on the Performance of Migrants. *Management Science* 70(7):4824-4846.

Guzman, J, Murray, F, Stern, S, Williams, H, eds. (2024) Accelerating Innovation Ecosystems: The Promise and Challenges of Regional Innovation Engines. (University of Chicago Press).

Hamilton, BH (2000) Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment. *Journal of Political Economy* 108(3):604-631.

Hayton, JC, Cacciotti, G (2013) Is There an Entrepreneurial Culture? A Review of Empirical Research. *Entrepreneurship & Regional Development* 25(9-10):708-731.

Hegde, D, Tumlinson, J (2021) Information Frictions and Entrepreneurship. *Strategic Management Journal* 42(3):491-528.

Kacperczyk, A (2013) Social Influence and Entrepreneurship: The Effect of University Peers on Entrepreneurial Entry. *Organization Science* 24(3):664-683.

Kerr, WR, Robert-Nicoud, F (2020) Tech Clusters. *Journal of Economic Perspectives* 34(3):50-76.

Lazear, EP (2005) Entreprenreurship. *Journal of Labor Economics* 23(4):649-680.

Lerner, J (2009) *Boulevard of Broken Dreams: Why Public Efforts to Boost Entrepreneurship and Venture Capital Have Failed: And What to Do About It* (Princeton University Press, Princeton, NJ).

Michelacci, C, Silva, O (2007) Why So Many Local Entrepreneurs? *The Review of Economics and Statistics* 89(4):615-633.

Moretti, E (2021) The Effect of High-Tech Clusters on the Productivity of Top Inventors. *American Economic Review* 111(10):3328-3375.

National Research Council (2010) *A Data-Based Assessment of Research-Doctorate Programs in the United States* (National Academies Press, Washington, DC).

Roach, M, Sauermann, H (2015) Founder or Joiner? The Role of Preferences and Context in Shaping Different Entrepreneurial Interests. *Management Science* 61(9):2160-2184.

Roach, M, Sauermann, H (2024) Can Technology Startups Hire Talented Early Employees? Ability, Preferences and Employee First Job Choice. *Management Science* 70(6):3619-3644.

Roach, M, Skrentny, J (2019) Why Foreign Stem Phds Are Unlikely to Work for Us Technology Startups. *Proceedings of the National Academy of Sciences* 116(34):16805-16810.

Roach, M, Skrentny, J (2021) Rethinking Immigration Policies for Stem Doctorates. *Science* 371(6527).

Roach, M, Sauermann, H, Skrentny, J, eds. (2020) Are Foreign Phds More Entreprenuerial? Entrepreneurial Characteristics, Preferences and Outcomes of Native and Foreign Science & Engineering Phd Students. (The University of Chicago Press, Chicago).

Saxenian, A (1994) *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Havard University Press, Cambridge, MA).

Sørensen, JB (2007) Bureaucracy and Entrepreneurship: Workplace Effects on Entrepreneurial Entry. *Administrative Science Quarterly* 52:387-412.

Sorenson, O, Audia, PG (2000) The Social Structure of Entrepreneurial Activity: Geographic Concentration of Footwear Production in the United States, 1940-1989. *American Journal of Sociology* 106(2):424-461.

Spence, M (1973) Job Market Signaling. *The Quarterly Journal of Economics* 87(3):355-374.

Spigel, B (2017) The Relational Organization of Entrepreneurial Ecosystems. *Entrepreneurship Theory and Practice* 41(1):49-72.

Stuart, T, Sorenson, O (2003) The Geography of Opportunity: Spatial Heterogeneity in Founding Rates and the Performance of Biotechnology Firms. *Research Policy* 32(2):229-253.