Entrepreneurial Spillovers Across Coworkers*

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Abstract

How do workplace social connections shape everyday entrepreneurship? Using comprehensive data on millions of American workers across the economy, I find three key patterns. First, entrepreneurial coworkers inspire and teach entrepreneurship: individuals are more likely to become entrepreneurs after working with coworkers who previously led young businesses. Second, these effects predominantly occur within demographic groups, perpetuating lower entrepreneurship rates for women and Black Americans. Third, these workplace spillovers can increase productivity: individuals exposed to relatively successful coworkers subsequently run successful companies too.

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Entrepreneurship is commonly regarded as a vital source of economic growth, with young firms contributing disproportionately to employment growth (Haltiwanger, Jarmin, and Miranda (2013)) and innovation (Klenow and Li (2021)). Yet the pathway along which individuals transition from ordinary work to entrepreneurship is fraught with many challenges, ranging from developing a business idea to learning the logistics of running a firm to accessing capital and other resources. These challenges likely bite differently for different populations, given large demographic gaps in entrepreneurship rates. For example, in the mid-2000s, only 41% of new business leaders were women, despite women making up 47% of the workforce; meanwhile, only 5% of new business leaders were Black, despite Blacks representing 10% of the workforce (Table 1).[1]

In this paper, I study one potential launchpad for entrepreneurship: exposure to entrepreneurial peers in the workplace. A growing literature has shown that entrepreneurs can inspire and teach future entrepreneurship in a variety of settings, and the workplace is a natural venue in which individuals may meet others with differing backgrounds and experience from whom they can learn. Indeed, Americans may be more likely to meet people from different backgrounds at their jobs than in other domains of their lives — for example, Chetty et al. (2022) find that low socioeconomic status (SES) individuals have higher exposure to high SES peers in the workplace than in their high schools, recreational and religious groups, and neighborhoods. If working alongside coworkers with entrepreneurial experience encourages entrepreneurship, as previously suggested by Nanda and Sørensen (2010), then the workplace might give access to entrepreneurship to a wide array of people. Simply put, many more people have coworkers, and thus could have coworkers with entrepreneurial lessons to teach, than matriculate in MBA programs. If entrepreneurial coworkers are common and give "good" advice, their presence could lower the barriers to entrepreneurship for many individuals, including entrepreneurial minorities like women and Black Americans.

I characterize how social connections in the workplace shape the landscape of everyday entrepreneurship. I do this in three steps that cover the five W's — "who," "what," "when," "where,"

[1]These shares are significantly smaller in the hyper-selected setting of venture capital-backed startups, in which women and Blacks represent less than 9% and 0.5% of entrepreneurs, respectively (Calder-Wang and Gompers (2017)).

and "why" (and "how") — of entrepreneurial learning from coworkers. First, I show that individuals learn entrepreneurship from their coworkers (the "what"): individuals who work alongside former entrepreneurs are more likely to lead firms themselves subsequently, such that entrepreneurial coworkers generate "spillovers" in the form of more new firms. Second, I find that, while these spillovers are common phenomena across the economy, the spillovers occur predominantly within demographic groups, if at all (the "who," "when," and "where"). Women only learn entrepreneurship from their — rare — female coworkers with entrepreneurial experience, and Black Americans experience almost no learning. This means that, despite workplaces bringing together workers from different backgrounds, entrepreneurial learning across coworkers actually *exacerbates* diversity issues in entrepreneurship. Third, these spillovers convey lessons that subsequently generate firms that mimic the coworkers' previous firms (the "why" and "how"). Because most entrepreneurs are not superstars, entrepreneurial coworkers on average inspire mediocre new firms; but, individuals who are "lucky enough" to work with relatively successful entrepreneurial coworkers appear to learn skills that translate into their own success as entrepreneurs.

I take these steps in turn by using data on over forty million Americans from the U.S. Census Bureau, where I leverage the richness of the data to characterize who is affected and the lessons learned. I combine longitudinal information on individuals and their coworkers in the Longitudinal Employer-Household Dynamics (LEHD) data with Census Bureau data on firms' outcomes. The scope of this data, which is large and spans many demographic groups, states, and industries, allows me to explore the heterogeneity of these spillovers and to construct estimates that are relevant in the national context; importantly, this paper studies "everyday entrepreneurship" — e.g., individuals starting new restaurants and shops, rather than venture capital-backed tech startups — which represents the modal entrepreneurship in the economy. Furthermore, studying the characteristics of the firms that arise through these spillovers allows me both to evaluate the productivity implications of these spillovers and to characterize the lessons learned through these spillovers.[2]

[2]While there are several ways of measuring entrepreneurship, in my main analyses I follow the recent literature and call an individual an entrepreneur if they are one of the top three earners at a new firm. See Agarwal et al. (2016), Kerr and Kerr (2017), and Azoulay et al. (2018). I test the robustness of this definition in Section A.I. This measure of entrepreneurship captures individuals who likely hold influential positions at young firms.

The first step of the paper addresses the "what" question of entrepreneurial learning across coworkers: namely, what is the role of coworkers with previous entrepreneurship in generating new firms? I estimate entrepreneurial spillovers across establishment coworkers by leveraging variation in individuals' exposure to coworkers with prior (within the past five years) entrepreneurial experience. As Figure 1 demonstrates, working with a larger share of entrepreneurial coworkers predicts entrepreneurship. I find that individuals who work with one standard deviation (about 10 percentage points) higher share of coworkers who were entrepreneurs in the past five years are 8% more likely to become entrepreneurs themselves in the next five years, relative to the average likelihood: exposure to entrepreneurial coworkers appears to nudge individuals towards entrepreneurship.[3]

While establishing the causality of these spillovers is inherently challenging — most crucially, individuals are not randomly assigned coworkers, such that estimated spillovers could reflect selection in which entrepreneurial workers happen to appear in the same workplaces — I present a series of analyses designed to strengthen the causal interpretation. For example, I show in panel regressions with employer fixed effects that spillover estimates persist when considering within-employer variation in entrepreneurial coworkers over time. In cross-sectional regressions I show that spillovers are concentrated amongst workers at the same establishment: an individual is substantially more likely to become an entrepreneur if their immediate coworkers have entrepreneurial experience than if workers at *other* locations of the same firm have entrepreneurial experience. Furthermore, by considering an individual's own history as an entrepreneur, I demonstrate that the estimated spillovers are not the result of recent entrepreneurs, who may become entrepreneurs again in the future, sorting to the same workplaces: the recent entrepreneurs are *not* more likely become entrepreneurs again in the future after working with entrepreneurial coworkers.

The second step of the paper addresses the "who," "when," and "where" questions: which workers learn and gain inspiration from entrepreneurial coworkers, and in which circumstances does this happen? While I find evidence that individuals do on average learn entrepreneurship

[3]This finding is consistent with several papers in the literature, most notably Nanda and Sørensen (2010); nonetheless, it is important to demonstrate the average patterns in my data before I move on the characterize the spillovers. See the literature discussion below for comments on the relative contribution of my paper.

from their coworkers and these spillovers occur broadly across sectors, these spillovers are concentrated amongst the traditionally represented groups in entrepreneurship — White and Asian men — such that spillovers may actually perpetuate low entrepreneurship rates amongst minorities. This arises for two reasons. First, exposure to entrepreneurial coworkers is not equal across demographic groups, with Blacks working with significantly lower shares of former entrepreneurs compared to Whites; Blacks are not working in the "right" firms in order to take advantage of learning opportunities. Second, conditional on exposure to entrepreneurial coworkers, spillovers occur mostly within demographic groups, if at all. Women appear to learn entrepreneurship only from their (uncommon) female entrepreneurial coworkers, and Blacks seemingly learn entrepreneurship from none of their coworkers, regardless of race. These two forces – unequal exposure and lower rates of spillovers conditional on exposure – mean that minority entrepreneurship is unlikely to blossom through workplace connections; indeed, in back-of-the-envelope calculations, I find that equalizing spillovers across sexes and races would reduce the gender and racial gaps by 10% and 5%, respectively.[4]

The third and final step of the paper addresses the "why" and "how" questions: when entrepreneurial learning happens, why and how does it happen? The goal here is to understand whether former entrepreneurs are simply inspiring entrepreneurs or also teaching them skills that will generate more productive new businesses. I find that individuals who become entrepreneurs after working with relatively more entrepreneurial coworkers tend to start firms that are smaller in both employment and sales and are less likely to survive, meaning that the spillovers tend to generate mediocre firms. This is consistent with a net pattern of individuals on average simply being inspired or learning the institutional knowledge needed to start a firm, as this leads to less productive individuals choosing to become entrepreneurs. However, if the individuals' entrepreneurial coworkers ran larger or longer-surviving firms, the individuals are more likely to start firms that

[4]These patterns are consistent with past literature that emphasizes the role of within-group mentorship for women as well as lower rates of discussing business ideas with peers for Blacks. For example, Rocha and Van Praag (2020) document that women are more likely to become entrepreneurs after working at female-founded startups in Denmark. Bennett and Robinson (2023) argue that the lower rate of idea socialization by Black would-be entrepreneurs is a crucial contributor to the Black-White entrepreneurship gap.

are larger and more likely to survive. These results suggest scope for *some* true productivity gains via entrepreneurial skill spillovers, if the spillovers are from particularly successful entrepreneurs.[5] This scope is limited by the frank reality that most former entrepreneurs an individual gets to meet are not superstars.

The remainder of this paper is organized as follows. Section I describes my contribution through the lens of the existing literature. Section II describes the U.S. Census Bureau data and samples used. The following three sections (Sections III, IV, V) take the three steps of the paper, covering the "what," "who"/"when,"/"where" and "why"/"how" questions of learning from entrepreneurial coworkers, respectively. Section VI concludes. A number of additional results are contained in an appendix available online.

I Related literature

This paper contributes to several literatures. The paper relates to and builds upon papers on learning entrepreneurship from coworkers and communities, which generally document a potential presence of entrepreneurial spillovers but have limited findings on *who* is affected by the spillovers and no or mixed evidence on *what* is transmitted across spillovers. For example, Nanda and Sørensen (2010) study entrepreneurial spillovers across a small sample of coworkers in Denmark, finding evidence of positive extensive margin spillovers in support of learning.[6] Other work considers entrepreneurial spillovers in other contexts. Guiso, Pistaferri, and Schivardi (2021) and Giannetti and Simonov (2009), for instance, find evidence of people learning entrepreneurship from their broader (geographic) community in Italy and Sweden, respectively. Meanwhile, Lerner and Malmendier (2013) leverage randomly assigned peer groups among Harvard MBAs and find evidence of nuanced entrepreneurial spillovers; having more previous entrepreneurs as classmates reduced students' likelihood of later becoming an entrepreneur, driven by a decrease in future

[5] I find limited evidence of spillovers alleviating financial constraints; instead, I interpret spillovers as generally reducing information frictions.

[6] Nanda and Sørensen (2010) find that a one standard deviation higher exposure to entrepreneurial coworkers predicts a 4% higher likelihood of becoming an entrepreneur subsequently. Surveying 292 representative Dutch entrepreneurs, Bosma et al. (2012) present evidence of former colleagues and employers serving as role models for entrepreneurship. Stuart and Ding (2006) find evidence of academic life scientists' entrepreneurship being positively correlated with their colleagues' experience with commercial science.

unsuccessful entrepreneurship.[7,8]

Using large, broad, and high-quality data that allow me to study a wide span of the American workforce, I find evidence consistent with the basic story these papers tell: nascent entrepreneurs' transition into entrepreneurship can be affected by their exposure to entrepreneurs. I provide new evidence characterizing these spillovers, both in terms of *who* is affected and *how* the spillovers affect productivity. My ability to study the nature of these spillovers stems from the size and scope of my data, as well as the high-quality demographic and firm success measures. For instance, Nanda and Sørensen (2010) do not characterize the spillovers beyond their existence, citing limitations in their data, including a lack of firm performance information as well as limited ability to control for and analyze time-varying individual- and firm-level attributes. Similarly, the external validity of studies of very narrow settings such as Harvard MBA classrooms (Lerner and Malmendier (2013)) is unclear; meanwhile, by studying the average American workplace, I produce results that are relevant economy-wide.[9]

By focusing on how the spillovers affect minority entrepreneurship in my heterogeneity analyses, I furthermore contribute to the literature on minority entrepreneurship and business leadership.[10] In particular, my findings resonate with papers that emphasize the role of women mentoring other women. For example, Rocha and Van Praag (2020) document that female-founded startups in Denmark spawn female entrepreneurs.[11] Furthermore, my findings on the lack of spillovers for

[7] Shue (2013) and Hacamo and Kleiner (2021) also study entrepreneurial spillovers across MBA classmates, finding evidence of positive spillovers in terms of firm policies and confidence, respectively. For younger students, Falck, Heblich, and Luedemann (2012) find positive correlations between a teenager's entrepreneurial intentions and their classmates'.

[8] There is also evidence of entrepreneurial spillovers within family members (e.g., Hvide and Oyer (2018), Akcigit et al. (2021), Lindquist, Sol, and Van Praag (2015), and Djankov et al. (2006)) as well as from employer to worker (e.g., Klepper and Sleeper (2005), Gompers, Lerner, and Scharfstein (2005), Bosma et al. (2012), and Babina and Howell (2020)). Additionally, there is mixed evidence of peer effects in the context of formal entrepreneurial training (e.g., Chatterji et al. (2019), Hasan and Koning (2019), Field et al. (2016), Karlan and Valdivia (2011)).

[9] In Appendix OA.VI, I provide evidence to reconcile my findings with Lerner and Malmendier (2013) by narrowing in on "like-Harvard MBA" entrepreneurial coworkers.

[10] Much of this vast literature focuses on documenting disparities in entrepreneurship and outcomes, such as financing, as well as the impact of policies on minority entrepreneurs. For example, see Fairlie and Meyer (1996), Guzman and Kacperczyk (2019), Ewens (2023).

[11] Similarly, Bosma et al. (2012) find survey evidence that entrepreneurs' role models tend to be of the same sex as them. Field et al. (2016) find evidence that female friends can catalyze women's entrepreneurial responses to formal business training in India. Mertz, Ronchi, and Salvestrini (2023) argue that exposure to entrepreneurs during adolescence predicts entrepreneurship during adulthood for girls but not boys. Hampole, Truffa, and Wong (2021)

Blacks support recent survey evidence suggesting that Black prospective entrepreneurs deviate in their path towards launching their businesses when they infrequently discuss their business ideas with others (Bennett and Robinson (2023)).

More broadly, this paper contributes to the literature on entrepreneurial occupation choice, demonstrating how entrepreneurship can arise from learning from entrepreneurs.[12] Furthermore, this paper highlights another dimension in which social networks formed in the workplace can have profound effects on individuals' lives.[13] Understanding the role of workplaces in generating opportunities for workers of different backgrounds is of growing importance, as workplaces have become more segregated along demographics over the past few decades (see, e.g., Sorkin and Wallskog (2023)). Finally, this paper contributes to the broader literature on growth driven by new firms, their employees, and declining dynamism, demonstrating an understudied source of new firms (Haltiwanger, Jarmin, and Miranda (2013), Klenow and Li (2021)).

II Data

I use several datasets from the U.S. Census Bureau to measure the entrepreneurship and entrepreneurial outcomes for individuals and their coworkers.[14] See Appendix A.I for details on these datasets and how samples and variables are constructed. Here, I present broad summary statistics for the main sample.

find that random exposure to female MBA classmates predicts holding corporate leadership positions in the future for women, suggesting that female classmates facilitate both the transmission of gender-specific information and access to job referrals.

[12] See Segal, Borgia, and Schoenfeld (2005) for a broad description of the various motivations for entrepreneurship. There is a related literature on the innovative and corporate motivations and decisions of firm managers and executives. See, for example, Bertrand and Schoar (2003), Graham et al. (2009), Campbell et al. (2011), Malmendier, Tate, and Yan (2011), Hirshleifer, Low, and Teoh (2012), Kaplan, Klebanov, and Sorensen (2012), Ben-David, Graham, and Harvey (2013), Graham, Harvey, and Puri (2013), Faleye, Kovacs, and Venkateswaran (2014), and Hall et al. (2014).

[13] There is a broader literature on individuals "learning" from coworkers in other domains, such as productivity-enhancing learning such as human capital (Herkenhoff, Phillips, and Lise (2018), Jarosch, Oberfield, and Rossi-Hansberg (2021)) and other behavioral imitation such as take-up of parental leave (Dahl, Løken, and Mogstad (2014), Welteke and Wrohlich (2019)) and insurance (Handel et al. (2020)).

[14] Data is available to researchers on approved projects through the Federal Statistical Research Data Center (FSRDC) network (Bureau (2023)).

II.A Coworkers and firm and worker characteristics

I measure earnings, demographics, and firm information for individuals and their coworkers using the Longitudinal Employer Household Dynamics (LEHD), which is the matched employer-employee data that covers the near-universe of formally employed workers in the United States. The LEHD is constructed from firm-side state unemployment insurance (UI) records and contains information on employment, earnings, and demographics. The data contains longitudinal employer and individual identifiers that allow me to link individuals and their coworkers and follow workers over time as they change jobs. I use LEHD data from 1993 to 2013 for a balanced sample of 18 states; for my main sample, I focus on individuals working in the middle of this time window (2004), for whom I can measure previous and future outcomes.[15] My main notion of an individual's employer is the establishment at which they earn the most in a given year.[16] An individual's coworkers are all other individuals with the same employer in the same year. From the LEHD, I measure individuals' firm-level earnings[17] and demographics, including age, sex, race/ethnicity, education, and country of birth;[18] I also measure establishment and firm variables, including industry and sector (based on 6-digit NAICS codes) and employment (counting the individual and

[15]This results in a balanced panel of the following 18 states: AK, AZ, CA, CO, FL, ID, IL, IN, KS, LA, MD, MO MT, NC, OR, WA, WI, WY (other states only provide data starting in later years). In the 2004 Current Population Survey Annual Social and Economic Supplement (CPS ASEC), these 18 states account for 44% of age 20-64 national employment. I source CPS data from IPUMS (Flood et al. (2020)).

[16]For this paper, the "establishment" is the least aggregate firm unit available in the LEHD, i.e., a state-level unemployment insurance account (called a State Employer Identification Number, or SEIN). For many employers, the establishment has a single location; for others, the establishment is a pooled collection of physical locations within a given state, generally within a single sector. Approximately half of individuals work at single-location establishments in 2004. Establishments belong to firms (given by the Census FIRMID). When individuals work at multiple firms or establishments in a year, I restrict to their highest-paying employer within that year. After making this restriction, I restrict my sample to individuals with coworkers, i.e., those at establishments with at least two employees. After this restriction, I make one final restriction: I focus on individuals aged 20-64, for whom I can measure entrepreneurship in the next five years up until age 69.

[17]These earnings include salaries and wages as well as bonuses, stock options, and other cash pay and are deflated to 2010 dollars.

[18]Note that some demographic variables within the Census contain imputed values; throughout this paper I only use non-imputed values, which are identified by imputation flags; about 5% of individuals have imputed sex and date and place of birth, while about 20% have imputed race and ethnicity and about 85% have missing education (see https://lehd.ces.census.gov/data/lehd-snapshot-doc/). In most analysis samples, I include individuals with imputed values but replace their imputed values with mean demographic values to those with missing demographics and then include as controls indicators for missing the various demographic values; while I could alternatively use the Census-provided imputed values which for example, impute race and ethnicity from sex and date and place of birth, I choose to not so as to not impose a correlation between the demographics. Notably, when studying heterogeneity in spillovers by sex and race, I restrict my analysis samples to individuals with non-imputed demographics.

their coworkers).

II.B Entrepreneurship and entrepreneurial outcomes

I measure entrepreneurship for individuals and their coworkers using the LEHD, which I supplement with firm entry information from the Longitudinal Business Database (LBD), which tracks all U.S. firms with paid employees over time. While there are several ways of measuring entrepreneurship, I follow the recent literature[19] and call an individual an entrepreneur if they are a top three earner at a new firm.[20] This definition will not always capture individuals who found a firm; sometimes, founders take little or no salary in the early years as their firms grow. In these cases, this definition will instead capture likely leaders or managers of these firms. For this paper, I take this measure of entrepreneurship as indicating individuals who hold influential positions at young firms and likely gain "entrepreneurial" experience in doing so.[21] We can think of these individuals as firm leaders, managers, and sometimes founders; I parsimoniously call them entrepreneurs in this paper.

For entrepreneurs, I measure a variety of outcomes for their new firms using the LEHD and several other Census data products. These outcomes include size and survival from the LEHD and revenue and revenue productivity (log revenue per worker) from the LBD.[22]

II.C Summary statistics

In Table 1, I present entrepreneurial, demographic, job, and establishment characteristics of all individuals working in 2004 and of those who later become entrepreneurs between 2005 and 2009. Relative to the general population, future entrepreneurs tend to be young, male, educated, White

[19] I follow Agarwal et al. (2016), Kerr and Kerr (2017), and Azoulay et al. (2018) in doing this; Azoulay et al. (2018) audits this initial team definition using W-2 records to compare founders to initial team members. They find that "90% of the owner-workers are in fact among the top three earners in the firm during the first year," though this coverage is noisy. There are firm owners who take no labor earnings; these individuals are naturally missed by this definition.

[20] I identify the three highest annual earners at a firm in the first year in which it employs workers, as measured in the LEHD.

[21] Appendix A.I provides tests of this definition.

[22] As discussed in Appendix A.I, I additionally use a variety of entrepreneurial outcomes from the Annual Survey of Entrepreneurs (ASE), management information from the Management and Organizational Practices Survey (MOPS), legal form from the Business Register (BR), and whether a firm is privately-held or publicly-traded from the Compustat-SSEL Bridge (CSB).

and Asian, born outside the U.S., higher earning, and working at smaller, younger firms. They also tend to work with more entrepreneurial coworkers, which I explore more systematically in the remainder of the paper.

Despite the fact that future entrepreneurs are different from workers in general, they work and become entrepreneurs across the economy. As Figure 2 shows, future entrepreneurs work in all industries in 2004 and start firms in all industries, though they disproportionately work and start firms in construction, professional/scientific/technical services (e.g., R&D and law and accounting services), and accommodation and food services, and less often appear in manufacturing and health, compared to the general workforce. Nearly half of future entrepreneurs start firms in the same sector as their 2004 establishment.

III "What": What is the role of coworkers with previous entrepreneurship in generating new firms?

In this first part of the paper, I address the "what" question of learning from entrepreneurial coworkers, namely what is the role of these coworkers in promoting entrepreneurship? There are a variety of reasons why entrepreneurial coworkers could encourage — or even discourage — entrepreneurship.[23] For example, former entrepreneurs may inspire entrepreneurship by sharing happy memories, describing the logistics of starting a firm, or making suggestions on nascent entrepreneurs' business ideas; alternatively, former entrepreneurs may recount the stresses of entrepreneurship and consequently discourage would-be entrepreneurs. In this section, I explore the simple *existence* and direction of net spillovers; I turn to mechanisms in Section V.

I estimate entrepreneurial learning across coworkers by leveraging variation in individuals' exposure to coworkers with prior entrepreneurial experience, conditional on rich controls. I find evidence of positive extensive margin spillovers: individuals who work with one standard deviation (10 percentage points) higher share of entrepreneurial coworkers are 2.5 percentage points more likely to become entrepreneurs themselves within the next five years, an 8% increase relative to the average likelihood. While proving the causality of this relationship is inherently challenging —

[23] See Appendix OA.I for a detailed conceptual framework outlining potential mechanisms as well as Section I for a discussion of previous findings in the literature.

most importantly because individuals are not randomly assigned coworkers — I present a battery of robustness analyses to bolster a causal interpretation.

III.A Empirical strategy: Leverage variation in exposure to entrepreneurial coworkers

In order to study the extensive margin, I estimate a model of entrepreneurship with rich controls that leverages cross-individual variation in exposure to entrepreneurial coworkers. Here I begin with my main analysis that compares the entrepreneurship of individuals cross-sectionally; below, I argue that these results are robust to key identification concerns.

I find that if an individual interacts proportionally more with former entrepreneurs, then they are more likely to become an entrepreneur subsequently. To make this causal argument, I want to compare individuals who are very similar, both in terms of their own demographics and entrepreneurship experience and their current firms, but who (perhaps randomly) have different exposure to entrepreneurial experience.

I estimate the following linear probability model:[24]

$$\begin{aligned}\text{Future entrepreneurship}_{i,n,s} = \alpha + \beta\,&\text{Share of coworkers with entrepreneurship}_i \\ &+\mathbf{X}_{i,n,s}\delta + \xi_{i,n,s},\end{aligned} \tag{1}$$

where Future entrepreneurship$_{i,n,s}$ is an indicator equal to 1 if individual i, whose 2004 primary establishment belongs to industry n (given by a 6-digit NAICS code) and is located in state s, becomes an entrepreneur within the next 5 years (i.e., from 2005 through 2009), and 0 otherwise.[25] The key coefficient of interest is β on the share of individual i's 2004 primary establishment coworkers who were entrepreneurs within the past 5 years; the share is a proportion and lies between 0 and 1.[26] This coefficient measures the relationship between having a larger share of coworkers in 2004 with recent entrepreneurship experience and the likelihood of becoming an entrepreneur in the near

[24] In unreported results, I confirm that my extensive margin results are similar if estimated as a logistic model, rather than a linear probability model.

[25] This indicator for being a future entrepreneur is zero if the individual either appears in my sample of states in 2005-2009 as a worker only (i.e., as a worker, but not as an entrepreneur) or does not appear in my sample of states (e.g., because they are unemployed, not in the labor force, or working in a state outside of my sample.)

[26] Specifically, this variable is calculated by counting the number of individual i's coworkers who were entrepreneurs (started a firm) between 1999 and 2003, and then dividing this count by the total number of coworkers. I exclude coworkers who are currently entrepreneurs in 2004.

future.[27]

The model also contains a vector of controls $\mathbf{X}_{i,n,s}$ that are chosen to bolster a causal interpretation of β measuring the causal effect of exposure to entrepreneurial coworkers on an individual's future entrepreneurship. Intuitively, by including controls, I make a "selection on observables" argument: conditional on these controls, exposure to entrepreneurial coworkers is exogenous; below, I test this argument by quantifying several identification concerns. Here, I include controls that may correlate with both the outcome and exposure variables, such that excluding these controls would generate endogeneity (i.e., omitted variable bias).

I control for several variables that, as shown in Table 1, are correlated with an individual's future entrepreneurship. Namely, I control for individual i's primary establishment's log employment[28] because future entrepreneurs tend to work at smaller establishments. Similarly, I control for individual i's own entrepreneurial experience by including indicators for whether the individual was previously an entrepreneur between 1999 and 2003 and for whether the individual is currently an entrepreneur in 2004, since entrepreneurship is highly serially correlated within individual. I control for individual i's 2004 log annual earnings at their primary firm, since future entrepreneurs tend to have higher earnings, perhaps because higher-paid individuals are more productive or have more access to start-up capital. Furthermore, I control for a vector of demographic controls, including age fixed effects and indicators for sex, race, four-bin education, and birth in the United States,[29] because, compared to the general workforce, future entrepreneurs tend to be younger,

[27] I deliberately follow Nanda and Sørensen (2010) in choosing this specification, in order to generate estimates comparable to theirs. I additionally consider other specifications. For example, in Table OA.1, I find that spillovers also appear in an alternative specification where I consider exposure to *any* entrepreneurial coworkers, particularly for smaller establishments where an individual may be more likely to run into a single particular employee. Individuals at establishments with fewer than 25 employees are 17.7% more likely to become entrepreneurs if they work with at least one entrepreneurial coworker, relative to the mean, while those at establishments with more than 100 employees are 10.9% more likely to become entrepreneurs if they have any entrepreneurial coworkers.

[28] For this measure of employment, I only count individuals for whom the establishment is their primary establishment. This is the group of workers who are considered when identifying coworkers. In Table OA.2, I control for establishment employment more flexibly (by including either employment bin or employment level fixed effects) and find qualitatively similar results.

[29] As noted above, non-imputed demographics are not available for all individuals. In regressions below, I assign the mean demographic values to those with missing demographics and then include as controls indicators for missing the various demographic values; a crucial exception appears in Section V when I study heterogeneity by sex and race, in which case I restrict the sample to individuals with non-imputed sex and race values.

male, more educated, White or Asian, or born outside the U.S. Many of these variables may correlate with individual i's exposure to entrepreneurial coworkers, making it important to control for them; for example, workers of particular demographics (and consequently similar entrepreneurial proclivities) may cluster at certain firms.

Additionally, I control for detailed industry and state fixed effects based on the industry and location of their 2004 primary establishment. Controlling for industry fixed effects is important because entrepreneurship rates vary dramatically by industry; for example, around 2004, many new firms entered the construction sector, perhaps due to booming housing demand (Figure 2). Controlling for state fixed effects is similarly important because there may be location-based policies that promote both future entrepreneurship and past entrepreneurship of coworkers.

The model also includes an idiosyncratic draw, $\xi_{i,n,s}$. Note that the share of individual i's coworkers who were previously entrepreneurs is correlated with that share for their coworkers themselves; treatment is effectively defined at the establishment level. For this reason, I estimate this model with standard errors clustered at the establishment level.

Before I present the estimates of this model, note that both the sign and magnitude of β are not known ex-ante, such that both the sign and magnitude are empirical questions. That is, β measures the linear prediction of having more entrepreneurial coworkers on future entrepreneurship, holding fixed the set of controls as specified. If we interpret model (1) as estimating a causal entrepreneurial spillover, β could be positive if individuals are inspired or taught by entrepreneurial coworkers. Alternatively, β could be negative if these entrepreneurial coworkers discourage entrepreneurship. These spillovers could be large or small in magnitude.

III.B Main results: Entrepreneurial coworkers inspire new entrepreneurship

Table 2 present the point estimates from model (1) as controls are gradually added, showing that individuals who work with proportionally entrepreneurial coworkers are more likely to become entrepreneurs in the future, regardless of the inclusion of controls. As more controls are added, this relationship decreases marginally but remains relatively stable.

In the full specification (column 5), the coefficient on the share of coworkers with entrepreneurial

experience is 0.025: this predicts that an individual whose entire set of coworkers have entrepreneurial experience is 2.5 percentage points more likely to become an entrepreneur themself, compared to an individual who works with no entrepreneurial coworkers. Only 3.1% of the sample become entrepreneurs, such that 2.5 percentage points is very large relative to 3.1%, suggesting an 80% increase relative to the mean.

However, this interpretation may be misleading, since very few individuals work with entirely former entrepreneurs. Instead, consider an increase in one standard deviation: the estimated model predicts that individuals who work with a one standard deviation (9.5 percentage points) higher share of entrepreneurial coworkers are 0.236 percentage points more likely to become entrepreneurs in the next five years. This gap is still large: a 0.236 percentage point increase in the predicted future entrepreneurship maps into a 7.6% increase, relative to the mean;[30] this increase is comparable to the prior findings in the literature.[31]

To provide a simple evaluation of the size of these spillovers, I conduct a back-of-the-envelope calculation to approximate how much the spillovers boosted aggregate entrepreneurship in 2004. I predict the number of "additional" future entrepreneurs that start firms in the presence of spillovers by multiplying the coefficient on the share with the mean share of coworkers with entrepreneurship experience (0.03356) and the number of individuals (46.68 million). This calculation yields a predicted additional 39,000 future entrepreneurs, which amounts to a 2.75% increase.[32] This calculation, while inherently simple and based on partial equilibrium numbers, demonstrates that these spillovers can generate many new firms. The fact that the spillovers are not the main source of new firms is not surprising — many factors enter into an individual's decision to become an

[30] This is calculated by the following: one standard deviation of share of coworkers with entrepreneurial experience (0.095) times the coefficient on the share of coworkers with entrepreneurial coworkers (0.025) divided by the share of individuals who become entrepreneurs (0.03120).

[31] In Denmark, Nanda and Sørensen (2010) find that a one standard deviation in an individual's coworkers' entrepreneurship predicts a 4% increase in their future entrepreneurship, relative to the mean. In Italy, Guiso, Pistaferri, and Schivardi (2021) find that a one standard deviation in an individual's local firm density at age 18 predicts an 8% increase in their entrepreneurship, relative to the mean. In Sweden, Giannetti and Simonov (2009) find that a one standard deviation increase in an individual's local entrepreneurship predicts a 5.7% increase in their entrepreneurship, relative to the mean.

[32] I reach a 2.75% increase by dividing the predicted number of entrepreneurs (number of observations $*$ mean share $*$ coefficient, i.e., 46,680,000 $*$ 0.03356 $*$ 0.02494 = 39,000) by the difference between the actual number (number of observations $*$ future entrepreneurship rate, i.e., 46,680,000 $*$ 0.03120 = 1,456,416) and the predicted number.

entrepreneur, and the spillovers measured here represent how that decision may be spurred at a snapshot in time. Nonetheless, these spillovers demonstrate that there exists a large number of marginal, "nudgeable" individuals who may opt to become entrepreneurs.

III.C Robustness

While I argue above that model (1) controls for important possible sources of endogeneity, there remains the possibility that other unobserved or misspecified characteristics generate endogeneity problems. Most importantly, there remains the possibility that entrepreneurial individuals cluster at particular workplaces or that workers at the same employers experience some common treatment that predicts entrepreneurship.[33] In other words, some employers may simply hire many previous and future entrepreneurs, or they may hire many previous entrepreneurs and additionally induce some of their workers to become entrepreneurs in the future.

In an ideal analysis, I would leverage some random shock to the coworkers an individual faces. In reality, these shocks are extremely difficult to capture.[34] Instead, I present a series of robustness exercises aimed at reducing the endogeneity concerns; no test is perfect, but they combine to reveal a robust pattern of spillovers.[35]

Robustness exercise 1: Add establishment fixed effects in a panel In the first robustness exercise, I move away from the cross-sectional analysis of model (1) in order to leverage variation in exposure to entrepreneurial coworkers *within an establishment over time*.

I estimate spillovers across coworkers in a panel version of my data, holding fixed the establishment. To do this, I extend my data into a panel by adding individuals in 2003 (in addition to

[33] In the language of the peer effects literature, these concerns amount to selection into peer groups and common shocks (see, e.g., Sacerdote (2014)). A third concern in estimating peer effects, namely the reflection problem first described in Manski (1993), captures bias created when trying to estimate the relationship between an individual and their peers' outcomes when these outcomes are measured at the same time. The reflection problem is not relevant for this paper because I measure coworkers' entrepreneurship in the past and individuals' in the future, and it is unlikely that an individual's future entrepreneurship affects their coworkers' past entrepreneurship, controlling for their past entrepreneurship. I follow Lerner and Malmendier (2013) in making this argument.

[34] One potential identification source could be the unexpected death (e.g., heart attack) of an entrepreneurial coworker (see, for example, Choi et al. (2019)). I am not able to consider this strategy as I do not observe mortality; furthermore, as I show in Section IV, the spillovers that I estimate disproportionately involve relatively young coworkers, for whom there may be relatively few unexpected deaths.

[35] Appendix OA.II presents additional robustness analyses. Appendix OA.III presents survey-based evidence of spillovers using the Annual Survey of Entrepreneurs (ASE).

those in 2004) and re-estimate model (1) with the inclusion of year and establishment fixed effects; because variation in establishments over time may confound firm life cycle effects, I additionally control for firm age fixed effects. Columns 1 and 2 of Table 3 present the results. Column 1 excludes establishment fixed effects and presents estimates comparable to those in column 5 of Table 2; in this panel sample, individuals working with a one standard deviation higher share of entrepreneurial coworkers are 7.4% more likely to become entrepreneurs within the next 5 years, relative to the mean. Column 2 leverages variation within establishments by adding establishment fixed effects, consequently accounting for (at least in part) selection into establishments that is fixed within the narrow time window. As the results show, there *is* a role for selection: the inclusion of the establishment fixed effects reduces the effect of spillovers by a little over a third. Yet, the spillovers I measure are not fully accounted for by selection into workplaces: controlling for this selection, a one standard deviation increase in entrepreneurial coworkers predicts a 4.6% higher likelihood of becoming an entrepreneur, relative to the mean.[36]

There are two distinct limitations of this exercise. First, this panel study imposes a specific structure on timing of the spillovers. For example, suppose an establishment has the exact same set of workers in 2003 and 2004, with the exception of a new worker with entrepreneurial experience being hired in 2004; then, when I study the workers' likelihoods of becoming entrepreneurs within the next five years, with establishment fixed effects, I am effectively testing whether they are more likely to become an entrepreneur in 2009 (five years after 2004, when they face an entrepreneurial coworker) than in 2004 (one year after 2003, when they do not face an entrepreneurial coworker) — all of the interim years (2005, 2006, 2007, and 2008) are contained in both "within five years" measures.[37] This comparison makes evaluating the reduction in coefficient with establishment fixed

[36]One possible concern with this analysis is that establishments that newly hire more former entrepreneurs may be shifting their hiring in general, e.g., because they are starting a new project. In untabulated results, I restrict this analysis to individuals who joined their firm in 2002 or earlier; these individuals were not hired during the same time new entrepreneurial coworkers may have been hired. (I allow these individuals' entrepreneurial coworkers to have joined after 2002.) I find similar results for this subsample, consistent with these within-establishment patterns not simply reflecting general hiring changes.

[37]Note that the analysis in Table 3 does not actually require individuals to be at the same establishment in both years, such that in reality there is identifying variation coming both from individuals and coworkers joining and/or leaving their establishment in either year and the timing of entrepreneurship.

effects difficult. While this mechanical oddity could be resolved by only considering future entrepreneurship within the next single year, that would also impose a tight timeline for spillovers.[38] Because of these issues, my preferred specifications are cross-sectional.

Second, while adding establishment fixed effects in a panel may remove a fixed component of the role of an employer for pooling and/or encouraging entrepreneurs, there could be time-varying selection or employer treatment effects. For example, an employer's propensity to hire entrepreneurial workers may depend on its situation; perhaps firms experiencing dramatic growth are more likely to become hubs for entrepreneurial individuals. If this is the case, employer fixed effects may miss this time-varying role for firms. Robustness exercise 2 considers this possibility.

Robustness exercise 2: Compare to other workers employed at other establishments of the same firm Given the limitations of the panel setting described above, I return to the 2004 cross-section to evaluate variation in entrepreneurial spillovers *within a firm* in the same year. Namely, I consider individuals at multi-establishment firms and analyze their future entrepreneurial behavior as a function of workers who work at the *same firm in the same year* but at different locations within the firm; assuming individuals at different locations do not interact on a regular basis, individuals should *not* be learning entrepreneurship from these workers. If individuals truly have no interactions across establishments, I interpret any apparent spillovers across establishments as reflecting selection or firm effects.[39,40]

Columns 3 and 4 of Table 3 present estimates of model (1) for the sample of multi-establishment firms. Column 3 presents the baseline specification; for this sample, we see a larger coefficient on the share of coworkers (at one's own establishment) with entrepreneurial experience of 0.098, which translates into a 14% increase in future entrepreneurship relative to the mean, for a one

[38] In untabulated results, I show that exposure to entrepreneurial coworkers in 2004 *does* predict entrepreneurship in 2005, it also continues to predict (new) entrepreneurship in 2006, 2007, 2008, and 2009, suggesting that restricting to the next year may needlessly restrict estimated spillovers.

[39] Recall that an establishment is an SEIN for this paper; this means that I study multi-SEIN firms. Virtually all multi-SEIN firms should have multiple physical locations, but some single-SEIN firms also have multiple locations. Because I cannot identify in which segment of an SEIN each worker works, I can only study cross-segment differences at the SEIN level and hence am limited to multi-SEIN firms.

[40] Note that the proliferation of video meeting software and other remote work technologies have likely resulted in more interaction between different-location workers in recent years; I assume that these interactions were limited in 2004.

standard deviation increase in exposure.[41] Column 4 compares the role of an individual's same-establishment coworkers to workers at the same firm but other establishments; I add as a covariate the share of workers at other establishments with recent entrepreneurship. We see some evidence of selection or firm effects: the coefficient on other-establishment workers is nonzero at 0.010. Yet, the coefficient on same-establishment coworkers remains large (0.092), demonstrating that an individual's future entrepreneurship is disproportionately related to their establishment coworkers' past entrepreneurship, rather than to the entrepreneurial experience of other employees at the firm. In other words, even when considering workers who have all chosen to work at the same firm in the same year, the spillovers I estimate are concentrated within an individual's workplace.[42,43]

Robustness exercise 3: Compare to local entrepreneurship environment While the first two exercises support the idea that spillovers are concentrated within an establishment, within a particular year, there remains the possibility of "common shocks" beyond an employer. For example, the local entrepreneurial environment may generate swings in entrepreneurship that generate patterns of previous and future entrepreneurs appearing at the same workplaces; this concern is particularly relevant as literature has shown that individuals may experience entrepreneurial learning from their broader geographic community (Guiso, Pistaferri, and Schivardi (2021), Giannetti and Simonov (2009)). To address this concern, I conduct a series of analyses controlling for an individual's local environment.

Columns 5 and 6 of Table 3 present one such analysis. I consider single-location establishments in my main 2004 sample for which I can identify the establishment's ZIP code and estimate

[41]This sample exhibits both a smaller average future entrepreneurship rate (1.9% instead of 3.1%) and smaller variation in the share (standard deviation of 0.027 instead of 0.095).

[42]One threat to this robustness exercise would entail different establishments of the same firm exhibiting different selection or employer treatment effect patterns; for example, perhaps a firm's headquarters is always more entrepreneurial than its other locations. In Table OA.5 I conduct a series of extensions to restrict the comparison of same-establishment coworkers to workers at other *similar* establishments of the firm, where similarity is defined on the basis of location and sector. I find similar results in these more conservative comparisons.

[43]More broadly to consider the role of time-varying firm behavior, I also estimate versions of model (1) for the full 2004 sample in which I control for establishment growth and firm success. I show in Table OA.3 that the results persist controlling for establishment employment growth at various horizons, and there is no consistent relationship between the growth and spillovers. Put differently, these spillovers appear to happen at both quickly and slowly growing employers and so are not driven by firm growth. Similarly, the spillovers do not appear to be driven by 2004 employer success — it is not the case that spillovers are clearly accounted for by individuals' employers' productivity or revenue, as shown in Table OA.4.

model (1). Column 5 presents the baseline specification. For this sample, I estimate a coefficient on the share of coworkers with entrepreneurial experience of 0.013, amounting to a 3.9% increase in future entrepreneurship relative to the mean, for a one standard deviation increase in exposure. Column 6 adds in ZIP code-by-industry fixed effects; doing this removes systematic differences in a local industry-specific entrepreneurship rate, such that I am comparing, for example, workers at two automobile dealers that sell new cars in north Durham, NC. Adding these fixed effects actually increases the estimated coefficient to 0.019, translating to a 5.7% increase in future entrepreneurship relative to the mean, for a one standard deviation increase in exposure. I interpret this result as reassurance the estimated spillovers are not wholly driven by individuals' local environments beyond their workplace.[44]

Robustness exercise 4: Heterogeneity by individuals' own previous entrepreneurship experience Despite the fact that the previous robustness exercises have supported a spillover interpretation of individuals learning entrepreneurship from their coworkers, there still remains the possibility of entrepreneurial workers clustering at particular establishments in particular years for some reason unexplained by the local entrepreneurship environment. I consider this possibility by leveraging the fact that I observe previous entrepreneurship experience for potential future entrepreneurs. This allows me to consider whether the estimated spillovers are driven by *observably* entrepreneurial individuals happening to work with entrepreneurial coworkers.

Column 7 of Table 3 presents this analysis. For my main 2004 sample, I extend model (1) to estimate how an individual's own entrepreneurial experience (in the past five years) interacts with exposure to entrepreneurial coworkers in predicting entrepreneurship. If the estimated spillovers in Table 2 reflect previous entrepreneurs simply happening to work alongside entrepreneurial coworkers, then individuals without entrepreneurial experience should have zero estimated spillovers (i.e., the coefficient on the share of coworkers with entrepreneurial experience would be zero), with all spillovers loading onto the interaction term of the individual's previous entrepreneurship experi-

[44] In Appendix OA.II I discuss other common shocks and show that the spillovers are not driven by time-varying local business cycle factors (Table OA.8).

ence and their exposure to entrepreneurial coworkers.[45] Instead, we see the opposite: previous entrepreneurs experience, if anything, *negative* spillovers, with a small negative marginal effect (i.e., $0.042 + (-0.049) = -0.007$). Consequently, the estimated spillovers are not wholly driven by observably entrepreneurial workers clustering in the same workplaces.[46]

IV "Who," "when," and "where": Which workers learn and gain inspiration from entrepreneurial coworkers, and in which circumstances does this happen?

In this second step of the paper, I address the "who," "when," and "where" questions of entrepreneurial learning from coworkers. I begin by showing that the entrepreneurial spillovers are widespread across the economy: workers in almost every sector are more likely to become entrepreneurs after working with entrepreneurial coworkers. But, it turns out that these spillovers are *not* widespread across demographic groups. Instead, spillovers are weak for women and effectively nonexistent for Black Americans, such that learning from entrepreneurial coworkers actually exacerbates diversity issues. I conclude by briefly describing other circumstances in which spillovers are weaker or stronger.

IV.A Spillovers are common across sectors

Because workplaces and entrepreneurship patterns vary by industry, it is plausible that spillovers may vary dramatically across sectors.[47] Any differences across sectors could have implications for minority entrepreneurship: for example, if spillovers were wholly concentrated in high tech, venture capital-backed sectors where women and racial minorities are poorly represented (see e.g., Ewens (2023)), then we may not expect spillovers to generate many new minority entrepreneurs.

[45] Recall that all specifications control for individuals' recent entrepreneurship on its own, so the selection at play here would have to be that previous entrepreneurs *who will be serial entrepreneurs* happen to have entrepreneurial coworkers; i.e., I already account for the case in which all previous entrepreneurs are equally likely to become entrepreneurs again.

[46] In Appendix OA.II, I additionally address the issue of selection at the individual level by studying how exposure to entrepreneurial coworkers affects the *timing* of an individual's entrepreneurship. Namely, I take individuals who become entrepreneurs at some point and estimate whether their entrepreneurship disproportionately follows exposure to entrepreneurial coworkers; this amounts to person-year level regressions with person fixed effects, following Table 4 of Nanda and Sørensen (2010). This exercise exhibits the timing issues present in the panel regressions with establishment fixed effects discussed above, such that it is an imperfect robustness exercise.

[47] For instance, Kerr and Kominers (2015) argue that benefits to individual interactions drive clustering of technology firms in Silicon Valley. This suggests that we might see large entrepreneurial spillovers in the information or high tech sector.

In fact, most sectors have similar coefficients to the aggregate coefficient, with some exceptions. Figure 3 shows the spillovers by the sector of the individual's current establishment, estimated in a single regression by interacting the share of coworkers who were recently entrepreneurs with indicators for each sector, while continuing to include industry fixed effects that control for baseline differences in future entrepreneurship rates. There appears to be few spillovers for workers in the agriculture, utilities, and health sectors (which likely have high entry costs due to regulation) but substantial spillovers in the accommodation and food services sector.[48]

The fact that spillovers exist in most sectors but are strongest in the accommodation and food service sector suggests three conclusions. First, these spillovers exist across the economy — these spillovers are commonplace and are not driven by the culture or structure of particular sectors. Second, because the spillovers are largest in the relatively low-technology accommodation and food services sectors, these spillovers are unlikely to be predominantly transmitting knowledge of complex technologies or promoting high-tech innovation.[49] Third, given how common these spillovers are, they could meaningfully increase minority entrepreneurship, which I explore below.

IV.B Spillovers perpetuate low entrepreneurial diversity

In my main sample, only 41% of entrepreneurs are women, despite women making up 47% of the workforce; meanwhile, only 5% of entrepreneurs are Black despite Blacks representing 10% of the workforce (Table 1). These gender and racial gaps are common concerns of policymakers looking to promote minority entrepreneurship. Do these spillovers increase entrepreneurial diversity by giving access to entrepreneurship to more underrepresented minorities? The spillovers are commonplace and have the potential to affect people of different backgrounds and resources, as most workers have coworkers. This contrasts with other forces behind entrepreneurship, such as having wealthy or entrepreneurial parents or having access to higher education. Hence, these spillovers *could* encourage greater diversity in entrepreneurship. However, the scope for this possibility is

[48] These patterns are similar if I normalize the coefficients by the sector-specific entrepreneurship rate (i.e., the mean outcome). The management sector consists of firms that manage companies and enterprises, such as holding companies and private equity firms.

[49] Beyond being common across sectors, spillovers also occur across the income distribution. See OA.V for details.

limited for two reasons, discussed in turn: differential exposure to entrepreneurial coworkers and differential effects of spillovers. I find substantial demographic gaps in both of these spaces, such that these spillovers may actually reinforce the gender and racial entrepreneurship gaps.

Exposure to entrepreneurial coworkers First, exposure to entrepreneurial coworkers is not equally distributed. Table 4 compares exposure to entrepreneurial coworkers by demographic group, both presenting gaps in raw means and means after residualizing against state and industry fixed effects. The latter tests how entrepreneurship and exposure vary by demographic group, accounting for selection into states and industries.

Columns 1 and 2 demonstrate that men and women on average have similar exposure to entrepreneurial coworkers: on average, 3.4% of men's coworkers have recent entrepreneurial experience, while 3.3% of women's coworkers have recent entrepreneurial experience. This gap flips when I residualize against state and industry fixed effects — i.e., women have slightly lower exposure on average *because* they sort into states and/or industries where there are fewer previous entrepreneurs as potential coworkers.

I see starker differences when I compare (non-Hispanic) White and (non-Hispanic) Black individuals in columns 3 and 4. On average, only 2% of Black workers' coworkers have recent entrepreneurial experience, while 3.5% of White workers' coworkers were entrepreneurs. This gap is halved when I residualize against state and industry fixed effects but remains large: even in the same narrow industry and state, Black workers have lower exposure to entrepreneurial coworkers. This means they have fewer learning opportunities.

Size of spillovers Second, conditional on having access to entrepreneurial coworkers, the spillovers do not operate equally for all demographic groups. I expand model (1) to study in turn how spillovers vary based on sex and race; I interact the exposure variable with the individual's demographics (e.g., sex) and additionally consider the special role of exposure to entrepreneurial coworkers belonging to particular demographic groups (e.g., female entrepreneurial coworkers).

I find stark differences in spillovers across sex and race, as shown in panels A and B of Table 5, respectively. Panel A shows that women seem to experience spillovers *only* if their entrepreneurial

coworkers are also women, which is relatively rare. As shown in column 1, women are marginally less likely to become entrepreneurs after working with more entrepreneurial coworkers in general. But, as shown in column 2, this is at least partially offset if those entrepreneurial coworkers are also women. Conditional on the share of her coworkers who were recently entrepreneurs, a woman with a one standard deviation (5.8 percentage points) higher share of coworkers who were recently entrepreneurs *and* who are women is 0.31 percentage points marginally more likely to become an entrepreneur, 10.0% of the mean outcome. Men also seem to experience spillovers disproportionately from their male entrepreneurial colleagues, suggesting that spillovers are predominantly occurring between coworkers of the same sex. This suggests that female entrepreneurship can be boosted by entrepreneurial learning from coworkers *if* those coworkers are also women. Crucially, this is often not the case — while on average 3.4% of all coworkers have recent entrepreneurial experience, only 1.3% of coworkers have entrepreneurial experience *and* are women, on average.

When we turn to race, we see even starker results: Black workers actually seem to experience negative spillovers, regardless of whether their entrepreneurial coworkers are also Black. As column 1 of Panel B shows, Blacks are *less* likely to become entrepreneurs if they work with more entrepreneurial coworkers. Furthermore, these individuals are not more likely to become entrepreneurs when they work with more entrepreneurial coworkers who are also Black (column 2); unlike women, Black individuals do not experience in-group spillovers on average. This is not simply driven by a lack of Black entrepreneurial coworkers teaching entrepreneurial lessons: non-Black individuals *do* appear to learn from their Black entrepreneurial coworkers. Somehow these same lessons are not equally taught (or are available) to Black individuals. Importantly, even if Blacks were learning from Black entrepreneurial coworkers like women learn from female entrepreneurial coworkers, the scope of these spillovers would be highly limited by the lack of Black entrepreneurial coworkers: on average, only 0.1% of coworkers have recent entrepreneurial experience *and* are Black.

There are a variety of reasons for why estimated spillovers may vary by demographic group. For example, even within a workplace, individuals of different demographics may have different

interactions with coworkers; I do not directly observe who actually interacts within an establishment, and perhaps some individuals are precluded from relationships with entrepreneurial coworkers due to differences in occupations or tasks.[50] There are also reasons why spillovers may be stronger within groups. In addition to potentially forming the basis of social or mentor relationships, demographics may also change the type of information that is conveyed in the spillovers. For example, female entrepreneurs may have suggestions for navigating the male-dominated sphere of entrepreneurship. The scope for homophilic mentorships for women is particularly large, given the literature on female mentorship.[51] Furthermore, the scope for these mentorships in entrepreneurship is large, as Bosma et al. (2012) find survey evidence that entrepreneurs' role models tend to be of the same sex and nationality as them. But not all demographic groups necessarily experience mentorship in entrepreneurship, even within demographic groups: Bennett and Robinson (2023) find survey-based evidence that Black prospective entrepreneurs socialize their business ideas less than others, consistent with the patterns I observe.[52]

Quantifying the role of spillovers Given unequal spillover experiences, how much do these differences actually affect gender and racial entrepreneurial gaps? I address this question through a set of simple back-of-the-envelope calculations, shown in Table 6.

In Panel A, I show how spillovers exacerbate gender gaps. Given an observed gender gap of

[50]This possibility aligns with the pattern that general spillovers are concentrated amongst workers who earn similar amounts. While I do not observe actual peer groups or occupations in the data, I proxy for these with earnings. In Table OA.10, I estimate model (1) but interact the exposure variable with whether the coworkers are in the same within-establishment 2004 earnings quartile as the individual. I find that spillovers are largest amongst individuals with similar earnings: conditional on general exposure to entrepreneurial coworkers, if *all* of an individual's entrepreneurial coworkers are also in the same within-establishment earnings quartile as them, their predicted likelihood of subsequent entrepreneurship more than doubles. The coefficient on the share of an individual's coworkers who were recently entrepreneurs is 0.024, and the coefficient on the share of their coworkers who were recently entrepreneurs *and* are in the same earnings quartile as the individual is 0.034. In other words, spillovers are amplified if an individual's entrepreneurial coworkers earn similar amounts, and thus likely work more closely, to them.

[51]For example, Rocha and Van Praag (2020) document that women are more likely to become entrepreneurs after working at female-founded startups in Denmark; Field et al. (2016) find evidence that female friends can catalyze women's entrepreneurial responses to formal business training in India. Mertz, Ronchi, and Salvestrini (2023) argue that exposure to entrepreneurs during adolescence predicts entrepreneurship during adulthood for girls but not boys. Hampole, Truffa, and Wong (2021) find that random exposure to female MBA classmates predicts holding corporate leadership positions in the future for women, suggesting that female classmates facilitate both the transmission of gender-specific information and access to job referrals. See Ginther et al. (2020) for an example of the power of female mentorship in economics as a discipline.

[52]One additional reason that Black individuals may not experience spillovers is that, when they have entrepreneurial coworkers, these coworkers may have been less successful as entrepreneurs.

20.4% (i.e., women are 20.4% less frequently entrepreneurs, compared to men), I consider several counterfactuals. First, I consider the world in which there are no spillovers; this amounts to "removing" the additional entrepreneurs born out of the spillovers.[53] In the absence of spillovers, the gender gap falls by 6.9% (column 2). If instead of removing spillovers I equalize the spillover experience across men and women, the gender gap falls even more: if women had the same exposure to and learning from their entrepreneurial coworkers, the gender gap would fall by 10.1% (column 5). This is primarily driven by equalizing the extent of learning (column 4), consistent with the pattern from Table 4 that women and men face similar shares of entrepreneurial coworkers.

In Panel B, I turn to racial gaps. From an observed racial gap of 57.0% (i.e., Blacks are 57.0% less frequently entrepreneurs, relative to Whites), removing all spillovers would reduce the racial gap by 2.4% (column 2).[54] Since Blacks actually experience negative spillovers (Table 5), simply equalizing Blacks' and Whites' exposure to entrepreneurs is insufficient to reduce the racial gap (column 3). Instead, having Blacks learn entrepreneurship as Whites experience on average can reduce racial gaps: having Blacks and Whites experience spillovers equally would reduce the racial gap by 4.7%.

Taken together, these sets of calculations, while inherently simple, highlight that the presence of unequal spillovers across sexes and races can have substantial impacts on diversity in entrepreneurship.

IV.C Other circumstances that affect the strength of spillovers

In this section, I briefly describe other circumstances in which learning from entrepreneurial coworkers is stronger, which may further shed light on the nature of these spillovers and how they play out unequally across individuals; Appendix OA.V provides details.

Spillovers are stronger if coworkers were relatively successful Because entrepreneurial experience can vary vastly in terms of success, and thus likely enjoyability, it is possible that these

[53] I.e., I subtract from the actual number of entrepreneurs the product (mean exposure $\times$ coefficient $\times$ number of individuals), which captures the implied number of additional entrepreneurs based on the average exposure and predicted entrepreneurship from Table 5.

[54] Note that for this exercise, I assume Whites experience the spillovers estimated for non-Blacks in Table 5. In the sample in Table 5 Panel B, Whites comprise 81.4% of the non-Black population.

extensive margin spillovers may vary by the characteristics of the coworkers' past entrepreneurial firms. Indeed, I find that the positive spillovers are generally amplified when the entrepreneurial coworkers ran relatively successful firms. As shown in Table OA.11, conditional on general exposure to entrepreneurial coworkers, individuals who work with more *successful* entrepreneurs are even more likely to become entrepreneurs themselves. That said, even relatively unsuccessful entrepreneurial coworkers encourage entrepreneurship, perhaps because they still enjoyed their entrepreneurship experiences or still learned useful lessons they can pass on to others.[55]

Spillovers are stronger for less experienced workers Entrepreneurial coworkers likely have the strongest capacity to inspire entrepreneurship for individuals with limited experience, i.e., for whom any lessons about entrepreneurship might be new. For example, spillovers are strongest for younger workers, who generally learn from their slightly older (but still relatively young) coworkers, who might be their supervisors or mentors (Figures OA.2 and Table OA.12). Similarly, spillovers are only relevant for individuals who do not *already* have entrepreneurial experience themselves: individuals with recent entrepreneurial experience themselves have, if anything, negative extensive margin spillovers (Table OA.12), consistent with previous entrepreneurs have little to learn from the average entrepreneurial coworkers.[56]

V "Why" and "how": When entrepreneurial learning happens, why and how does it happen?

This third and final part of the paper addresses the "why" question of entrepreneurial learning from coworkers: when entrepreneurial learning happens, how and why does it happen? The goal here is to understand the mechanisms of spillovers. When an individual meets an entrepreneurial

[55] In Appendix OA.VI, I provide evidence to reconcile the lack of discouragement in general with the findings of Lerner and Malmendier (2013). I identify entrepreneurial coworkers similar to the MBAs in Lerner and Malmendier (2013) and show that these particular entrepreneurial coworkers appear to discourage unsuccessful entrepreneurship, consistent with the findings in Lerner and Malmendier (2013). This comparison both supports the causal interpretation of my paper's spillovers, since my findings for this particular group are consistent with those from a setting with exogenous variation, and suggests that my estimates may better capture the experience of the average American worker. I further explore what the characteristics of coworkers' entrepreneurial firms predict for future entrepreneurs' firms in Section V.

[56] Note that this evidence was discussed as a robustness exercise in Section III and is consistent with survey evidence by Bosma et al. (2012), who find that experienced entrepreneurs are less likely to report using role models than new entrepreneurs.

coworker, are they simply inspired? Or, are they learning entrepreneurial skills that translate into more productive new businesses? Understanding the mechanisms provides insights both for how coworkers shape the entrepreneurial outcomes of workers but also for how these spillovers affect the overall productivity of new firms.

In order to characterize why entrepreneurial spillovers occur, I leverage information on firm outcomes. The idea here is to compare how individuals' entrepreneurial successes vary with their past exposure to entrepreneurial coworkers. I hypothesize that if entrepreneurial coworkers simply inspire others or teach basic institutional knowledge (e.g., the logistic steps of starting a company), this effectively lowers the entry cost or barrier to entrepreneurship such that ex ante lower productivity entrepreneurs should decide to start firms. In this case, I expect the marginal entrepreneur born out of learning from coworkers to have worse outcomes. Alternatively, if entrepreneurial coworkers give advice or provide networks that meaningfully increase the productivity of nascent entrepreneurs, I expect the marginal entrepreneur born out of learning from coworkers to have better outcomes.[57,58]

Below, I tease out these two potential channels by considering how general entrepreneurial coworkers versus relatively successful entrepreneurial coworkers predict future outcomes. I posit that *if* there is scope for spillovers to increase productivity, it is likely to occur when individuals meet relatively successful entrepreneurial coworkers, who may have entrepreneurial skills to pass on. Average coworkers may be more likely to simply convey happy stories of entrepreneurship; in fact, the average entrepreneurial coworker was — by virtue of now being a coworker — a mediocre entrepreneur.[59] These coworkers were far from superstars and so are unlikely to convey secrets to becoming a productive firm that they did not manage to enact themselves.

[57] See Appendix OA.I for a detailed conceptual framework.

[58] Appendix OA.IV presents additional evidence against several alternative mechanisms, including entrepreneurial coworkers taking individuals along with them for their next venture, teaching generic leadership skills, or providing direct funding or access to financial networks.

[59] As Table OA.13 shows, average entrepreneurial coworkers look marginally worse compared to all entrepreneurs in terms of their firms' survival, employment, payroll, revenue, and revenue per worker. Note that these are imperfect measures of success, and entrepreneurs of "failed" firms need not be discouraged from entrepreneurship themselves, and consequently they need not discourage others. As Dillon and Stanton (2017) document, serial entrepreneurs frequently "dip in and out" of standard wage work.

I find that individuals who work with more entrepreneurial coworkers tend to start firms that are smaller, less productive, and less likely to grow and continue employing workers compared to other new entrepreneurs; furthermore, these individuals tend to earn less as entrepreneurs. However, if the entrepreneurial coworkers themselves ran larger, more productive, and/or growing firms, the individuals are more likely to start firms that too are larger, more productive, and growing. These results suggest the scope for *some* true productivity gains via spillovers from particular entrepreneurs while indicating that the average future entrepreneur exposed to more entrepreneurial coworkers does not start a superstar firm.

V.A Empirical strategy: Leverage variation in exposure to successful entrepreneurs

I estimate an OLS specification with rich controls that leverages cross-individual variation in exposure to entrepreneurial coworkers and to entrepreneurial coworkers with different entrepreneurial firm characteristics. This estimation is restricted to the set of individuals who become entrepreneurs in the near future.

For future entrepreneurs, I estimate models of the form

$$\begin{aligned}\text{Future entrepreneurial outcome}_{i,n,s} = \alpha &+ \beta_1 \text{Share of coworkers with entr.}_i \\ &+ \beta_2 \text{Share of coworkers with entr. \& firm outcome}_i \\ &+ \mathbf{X}_{i,n,s}\delta + \xi_{i,n,s},\end{aligned} \tag{2}$$

which is identical to model (1) except that now the outcome is some outcome for the firm that individual i starts in the next five years, such as the productivity or size of the firm. I include an additional explanatory variable: the share of individual i's coworkers who were both entrepreneurs within in the past five years and whose entrepreneurial firm had some outcome (e.g., survived to a second year or was particularly large or productive). In some estimates of the model, I include entrepreneurial firm industry fixed effects in order to test whether more exposed individuals simply tend to start firms in, e.g., less productive industries.

V.B Main results: Mixed intensive margin spillovers

Estimates from the above empirical strategy present a nuanced picture. Individuals who work with more entrepreneurial coworkers tend to start firms that are shorter-surviving and smaller and tend to earn less as entrepreneurs. However, if these entrepreneurial coworkers themselves ran longer-surviving, larger, and/or more productive, these patterns (at least partially) reverse.

I estimate model (2) for several metrics of how "successful" entrepreneurs are for the 2004 sample; Tables 7 and 8 present the main results. I begin in columns 1-4 of Table 7 by considering a simple measure of firm success: survival.[60] Do future entrepreneurs start longer-surviving firms if they worked with more entrepreneurial coworkers, especially those who started longer-surviving firms? As columns 1 and 3 show, general exposure to more former entrepreneurs is associated with a lower likelihood of firm survival to both a second and fifth year, although the coefficient is economically small.[61,62] However, exposure to former entrepreneurs whose own firms survived after entry is associated with a higher likelihood of starting a firm that survives after entry, as shown in columns 2 and 4, though this generally does not fully offset the negative effect from general exposure.[63,64]

[60] Survival is measured by the continued employment of workers.

[61] A one standard deviation (14.7 percentage point) increase in the share of coworkers with entrepreneurship is associated with a 0.14 percentage point lower likelihood of having an entrepreneurial firm that survives to a second year, a 0.17% decrease relative to the mean likelihood (column 1).

[62] As Table OA.14, the estimates for firm survival are robust to the inclusion of entrepreneurial firm industry and entry year fixed effects, such that the patterns are not driven by more exposed entrepreneurs entering particular sectors or in particular years.

[63] While I provide evidence in Section III in support of interpreting the extensive margin results as causal, it is possible that the causal interpretation does not extend to the intensive margin results. Specifically, while exposure to entrepreneurs in general may be quasi-random, exposure to successful entrepreneurs may not be; for example, having productive entrepreneurs as coworkers may reflect that an individual has high latent productivity themself. However, note that my baseline regressions already control for the individuals' earnings, which should reflect some of their productivity. Additionally, I conduct robustness for these survival regressions by controlling for the individuals' firms' productivity (see columns 9 and 10 of Table OA.14); if high-productivity individuals and coworkers cluster at high-productivity firms, control for firm productivity should (at least partially) account for any bias generated by this clustering.

[64] It is worth noting that the effect of exposure to more successful entrepreneurial coworkers, by the metric of survival, may be conflated by the extent of interaction between the individual and their coworkers. That is, suppose an entrepreneurial coworker started a firm in the past five years that continues to employ workers several years after entry, yet they are now working at the current firm (unless they are the entrepreneur of the current firm). This could have two implications for the types of interactions this coworker would have with others. First, they may have only joined the firm very recently, meaning that they might have had limited interactions with others. Second, if they joined less recently, then perhaps they were less influential at their entrepreneurial firm (since they may have left it shortly after the firm entered), making their experience less informative for potential entrepreneurs.

Beyond firm survival, I explore other measures of firm success, including size, in terms of employment, payroll, revenue, and revenue productivity. As shown in Table 7 (and Table OA.15), the patterns are generally similar to those for firm survival: individuals who work with more entrepreneurs tend to start "worse" firms, unless their entrepreneurial coworkers themselves were successful. For example, in column 5 of Table 7, I find that a one standard deviation (14.7 percentage point) increase in the share of coworkers who were recently entrepreneurs predicts 5.5% lower entry year employment. Yet, as column 6 shows, this relationship turns positive if the entrepreneurial coworkers ran large firms.[65] Columns 7 and 8 show similar patterns for the likelihood of a future entrepreneur's firm being in the top 10% of entry year employment, relative to firms that enter in the same year and industry. These specifications measure whether a future entrepreneur's prospects of being a "top" entrepreneur depend on whether their entrepreneurial lessons came from "top" former entrepreneurs. Table OA.15 presents analogous specifications for entry year payroll, revenue, and revenue per worker, and demonstrates that the results are robust to the inclusion of entrepreneurial firm industry fixed effects. Regardless of firm outcome, individuals are more likely to become successful as entrepreneurs in the future if their coworkers ran relatively successful firms.[66,67]

Finally, I consider the (labor market) earnings of entrepreneurs themselves. Consistent with having less success on average, individuals exposed to more entrepreneurial corkers also earn lower pay as entrepreneurs compared to other new entrepreneurs, as shown in Table 8, regardless of their entry year or industry. A one standard deviation (14.7 percentage point) increase in the

[65] Individuals start larger firms if their entrepreneurial coworkers' firms were in the top 10% of entry year employment, amongst firms that entered in the same year and industry: conditional on general exposure to entrepreneurial coworkers, a future entrepreneur with a one standard deviation (3.8 percentage point) higher share of coworkers who were entrepreneurs of particularly large firms has 4.3% higher entry year employment.

[66] The one exception is in terms of revenue productivity, where on its own, general exposure to entrepreneurs predicts a marginally higher probability of starting a particularly productive firm (column 5), but this appears to be driven by the particularly productive coworkers (column 6). Conditional on exposure to entrepreneurial coworkers, a future entrepreneur who works with a one standard deviation (4.5 percentage point) higher share of coworkers who were entrepreneurs at particular high-productivity firms is on average 0.6 percentage points more likely to run a particularly productive firm, a 9.9% increase relative to the mean outcome. Estimates based on the revenue and productivity measures, which come from the LBD, should be interpreted with some caution because the LBD has missing revenue data for some firms due to nonresponse or data linkage issues; additionally, the revenue data is a research dataset and may be processed further by the Census.

[67] In untabulated results, I show that these patterns hold too for female and Black entrepreneurs.

share of coworkers who were entrepreneurs predicts that a future entrepreneur's entry year earnings will be 2.3% lower. Consistent with the previous results, future entrepreneurs who work with more successful entrepreneurs are more likely to have higher earnings, conditional on their general exposure.

Taken together, these results suggest that average entrepreneurial coworkers are simply inspiring or teaching basic information to nascent entrepreneurs, which in turn allows less productive entrepreneurs to choose to enter. Yet, the fact that relatively successful entrepreneurial coworkers prompt successful entrepreneurship suggests that *some* of these spillovers translate into productivity, and consequently earnings, gains. This means that when women and Black would-be entrepreneurs do not experience spillovers, they may miss out opportunities to earn more.[68]

Additional outcomes In Appendix OA.V, I explore additional outcomes to further characterize entrepreneurial spillovers. I find that exposure does not predict a higher likelihood of extreme success, as measured by making an initial public offering (IPO). Furthermore, exposed individuals tend to start firms that are less innovative, generating fewer patents, copyrights, and trademarks. In some cases, entrepreneurs are more likely to start firms in the sectors in which their entrepreneurial coworkers ran firms, consistent with entrepreneurial coworkers transmitting sector-specific knowledge or connecting individuals with production or sales networks in a particular industry. Finally, I find that these firms of more exposed individuals tend to have less within-firm earnings inequality, operate with less structured management practices, are more often financed by the owners instead of by banks or other investors, and are less likely to be family-owned (i.e., not have financing from family members).

Taken together, these additional outcomes highlight that, for the majority of individuals, these spillovers provide a pathway from regular work to entrepreneurship without conveying advanced

[68]It is tempting to conclude that many of these individuals are making a sub-optimal decision to become an entrepreneur and that their entrepreneurial coworkers are "leading them astray." However, it is important to remember that individuals become entrepreneurs for many reasons; for instance, some entrepreneurs simply enjoy being their own boss, so even running a less successful firm may be preferable to standard work. Furthermore, my metrics for firm success may not reflect how entrepreneurs view success; some individuals may become entrepreneurs as temporary ventures, such that they may not desire a long-surviving firm. Understanding entrepreneur welfare, like any welfare, is inherently difficult to do using administrative data, and so evaluating the individual-level welfare implications of these spillovers is beyond the scope of this paper.

skills or other tools for success. Generally faced with relatively unsuccessful former entrepreneurs, individuals are learning simple lessons, such as the basic logistics of starting a firm or the benefits of being your own boss. These coworkers are not generally teaching lessons on management practices, how to source financial capital, or the road to being a superstar.

VI Conclusion

Workplace social connections affect the landscape of entrepreneurship. By bringing together individuals with different experiences, workplaces can serve as hubs for new entrepreneurship. Indeed, individuals who work with more entrepreneurial coworkers appear to be inspired by those coworkers and start firms of their own. While *what* they are learning in these relationships is difficult to pin down precisely, patterns about firms' success suggest that *what* individuals learn from their entrepreneurial coworkers depends on *what* those coworkers have to teach. The relatively successful entrepreneurs possess teachable skills that may improve future firms' productivity, while the less successful entrepreneurs may still have institutional knowledge that reduces the entry cost to entrepreneurship without improving productivity. Yet, not everyone experiences these spillovers. Both *access* to and the *effect* of entrepreneurial spillovers vary by demographic group, such that women and Black individuals experience substantially fewer opportunities to launch new entrepreneurial careers out of these connections.

What do these findings mean for policymakers? This paper demonstrates the "status quo" of entrepreneurial spillovers across individuals in the workplace. The presence of these spillovers suggests that there are many individuals who could become entrepreneurs under the "right" circumstances — people are nudged towards entrepreneurship after working with former entrepreneurs. But, because most entrepreneurial coworkers were not superstars, these spillovers are limited in their ability to increase productivity dramatically. Furthermore, underrepresented demographic groups in entrepreneurship are frequently excluded from or not impacted by these spillover opportunities. As a consequence, policymakers may have to push beyond this status quo in order to generate productivity gains and greater entrepreneurial diversity.

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Table 1: Individuals who become entrepreneurs are different from the average worker

	All Individuals			Future Entrepreneurs			T-Stat
	Mean (1)	Std Dev (2)	N (M) (3)	Mean (4)	Std Dev (5)	N (M) (6)	(4)-(1) (7)
Panel A: Entrepreneurship							
Recent entrepreneur	0.034	0.180	46.68	0.090	0.287	1.456	237.0
Current entrepreneur	0.009	0.096	46.68	0.032	0.175	1.456	152.8
Future entrepreneur	0.031	0.174	46.68	1.000	0.000	1.456	38084.6
Share cow. entr.	0.034	0.095	46.68	0.064	0.147	1.456	248.0
Share cow. survived, age 2	0.029	0.093	46.68	0.057	0.143	1.456	234.9
Share cow. survived, age 5	0.021	0.083	46.68	0.038	0.118	1.456	170.4
Panel B: Demographics							
Female	0.47	0.50	46.68	0.41	0.49	1.456	-135.8
White	0.73	0.44	36.370	0.78	0.41	1.129	122.8
Black	0.10	0.30	36.370	0.05	0.21	1.129	-269.3
Native American	0.01	0.08	36.370	0.01	0.08	1.129	-19.4
Asian	0.05	0.22	36.370	0.07	0.25	1.129	60.3
Hispanic	0.10	0.29	36.370	0.09	0.29	1.129	-22.1
Age	39.09	11.83	46.68	37.39	11.00	1.456	-183.2
High school	0.28	0.45	4.234	0.25	0.44	125,000	-17.0
Some college	0.34	0.48	4.234	0.34	0.47	125,000	-4.3
College	0.26	0.44	4.234	0.30	0.46	125,000	29.3
Born outside the U.S.	0.18	0.39	46.68	0.20	0.40	1.456	64.7
Panel C: 2004 Job Characteristics							
Annual earning	37,240	155,300	46.68	41,140	185,400	1.456	25.1
Log(annual earnings)	9.76	1.51	46.68	9.82	1.43	1.456	49.9
Years since joined firm	3.97	3.15	46.68	3.53	2.90	1.456	-182.5
Years until leave firm	3.04	3.07	46.68	1.58	2.02	1.456	-844.3
Panel D: 2004 Establishment Characteristics							
Log(employment)	5.42	2.46	46.68	4.08	2.35	1.456	-675.5
Firm age	8.95	3.25	46.68	7.96	3.65	1.456	-322.3

Note: This table compares entrepreneurial, demographic, job, and establishment characteristics for all individuals in 2004 vs. the subset of those individuals who become entrepreneurs between 2005 and 2009. Recent entrepreneurship is entrepreneurship between 1999 and 2003; current entrepreneurship is entrepreneurship in 2004. "Share cow. entr." indicates the share of the individual's coworkers who were recent entrepreneurs; "Share cow. survived, age [A]" indicates the share of the individual's coworkers who were recent entrepreneurs and whose firms survived to an A-th year after entry. Demographics are only reported for individuals with non-imputed values. Note that all categories within a demographic category are mutually exclusive, e.g., Black identifies non-Hispanic Blacks. Note that the variance of log(annual earnings) is higher than what is typically found in the inequality literature because (a) I do not drop individuals earning below minimum wage, and (b) I do not drop individuals who appear at their primary firm for less than the full year. Observation counts are in millions, as denoted in the header by "M".

Table 2: Exposure to entrepreneurial coworkers predicts future entrepreneurship

	Dependent Variable: Entrepreneur Within Next 5 Years				
	(1)	(2)	(3)	(4)	(5)
Share of coworkers w/ entrepreneurship	0.056*** (0.001)	0.039*** (0.001)	0.038*** (0.001)	0.035*** (0.001)	0.025*** (0.001)
Log employment	x	x	x	x	x
Previous entr.		x	x	x	x
Demographics, earnings			x	x	x
State FE				x	x
Industry FE					x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence of positive extensive margins spillovers. The five columns gradually build up model (1), slowly adding controls as demonstrated in the table footer.

Standard errors are robust and clustered at the establishment level.

N=46,680,000. Mean of dependent variable: 0.031. Mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095).

Table 3: Exposure to entrepreneurial coworker *robustly* predicts future entrepreneurship

Robustness exercise:	Dependent Variable: Entrepreneur Within Next 5 Years						
	Add estab. fixed effects		Vs. at firm's other estabs.		Vs. local environment		Previous entr.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of coworkers w/ entrepreneurship	0.021***	0.014***	0.098***	0.092***	0.013***	0.019***	0.042***
	(0.001)	(0.001)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)
Share of workers at *other* estabs. w/ entr.				0.010***			
				(0.002)			
Previous entr. × Share of coworkers w/ entr.							–0.049***
							(0.001)
Establishment FE		x					
ZIP code-Ind FE						x	
Sample	'03-'04 Panel		Multi-estabs.		Single-location		Main 2004

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents robustness checks of the positive extensive margins spillovers. All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects). Standard errors are robust and clustered at the establishment level.

Exercise 1 (columns 1 and 2): add establishment fixed effects to show that variation in exposure to entrepreneurial coworkers *within*-establishment over time predicts future entrepreneurship. Sample: 2003 and 2004 panel. Additional controls: year, firm age fixed effects; establishment fixed effects in column 2. N = 92,820,000. Mean of dependent variable: 0.032. Mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095).

Exercise 2 (columns 3 and 4): compare to workers at other establishments of the same firm to show that selection at the firm level does not fully drive results. Sample: 2004 firms with multiple establishments (SEINs). Additional controls: log employment at other establishments of the firm in column 4. N = 24,030,000. Mean of dependent variable: 0.019. Mean (std dev) of share of coworkers with entrepreneurship: 0.014 (0.027).

Exercise 3 (columns 5 and 6): control for local environment to show that local entrepreneurial ecosystem does not fully drive results. Sample: Single-location establishments with recorded ZIP codes. Additional controls: ZIP code-industry fixed effects. N=20,200,000. Mean of dependent variable: 0.044. Mean (std dev) of share of coworkers with entrepreneurship: 0.055 (0.131).

Exercise 4 (column 7): estimate heterogeneity by individuals' previous entrepreneurship experience to show that results are not driven by those who already have experience. N=46,680,000. Mean of dependent variable: 0.031. Mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095).

Table 4: Exposure to entrepreneurial coworkers varies by demographic group

	Sex		Race	
	Men (1)	Women (2)	White (3)	Black (4)
Mean share of coworkers w/ entrepreneurship	0.034	0.033	0.035	0.020
Gap relative to majority group (men or Whites)		-0.001		-0.015
Gap relative to majority group, residualized against industry and state		0.001		-0.007
N (Millions)	21.89	24.80	26.58	3.71
Share entrepreneur 2005-2009	0.035	0.027	0.033	0.014

Note: This table demonstrates that exposure to entrepreneurial coworkers varies by demographic group. The first row presents the average share of coworkers with entrepreneurial experience, by demographic group. The second row presents the gap between demographic groups (i.e., average share for women minus men in columns 1 and 2; average share for non-Hispanic Blacks minus non-Hispanic Whites in columns 3 and 4). The third row presents the similar gaps with exposure residualized against industry (NAICS6) and state fixed effects in order to account for worker sorting across industry and geography.

Taken together, columns 1 and 2 show that women are less likely than men to be exposed by entrepreneurial coworkers, but this difference in exposure is accounted for by selection into different states and/or industries — women work in states and/or industries where there are fewer previous entrepreneurs as potential coworkers. Columns 3 and 4 show that Blacks have lower exposure to entrepreneurial coworkers than Whites, and this gap is still pronounced conditional on industry and state sorting.

As shown in the footer, women and Blacks have lower future (next 5 years, 2005-2009) entrepreneurship rates than men and Whites, respectively.

Table 5: Spillovers largely occur within-demographic group, if at all

	Dep Var: Entrepreneur 2005-2009	
	(1)	(2)
Panel A: Women learn from women, men learn from men		
Share of coworkers with entrepreneurship	0.035***	0.047***
	(0.001)	(0.001)
$\mathbb{1}\{\text{Woman}\} \times$	-0.020***	-0.041***
Share of coworkers with entrepreneurship	(0.001)	(0.001)
Share of coworkers with entr. *and* who are women		-0.037***
		(0.002)
$\mathbb{1}\{\text{Woman}\} \times$		0.054***
Share of coworkers with entr. *and* who are women		(0.002)
Panel B: Blacks do not learn from anyone		
Share of coworkers with entrepreneurship	0.022***	0.021***
	(0.001)	(0.001)
$\mathbb{1}\{\text{Black}\} \times$	-0.028***	-0.026***
Share of coworkers with entrepreneurship	(0.002)	(0.003)
Share of coworkers with entr. *and* who are Blacks		0.022***
		(0.005)
$\mathbb{1}\{\text{Black}\} \times$		-0.023***
Share of coworkers with entr. *and* who are Blacks		(0.007)

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table explores heterogeneity in spillovers by demographic group by adapting column 5 of Table 2 by assessing the demographics of both the focal individual and their entrepreneurial coworkers; to assess marginal effects for different groups, sum coefficients across rows. Column 1 presents demographic differences in learning from average entrepreneurial coworkers, while column 2 explores within-group learning.

Panel A shows that women are marginally less likely than men to become entrepreneurs after working with entrepreneurial coworkers (i.e., row 2 is negative) and that spillovers are predominantly within-gender, with women more likely to become entrepreneurs if their entrepreneurial coworkers are women (row 3+4 is positive). Men are marginally less likely to become entrepreneurs if their entrepreneurial coworkers are women (row 3 is negative). Panel B shows that (non-Hispanic) Blacks experience no spillovers on average, regardless of race.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects). Column 2 also controls for the share of coworkers in the relevant group (e.g., women or Blacks) as well as the interaction between the group and that share (e.g., woman $\times$ share of coworkers who are women).

Panel A N=46,680,000. Panel B N = 36,370,000 (smaller due to restricting to non-imputed race/ethnicity). Standard errors are robust and clustered at the establishment level.

Mean of dependent variable for men: 0.035; women: 0.027; Whites: 0.033; Blacks: 0.014.

Mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095); share of coworkers with entrepreneurship and who are women: 0.013 (0.058); share of coworkers with entrepreneurship and who are Black: 0.001 (0.013).

Table 6: Back-of-the-envelope: Spillovers perpetuate low entrepreneurial diversity

	Actual	Counteractuals			
		No spillovers	Same exposure	Same size of spillover	Same exposure and size
	(1)	(2)	(3)	(4)	(5)
Panel A: Spillovers exacerbate gender gaps					
Men's rate	0.0345	0.0333	0.0345	0.0345	0.0345
Women's rate	0.0275	0.0270	0.0275	0.0281	0.0282
Gap $(1 - \frac{\text{Women's}}{\text{Men's}})$	0.204	0.190	0.204	0.185	0.184
Change in gap		-6.9%	-0.2%	-9.6%	-10.1%
Panel B: Spillovers exacerbate racial gaps					
Whites' rate	0.0331	0.0324	0.0331	0.0331	0.0331
Blacks' rate	0.0142	0.0144	0.0142	0.0148	0.0151
Gap $(1 - \frac{\text{Whites'}}{\text{Blacks'}})$	0.570	0.556	0.573	0.553	0.543
Change in gap		-2.4%	0.5%	-3.0%	-4.7%

Note: This table provides calculations characterizing how spillovers affect gender and racial gaps. Column 1 presents actual 2005-2009 entrepreneurship rates and gaps. Columns 2-5 present counterfactuals: column 2 removes all spillovers; column 3 assumes that women (Blacks) have the same exposure as men (Whites); column 4 assumes that women (Blacks) have the same size of spillover (i.e., coefficient) as men (Whites); column 5 assumes the same exposure and size. In both panels, the final row shows how the gap changes in each counterfactual, relative to the actual gap (i.e., difference between a column's gap and column (1)'s gap, divided by column (1)'s gap.

Rates are estimated as: $\frac{\text{\# entr. under no spillovers} + (\text{mean exposure} \times \text{coefficient} \times \text{\# individuals})}{\text{\# individuals}}$, where the number of entrepreneurs under no spillovers is estimated as: # actual entr. $-$ (mean exposure $\times$ coefficient $\times$ # individuals).

Men: N=24,800,000. 2005-2009 entrepreneurship rate: 0.03450. Mean exposure (share coworkers with entrepreneurship): 0.0345. Size of spillover (coef): 0.03463. Women: N=21,890,000. Entrepreneurship rate: 0.02745. Mean exposure: 0.03301. Size: 0.0142.

Whites: N=26,580,000. Entrepreneurship rate: 0.03311. Mean exposure: 0.03488. Size (estimated from non-Black coef.): 0.02152. Blacks: N=3,710,000. Entrepreneurship rate: 0.01424. Mean exposure: 0.02033. Size: -0.00623.

Table 7: New firms mimic entrepreneurial coworkers' firms in success

	Dependent Variable: 2005-2009 Entrepreneurial Firm Outcome							
	Survive to age 2		Survive to age 5		Entry year log emp		Emp in top 10%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of coworkers with entrepreneurship	-0.010***	-0.039***	-0.034***	-0.057***	-0.381***	-0.441***	-0.088***	-0.106***
	(0.003)	(0.011)	(0.003)	(0.005)	(0.007)	(0.007)	(0.002)	(0.002)
Additional effects:								
Share of coworkers with entr. whose firm survived to age 2		0.031***						
		(0.011)						
Share of coworkers with entr. whose firm survived to age 5				0.036***				
				(0.006)				
Share of coworkers with entr. whose firm was in top 10% emp						1.104***		0.334***
						(0.029)		(0.011)
Mean(dep var)	0.815	0.815	0.536	0.536	1.928	1.928	0.168	0.168
Mean(share with entr. in add. effects)		0.057		0.038		0.009		0.009
Std dev(share with entr. in add. effects)		0.143		0.118		0.038		0.038

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence of the productivity implications of spillovers. The columns present estimates of model (2) for individuals who become entrepreneurs between 2005 and 2009 for different measures of firm survival. The covariate "Share of coworkers with entr. whose firm survived to age 2(5)" is the share of coworkers who were recently entrepreneurs and whose firm survived to age 2 or 5. For example, column 2 tests whether an individual's entrepreneurial firm is more likely to survive to age 2 if in 2004 they worked with (a) a higher share of coworkers who were entrepreneurs, and (b) a higher share of coworkers who were entrepreneurs of firms that survived to age 2. The covariate "Share of coworkers with entr. whose firm was in top 10% emp" is the share of coworkers who were recently entrepreneurs and whose firm was in the top 10% of firms that entered in the same year and 6-digit industry in terms of entry year employment. (Means and standard deviations for these variables are in the footer.)

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects). Standard errors are robust and clustered at the establishment level. N = 1,456,000. Mean (std dev) of the share of coworkers with entrepreneurship is 0.064 (0.147). See Tables OA.14 and OA.15 for robustness to the inclusion of entrepreneurial industry and entry year fixed effects.

Table 8: Entrepreneurs' wages mimic entrepreneurial coworkers' firms in success

	Dependent Variable: Entry Year Log(Earnings) as Entrepreneur 2005-2009			
	(1)	(2)	(3)	(4)
Share of coworkers with entrepreneurship	-0.164***	-0.160***	-0.184***	-0.178***
	(0.007)	(0.007)	(0.007)	(0.007)
Additional effects:				
Share of coworkers with entr. whose firm was in top 10% emp			0.357***	0.339***
			(0.026)	(0.026)
Entrepreneurial industry-Entry year FE		x		x

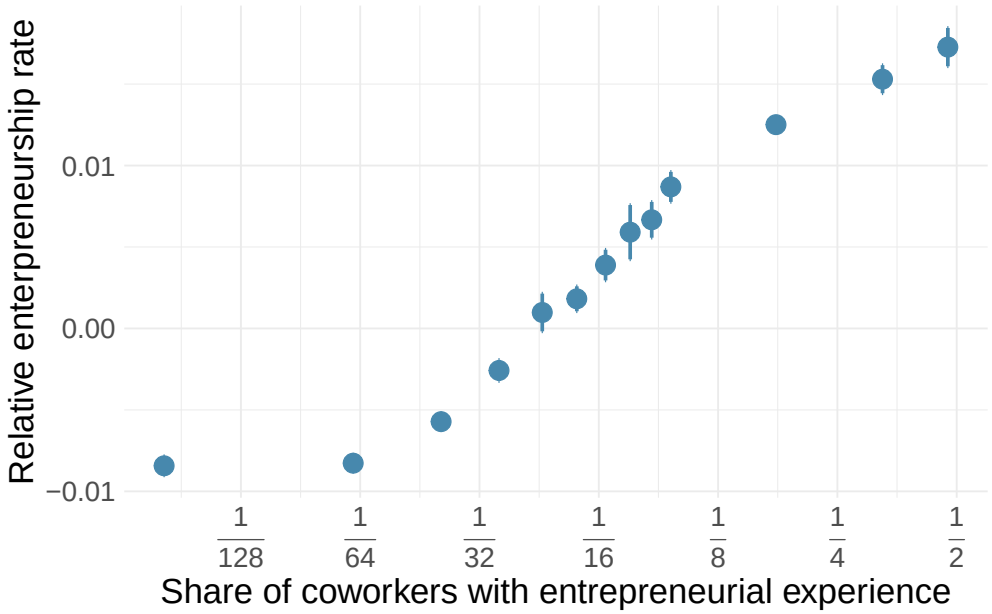
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that future entrepreneurs' labor earnings as entrepreneurs depend on the relative success of their entrepreneurial coworkers' firms. The table presents regressions performed on the sample of individuals who become entrepreneurs between 2005 and 2009. The columns present estimates of model (2) for the wage and salary income that the entrepreneur earns at their entrepreneurial firm in its entry year, with controls indicated in the footer (model (1) controls are log establishment employment, own recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects measured at the time of exposure). "Entrepreneurial industry-Entry year FE" indicate (entry year 6-digit) industry-by-entry year fixed effects. The second reported variable ("top 10%") is the share of coworkers who were entrepreneurs and whose entrepreneurial firm's entry year employment was in the top 10% of firms that entered in the same year and 6-digit industry.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

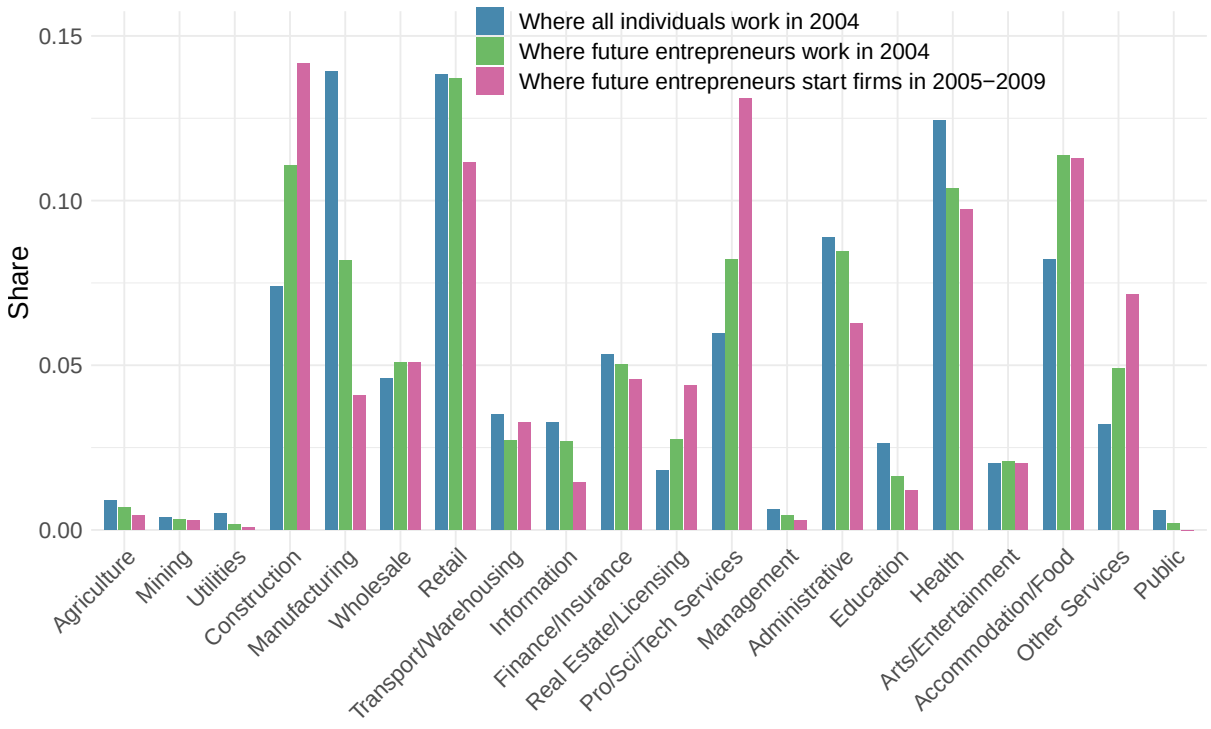
Standard errors are robust and clustered at the establishment level. N=1,456,000. Mean of dep var is 9.832. Mean (std dev) of share is 0.064 (0.147). Mean (std dev) of share top 10% is 0.009 (0.038).

Figure 1: Working with entrepreneurial coworkers predicts entrepreneurship



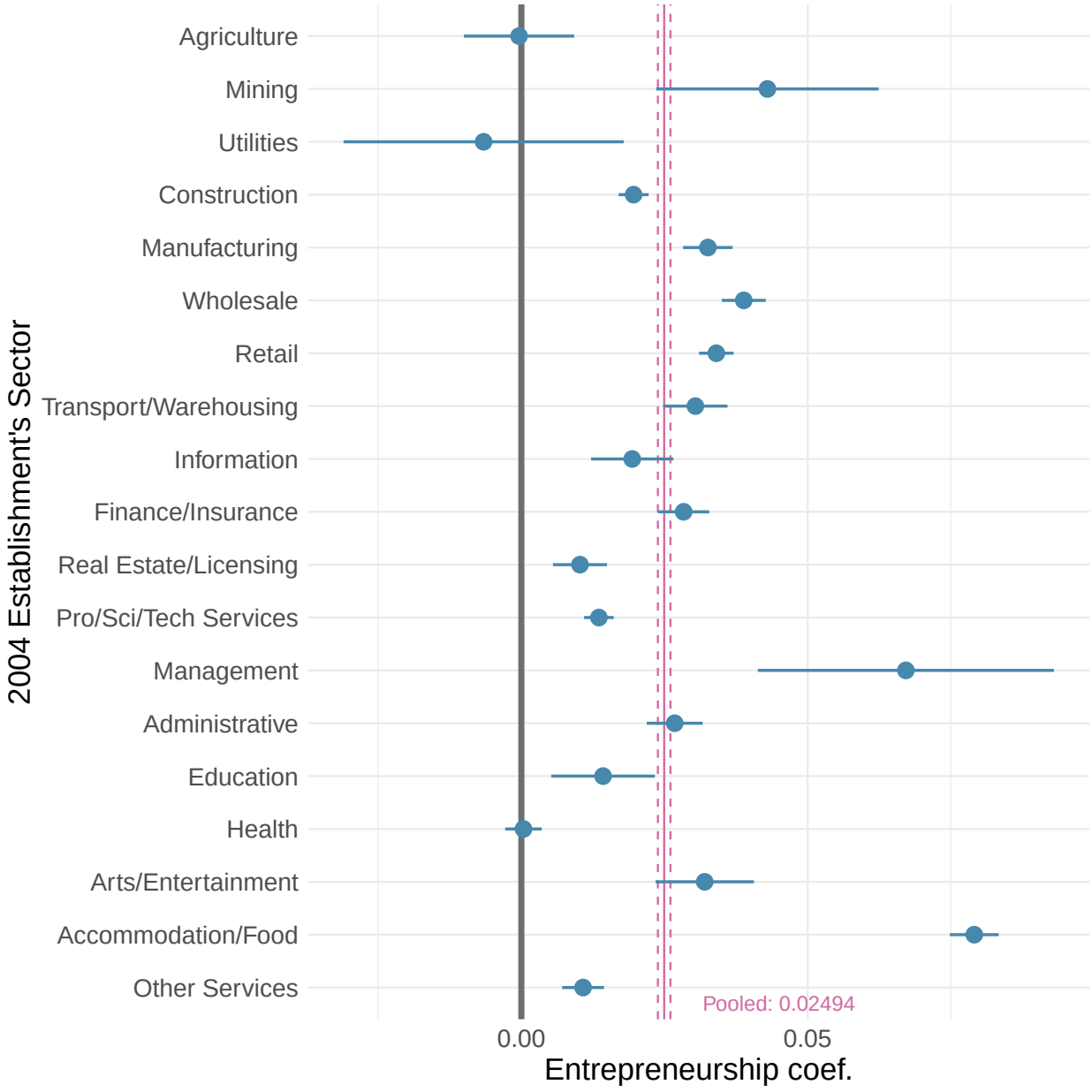
Note: This figure demonstrates that workers who work with larger shares of coworkers with past entrepreneurial experience are more likely to become entrepreneurs in the future, conditional on controls. The figure presents the estimated coefficients from binscatter version of model (1), where the share of coworkers with entrepreneurial experience is replaced by indicators for having the share fall in different bins, e.g., between 0 and 0.01, 0.01, and 0.02, etc; the omitted bin is the indicator for having the share equal to zero (for expositional purposes, bins for coworker shares greater than 0.55 are excluded from the figure; fewer than 0.5% of workers fall into these bins). See column 5 of Table 2 for comparable linear specification.

Figure 2: Entrepreneurial individuals work and start firms across the economy



Note: This figure plots the distributions of sectors of 2004 primary firms for all individuals and for future (2005-2009) entrepreneurs, as well as the distribution of sectors in which the future entrepreneurs start firms. The NAICS codes map to sectors as follows (note that some sector names are abbreviated in the figure): 11: Agriculture, Forestry, Fishing and Hunting; 21: Mining, Quarrying, and Oil and Gas Extraction; 22: Utilities; 23: Construction; 31-33: Manufacturing; 42: Wholesale Trade; 44-45: Retail Trade; 48-49: Transportation and Warehousing; 51: Information; 52: Finance and Insurance; 53: Real Estate and Rental and Leasing; 54: Professional, Scientific, and Technical Services; 55: Management of Companies and Enterprises; 56: Administrative and Support and Waste Management and Remediation Services; 61: Educational Services; 62: Health Care and Social Assistance; 71: Arts, Entertainment, and Recreation; 72: Accommodation and Food Services; 81: Other Services (except Public Administration); 91: Public Administration.

Figure 3: Entrepreneurial spillovers vary by sector



Note: This figure presents evidence that extensive margin spillovers exist in most sectors of the economy. The figure presents regression coefficient and 95% confidence interval estimates of an adapted version of model (1), performed on the sample of individuals in 2004, in which I replace the explanatory variable (share of coworkers who were entrepreneurs in the past 5 years) with the share of coworkers who were entrepreneurs in the past 5 years interacted with the sector of the 2004 establishment (SEIN). I exclude the coefficient for workers in the public sector here, who account for less than 0.5% of the sample, whose coefficient is substantially different and very noisy (coefficient −0.3163, standard error 0.010). See Figure 2 for NAICS codes of each sector.

A.I Data appendix

In this section, I present additional details on how I construct several variables from U.S. Census Bureau datasets, which are described with fewer details in Section II.

A.I.A Longitudinal Employer Household Dynamics (LEHD)

The LEHD is the crucial source of data for this paper, as I use the LEHD both to identify entrepreneurs and to connect individuals with their coworkers. The LEHD is constructed from firm-side state unemployment insurance (UI) records. It contains quarterly information on employment and earnings for most individuals within a state, with longitudinal employer and individual identifiers that can be followed across states. These longitudinal identifiers allow me to track the entrepreneurial outcomes of individuals and their coworkers over time. I use LEHD data from 1993 to 2013 for a balanced sample of 18 states.[69]

The LEHD contains information on earnings and demographics. The earnings include salaries and wages as well as bonuses, stock options, and other cash pay, allowing me to find top (labor income) earnings at each firm; this allows me to identify entrepreneurs as top earners. I use the CPI-U from the Bureau of Labor Statistics (BLS) to deflate earnings measures to 2010 dollars. The LEHD also contains demographic information for individuals, including date of birth, sex, race/ethnicity, education, and country of birth, which allows me to explore the heterogeneity of entrepreneurial spillovers.[70] I define an individual's age in a year as the difference between the year and the individual's year of birth (such that their age is their age on December 31st of that year) and restrict to individuals aged 20-69.[71]

Using the LEHD, I study employers at two levels of aggregation. First, the least aggregated

[69]This results in a balanced panel of the following 18 states: AK, AZ, CA, CO, FL, ID, IL, IN, KS, LA, MD, MO MT, NC, OR, WA, WI, WY. In 2013, these states account for 43.0% of total (pay period including March 12) employment, 44.8% of firms, and 44.4% of establishments in the U.S. (50 states and D.C.), estimated using the Business Dynamics Statistics dataset (the public tabulations of the U.S. Census Bureaus' Longitudinal Business Database). Other states have incomplete or fluctuating coverage over this time period and so are excluded in order to create a balanced panel of states; the LEHD does have data in previous years for a handful of states, but I choose to start in 1993 in order to get as many states as I can while still maintaining a long panel.

[70]The demographic information is drawn from other Census and government datasets, mostly the Decennial Censuses and the Social Security Administration's Numident file. Coverage is imperfect, and while the Census does impute missing values, I only use variation from the non-imputed values.

[71]When I study future entrepreneurship, I restrict to individuals aged 20-64, for all of whom I can study entrepreneurship in the next five years up to the age of 69.

firm unit with known employees within the LEHD is a state-level unemployment insurance account (called a State Employer Identification Number, or SEIN).[72] I refer to this unit as an **establishment**, but note that this unit can contain multiple physical establishments of a single firm within a given state. That is, an SEIN is a tax ID number that pools together physical establishments of a firm within a given state, generally within a given sector. I primarily study individuals and their coworkers (i.e., other workers) at the SEIN level, since I assume that individuals have the most contact within their firm with coworkers at the same SEIN. Second, for my measures of firm outcomes (and robustness for coworkers), I study firms, pooling across states and sectors. That is, a **firm** consists of all establishments belonging to the same national firm, within my sample of states.[73] Note that for firms that only exist in my sample of states, my measure of a firm captures the entire firm; for firms that exist in states outside of my sample, my measure of a firm will only capture part of the firm.

The LEHD provides detailed information on the industry of each establishment, which is useful both for controlling for industry patterns to entrepreneurship and for exploring heterogeneity and mechanisms. I use the 6-digit NAICS codes [74] to group establishments by industry. For each firm, I assign the sector (approximately 2-digit NAICS codes) with the majority of employees, summing across establishments.

The LEHD covers almost all sectors of the economy, making it an ideal source for studying entrepreneurial spillovers in a broad context and sectoral heterogeneity. Namely, it includes workers covered by the UI system (i.e., workers who could claim UI benefits if they experience an eligible dismissal from their employer); in 1994, this mass of workers reflected about 96% of employment and 92.5% of wages and salaries (BLS (1997, pg. 42)). Due to the nature of the UI system, the data

[72]Note that the U.S. Census Bureau assigns individuals within an SEIN to distinct locations, called SEIN-units; this is an imputation and thus cannot be reliably used to study spillovers across coworkers.

[73]That is, I combine all SEINs that map to the national Census variable FIRMID, using the LEHD's ECFT26 crosswalk. The FIRMID variable allows me to connect individuals in the LEHD to firm outcomes in the remaining datasets.

[74]I use the 2012 "FNL" NAICS codes that source industry information from both the Covered Employment and Wages program and the LBD (Vilhuber, McKinney et al. (2014)). 6-digit NAICS codes are the most disaggregated industry codes available and are quite narrow. For example, NAICS 311111 consists of firms that manufacture dog and cat food, while NAICS 311119 consists of firms that manufacture food for other animals; and NAICS 441110 consists of automobile dealers that sell new cars, while NAICS 441120 consists of dealers that sell used cars.

does not include small non-profits, self-employed workers, some agricultural workers, and federal government workers.[75] Note that this nature of the LEHD means that some firm owners, especially sole proprietors, are not covered by the LEHD because they do not take labor income earnings (Hyatt, Murray, and Sandusky (2020)); I discuss how this affects my definition of entrepreneurship in Section II.

For each individual, I define a **primary firm** and **primary establishment** for each year. An individual's primary firm is the firm from which they earn the most in the year (summing across all establishments) and thus at which they presumably spend the most time; their primary establishment is the establishment at their primary firm at which they earn the most in the year. Below, I measure characteristics of an individual's **coworkers**, who are other workers at the individual's primary establishment in a given year, for whom the establishment is also their primary establishment. I restrict all samples to individuals with at least one coworker, i.e., individuals at establishments with at least two workers (from whom the establishment is their primary establishment).

In an attempt to assess the quality of firms, I measure several outcomes in the LEHD. I proxy firm survival by tracking whether a new firm continues to employ individuals in the years after it enters; e.g., a firm survives to a second year if it employs individuals (counting all earners at the firm, regardless of whether the firm is the earners' primary firm, in my sample of states) in the year after it enters.[76] I also measure total employment and payroll levels and growth, including all individuals who have earnings at a firm in a given year (i.e., not restricting to individuals for whom the firm is their primary firm). Finally, I flag firms that are particularly large or fast-growing, by identifying firms whose employment levels or growth fall in the top 10% of the given measure among firms that entered in the same year, in the same (6-digit NAICS) industry.

Measuring entrepreneurship While there are several ways of measuring entrepreneurship, I follow the recent literature and call an individual an entrepreneur if they are a top three earner at a new firm, although I conduct a variety of robustness and audit checks on this definition. This measure

[75] For details, see Kornfeld and Bloom (1999, pg. 173), BLS (1997, pg. 43) and http://workforcesecurity.doleta.gov/unemploy/pdf/uilawcompar/2012/coverage.pdf.

[76] In some cases, firms "dip in and out" of employment within the LEHD, such that a firm may appear to not survive to the second year after entry but then reappears in the third year after entry.

of entrepreneurship captures individuals who likely hold influential positions at young firms.

In this paper, I consider a broad notion of entrepreneurship. I am interested in the founding of firms, so I take an "initial team" approach to defining and measuring entrepreneurship. That is, I call an individual an entrepreneur if they are amongst the three highest-paid employees of a firm in the first year that the firm has paid employees.[77]

In order to enact this definition, I determine the year in which a firm enters. I follow the literature and start by finding the first year a firm has positive employment in the national LBD, i.e., the first year the firm's oldest establishment has employment in the payroll period that contains March 12 (Haltiwanger, Jarmin, and Miranda (2013, pg. 353)).[78] I use this first year as each firm's **entry year**, with minor adjustments. First, some firms, particularly small and new ones, appear in the LEHD without appearing in the LBD. Second, some firms appear in the LEHD years before or after they first appear in the LBD.[79] For firms in either of these two cases, I take the first year that the firm appears with employment in the LEHD (in my sample of states) as its entry year.[80] Finally, while the firm identifiers are longitudinal, it is possible (but uncommon) for firm IDs to change over time. Because I am interested in new firms, rather than, e.g., firms that have changed ownership, I attempt to avoid misclassifying firm ID changes as new firms by ignoring in my definition of entrepreneurship below firms that are very large in their entry year,[81] who I assume

[77] I follow Agarwal et al. (2016), Kerr and Kerr (2017), and Azoulay et al. (2018) in doing this; Azoulay et al. (2018) audits this initial team definition using W-2 records to compare founders to initial team members. They find that "90% of the owner-workers are in fact among the top three earners in the firm during the first year," though this coverage is noisy.

[78] Note that the LBD begins in 1976, such that firm entry years are left censored in 1976. I focus on entrepreneurship, and thus firm entry, between 1994 and 2013, so this censorship is not relevant.

[79] A firm may appear in the LEHD before it appears in the LBD because of the structure of the LBD: because LBD employment is based on the payroll period that contains March 12, firms that enter after that payroll period will appear in the LEHD but only appear in the LBD in the following year (if they survive). A firm may appear in the LEHD after it appears in the LBD for several reasons. First, firms only appear in the LEHD if they pay unemployment insurance taxes, which may not be relevant to all, especially younger, firms in the LBD. Second, because my LEHD sample contains a subsample of all states, it is possible for firms to appear in the LEHD, in my sample of states, after they appear in the LBD and in states outside my sample.

[80] In order to avoid misclassifying old firms that are simply entering the sample of states in the LEHD as new firms, I ignore in my definition of entrepreneurship below any firm that appears in the LEHD strictly more than two years after its first year in the LBD.

[81] I.e., firms whose entry year LEHD employment exceeds the 99th percentile of employment (slightly under 200 employees) for all entering firms.

are less likely to be truly new firms.[82]

Given a firm's entry year, I identify the "initial team" of the firm as the individuals with the three highest annual earnings in the firm in the entry year. Unless otherwise noted, I call an individual an **entrepreneur** in a given year if they are one of the top three highest paid employees of a firm and the year is the firm's entry year.[83]

This notion of an entrepreneur is intended to capture an individual who most likely is integral to or closely witnesses the decision-making at a young firm, regardless of whether they are a legal owner or founder of the firm. There are two important aspects to consider for interpreting this definition. First, my definition of a firm's entry year marks the first year it has paid employees. Firms may have existed previously without employees, such that the entry year likely lags the initial planning and starting of a firm. Nonetheless, the transition to being a firm with paid employees is an extremely important step in a firm's life, particularly for firms that hope to grow.

Second, my definition *will not* pick up "owner-investors," who take their payoffs in the form of profit dividends rather than in wages (and thus would not appear in the LEHD). This is particularly relevant for sole proprietorships and partnerships, for which owners are not supposed to take wages, and thus should not appear in the LEHD (Hyatt, Murray, and Sandusky (2020)). I take any distinction between entrepreneurs, "owner-workers," managers, "firm-runners," etc. to be semantics alone; put differently, as discussed below, what matters for coworker learning is experience as part of a firm when the firm is very young, rather than strictly investment or idea-generation experi-

[82] An alternative method to determine a firm's entry year without the LBD is to use the firm age variable as listed in the LEHD (as described in Haltiwanger et al. (2014)). This variable is based on several sources, mostly the LBD and the National Employer Characteristics File (NECF), and is meant to provide age information for all firms in the LEHD (note that while the majority of the LEHD establishments can be mapped to the LBD, where firm age has been traditionally measured, this mapping is biased: smaller, younger firms are less likely to be matched). In Table OA.16, I conduct a robustness analysis, defining entrepreneurship using the LEHD firm age variable, where I identify a firm's entry year by the year in which the firm is aged 0 (note that the Census zero-indexes age, while I one-index age); the results are virtually the same as my main extensive margin results: a one standard deviation (8.8 percentage points) increase in the share predicts a 0.22 percentage point higher likelihood of future entrepreneurship, 8.5% of the mean outcome.

[83] Note that this firm need not be the entrepreneur's primary firm in the year and that not all firms have three entrepreneurs. For a more restricted definition, in Table OA.16 I consider only the top earner at new firms, which yields similar results: a one standard deviation (5.9 percentage point) in the share of coworkers who were recently the top earner at a new firm predicts a 0.13 percentage point higher likelihood of becoming a top earner at a new firm in the next five years, 9.13% of the mean outcome. In untabulated results, I similarly investigate and find qualitatively similar intensive margin results using this definition.

ence. I further conduct a robustness exercise by separately analyzing entrepreneurs at corporations, vs. those at sole proprietorships or partnerships, since the individuals I identify as entrepreneurs at corporations are more likely to be the true owners and founders of their companies.[84]

Finally, note that for my analysis of spillovers, an individual is only identified as an entrepreneur in their firm's entry year; they are also always considered a worker, regardless of their entrepreneur status.

Entrepreneurial outcome in the LEHD I measure absolute firm size in terms of employment and payroll from the LEHD, counting all individuals with employment at a firm in a year (i.e., not restricting to individuals for whom the firm is their primary firm). I also measure relative firm size by identifying firms whose LEHD employment or payroll falls in the top 10% among firms that enter in the same year and (6-digit NAICS) industry. Note that the thresholds determining which firms are in the top 10% of a given outcome are based on all firms that start in a given year, not restricting to firms started by individuals in my main reduced form sample; the thresholds are also calculated by weighting firms equally, rather than by weighting firms by the number of entrepreneurs (up to three). In practice, this means that more than 10% of previous entrepreneurs started firms with top 10%.

I measure firm survival and entrepreneur retention using the LEHD. I define a firm's survival to a given firm age based on whether the firm has nonzero employment at that age and say that, e.g., a firm survives to age 2 if it employs workers in its second year. In this paper, I consider survival as a marker of success — more successful firms survive for more years; I abstract from the possibility of successful exits (e.g., mergers and acquisitions). I measure whether an entrepreneur is still employed at their entrepreneurial firm at a given firm age (regardless of whether the firm is their primary firm).

[84] In Table OA.16, I estimate models in which I only consider each legal type, in turn. I still find a positive coefficient on the share of an individual's coworkers who were recently entrepreneurs, if I restrict my definition of entrepreneurship (for both dependent and independent variables) to corporations. For corporations, I find that a one standard deviation (8.3 percentage points) increase in the share predicts a 0.12 percentage point higher likelihood of future (corporation) entrepreneurship, 5.7% of the mean outcome. (I also find positive coefficients when I restrict to other legal types.)

A.I.B Longitudinal Business Database (LBD)

I use the Longitudinal Business Database (LBD) to construct my definition of entrepreneurship, as described in Section II.B. The LBD's coverage starts in 1976 and tracks all U.S. business establishments and firms with paid employees over time, including physical establishments in states not covered by the LEHD in early years.[85] I aggregate the LBD to the firm level.

A.I.C Annual Survey of Entrepreneurs (ASE)

The ASE collects information from firms' owners on a variety of outcomes which are useful for studying the mechanisms of entrepreneurial spillovers. This dataset is a firm-level survey based on a collaboration of the Census with the Ewing Marion Kauffman Foundation and the Minority Business Development Agency.[86][87] The ASE ran annually to collect 2014, 2015, and 2016 economic and demographic data on businesses and owners for a representative sample of non-farm businesses with paid employees and with receipts of at least $1,000. I use information from the surveys' questions on reasons for owning a business.[88]

A.I.D Compustat-SSEL Bridge (CSB)

The CSB identifies publicly-traded firms by linking firms in the Census data to Standard & Poor's Compustat database, by year (Tello-Trillo and Streiff (2020)). I use this information to investigate whether exposure to more entrepreneurial coworkers predicts future entrepreneurs' firms becoming publicly traded.

A.I.E Business Register (BR)

The BR provides information on the legal form of businesses, namely whether they are structured as corporations, sole proprietorships, partnerships, or other forms. I use this information to conduct heterogeneity by legal type, in part to help interpret my measure of entrepreneurship.[89]

[85] For details, see Jarmin and Miranda (2002).

[86] For details, see Foster and Norman (2017) and https://www.census.gov/programs-surveys/ase/about.html.

[87] This data is at the FIRMID-level.

[88] See https://www.census.gov/programs-surveys/ase/technical-documentation/questionnaires.2014.html for the 2014 questionnaire.

[89] For details, see https://www.census.gov/econ/overview/mu0600.html.

Online Appendix

OA.I Conceptual framework in detail: Multidimensional spillovers

This section shows the full details of the conceptual framework underlying the proposed mechanisms in the paper. When individuals work with former entrepreneurs, they may experience multiple dimensions of entrepreneurial spillovers, and the ultimate implications of these spillovers depend on *what* these coworkers can teach them. Here, I present a conceptual framework in which individuals may learn from former entrepreneurs both how to be more **productive** entrepreneurs, e.g., by learning entrepreneurial skills, and to have lower **entrepreneurial costs**, e.g., by learning institutional knowledge. On the margin, both of these types of spillovers encourage more entrepreneurship (i.e., have positive *extensive margin* effects), but only productivity spillovers lead to productivity gains (i.e., have positive *intensive margin* effects).

These patterns mean that I can empirically measure the presence of entrepreneurial spillovers by studying the extensive margin, leveraging variation in exposure to entrepreneurial coworkers (Section III). Then, I can disentangle the relative strengths of the spillovers to productivity and cost by studying the intensive margin, leveraging variation in exposure to *productive* entrepreneurial coworkers (Section V).

OA.I.A Individuals choose between wage work and entrepreneurship

To see how studying both extensive and intensive margin spillovers is informative about *what* is transmitted across coworkers, consider a version of the occupational choice model of Lucas (1978).[90] Suppose a positive mass of individuals maximize utility by choosing between wage work and entrepreneurship, given an equilibrium wage w. Let individuals be heterogeneous along two dimensions: how productive they would be as an entrepreneur (given by productivity z) and how costly entrepreneurship is to them (given by fixed cost c). (Note that productivity z is a distinct concept from, and will not be mapped to, revenue productivity defined in Section II.)

Formally, individuals choose between work and entrepreneurship by maximizing

[90] This conceptual framework is similar to that in Guiso, Pistaferri, and Schivardi (2021), who in turn follow Guiso and Schivardi (2011) and Lucas (1978). Note that Guiso, Pistaferri, and Schivardi (2021) also include physical capital, but this does not affect the intuition.

$$V(z,c;w) = \max_{x\in\{0,1\}} \Big\{ \underbrace{(1-x)w}_{\text{worker}} + \underbrace{x \max_{N}(f(z,N) - wN - c)}_{\text{entrepreneur}} \Big\}. \tag{OA.1}$$

Each individual chooses between wage work ($x = 0$), in which case they earn the equilibrium wage, or entrepreneurship ($x = 1$), in which case they earn a profit after optimizing their labor demand (i.e., optimal N), producing (where $f(z,N)$ increases in both inputs), and paying wages and the fixed cost. In equilibrium, the wage clears the labor market: given the equilibrium wage, the number of workers (labor supply) equals the total labor demand from entrepreneurs, with all individuals optimally choosing between work and entrepreneurship.

Individuals will opt for entrepreneurship if their payoff as an entrepreneur exceeds their payoff as a worker. An entrepreneur's productivity z increases their payoff as an entrepreneur, while their cost c decreases it. Conceptually, z captures an entrepreneur's ability to extract more profits from a given level of labor, which empirically might derive from a new entrepreneur's skills in conducting market research, producing initial products and services, and hiring and managing productive workers.[91] Meanwhile, c captures the fixed costs to entrepreneurship, which for new entrepreneurs may include overhead costs as well as logistical necessities, such as choosing the optimal legal structure and banking relationships for a firm as well as correctly obtaining and maintaining tax IDs, licenses, and permits.[92]

The solution to this model has a simple cutoff property: for any given level of c, there is a threshold level of z above which individuals choose to become entrepreneurs, given the wage. Conditional on the fixed cost, individuals with a "high enough" productivity opt into entrepreneurship. This threshold, $z^*(c)$, is defined as the productivity at which an individual is indifferent between wage work and entrepreneurship, given the wage and cost c. Denoting $\pi(\cdot)$ as profits,

[91] In Lucas (1978), this productivity is known as managerial technology and encompasses both managerial skill and span of control.

[92] The fixed cost c may also capture the mental burden of entrepreneurial risk, etc. See examples of lists of all the decisions entrepreneurs must make from the U.S. Small Business Association (https://www.sba.gov/business-guide/10-steps-start-your-business) and *Forbes* (https://www.forbes.com/sites/allbusiness/2018/07/15/35-step-guide-entrepreneurs-starting-a-business/?sh=34ea1f54184b). Some of these decisions are highly logistical and build up institutional knowledge, while other decisions are more closely linked to the productivity, and thus profitability, of the business.

given optimal labor demand and the wage (excluding the fixed cost), this threshold satisfies[93]

$$w = \max_{N}(f(z^*(c),N) - wN - c) = \pi(z^*(c);w) - c. \tag{OA.2}$$

The threshold $z^*(c)$ increases in c: as entrepreneurship becomes more costly, only the relatively more productive individuals will choose entrepreneurship.[94] This means that, all else equal, raising the fixed cost to entrepreneurship translates into a higher productivity of the marginal entrepreneur:

$$\frac{\partial z^*(c)}{\partial c} > 0. \tag{OA.3}$$

Additionally, this threshold means that, in equilibrium, individuals who choose entrepreneurship but are unproductive as entrepreneurs are likely to have low cost; otherwise, they would have chosen to work.

OA.I.B Comparative statics: Entrepreneurial spillovers to productivity and cost

Given this framework, consider how entrepreneurship decisions and individuals' z and/or c change because of entrepreneurial spillovers. The spillovers have implications for both the decision to become an entrepreneur (the extensive margin) and the productivity of the marginal entrepreneur (the intensive margin), which motivates my empirical analysis in the remainder of the paper. Here, I consider the partial equilibrium implications of entrepreneurial spillovers (i.e., ignoring any effects of the spillovers on wages), which matches the structure of my individual-level analyses in Sections III and V, in which the economy is implicitly held fixed. I additionally briefly consider the general equilibrium, in which wages may change with spillovers.

Suppose there are spillovers that shift the distributions of z and c, e.g., increasing the average z and/or decreasing the average c for individuals who work with entrepreneurial coworkers. How do these spillovers affect individuals' entrepreneurial decisions, as well as the characteristics of entrepreneurs in the economy? In partial equilibrium, the implications of spillovers are straightfor-

[93] Note that because c only enters additively in the payoff, optimal N does not depend on c.

[94] This is because production (and thus profits, excluding the fixed cost) increases in z, while the total payoff to entrepreneurship decreases in c. Taking partial derivatives of equation (OA.2), we see that $\frac{\partial z^*(c)}{\partial c} = \left(\frac{\partial \pi(z^*(c);w)}{\partial z^*(c)}\right)^{-1} > 0$.

ward: increases in z and decreases in c both push individuals towards entrepreneurship, but only increases in z increase the productivity of the marginal entrepreneur.

Formally, suppose that individuals learn from their entrepreneurial coworkers. First, if an individual works with more former entrepreneurs who have lower values of c, then they "learn" to lower their own c (e.g., because they learn institutional knowledge from the low-c entrepreneurs). Second, if an individual works with more former entrepreneurs who have higher values of z, then they "learn" to increase their own z (e.g., because they learn entrepreneurial skills that increase their productivity from the high-z entrepreneurs).[95]

As discussed above, both increasing their z and decreasing their c will push individuals towards choosing entrepreneurship, since both increase their relative payoff from entrepreneurship, as seen in equation (OA.2).[96] Holding the wage fixed, an increase in z or a decrease in c yields a larger payoff from entrepreneurship, such that an individual is more likely to opt into entrepreneurship.[97]

Meanwhile, spillovers to z and c have different effects on the productivity of the marginal entrepreneur. If an individual's c decreases, they are more likely to choose entrepreneurship regardless of whether they have a lower z, such that spillovers that decrease c lead to marginally less-productive entrepreneurs; formally, because the threshold level of z above which individuals choose entrepreneurship increases with c, as shown in equation (OA.3), reducing c predicts that the marginal entrepreneur has a lower z in partial equilibrium. Spillovers that increase z, however, will increase the entrepreneurial productivity of the marginal entrepreneur, as well as the average productivity (under frequently used distributional assumptions).[98] Taken together, this means that

[95] It is also possible that exposure to entrepreneurial coworkers may decrease an individual's z, e.g., if these coworkers give bad advice. Exposure may also increase an individual's c, e.g., if these entrepreneurial coworkers convey how difficult entrepreneurship can be, which could increase the cost of entrepreneurship. Below, I argue that the empirical evidence does not support these alternatives playing dominant roles.

[96] Formally, $\frac{\partial \Pr(x=1)}{\partial c} < 0$ and $\frac{\partial \Pr(x=1)}{\partial z} > 0$, where $\Pr(x=1)$ denotes the probability an individual chooses to be an entrepreneur, i.e., the probability that $w \leq \max_N(f(z,N) - wN - c)$.

[97] See Guiso, Pistaferri, and Schivardi (2021) and Guiso and Schivardi (2011) for a complete discussion of how entrepreneurial spillovers within locations push more individuals towards entrepreneurship.

[98] It is possible for spillovers that increase z to decrease the average productivity of equilibrium entrepreneurs through a composition effect if some low productivity individuals have their productivity increased "just enough" to induce them to choose entrepreneurship without making them high productivity entrepreneurs. As Guiso, Pistaferri, and Schivardi (2021) argue, positive spillovers in productivity increase the average entrepreneurial productivity in general if entrepreneurial productivity is drawn from a log-concave distribution (Barlow and Proschan (1975)), e.g., is distributed as uniform, normal, or exponential; an example of a non-log-concave distribution is a bimodal one.

the ultimate partial equilibrium effect of spillovers on the entrepreneurial productivity will depend on which of the two spillovers — i.e., productivity and cost — dominate for the average individual, which is ultimately an empirical question.

Therefore, this conceptual framework demonstrates that I can measure the presence of spillovers by studying the *extensive margin* (i.e., the decision to become an entrepreneur), by leveraging variation in exposure to any (i.e., low c and/or high z) entrepreneurial coworkers; and then disentangle the spillovers in z and c by studying the *intensive margin* (i.e., the quality of entrepreneurs), by leveraging variation in exposure to more productive (i.e., high z) entrepreneurial coworkers. Namely, we want to determine in which box below each individual who works with entrepreneurial coworkers is located:

		Spillovers to c? (i.e., $c \downarrow$)	
		Yes	No
Spillovers to z? (i.e., $z \uparrow$)	Yes	$+$ extensive margin, $+/-$ intensive margin	$+$ extensive margin, $+$ intensive margin
	No	$+$ extensive margin, $-$ intensive margin	no effects

In Section III, I demonstrate the presence of spillovers by studying the extensive margin. I show that individuals who work with more entrepreneurial coworkers are more likely to subsequently become entrepreneurs themselves. I interpret this positive extensive margin result as indicating the presence of spillovers, i.e., ruling out the southeast box in the table above. Namely, individuals who work with entrepreneurial coworkers learn *something*, although this exercise cannot distinguish between whether they learn to lower their c's or increase their z's.

In Section V, I disentangle the spillovers to z and c by studying the intensive margin, in order to determine in which of the other boxes exposed individuals are located. I show that individuals who work with more entrepreneurial coworkers (who are high-z and/or low-c) tend to become less productive entrepreneurs, starting smaller firms that are less likely to survive than other new firms; this suggests spillovers to c. However, *if* the entrepreneurial coworkers themselves started relatively productive firms, and thus were likely high-z entrepreneurs, the individuals start rela-

tively productive firms too, suggesting spillovers to z.[99] Through these analyses, I conclude that spillovers to both c and z exist, such that exposed individuals are located in the northwest box. These individuals are more likely to become entrepreneurs, but their predicted success depends on their relative exposure to high-z versus low-c entrepreneurial coworkers.

OA.II Additional robustness checks

This section provides additional identification tests for the extensive margin spillovers, expanding upon the analyses covered in Section III.C, which already presents panel regression evidence with establishment fixed effects; the analyses here are intended to be additional checks. I provide additional support that the results are not driven by entrepreneurial individuals simply selecting into particular peer groups.

Selection into workplaces If entrepreneurship-prone individuals cluster at certain firms, regardless of reason, then there should be nothing inherently "special" about an individual's establishment coworkers within their firm. That is, the relationship from model (1) should be similar if instead of considering establishment coworkers, I estimate the relationship between an individual's future entrepreneurship and the entrepreneurial experience of employees at their firm, particularly employees at other establishments within the same firm with whom they may never interact (and thus from whom they should not learn). I estimate versions of model (1) where in addition to considering exposure to entrepreneurial coworkers at an individual's establishment, I also consider "exposure" to coworkers at the firm at large or at *other* establishments belonging to the same firm.

Table OA.5 shows that spillovers are concentrated within-establishment: regardless of which set of other establishments at the firm I consider, an individual's future entrepreneurship is disproportionately related to their establishment coworkers' past entrepreneurship, rather than to the entrepreneurial experience of other employees at the firm. I find that all evidence of spillovers

[99] The positive intensive margin results for individuals exposed to more productive entrepreneurial coworkers could also arise if these successful coworkers discourage entrepreneurial ventures that are likely to fail, i.e., generating positive selection into entrepreneurship. I provide evidence against this option in Section III, where I show that, in general, exposure to more productive entrepreneurial coworkers also predicts entrepreneurship. That is, productive entrepreneurial coworkers do not appear to discourage entrepreneurship, on average. Additionally, as noted in footnote 98, it is possible for spillovers that increase z to lead to lower average productivity through a composition effect. The fact that I measure the positive intensive margin results for individuals exposed to more successful entrepreneurs suggests that the marginal impact of spillovers that increase z is positive.

load onto establishment coworkers, rather than firm workers in general. Furthermore, I find substantially larger coefficients on exposure to entrepreneurial establishment coworkers compared to entrepreneurial other-establishment workers. For example, when I horse-race the entrepreneurial share of an individual's establishment coworkers with that of workers at all other establishments in the firm (column 5), the coefficient on the establishment coworkers is more than 9 times larger than the coefficient on the other-establishment workers. Similar gaps appear if I only consider particular sets of other establishments, including those in the same state or industry. While there is some scope for general firm patterns (i.e., the coefficients on the share of other-establishment coworkers who were entrepreneurs are nonzero), the spillover pattern is dominated by establishment patterns.

Selection into coworker groups Beyond selection into particular firms or establishments, nascent entrepreneurs could also select based on the coworkers themselves. To address this concern, I consider two analyses.

First, I consider spillovers from coworkers who join the firm before and after an individual joins (but who are still employed at the establishment in 2004); if an individual joins an establishment to work with particular coworkers, then they may only appear to learn from the coworkers who were already employed at the firm before they joined, on whom they could select when joining. Instead, in Table OA.17, when I estimate model (1), splitting the coworkers into bins of when they join the firm, I find that individuals also learn from coworkers who join after them: I estimate positive coefficients on exposure to entrepreneurial coworkers who joined an establishment both before and after (and in the same year as) the individuals. I take this as evidence that the extensive margin spillovers are not wholly driven by coworkers who joined the firm after the individual, i.e., who the individual may have known would be their coworker when they joined the firm.

Second, as Jarosch, Oberfield, and Rossi-Hansberg (2021) argue for the case of human capital spillovers, if individuals truly seek out entrepreneurial coworkers, then this may be reflected in their wages — these individuals may accept lower wages in exchange for working with these coworkers. Empirically, this is not the case on average. In Table OA.18, when I estimate model (1) and replace future entrepreneurship with current earnings as the outcome (and control for past earnings

instead of current earnings) for new hires, I see that individuals who join establishments with more entrepreneurial coworkers earn, if anything, higher earnings. Conditional on past earnings, a new hire with a one standard deviation (8.9 percentage point) higher share of coworkers with recent entrepreneurship is predicted to have 1.4% higher earnings.

Selection at the individual level Suppose selection is inherently fixed within an individual — some people are just more likely to become entrepreneurs than others. If this is true, and these individuals appear at workplaces with more entrepreneurial coworkers before they become entrepreneurs themselves for some reason, then the patterns I find may still reflect simple selection. I test this in Table OA.6, where I leverage variation in exposure to entrepreneurial coworkers *within* an individual's work history in order to study the timing of the individual's entrepreneurship.[100]

I take a sample of individuals who work between 1999 and 2008 and become entrepreneurs at least once between 2000 and 2009. For this sample, I predict how future entrepreneurship varies with variation in exposure to entrepreneurial coworkers *within*-individual, via the inclusion of person fixed effects. These estimates capture how entrepreneurial coworkers predict the *timing* of entrepreneurship, amongst the group of ever-entrepreneurs. As Table OA.6 shows, even within-individual, exposure to entrepreneurial coworkers predicts future entrepreneurship: within-individual, a one standard deviation increase in the share of entrepreneurial coworkers predicts a 1.8% higher likelihood of subsequent entrepreneurship relative to the mean.[101] Thus, we see patterns of spillovers even within-individual, accounting for fixed components of selection at the individual level.

Common shocks Common shocks outside of the firm could drive both an individual's future entrepreneurship and their coworkers' past entrepreneurship. However, there is little space nor evidence for these common shocks, conditional on the rich set of controls in model (1). Model

[100] This person panel analysis is inspired by Table 4 of Nanda and Sørensen (2010).

[101] The 1.8% effect is smaller than the effects measured in previous analyses for two (or potentially more) reasons. First, this analysis takes into account important selection (fixed at the individual level) that is not removed in previous analyses. Second, in this analysis I focus on entrepreneurship within the next year as the outcome in order to remove mechanical dependence in outcomes within an individual. This timing may curtail the role of spillovers if some spillovers take time to be observable (e.g., if individuals learn entrepreneurship today but only formalize their business more than one year in the future).

(1) includes detailed 6-digit industry and state fixed effects, such that any common shocks would have to operate within these categories. In untabulated results, I additionally estimate model (1) including state-by-6 digit industry fixed effects and find consistent results. For single-location establishments, I can also identify the establishments' ZIP codes from the LBD; in Table OA.7, for the sample of individuals at these establishments, I find the estimated spillovers are actually larger when I include ZIP code and ZIP code-by-6-digit industry fixed effects. Common shocks would have to operate within these ZIP code-industry pairs in order to drive the estimated spillovers.[102]

Further, it is not the case that the results are driven by the five-year time windows, which could map to business cycles. Instead, in Figure OA.1 I estimate model (1) for exposure to coworkers who were entrepreneurs in each of the past 10 years, and the results are similar regardless of when the coworkers were entrepreneurs. Similarly, if I estimate separate versions of model (1), considering exposure to entrepreneurial coworkers whose entrepreneurship happened more or less recently; in Table OA.19, the positive spillovers already exist when I only consider exposure to coworkers who were entrepreneurs in the past year (i.e., in 2003) and persist if I consider exposure to coworkers who were entrepreneurs in the past years, up to 10 years (i.e., between 1994 and 2003).

Entrepreneurship could also depend on time-varying local factors, such as a changing entrepreneurial environment, that would not be accounted for by the inclusion of location fixed effects. I study this potentially confounding factor by horse-racing spillovers across coworkers with potential location-based spillovers, as measured by the inclusion of the local entrepreneurship rate as a control. Table OA.8 demonstrates that the spillovers across coworkers are distinct from spillovers at the local level — while working in a more entrepreneurial location and sector predicts entrepreneurship, consistent with findings such as in Guiso, Pistaferri, and Schivardi (2021), spillovers across coworkers still have an effectively unchanged measured effect.

[102]For individuals at single-location establishments, in the baseline specification (with state and industry fixed effects), a one standard deviation (13.2 percentage point) increase in the share of coworkers with recent entrepreneurship experience predicts a 0.17 percentage point increase in the likelihood of future entrepreneurship, 3.9% of the mean outcome. When I include ZIP code-by-industry fixed effects, a one standard deviation increase predicts a 0.26 percentage point increase, 5.8% of the outcome.

OA.III Survey evidence of spillovers

In this section, I provide survey evidence of entrepreneurial spillovers in support of that story: entrepreneurs who previously worked with more entrepreneurial coworkers are more likely to report that entrepreneurial role models led them to start firms. After matching entrepreneurs in the LEHD to owners in the ASE survey data, I find that ASE entrepreneurs who previously worked with more entrepreneurial coworkers are more likely to say that exposure to entrepreneurs influenced their decisions to start firms.

For the top four owners of each firm in the 2014-2016 surveys, the ASE asks "How important to Owner [n] are each of the following reasons for owning this business?" Respondents are faced with a list of options,[103] each of which they can label "Not Important," "Somewhat Important," or "Very Important." While there is no direct question about previous coworkers, the option "an entrepreneurial friend or family member was a role model" may refer to coworkers who are also friends.[104]

Given this survey question, I estimate whether individuals with higher shares of coworkers with previous entrepreneurship are more likely to cite this "role model" reason for their entry to entrepreneurship, conditional on appearing in the ASE after working with those coworkers. I estimate model (1) but replace future entrepreneurship as the outcome with stating that role models were at least somewhat important.

There are two challenges to running this analysis. First, the ASE begins in 2014; since exposure to entrepreneurship may affect the quality of a future entrepreneur's firm (see Section V), matching individuals in 2004 to firms in the ASE may produce a very selected group of individuals whose entrepreneurial firms were successful enough to survive to 2014. Furthermore, entrepreneurs in

[103] These include: "wanted to be my own boss," "flexible hours," "balance work and family," "opportunity for greater income/wanted to build wealth," "best avenue for my ideas/goods/services," "couldn't find a job/unable to find employment," "working for someone else didn't appeal to me," "always wanted to start my own business," "an entrepreneurial friend or family member was a role model," and "other."

[104] According to the May 2021 American Perspectives Survey, 54% of Americans with close friends report making those friends at their (or their spouse's) workplace (Cox (2021)), and Chetty et al. (2022) identify the workplace as a common place friendships are born. To the degree that this question reflects non-coworker friends and family members, I expect measurement error to reduce precision in my results. In a survey of Dutch entrepreneurs, Bosma et al. (2012) find that entrepreneurs' self-reported role models tend to be their family members, friends, former colleagues, or former employers and are very rarely business icons.

2014 may have imperfect recall of their motivations and experiences a decade earlier. For these reasons, I estimate this model on a new sample: individuals in 2009-2012 who become an entrepreneur in 2013[105] and whose entrepreneurial firm is surveyed in at least one of the three ASE rounds; I restrict to the last year I see each individual within the 2009-2012 and measure coworkers in that year.

The second challenge lies in that the ASE does not contain identification numbers for the owners, so I cannot directly match the individuals I identify as entrepreneurs in the LEHD to the ASE owners. Instead, for individuals in the LEHD who become entrepreneurs and whose entrepreneurial firm is surveyed in the ASE, I check whether their demographics align with those of any of the owners described in the ASE. Specifically, I match the entrepreneurs in the LEHD to ASE owners of their entrepreneurial firm on the basis of sex, education, race, age, and birth country and keep the sample of entrepreneurs who match to at least one owner; for individuals who match to more than one owner along these demographics, I average across the owners' responses.[106] In the resulting sample of 7,000 entrepreneurs, 55% of individuals say that entrepreneurial role models were at least somewhat important to their decision to become an entrepreneur.

Consistent with the presence of spillovers, estimates of model (1) show that entrepreneurs who previously worked with more entrepreneurial coworkers are more likely to report that entrepreneurial role models were important to their decision to start a firm. Specifically, entrepreneurs who worked with a one standard deviation (15.5 percentage point) higher share of coworkers with entrepreneurial experience are 2.4% more likely to report that entrepreneurial role models were at least somewhat important for their entrepreneurship, relative to the mean.[107] In other words, the

[105] Ideally, I would study firms in the ASE that start in 2014, 2015, or 2016; unfortunately, the currently available LEHD ends (with amply available SEIN to FIRMID matching) in 2013.

[106] In each year of the ASE, information is reported for up to 4 owners; some firms are re-sampled across the survey waves, such that each firm will have at least 1 owner and at most 12. I restrict to owners who self-identify as founders of the firm. I match individuals on non-imputed sex, education, race, age bin, and birth in the U.S.; for each individual, I allow for up to 1 of these categories to not match in order to call the match a success. I restrict to individuals who match to at least one owner; 80.4% of individuals who are matched are uniquely matched to only one owner in at least one year.

[107] See Table OA.9 for estimates. This calculation is as follows: one standard deviation in the share of coworkers with entrepreneurship (0.155) times the coefficient on the share of coworkers with entrepreneurship (0.084) divided by the share of entrepreneurs who report that entrepreneurial role models were at least somewhat important (0.5507).

individuals whom I predict to have been influenced by entrepreneurial models, via their exposure to entrepreneurial coworkers, are indeed more likely to report this influence, consistent with these spillovers actually taking place.

OA.IV Alternative hypotheses: Spawning, exposure to leaders, and workplace culture

While I argue that the positive extensive margin results are consistent with a story of entrepreneurial coworkers passing on entrepreneurial knowledge or skills (or generally inspiring) potential entrepreneurs, it is worth considering alternative hypotheses.

Spawning Entrepreneurial spillovers do not appear to be driven by firm behavior promoting entrepreneurship nor by entrepreneurial coworkers bringing individuals along for their next venture, collectively known as entrepreneurial spawning (also known as spin-outs or spin-offs) (Klepper and Sleeper (2005), Gompers, Lerner, and Scharfstein (2005), Babina, Ouimet, and Zarutskie (2018)). I find that my spillover results are not driven by firm lifecycle patterns or success (Table OA.20), and the spillovers are not characterized by individuals starting firms *with* their entrepreneurial coworkers (Table OA.21).[108]

Exposure to leaders Entrepreneurial spillovers are also not driven by exposure to firm leaders in general, who may teach individuals leadership skills or human capital. Exposure to coworkers who were recently leaders of new firms, rather than firms of any age, disproportionately predicts entrepreneurship. In Table OA.21, I horse-race spillovers from entrepreneurial coworkers against coworkers who were recently top earners at any firm, not just new ones. While exposure to top earners in general also predicts entrepreneurship, there is a distinct role for entrepreneurial coworkers: the coefficient on the share of coworkers who were recently entrepreneurs is nearly three times larger than the coefficient on the share of coworkers who were recently a top earner at any firm. I interpret these results as evidence that the process of entrepreneurship — i.e., of being a top earner at a new firm — is a meaningful experience, above and beyond that of being a leader at a firm in general, from which others can learn.

[108] Future entrepreneurs do often start firms with their coworkers, but not disproportionately their *entrepreneurial* coworkers.

Workplace culture Entrepreneurial spillovers are not driven simply by exposed individuals being more likely to leave their firm, for instance because their entrepreneurial coworkers create unpleasant workplace cultures or generically encourage trying new careers. In Table OA.21, I restrict to individuals leaving their firm in 2004; I still find evidence of positive spillovers, with a one standard deviation (9.4 percentage point) increase in the share of coworkers who were recently entrepreneurs predicts a 0.37 percentage point increase in the likelihood of entrepreneurship, 9.1% of the mean outcome.

OA.V Additional extensive margin heterogeneity and intensive margin outcomes

Here I present additional heterogeneity and outcome analyses.

OA.V.A Extensive margin heterogeneity

Heterogeneity by characteristics of coworkers' past entrepreneurial firms Because entrepreneurial experience can vary vastly in success, and thus likely enjoyability, it is possible that these extensive margin spillovers may vary by the characteristics of the coworkers' past entrepreneurial firms. Indeed, I find that the positive spillovers are generally amplified when the entrepreneurial coworkers ran relatively successful firms.

Why might the spillovers vary by the quality of the entrepreneurial coworkers' firms? Entrepreneurial experience can vary significantly, leading to coworkers potentially having different skills and evaluations of entrepreneurship. For instance, coworkers whose entrepreneurial firms failed may express the woes and stresses of entrepreneurship, discouraging other individuals from becoming entrepreneurs. Meanwhile, coworkers whose entrepreneurial firms were relatively successful may present more optimistic views of entrepreneurship or may be able to pass on knowledge and skills that make prospective entrepreneurs expect success for themselves. Or, these relatively successful entrepreneurs may too discourage entrepreneurship, if they are able to provide criticism against poorly formed business ideas, as in Lerner and Malmendier (2013).

I explore this heterogeneity by estimating whether the extensive margin spillovers are increased or decreased if an individual's entrepreneurial coworkers ran more successful firms. I estimate an extended version of model (1) in which I add as an explanatory variable the share of an individual's

coworkers who were both entrepreneurs in the past 5 years and whose firms were successful. I employ several measures of success here, namely whether the firm was among the top 10% of firms that entered in the same year and industry (6-digit NAICS) in terms of employment, payroll, revenue, and productivity.[109]

Table OA.11 presents the findings: conditional on general exposure to entrepreneurial coworkers, individuals who work with more *successful* entrepreneurs are even more likely to become entrepreneurs themselves. For example, conditional on general exposure to entrepreneurs, an individual with a one standard deviation (2.5 percentage points) higher share of coworkers who were entrepreneurs at firms in the top 10% of entry year employment is 0.05 percentage points more likely to become an entrepreneur, a 1.7% increase relative to the mean. That is, on net, neither unsuccessful nor successful (by these metrics) entrepreneurial coworkers discourage entrepreneurship in general.

In Section OA.VI, I provide evidence to reconcile the lack of discouragement in general with the findings of Lerner and Malmendier (2013). I identify entrepreneurial coworkers similar to the MBAs in Lerner and Malmendier (2013) and show that these particular entrepreneurial coworkers appear to discourage unsuccessful entrepreneurship, consistent with the findings in Lerner and Malmendier (2013). This comparison both supports the causal interpretation of my paper's spillovers, since my findings for this particular group are consistent with those from a setting with exogenous variation, and suggests that my estimates may better capture the experience of the average American worker. I further explore what the characteristics of coworkers' entrepreneurial firms predict for future entrepreneurs' firms in Section V.

Ages of individuals and their coworkers I investigate heterogeneity in spillovers by age, both in terms of the age of the individuals and the ages of their entrepreneurial coworkers.[111] Both of

[109]The LBD provides information on national firm-level revenue and employment for larger employers in the U.S. beginning in 1997, allowing me to study firm revenue productivity (Haltiwanger et al. (2017)).[110] Note that this data is available to researchers on approved projects through the Federal Statistical Research Data Center (FSRDC) network, where additional documentation is available (Haltiwanger et al. (2019)).

[111]The recent literature has highlighted that entrepreneurship patterns vary dramatically by age: older individuals are disproportionately less likely to become entrepreneurs than younger ones, but tend to start more successful firms (Azoulay et al. (2018)). These patterns have led to arguments that population aging has driven declines in firm entry and business dynamism (Engbom (2019); Hopenhayn, Neira, and Singhania (2020); Karahan, Pugsley, and Şahin

these dimensions are important since they are informative about who is affected by spillovers and yield some predictions on the future relevance of spillovers as the population ages.

First, I estimate model (1) but interact the exposure variable with dummies capturing the age of the individuals, continuing to include age fixed effects that account for baseline differences in future entrepreneurship rates. The estimates from this model, as shown in Panel A of Figure OA.2, show an inverse-U relationship between individual age and spillovers: younger individuals are the most likely to become entrepreneurs after working with more entrepreneurial coworkers, with the largest spillovers experienced by individuals around the age of 30.

The pattern of younger individuals experiencing stronger spillovers is consistent with the notion that younger individuals tend to be the most entrepreneurially opportunistic: Bernstein et al. (2018) argue that young and skilled individuals drive new firm creation in response to local demand shocks. Younger individuals "learning" more in terms of entrepreneurship is also consistent with general learning patterns in the workforce, as Jarosch, Oberfield, and Rossi-Hansberg (2021) argue that individuals below the age of 40 learn human capital from their coworkers more quickly than older individuals. Part of this pattern might also be driven by younger individuals having the most to learn about entrepreneurship; older individuals likely have already been exposed to entrepreneurs during their time in the labor market, and so might have less to learn from current coworkers.

Second, I investigate how spillovers vary with the ages of the entrepreneurial coworkers. I estimate model (1) but consider exposure to entrepreneurial coworkers of specific ages (controlling for the share of all coworkers who are each age). Panel B of Figure OA.2 shows the estimates of this model, demonstrating that spillovers tend to decrease with the age of the entrepreneurial coworkers: individuals are less likely to become entrepreneurs if their entrepreneurial coworkers are older.

While the above two analyses suggest that spillovers are largest when individuals are younger and entrepreneurial coworkers are younger, it is not the case that the spillovers are restricted to

(2019)).

individuals of similar ages. Instead, when I interact the age of the individual with the ages of their entrepreneurial coworkers, as shown in Table OA.12, I find that individuals tend to learn from coworkers who are older than them.[112] This may be because older coworkers are more likely to serve as role models or mentors.

Relative earnings As Table 1 shows, individuals who become entrepreneurs tend to earn more than and are more likely to have graduated from college than individuals who do not become entrepreneurs, and so it is possible that higher earning and skilled individuals drive the estimated spillovers.[113] In fact, in my context there is no substantial heterogeneity by earnings. I estimate model (1) but interact the exposure variable with dummies capturing in which quartile of the aggregate earnings distribution individuals' 2004 earnings fall. In Table OA.22, I find similar coefficients for all quartiles except for the lowest.[114] That is, individuals earning in the top 75 percent of the aggregate earnings distribution are similarly affected by spillovers, at least when compared coarsely in terms of earnings quartiles.[115]

Previous entrepreneurship experience Lastly, I investigate whether individuals with previous entrepreneurial experience themselves experience spillovers. On the one hand, previous entrepreneurs have already demonstrated a desire or willingness to be entrepreneurs and so might be particularly receptive to any lessons that entrepreneurial coworkers teach. On the other hand, previous entrepreneurs already have entrepreneurial experience and so may already know these lessons; they may also already know that they do not enjoy entrepreneurship, and so will not be pushed to en-

[112] In the context of human capital learning, Jarosch, Oberfield, and Rossi-Hansberg (2021) find that individuals who are younger than 40 are the most likely to learn, particularly from other young workers.

[113] Bernstein et al. (2018) argue that higher-skilled individuals are more responsive to entrepreneurial opportunities in the case of demand shocks.

[114] If instead I consider in which earnings quartile an individual's earnings falls *within their establishment*, I find the largest coefficient on the share of coworkers who were recently entrepreneurs for individuals the second highest quartile, although the pattern remains that all but the bottom quartile experiences relatively similar (and positive) spillovers.

[115] The fact that the bottom quartile experiences fewer spillovers is unsurprising for several reasons. First, these individuals may not have the capital needed to start firms and consequently cannot respond to entrepreneurial coworkers. Second, some of these workers may have low earnings because they are starting and/or leaving jobs in 2004; in this case, they may have less exposure to entrepreneurial coworkers. Third, some of these workers may be part-time workers who are uninterested in full-time entrepreneurship. Note that for individuals switching jobs, I keep their highest-paying firm (such that the data is at the individual level) and only count their earnings at that firm. In an unreported analysis, I confirm that my main extensive margin estimates are robust to excluding the probable part-time workers, i.e., individuals earning below one quarter's worth of full-time minimum wage.

trepreneurship by their coworkers.

I explore spillovers for previous entrepreneurs by estimating a version of model (1) in which I add the interaction between an individual's previous (1999-2003) entrepreneurship with the share of their coworkers who were previously entrepreneurs. As Table OA.12 shows, individuals with recent entrepreneurial experience themselves have, if anything, negative extensive margin spillovers: the coefficient on the interaction is negative and larger in magnitude than the coefficient on the share by itself.

I interpret this as evidence that previous entrepreneurs have little to learn from the average entrepreneurial coworkers.[116] I view this evidence also as a robustness check: if it were the case that entrepreneurial individuals, including those who were recently entrepreneurs, clustered at firms that promoted future entrepreneurship, such that spillovers are unrelated to coworkers directly, we might see spillover patterns for these previous entrepreneurs too. Previous entrepreneurs being unaffected by spillovers reduces this identification concern.

OA.V.B Intensive margin outcomes

Beyond the traditional measures of firm characteristics studied in Section V, I explore other ways in which more exposed individuals' entrepreneurial firms differ, which provides some intuition for mechanisms. I find that exposure to entrepreneurial coworkers does not predict a higher likelihood of becoming publicly traded by making an initial public offering (IPO). Furthermore, exposed individuals tend to start firms that are less innovative, generating fewer patents, copyrights, and trademarks. I find that, in some cases, entrepreneurs are more likely to start firms in the sectors in which their entrepreneurial coworkers ran firms. Finally, I find that these firms of more exposed individuals tend to have less within-firm earnings inequality, operate with less structured management practices, are more often financed by the owners, and are less likely to be family-owned (e.g., not having financing from family members).

Initial public offerings A standard measure of extreme success and desire to grow is whether a firm makes the transition to being publicly traded by making an initial public offering (IPO)

[116] This evidence is consistent with survey evidence by Bosma et al. (2012), who find that experienced entrepreneurs are less likely to report using role models than new entrepreneurs.

(Brau and Fawcett (2006)). I investigate whether exposure to more entrepreneurial coworkers predicts whether an entrepreneur starts a firm that becomes publicly-traded (i.e., appears in the CSB). I estimate model (2) for outcomes of whether an entrepreneur's firm becomes publicly-traded within its first five years or ever between 2005 and 2016, the last year covered in the CSB data. In Table OA.23, I find imprecise zeros for the coefficients on the share of coworkers who were recently entrepreneurs. Because becoming publicly-traded is a very rare event — only 0.1% of entrepreneurs start firms that ever become publicly-traded by 2016 — the estimates lack precision. However, the confidence intervals implied by the standard errors are still small and close to zero.[117] I conclude that entrepreneurs who are generally exposed to more entrepreneurial coworkers are not dramatically more or less likely to start firms that become publicly-traded.

Innovation Another measure of firm performance is innovation. I investigate the connection between exposure to entrepreneurial coworkers and innovation by using a broad sample of individuals in 1999-2012 who become entrepreneurs within five years and whose firms are covered by the 2014-2016 ASE; I restrict to the most recent (prior to the entrepreneurship) appearance in the LEHD in order to avoid double counting individuals. I estimate a version of model (2) for the outcome of whether an entrepreneur's firm reports that it owns any patents (pending or granted), copyrights, or trademarks. In Table OA.24, I find that entrepreneurs who worked with more entrepreneurial coworkers are less likely to start firms that report owning patents, copyrights, or trademarks. A one standard deviation (15.9 percentage point) increase in the share of entrepreneurial coworkers predicts a 0.4 percentage point lower likelihood, a 2% decrease relative to the mean.

Sector choice Beyond impacting an individual's likelihood of becoming an entrepreneur and their ultimate success, entrepreneurial coworkers may also affect the type of firm they start. In particular, entrepreneurial coworkers may push individuals towards (or away from) the sectors in which they were entrepreneurs, since the coworkers may have particular industry knowledge or networks

[117] For example, the standard error for the estimated coefficient on the share when studying becoming publicly traded within 5 years, 0.00023, indicates that I can reject the null hypotheses that a one standard deviation increase in the share of entrepreneurial coworkers predicts a greater (in magnitude) than 0.011 percentage point (10.5% of the mean outcome) lower or greater than 0.003 percentage point (2.6% of the mean outcome) higher likelihood of becoming publicly traded within 5 years.

that they can transmit to an individual. Because past industry experience is a strong predictor of entrepreneurial success (Azoulay et al. (2020)), it is plausible that exposure to entrepreneurs from a particular industry may serve as a substitute for personal experience in that sector. In Table OA.25, I estimate versions of model (2) where I study outcomes of whether an entrepreneur starts a firm in different sectors, both depending on their general exposure to entrepreneurial coworkers and exposure to entrepreneurial coworkers who ran firms in the given sector.[118] I find substantial variation in patterns across sectors. I find that general exposure to entrepreneurial coworkers predicts that entrepreneurs start firms in agriculture, wholesale trade, finance and insurance, management, and arts and entertainment and not in manufacturing, administrative services, health, and accommodation and food services.[119] Furthermore, entrepreneurs are more likely to start firms in construction, professional, scientific and technical services, and accommodation and food services if they worked in another sector in 2004 with coworkers who had entrepreneurial experience in those sectors. These findings suggest that these entrepreneurial coworkers may be providing sector-specific knowledge or help to individuals and are consistent with survey evidence by Bosma et al. (2012), who find that entrepreneurs' role models tend to operate in the same sector as them.

Average pay and inequality In Table OA.26, I explore spillovers to pay and inequality. I find that future entrepreneurs who worked with more entrepreneurial coworkers tend to start firms with higher mean log earnings and lower pay inequality (measured both as the variance of log earnings and the 90-10 gap of log earnings).

Management structure In analyses available upon request, I consider whether entrepreneurial coworkers convey managerial skills, inspired by Guiso, Pistaferri, and Schivardi (2021), who argue that learning management skills may be one important way in which entrepreneurship leads to more entrepreneurship. The 2015 ASE and 2010 Management and Organizational Practices Survey

[118] When studying coworkers with experience in a given sector, I focus on cases in which that sector is *not* the sector in which the individual and their coworkers work in 2004.

[119] For example, a one standard deviation (14.7 percentage point) increase in the share of coworkers who were recently entrepreneurs predicts that an entrepreneur is 0.09 percentage points more likely to start a firm in wholesale trade, a 1.7% increase relative to the mean. It is also worth noting that these estimates account for individuals' 2004 establishments' industry (through the inclusion of 6-digit industry fixed effects); 45.3% of these entrepreneurs start firms in the same sector as their 2004 establishment, so relatively small shifts in entrepreneurial sector choice are still meaningful.

(MOPS) both collect information on how structured firms' management protocols are, and I can use these surveys to analyze this question. I find limited evidence for managerial skill transmission: entrepreneurs who previously worked with more entrepreneurial coworkers tend to run firms with less structured or sophisticated management practices.

Financing For individuals considering entrepreneurship, one potential stumbling block is financing.[120] Entrepreneurial coworkers may also help prospective entrepreneurs with financing, either directly investing in their firms or connecting them with outside investors or banks. I investigate this possibility by studying reported sources of start-up and general financing for firms in the ASE.

For the broad sample of individuals in 1999-2012 who become entrepreneurs within five years and whose firms are covered by the ASE used to study management above, I estimate versions of model (2) with outcomes on whether the entrepreneurial firms had start-up funding from venture capitalists (VC), banks, and/or family or friends as well as current funding from outside investors (including VC), banks, government grants, family or friends, and the owner themself. In Table OA.24, I find that entrepreneurs who worked with more entrepreneurial coworkers do not appear to be more likely to have start-up or current funding from outside investors, banks, and family or friends. If anything, these more exposed entrepreneurs are more likely to fund their firms themselves — a one standard deviation (15.1 percentage point) increase in the share of coworkers who were entrepreneurs predicts that an entrepreneur's firm is 0.5 percentage points more likely to report that the owner currently personally puts money into the business, a 0.7% increase relative to the mean. This increase is modest, but alongside the other financing results is consistent with a story of entrepreneurial coworkers encouraging entrepreneurship without providing direct help, either through their own investment or through their finance networks.

Hereditary entrepreneurship and family ownership While I argue that entrepreneurial spillovers from coworkers can be important forces behind an individual's decision to become an entrepreneur, there are many other reasons individuals may pursue entrepreneurship. One widely cited reason is parental entrepreneurship: individuals whose parents have entrepreneurial experience are dispro-

[120] Liquidity constraints have been found to have effects on levels of entrepreneurship, such that cash windfalls can significantly increase business formation, as shown recently by Bellon et al. (2021), e.g.

portionately likely to become entrepreneurs (Hvide and Oyer (2018), Akcigit et al. (2021)). For individuals with entrepreneurial parents, the impact of transitory coworkers likely pales in comparison to the lessons and capital input from their parents. Indeed, Nanda and Sørensen (2010) argue that entrepreneurial coworkers do not push individuals who have entrepreneurial parents towards entrepreneurship.

While I do not have access to parental entrepreneurship information,[121] I investigate whether individuals who work with more entrepreneurial coworkers are more or less likely to start family-owned firms (in which two or more members of the same family own the majority of the firm). If having entrepreneurial coworkers is a substitute for having entrepreneurial parents, and entrepreneurial parents contribute capital to their children's firms, I expect entrepreneurs who worked with more entrepreneurial coworkers to start firms that are not family-owned.

I investigate this using the broad sample of individuals in 1999-2012 who become entrepreneurs within five years and whose firms are covered by the ASE used above. I estimate a version model (2) for the outcome of whether an entrepreneur's firm reports that it is family-owned in the ASE (i.e., whether two or more members of one family own the majority of the firm). In Table OA.24, I find that more exposed entrepreneurs indeed are less likely to start family-owned firms, although the relationship is relatively small: a one standard deviation (15.1 percentage point) increase in the share of coworkers with entrepreneurial coworkers predicts that an entrepreneur's firm is 0.8 percentage points less likely to be family-owned, a 2.1% decrease relative to the mean. This result is consistent with the idea that having entrepreneurial coworkers provides a different pathway to entrepreneurship than having entrepreneurial parents.

OA.VI Reconciling with Lerner and Malmendier (2013)

In the literature on entrepreneurial spillovers across individuals, Lerner and Malmendier (2013) leverage random assignment of Harvard MBAs students to class sections (and thus peers). Yet, their findings are strikingly different from my main results: Lerner and Malmendier (2013) find

[121] It is, in theory, possible to link children to parents and analyze hereditary entrepreneurship using the LEHD. (Staiger (2020) links parents to children in the LEHD to study intergenerational employment patterns.) However, because of the short window in which I measure entrepreneurship, it would be difficult to measure the entrepreneurship of both parents and children. I leave this avenue for future research

that class sections with more students with entrepreneurial experience actually generate fewer subsequent entrepreneurs, which they argue is driven by a decline in unsuccessful entrepreneurship. The authors interpret these patterns as evidence of former entrepreneurs dissuading ventures that are unlikely to succeed. Meanwhile, I find positive extensive margin spillovers, suggesting, at least on net, no evidence of dissuasion. How can we reconcile these findings?

I argue that context matters. While the random assignment of Harvard MBA students to class sections makes the findings of Lerner and Malmendier (2013) internally valid, the former and potential entrepreneurs among these classes are unlikely to represent the general population of entrepreneurs.[122] Harvard MBA students are likely wealthier, more educated, and younger than the average entrepreneur in the U.S., and likely start firms in different sectors.[123] Further, Harvard MBA students with past entrepreneurship experience may have negative views on entrepreneurship, having possibly chosen to pivot their careers through an MBA instead of continuing to be entrepreneurs.

In an attempt to reconcile my findings with Lerner and Malmendier (2013), I seek a group of entrepreneurial coworkers who are comparable to Harvard MBA students. I do this in two ways. First, I simply use one of my measures that identifies particularly successful entrepreneurs, i.e., entrepreneurs whose firms were in the top 10% of entry year employment; since Harvard MBAs are likely relatively successful as entrepreneurs, entrepreneurs who start large firms in my data may be a similar group. Second, I seek a group similar to the Harvard MBAs in a way unrelated to entrepreneurial success. While the LEHD demographics data does contain information on education, it is only available for a small fraction of individuals and is very coarse, with the highest level of education recorded being college; this makes using education as a proxy for like-MBA status impractical. Instead, I focus on earnings and investigate whether individuals experience entrepreneurial spillovers from their entrepreneurial coworkers who earn above $100,000 (in 2010

[122] Furthermore, MBA programs typically involve extensive networking, such that the types of interactions within MBA programs might be quite different from the interactions of coworkers at firms.

[123] Lerner and Malmendier (2013) do not provide a summary of the industries in which the former entrepreneurs ran firms, but they provide some examples, including businesses on college campuses, food service or retail companies, and software firms.

USD).[124]

I investigate whether these "like-Harvard MBA" entrepreneurs discourage their coworkers from becoming entrepreneurs by estimating versions of model (1) in which I additionally consider exposure to successful and high-earning entrepreneurial coworkers. As columns 2 and 3 of Table OA.27 show, exposure to these types of entrepreneurial coworkers marginally pushes individuals towards entrepreneurship (i.e., the coefficients on the shares are positive), such that there is no evidence that these groups on net discourage entrepreneurship.

Yet, it is possible that these "like-Harvard MBA" entrepreneurial coworkers discourage ventures that are unlikely to succeed, as Lerner and Malmendier (2013) argue. To investigate this, I re-estimate my modified versions of model (1) and I integrate into the outcome variable a measure of firm success, similar to how Lerner and Malmendier (2013) study future entrepreneurial success. First, I study whether these "like-Harvard MBAs" encourage or prompt successful entrepreneurship. I estimate models in which the dependent variable is an indicator equal to 1 if an individual becomes an entrepreneur in the next five years *and* their entrepreneurial firm has entry year log employment in the top 10%, relative to firms that enter in the same year and industry, and 0 otherwise. The estimates of these regressions, shown in columns 4-6 of Table OA.27, reflect the patterns previously documented in this section: individuals who are exposed to more entrepreneurs in general tend to be less likely to start firms that are particularly large, while those exposed to the "like-Harvard MBA" entrepreneurial coworkers are more likely to start firms that are particularly large.

Next, I study whether the "like-Harvard MBAs" discourage unsuccessful entrepreneurship. I estimate models in which the dependent variable is an indicator equal to 1 if an individual becomes an entrepreneur in the next five years *and* their entrepreneurial firm has entry year log employment in the bottom 90%, relative to firms that enter in the same year and industry, and 0 otherwise. The estimates of these regressions, shown in columns 7-9 of Table OA.27, show some evidence of

[124] In the 2005 Current Population Survey (CPS), 6.6% of individuals with positive 2004 income and wages report earning above $100,000 (in 2010 USD). Among individuals with at least a bachelor's degree, this share is, as expected, higher: 17.5%; among individuals with at least a master's degree, the share is again higher: 26.3%. I source CPS data from IPUMS (Flood et al. (2020)).

dissuasion. Individuals who are exposed to more entrepreneurs in general are more likely to start unsuccessful firms, but this is partially offset if those entrepreneurial coworkers started particularly large firms or are high earners.

These patterns suggest that, as Lerner and Malmendier (2013) argue, there is some scope for former entrepreneurs to discourage future entrepreneurship, particularly less successful future entrepreneurship. However, these patterns are restricted to particular circumstances and may only be relevant for individuals who work with special coworkers. The vast majority of the population does not work with Harvard MBA-type coworker, and so my findings may be more relevant in the broad context.

Table OA.1: Exposure to any entrepreneurial coworkers predicts entrepreneurship, particularly at smaller establishments

Dependent Variable:	Entrepreneur 2005-2009
	(1)
Any coworkers with entrepreneurship $\times$ Emp $\in [0,24]$	0.006^{***}
	(0.000)
Any coworkers with entrepreneurship $\times$ Emp $\in [25,99]$	0.005^{***}
	(0.000)
Any coworkers with entrepreneurship $\times$ Emp $\in [100,\infty)$	0.003^{***}
	(0.000)
$\mathbb{1}\{\text{Emp} \in [0,24]\}$	x
$\mathbb{1}\{\text{Emp} \in [25,99]\}$	x

Standard errors in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Note: This table presents evidence that extensive margin spillovers are not driven by the linear-in-means functional for of model (1); rather, individuals who work with *any* entrepreneurial coworkers, particularly those at smaller establishments, are more likely to become entrepreneurs. The table present estimates of (1) where I replace the variable on the share of coworkers with entrepreneur experience with variables on whether the individual has any entrepreneurial coworkers interacted with the establishment's size (only counting individuals for whom the establishment is their primary establishment), with controls indicated in the footer (mindicators for being in each establishment employment bin).

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=46,680,000. Mean (dep var): 0.031. 21.4% of individuals are in establishments with 24 or fewer employees; 18.6% are in establishments with 25-99 employees; 60.0% are in establishments with 100+ employees.

Table OA.2: Extensive margin spillovers: Exposure to entrepreneurial coworkers predicts future entrepreneurship, controlling flexibly for employment

	Dependent Variable: Entrepreneur 2005-2009		
	(1)	(2)	(3)
Share of coworkers with entrepreneurship	0.025***	0.014***	0.013***
	(0.001)	(0.001)	(0.001)
Employment bins fixed effects		x	
Employment fixed effects			x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence of positive extensive margins spillovers, controlling more flexibly for 2004 establishment employment than in Table 2. The table presents regressions performed on the sample of individuals in 2004. The columns present estimates of model (1), with additional employment controls indicated in the footer. Column 1 replicates column 5 of Table 2. Column 2 adds fixed effects for bins of establishment employment; these bins split establishments based on employment in the following groups: employment less than 5; between 5 and 10, 11 and 25, 26 and 50, 51 and 75, 76 and 100, 101 and 150, 151 and 200, 201 and 250, 251 and 500, 501 and 1,000, 1,001 and 5,000, 5,001 and 10,000; and greater than 10,000. Column 3 instead includes employment fixed effects (note, for some establishments with unique employment values, this amounts to establishment fixed effects).

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=46,680,000. Mean of dependent variable: 0.031. Mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095).

Table OA.3: Extensive margin spillovers: Exposure to entrepreneurial coworkers predicts future entrepreneurship, controlling for growth

	Dependent Variable: Entrepreneur 2005-2009									
Growth from __ year(s) ago:	5		4		3		2		1	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Share of cow.	0.023***	0.032***	0.024***	0.025***	0.024***	0.023***	0.024***	0.022***	0.025***	0.024***
with entr.	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
DHS emp.	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.000**	0.000
growth	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Share × DHS		-0.005***		-0.001		0.001***		0.003***		0.013***
growth		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence of positive extensive margins spillovers, controlling for 2004 establishment growth, suggesting that results are not driven by establishments experience different growth patterns. The table presents regressions performed on the sample of individuals in 2004. The columns present estimates of model (1), with additional controls for establishment employment growth from previous years to 2004 as well as the interaction of the exposure to entrepreneurial coworkers with this growth. The table considers growth from up to 5 years prior to 2004 to 2004, as indicated in the header. Employment growth is measured as DHS growth, which is computed as the difference between establishment employment in 2004 and employment in a prior year, divided by the average of these two values (Davis, Haltiwanger, and Schuh (1996)); these growth measures take on values between -2 and 2, taking on value 2 if an establishment had zero employment in the prior year.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N = 46,680,000. Mean of dependent variable: 0.031. Mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095). Mean (std dev) of DHS establishment employment growth from 5 years ago: 0.802 (0.954); from 4 years ago: 0.678 (0.930); from 3 years ago: 0.547 (0.878); from 2 years ago: 0.364 (0.755); from 1 year ago: 0.209 (0.591).

Table OA.4: Extensive margin spillovers: Exposure to entrepreneurial coworkers predicts future entrepreneurship, controlling for firm productivity and revenue

	Dependent Variable: Entrepreneur 2005-2009			
	(1)	(2)	(3)	(4)
Share of coworkers with entrepreneurship	0.025***	0.018***	0.024***	-0.022***
	(0.001)	(0.000)	(0.001)	(0.000)
Productivity	-0.001***	-0.001***		
	(0.000)	(0.000)		
Productivity × Share		0.001***		
		(0.001)		
Log revenue			-0.001***	-0.001***
			(0.000)	(0.000)
Log revenue × Share				0.006***
				(0.000)

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence of positive extensive margins spillovers, controlling for 2004 firm success measures (productivity and revenue). The table presents regressions performed on the sample of individuals in 2004. The columns present estimates of model (1), adding controls and interactions of the exposure to entrepreneurial coworkers with an individual's 2004 firm's productivity (log revenue/employment) or log revenue. Columns 1 and 3 demonstrate that the positive spillovers presented in Table 2 persist when controlling for these employer success measures; columns 2 and 4 show that spillovers may be stronger at more successful employers. These productivity and revenue measures are sometimes unavailable for some firms; in these cases, I replace the measure with the worker-weighted mean of the variable and include as a control an indicator equal to 1 if the variable was missing, 0 otherwise.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N = 46,680,000. Mean of dependent variable: 0.031. Mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095). Mean (std dev) of productivity: 4.855 (1.171); of log revenue: 11.39 (3.706). Note that the negative coefficient on exposure to entrepreneurial coworkers in column 4 reflects the fact that log revenue is not close to zero; even at two standard deviations below mean log revenue, the marginal effect of having more entrepreneurial coworkers — i.e., the sum of the coefficient on the share alone (-0.022) and the implied additional effect from the interaction of the share and log revenue ($(11.39 - 2 \times 3.706) \times 0.006$) — is positive. (If I standardize log revenue before estimating the model in column 4, the coefficient on the share alone is positive.)

Table OA.5: Extensive margin spillovers are largest from establishment coworkers, rather than from other firm employees

Sample:	Dependent Variable: Entrepreneur 2005-2009								
	Main			Multi-estab.		Multi-estab.: 2+ Sectors		Multi-estab.: 2+ States	
Other-establishment coworkers:				All		Same State, Other Sector		Same Sector, Other State	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of establishment coworkers with entr.	0.025***		0.024***	0.098***	0.092***	0.140***	0.139***	0.101***	0.097***
	(0.001)		(0.003)	(0.003)	(0.003)	(0.007)	(0.007)	(0.004)	(0.004)
Share of firm workers with entr.		0.026***	-0.000						
		(0.001)	(0.003)						
Share of other-establishment workers with entr.					0.010***		0.005***		0.010***
					(0.002)		(0.001)		(0.002)
Log employment	x		x	x	x	x	x	x	x
Log employment, firm		x							
Log employment, other estabs.					x		x		x
Other model (1) controls	x	x	x	x	x	x	x	x	x
Mean(dep var)		0.031		0.019		0.016		0.019	
Mean(new indep var)	0.034	0.034		0.014	0.018	0.011	0.020	0.014	0.017
Std dev(new indep var)	0.095	0.094		0.027	0.056	0.016	0.064	0.024	0.053
N		46,680,000		24,030,000		10,890,000		19,630,000	

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that extensive margin spillovers are concentrated amongst workers in the *same* establishment within a firm. The table present regressions performed on the sample of individuals in 2004 (in columns 1-3) and subsamples of these individuals at multiple-establishment (SEIN) firms (in columns 4-9). The columns present estimates of an augmented model (1) where I consider exposure to coworkers at both the same of different establishments in the same firm. All columns include the other standard controls (own recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects). Standard errors are robust and clustered at the establishment (SEIN) level in all columns except (2), where they are clustered at the firm level. Note that for defining the set of establishments considered in columns 6-9, "sector" indicates 2-digit NAICS. Columns 6-7 compare an individual's establishment coworkers to employees at their firm in other establishments located in the same state, but different sector. Columns 8-9 compare an individual's establishment coworkers to employees at their firm in other establishments located in the same sector, but different state.

Table OA.6: Exposure to entrepreneurial coworkers predicts timing of entrepreneurship *within*-individual

Dependent Variable:	Entrepreneur Next Year	
	(1)	(2)
Share of coworkers with entrepreneurship	0.006***	0.014***
	(0.001)	(0.001)
Year FEs	x	x
Person FEs		x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that extensive margin spillovers hold even *within*-individual. The table presents regressions performed on the sample of individuals who work at least twice between 1999 and 2008 and who become entrepreneurs at least once between 2000 and 2009 (and who at least once between 1999 and 2008 do not become entrepreneurs in the following year; i.e., individuals with variation in future entrepreneurship). This sample allows me to measure how exposure to entrepreneurial coworkers predicts the *timing* of entrepreneurship within an individual, captured with the inclusion of person fixed effects. The table present estimates of (1) for this sample, where I add person fixed effects in column 2. The dependent variable is an indicator equal to 1 if an individual becomes an entrepreneur within 1 year, and 0 otherwise; this outcome is chosen instead of within 5 years in order to remove mechanical dependence in outcomes within an individual.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N = 21,760,000. Mean of dependent variable: 0.140. Mean (std dev) of share of coworkers with entrepreneurship: 0.091 (0.188).

Table OA.7: Additional robustness to extensive margin spillovers: Single-location establishments

	Dependent Variable: Entrepreneur 2005-2009		
	(1)	(2)	(3)
Share of coworkers with entrepreneurship	0.013***	0.013***	0.019***
	(0.001)	(0.001)	(0.001)
Log employment	x	x	x
Own entrepreneurship	x	x	x
Demographics	x	x	x
Log annual earnings	x	x	x
Age FE	x	x	x
Industry FE	x	x	
State FE	x	x	x
ZIP code FE		x	
Zip code-Industry FE			x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents additional evidence that the extensive margin results are robust to including finer geographic and geographic-by-industry fixed effects. The table presents regressions performed on the sample of individuals that (a) are single-location establishments (i.e., the SEIN has one "SEIN-unit") and (b) are mappable to a physical establishment in the LBD from which I can identify the establishment's ZIP code. The columns present estimates of several adaptations of model (1) with different controls, as noted in the footer.

Standard errors are robust and clustered at the establishment level. N=20,200,000. Mean of the dependent variable is 0.044. Mean (std dev) of share of coworkers who were recently entrepreneurs is 0.055 (0.131).

Table OA.8: Extensive margin spillovers: Exposure to entrepreneurial coworkers predicts future entrepreneurship, controlling for local entrepreneurship

	Dependent Variable: Entrepreneur 2005-2009			
	(1)	(2)	(3)	(4)
Share of coworkers with entrepreneurship	0.025***	0.011***	0.025***	0.026***
	(0.001)	(0.002)	(0.001)	(0.001)
State entrepreneurship rate	(collinear with state FEs)	(collinear with state FEs)		
State entr. rate × Share		1.420***		
		(0.255)		
State-by-sector entrepreneurship rate			0.554***	0.562***
			(0.028)	(0.029)
State-sector entr. rate × Share				-0.133
				(0.082)

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence of positive extensive margins spillovers, controlling for 2004 local entrepreneurship. The table presents regressions performed on the sample of individuals in 2004. The columns present estimates of model (1), adding controls and interactions of the exposure to entrepreneurial coworkers with an individual's 2004 local entrepreneurship rate. In columns 1 and 2, the local entrepreneurship rate is the 2004 entrepreneurship rate (i.e., what share of individuals are currently entrepreneurs in 2004) in an individual's state; in columns 3 and 4, the local entrepreneurship rate is measured at the state-by-sector (NAICS2) 2004 entrepreneurship rate, for the sector in which an individual works in 2004. Columns 1 and 3 demonstrate that the positive spillovers presented in Table 2 persist when controlling for these local entrepreneurship rate measures (note that column 1 is column 5 from Table 2, as state entrepreneurship rates are collinear with state fixed effects); columns 2 and 4 show that spillovers may be stronger in states experiencing higher entrepreneurship rates but not necessarily stronger in state-sector pairs experiencing higher entrepreneurship rates.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N = 46,680,000. Mean of dependent variable: 0.031. Mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095). Mean (std dev) of state entrepreneurship: 0.009 (0.002); of state-by-NAICS2 entrepreneurship: 0.009 (0.005).

Table OA.9: Entrepreneurs who worked with more entrepreneurial coworkers are more likely to cite role models as leading to their entrepreneurship

	Dependent Variable: Role Models Were At Least Somewhat Important	
	(1)	(2)
Share of coworkers with entrepreneurship	0.084**	-0.1577
	(0.038)	(0.141)
Share of coworkers with entr. and survived to age 2		0.2603*
		(0.145)

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents survey evidence that entrepreneurial coworkers serve as role models to future entrepreneurs. Individuals who work with proportionally more entrepreneurial coworkers, and then become entrepreneurs, are more likely to say that entrepreneurial role models were important to their decision to become an entrepreneur.

This table presents regression estimates of model performed on the sample of individuals in 2008-2012 who became entrepreneurs in 2013 at firms surveyed by the 2014-2016 ASE (and are matched by demographics to at least one owner in the ASE who reports that they founded the firm).

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=7,000. Mean of dep var: 0.5507. Mean (std dev) of share with entrepreneurship: 0.06345 (0.1547). Mean (std dev) of share ... and survived to age 2: 0.05561 (0.1490).

Table OA.10: Extensive margin spillovers are stronger among coworkers with similar earnings

	Dependent Variable: Entrepreneur 2005-2009		
	(1)	(2)	(3)
Share of coworkers with entrepreneurship	0.026***	0.024***	
	(0.001)	(0.001)	
Share of coworkers with entrepreneurship and in the same earnings quartile		0.034***	
		(0.002)	
Share of coworkers with entrepreneurship and in lowest quartile			0.082***
			(0.003)
Share of coworkers with entrepreneurship and in second lowest quartile			0.012***
			(0.001)
Share of coworkers with entrepreneurship and in second highest quartile			0.047***
			(0.002)
Share of coworkers with entrepreneurship and in highest quartile			0.024***
			(0.001)
Within-establishment earnings bin FE	x	x	
Share of coworkers in each earnings bin		x	x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that extensive margin spillovers are amplified when entrepreneurial coworkers have similar earnings to an individual, and thus are more likely to belong to the same occupation and/or work group. While individuals may learn entrepreneurship from coworkers in any quartile of the within-establishment earnings distribution, they are disproportionately likely to become entrepreneurs when their entrepreneurial coworkers fall in the same earnings quartile as them. This table presents regression estimates of model (1), expanded to consider in which within-establishment earnings quartiles the coworkers fall (relative to the individual), performed on the sample of individuals in 2004.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=46,680,000. Mean of dep var: 0.034. In columns 1 and 2, mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095). In column 2, In column 3, mean (std dev) of share ... and same quartile: 0.006 (0.029). In column 3: mean (std dev) of share ... and lowest quartile: 0.004 (0.016); second lowest quartile: 0.007 (0.042); second highest quartile: 0.007 (0.031); highest quartile: 0.016 (0.066).

Table OA.11: Entrepreneurial coworkers' success predicts future entrepreneurship

	Dependent Variable: Entrepreneur 2005-2009								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of coworkers with entrepreneurship	0.025***		0.025***		0.025***		0.024***		0.023***
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)
Additional effects:									
Share of coworkers with entr. and top 10% employment		0.039***	0.021***						
		(0.002)	(0.002)						
Share of coworkers with entr. and top 10% payroll				0.023***	0.004**				
				(0.002)	(0.002)				
Share of coworkers with entr. and top 10% revenue						0.042***	0.024***		
						(0.002)	(0.002)		
Share of coworkers with entr. and top 10% revenue/employment								0.041***	0.022***
								(0.002)	(0.002)
Mean(share entr., top 10%)		0.005	0.005	0.005	0.005	0.003	0.003	0.002	0.002
Std dev(share entr., top 10%)		0.025	0.025	0.029	0.029	0.023	0.023	0.026	0.026

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence of exposure to successful entrepreneurial coworkers amplifying the positive extensive margin spillovers. The columns present estimates of several adaptations of model (1) with different measures of entrepreneurial coworkers' success. "Share of coworkers with entr. and top 10% employment," e.g., is the share of coworkers who were recently entrepreneurs and whose entrepreneurial firms was in the top 10% of entry year employment, amongst firms that entered in the same year and industry. Column 1 presents the main baseline results from column 5 of Table 2 for comparison.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N = 46,680,000. Mean of dep var is 0.031. Mean (std dev) of share of coworkers with entrepreneurship is 0.034 (0.095).

Table OA.12: Spillovers depend on relative age and own entrepreneurial experience

	Dependent Variable: Entrepreneur 2005-2009 (1)
Panel A: Spillovers strongest from *relatively* older entrepreneurial coworkers	
Share of coworkers with entrepreneurship and younger	0.016***
	(0.001)
Share of coworkers with entrepreneurship and same age	0.020***
	(0.001)
Share of coworkers with entrepreneurship and older	0.033***
	(0.001)
Panel B: Spillovers lead to *new* entrepreneurs	
Share of coworkers with entrepreneurship	0.042***
	(0.001)
Previous entrepreneur	0.039***
	(0.000)
Share of coworkers with entrepreneurship × Previous entrepreneur	-0.049***
	(0.001)

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that extensive margin spillovers are strongest when coworkers are relatively older (Panel A) and when the individual has no recent entrepreneurial experience (Panel B). The table presents regression estimates of adapted versions of model (1) performed on the sample of individuals in 2004. Panel A replaces as the main explanatory variable the share of coworkers with recent entrepreneurship with three variables: the share of coworkers with entrepreneurial experience *and* who are younger than the individual, the share of coworkers with entrepreneurial experience *and* who are the same age as the individual, and the share of coworkers with entrepreneurial experience *and* who are older than the individual; the regressions also include controls for the share of all coworkers who are younger, the same age, and older than the individual. I bin an individual's coworkers into three bins based on the relative ages: those "younger" than the individual (i.e., between age 20 and their age minus 3, inclusively); those the "same age" as their (i.e., between their age minus 2 and their age plus 2, inclusively); and those "older" than their (i.e., between their age plus 3 and 69, inclusively). Panel B includes the interaction of the individual's own previous entrepreneurship with the share of their coworkers who were recently entrepreneurs. (Note that Panel B explicitly presents the coefficient on previous entrepreneurship, while that coefficient is suppressed in other tables.)

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N = 46,680,000. Mean (std dev) of: share of coworkers with entrepreneurship and younger = 0.020 (0.053); share of coworkers with entrepreneurship and same age = 0.005 (0.039); share of coworkers with entrepreneurship and older = 0.0164 (0.064).

Table OA.13: Previous entrepreneurs vary in success, but many entrepreneurial coworkers were unsuccessful

	Previous Entrepreneur *Coworkers*		*All* Previous Entrepreneurs	
	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)
Entrepreneur of current firm	0.087	0.271	0.517	0.500
Firm survived to age 5	0.450	0.307	0.620	0.485
Entrepreneur at firm at age 5	0.117	0.245	0.374	0.484
Top 10% entry year employment	0.154	0.239	0.156	0.363
payroll	0.126	0.230	0.154	0.361
revenue	0.068	0.170	0.084	0.278
revenue productivity	0.051	0.135	0.063	0.242
N	36,310,000		1,573,000	

Note: This table presents entrepreneurial characteristics of individuals who became entrepreneurs between 1999 and 2003 and shows that these entrepreneurs vary in their past success, with the average set of entrepreneurial coworkers comprising relatively unsuccessful entrepreneurs who now work in other firms. Columns 1 and 2 present characteristics of entrepreneurial coworkers, for individuals in 2004 who have at least one previous entrepreneur as a coworker; specifically, these values are the summary statistics for the share of coworkers who satisfy some characteristic. These columns describe the average "treatment" that individuals face in the workforce. Columns 3 and 4 present characteristics of all previously entrepreneur individuals, serving as a benchmark for the success of average entrepreneurs; many of these individuals started their current firm. Top 10% measures are based on 90th percentile thresholds estimated at the entry year-industry (NAICS6) level; note that because there can be up to three entrepreneurs per firm, more than 10% of *entrepreneurs* can start *firms* that are in the top 10% of entry year log employment, etc.

Table OA.14: Additional robustness to intensive margin spillovers

	Dependent Variable: 2005-2009 Entrepreneurial Firm Survives to Age 2							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of coworkers with entr.	-0.009***	-0.033***	-0.010***	-0.039***	-0.009***	-0.032***	-0.038***	-0.039***
	(0.003)	(0.011)	(0.003)	(0.011)	(0.002)	(0.011)	(0.011)	(0.011)
Share of coworkers with entr. and survived to age 2		0.025**		0.032***		0.024**	0.030***	0.031***
		(0.011)		(0.011)		(0.011)	(0.011)	(0.011)
Entr. industry FE		x	x					
Entry year FE			x	x				
Entr. ind.-Entry year FE					x	x		
$\mathbb{1}\{$Missing rev.$\}$							x	x
Firm log revenue							x	
Firm log rev./emp.								x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that the intensive margin spillovers (in particular, those measured in terms of firm survival, i.e., columns 1-2 of Table 7) are robust to several specification extensions. The table presents regressions performed on the sample of individuals who become entrepreneurs between 2005 and 2009. The columns present estimates of several adaptations of model (2) for the outcome of whether an individual's entrepreneurial firm survives to a second year, with different controls, as indicated in the footer. "Entr. industry FE" indicates fixed effects for the future entrepreneur's firm's entry year 6-digit industry; "Entry year FE" indicate fixed effects for the future entrepreneur's firm's entry year. "Entr. instury-Entry year FE" indicate the entrepreneurs' industry-by-entry year fixed effects. In the final two columns, firms with missing revenue information (i.e., does not have LBD revenue data) have revenue or productivity values replaced by the mean; this is controlled for with a missing indicator.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N = 1,456,000. Mean of dep var is 0.815. Mean (std dev) of share of coworkers with entrepreneurship is 0.064 (0.147); mean (std dev) of share of coworkers with entrepreneurship and whose entrepreneurial firm survived to age 2 is 0.057 (0.143).

Table OA.15: Entrepreneurial coworkers' success predicts future entrepreneurs' success

	Dependent Variable: Entrepreneurial Firm in Top 10%					
	Log(Payroll)		Log(Revenue)		Log(Rev/Emp)	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Without entrepreneurial firm industry fixed effects						
Share of coworkers with	-0.080***	-0.101***	-0.022***	-0.034***	0.014***	0.003
entrepreneurship	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Additional effect:						
Share of coworkers with entr.		0.238***		0.202***		0.125***
and top 10%		(0.010)		(0.010)		(0.008)
Panel B: With entrepreneurial firm industry fixed effects						
Share of coworkers with	-0.080***	-0.102***	-0.022***	-0.034***	0.014***	0.003*
entrepreneurship	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Additional effect:						
Share of coworkers with entr.		0.282***		0.204***		0.126***
and top 10%		(0.010)		(0.010)		(0.008)
Entr. industry FE	x	x	x	x	x	x
Mean(dep var)	0.164	0.164	0.083	0.083	0.057	0.057
Mean(share entr., 10%)		0.009		0.006		0.005
Std dev(share entr., 10%)		0.044		0.038		0.045

Note: This table presents additional evidence of intensive margin spillovers depending on the relative success of entrepreneurial coworkers. The table presents regressions performed on the sample of individuals who become entrepreneurs between 2005 and 2009. The columns present estimates of (2) for different measures of firm success, with controls indicated in the footer; the covariate "Share of coworkers with entr. and top 10%" is the share of coworkers who were recently entrepreneurs and whose firm was in the top 10% of firms that entered in the same year and 6-digit industry in terms of the dependent variable outcome (i.e., in column 1, this share is in terms of entry year log employment).

In all columns, the dependent variables are indicators equal to 1 if the firm was in the top 10% of the listed measure, amongst firms that entered in the same year and industry, and 0 otherwise. Revenue and productivity (revenue/employment) measures are based on LBD data; if an entrepreneur's firm does not appear in the LEHD, they are coded as not being in the top 10% (although the top 10% threshold is based only on the firms with LBD data).

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors in parentheses are robust and clustered at the establishment level. N = 1,456,000. Mean (std dev) of the share of coworkers with entrepreneurship is 0.064 (0.147).

Table OA.16: Additional robustness to entrepreneurship measurement

	Dependent Variable: Entrepreneur 2005-2009						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of coworkers with entrepreneurship	0.025***	0.025***	0.021***	0.015***	0.023***	0.025***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Entrepreneurship definition	Main	LEHD Age	Top 1	Corporations	Sole Proprietorships	Partnerships	Other Legal Form
Mean(dep var)	0.031	0.026	0.014	0.021	0.005	0.007	0.002
Mean(share)	0.034	0.029	0.014	0.024	0.006	0.005	0.006
Std Dev(share)	0.095	0.088	0.059	0.083	0.038	0.033	0.036

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that the extensive margin spillovers are robust to varying the definition of entrepreneurship. The columns present estimates of several adaptations of model (1). Column 1 provides the baseline estimate from Table 2 for comparison. In column 2, I define entrepreneurship (for both the dependent and independent variables, including the unreported controls of own recent entrepreneurship) as being one of the top 3 annual earners at a firm at LEHD firm age 0 (based on an calculation of firm age provided by the Census). In column 3, I define entrepreneurship as being the top annual earner at a new firm, based on my definition of firm entry (based on entry to the LEHD and LBD). In columns 4-7, I define entrepreneurship as being one of the top 3 annual earners at a new firm of a given legal type; I identify firms' legal types from the Business Register (BR), and label a firm as a corporation, sole proprietorship, partnership, and/or other legal form if it is ever labeled as such in the 1994-2013 BR. Note that of all the legal types, entrepreneurs at corporations are most likely to be true firm owners; owners of sole proprietorship and partnerships are generally not supposed to take wage and salary income and thus should not appear in the LEHD.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=46,680,000.

Table OA.17: Extensive margin spillovers exist regardless of when coworkers joined firm

	Dependent Variable: Entrepreneur 2005-2009 (1)
Share of coworkers with entrepreneurship and joined before	0.036***
	(0.001)
Share of coworkers with entrepreneurship and joined in same year	0.005***
	(0.001)
Share of coworkers with entrepreneurship and joined after	0.074***
	(0.002)
Share of coworkers who joined in each year, 1994-2004	x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that the extensive margin spillovers exist regardless of when the entrepreneurial coworkers joined the firm, relative to the individual, including coworkers who joined after them (i.e., who the individual should not have selected on when joining). The table presents regression estimates of model (1), breaking out the share of coworkers who were recently entrepreneurs into three categories based on whether the coworkers joined before, in the same year, or after the individual, performed on the sample of individuals in 2004, with controls indicated in the footer.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=46,680,000. Mean of dep var is 0.034. Mean (std dev) of share entr. and . . . joined before is 0.013 (0.061); joined in the same year is 0.014 (0.070); and joined after is 0.007 (0.024).

Table OA.18: Having entrepreneurial coworkers is not a compensating differential for the average new hire

	Dependent Variable: Log 2004 Earnings	
	(1)	(2)
Share of coworkers with entrepreneurship	0.084***	0.151***
	(0.024)	(0.021)
Model (1) controls	x	x
Log 2003 total earnings		x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence against the idea that individuals seek out and pay for the opportunity to work with entrepreneurial coworkers. The table presents regressions performed on the sample of individuals who are new hires at their firm in 2004. The columns present estimates of several adaptations of model (1) with different controls, as indicated in the footer, where I replace the dependent variable with the individual's log earnings at their firm in 2004. In column 2, I control for the individual's log total earnings in 2003, summing across all employers; if an individual does not have 2003 earnings, I replace this value by the mean and control for this using an indicator.

All columns include model (1) controls *except* log earnings (log employment, recent entrepreneurship, demographics, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=13,970,000. Mean of the dependent variable is 9.756. Mean (std dev) of share of coworkers who were recently entrepreneurs is 0.035 (0.089).

Table OA.19: Extensive margin spillovers exist, but are not only, from very recent entrepreneurs

	Dependent Variable: Entrepreneur 2005-2009									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Share of coworkers with entrepreneurship	0.024***	0.024***	0.025***	0.025***	0.025***	0.026***	0.026***	0.026***	0.027***	0.027***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Coworker entr. within past __ years	1	2	3	4	5	6	7	8	9	10
Mean(share)	0.008	0.015	0.022	0.028	0.034	0.039	0.045	0.051	0.056	0.060
Std dev(share)	0.054	0.071	0.081	0.089	0.095	0.100	0.105	0.108	0.111	0.114

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that the extensive margin spillovers are similar regardless of how recent I measure coworkers' entrepreneurship. The table presents regression estimates of model (1) performed on the sample of individuals in 2004 based on the share of coworkers who entrepreneurs within the past 1, ..., 10 years, with controls indicated in the footer (model (1) controls are log establishment employment, own recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects measured at the time of exposure). (Column 5 is the baseline estimate from Table 2.)

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=46,680,000.

Table OA.20: Additional robustness to extensive margin spillovers

	Dependent Variable: Entrepreneur 2005-2009						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of coworkers with entrepreneurship	0.025*** (0.001)	0.022*** (0.001)	0.021*** (0.001)	0.024*** (0.001)	0.028*** (0.001)	0.025*** (0.001)	0.025*** (0.001)
Log employment	x	x	x	x	x	x	x
Own entrepreneurship	x	x	x	x	x	x	x
Demographics	x	x	x	x	x	x	x
Log annual earnings	x	x	x	x	x	x	x
Age FE	x	x	x	x	x	x	x
Industry FE	x		x	x	x	x	x
State FE	x		x	x	x	x	x
Industry-State FE		x					
Firm age FE			x				
First year at firm FE				x			
Within-firm earnings bin FE					x		
$\mathbb{1}\{$Missing revenue$\}$						x	x
Firm log revenue						x	
Firm log revenue/employment							x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that the extensive margin spillovers are robust to the inclusion of several additional controls, including industry-by-state, firm age, tenure, and earnings bin fixed effects; past entrepreneurial exposure; and the firm's productivity. The columns present estimates of several adaptations of model (1) with different controls, as indicated in the footer (model (1) controls are log establishment employment, own recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects measured at the time of exposure). In the final two columns, firms with missing revenue information (i.e., does not have LBD revenue data) have revenue or productivity values replaced by the mean; this is controlled for with a missing indicator. Column 1 presents the main baseline results from Table 2 for comparison.

Standard errors are robust and clustered at the establishment level. N=46,680,000. Mean of dep var: 0.031. Mean (std dev) of share of coworkers with entrepreneurship: 0.034 (0.095).

Table OA.21: Evidence against alternative hypotheses: Spawning, exposure to leaders, and workplace culture

Dependent Variable:	# Entrepreneurs	Co-entrepreneur	Entrepreneur 2005-2009		
Sample	Future entr.		Main		Leave in 2004
	(1)	(2)	(3)	(4)	(5)
Share of coworkers with entrepreneurship	-0.085***	-0.003		0.015***	0.040***
	(0.005)	(0.004)		(0.001)	(0.001)
Share of coworkers with top 3 earnings at any firm			0.032***	0.005***	
			(0.000)	(0.000)	
Mean(dep var)	2.046	0.241	0.034	0.034	0.041
Mean(share)	0.064	0.064	0.034	0.034	0.036
Std dev(share)	0.147	0.147	0.095	0.095	0.094
Mean(share top 3 at any firm)			0.156	0.156	
Std dev(share top 3 at any firm)			0.200	0.200	
N	1,456,000	1,456,000	46,680,000	46,680,000	13,030,000

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence against several alternative mechanisms (coworkers bringing along individuals on their next venture, teaching general leadership skills, or driving individuals to leave the firm) that could explain the extensive margin spillovers. The table presents regression estimates of versions of model (1) performed on the sample of individuals in 2004 (columns 3-4), the subsample of individuals who become entrepreneurs between 2005 and 2009 (columns 1 and 2), and the subsample of individuals whose last year at the firm is 2004 (column 5); with controls indicated in the footer. In columns 1 and 2, the dependent variable is different; in column 1, the dependent variable is the number of entrepreneurs (between 1 and 3, only counting those who appear in the data in 2004) at a future entrepreneur's entrepreneurial firm. In column 2, the dependent variable is an indicator equal to 1 if at least one of the other entrepreneurs (if there are any) at an future entrepreneur's firm was employed at the same establishment in 2004, and 0 otherwise.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level.

Table OA.22: Extensive margin spillovers are strongest for top three quartiles of earners

	Dependent Variable: Entrepreneur 2005-2009	
	(1)	(2)
Share of coworkers w/ entrepreneurship	0.008***	-0.001
× Earnings in lowest quartile	(0.001)	(0.001)
Share of coworkers w/ entrepreneurship	0.031***	0.015***
× Earnings in second lowest quartile	(0.001)	(0.001)
Share of coworkers w/ entrepreneurship	0.030***	0.052***
× Earnings in second highest quartile	(0.001)	(0.001)
Share of coworkers w/ entrepreneurship	0.038***	0.037***
× Earnings in highest quartile	(0.001)	(0.001)
Earnings quartile FE	x	x
Quartile relative to	Economy	Establishment

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that extensive margin spillovers are commonplace across the earnings distribution. The table presents regression estimates of model (1) performed on the sample of individuals in 2004, with the share variable broken out into mutually-exclusive bins based on the individual's 2004 earnings quartile (either relative to the whole economy, in column 1, or their establishment, in column 2) with controls indicated in the footer. All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=46,680,000. For relative to the economy, mean (std dev) of share w/ entrepreneurship and ... lowest quartile is 0.009 (0.053); second lowest is 0.010 (0.057); second highest is 0.008 (0.048); and highest is 0.006 (0.039). For relative to the establishment, mean (std dev) of share w/ entrepreneurship and ... lowest quartile is 0.007 (0.036); second lowest is 0.010 (0.061); second highest is 0.008 (0.041); and highest is 0.010 (0.057).

Table OA.23: Exposure to more entrepreneurs does not predict becoming publicly-traded

Dependent variable:	Publicly-traded within 5 years		Ever publicly-traded	
	(1)	(2)	(3)	(4)
Share of coworkers with entrepreneurship	-0.0003	-0.0002	-0.0004	-0.0003
	(0.0002)	(0.0002)	(0.0003)	(0.0003)
Entr. industry FEs		x		x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that exposure to entrepreneurial coworkers predicts less successful firms, by the extreme outcome of being publicly-traded. The table presents regressions performed on the sample of individuals who become entrepreneurs between 2005 and 2009. The columns present estimates of (2) for whether a firm becomes publicly-traded (IPO's, i.e., appears in the CSB) within 5 years after entry (columns 1 and 2) or ever (up until 2016, columns 3 and 4), with controls indicated in the footer (model (1) controls are log establishment employment, own recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects measured at the time of exposure).

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=1,456,000. Mean of dep var: columns 1 and 2: 0.0010; columns 3 and 4: 0.0014. Mean (std dev) of share of coworkers with entrepreneurship: 0.064 (0.147).

Table OA.24: Entrepreneurs who worked with more entrepreneurial coworkers tend to be more self-funded, not family owned, and less innovative

	Dependent Variable: Entrepreneurial Firm Outcome									
	Start-up funding sources			Current funding sources					Family Owned	Patent/ copyright/ trademark
	VC	Banks	Family/ friends	Investors	Banks	Grants	Family/ friends	Owner		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Without entrepreneurial firm industry fixed effects										
Share of cow. w/ entr.	0.008	-0.013	0.014	0.007	-0.022	-0.010	0.007	0.030*	-0.051***	-0.029***
	(0.005)	(0.015)	(0.012)	(0.012)	(0.018)	(0.011)	0.016)	(0.016)	(0.017)	(0.013)
Year-EY FE	x	x	x	x	x	x	x	x	x	x
Panel B: With entrepreneurial firm industry fixed effects										
Share of cow. w/ entr.	0.006	-0.014	0.013	0.005	-0.025	-0.009	0.006	0.032**	-0.052***	-0.025*
	(0.005)	(0.015)	(0.012)	(0.012)	(0.018)	(0.011)	(0.016)	(0.016)	(0.017)	(0.013)
Year-EY FE	x	x	x	x	x	x	x	x	x	x
Entr. ind. FE	x	x	x	x	x	x	x	x	x	x
Mean(dep var)	0.025	0.308	0.109	0.130	0.590	0.096	0.274	0.682	0.376	0.209

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence against several potential mechanisms behind the entrepreneurial spillovers, including financing, family connections, and technological knowledge transfers. The table presents regressions based on model (1) for different ASE binary outcomes, performed on the sample of individuals who become entrepreneurs of firms that are surveyed in the 2014-2016 ASE, with controls indicated in the footers; "Year-EY FE" indicates year of exposure to coworkers-by-firm entry year fixed effects ("EY"="entry year"). Panel B includes 6-digit industry fixed effects for the entrepreneur's entrepreneurial firm (at entry). Columns 1-3 study the firms' start-up funding, namely whether a firm received funding from venture capitalists (VC), business loans from banks, or business loans from family or friends. Columns 4-8 study the sources of the firms' current funding, including from outside investors (angel investors, VC, or other businesses), banks, government grants, family or friends, and the owner themself. Column 9 studies whether the firm is family owned (i.e., whether two or more members of one family own a majority of the firm); column 10 studies whether the firm owns any patents, copyrights, or trademarks. See Section A.I.C for precise definitions of the outcomes.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects). Standard errors are robust and clustered at the establishment level. N=49,000. Mean (std dev) of share: 0.066 (0.151).

Table OA.25: Entrepreneurial coworkers push entrepreneurs towards some sectors, away from others

	Dependent Variable: Entrepreneurial Firm in Sector									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Agriculture		Mining		Utilities		Construction		Manufacturing	
Share of coworkers w/ entrepreneurship	0.001***	0.001***	0.000	0.000	-0.000	-0.000	0.000	-0.004**	-0.004***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.001)	(0.001)
Share of coworkers w/ entr. in sector (not estab.'s)		-0.007		-0.009***		-0.001		0.293***		-0.041
		(0.004)		(0.003)		(0.002)		(0.027)		(0.037)
Mean(dep var)	0.004	0.004	0.003	0.003	0.007	0.007	0.142	0.142	0.041	0.041
	Wholesale		Retail		Transport/Warehous.		Information		Finance/Insurance	
Share of coworkers w/ entrepreneurship	0.006***	0.008***	0.002	0.002	0.000	0.001	-0.001	-0.000	0.003**	0.004***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Share of coworkers w/ entr. in sector (not estab.'s)		-0.095***		0.012		-0.047***		-0.035***		-0.097***
		(0.017)		(0.020)		(0.008)		(0.008)		(0.012)
Mean(dep var)	0.051	0.051	0.112	0.112	0.033	0.033	0.015	0.015	0.046	0.046
	Real Estate/Licensing		Pro/Sci/Tech Serv.		Management		Admin		Education	
Share of coworkers w/ entrepreneurship	0.001	0.003**	-0.000	-0.004**	0.001**	0.001***	-0.003**	-0.001	-0.000	0.000
	(0.001)	(0.001)	(0.002)	(0.002)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Share of coworkers w/ entr. in sector (not estab.'s)		-0.115***		0.269***		-0.020***		-0.101***		-0.048***
		(0.012)		(0.024)		(0.001)		(0.014)		(0.005)
Mean(dep var)	0.044	0.044	0.131	0.131	0.003	0.003	0.063	0.063	0.012	0.012
	Health		Arts/Entertainment		Accomm./Food		Other Services			
Share of coworkers w/ entrepreneurship	-0.003**	-0.003*	0.001*	0.002**	-0.006***	-0.008***	0.000	0.000		
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)		
Share of coworkers w/ entr. in sector (not estab.'s)		-0.054***		-0.045***		0.126***		0.013		
		(0.013)		(0.008)		(0.017)		(0.013)		
Mean(dep var)	0.097	0.097	0.020	0.020	0.113	0.113	0.072	0.072		

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that exposure to entrepreneurial coworkers may predict in which sector an individual starts a firm, particularly if those coworkers ran firms in those sectors, suggesting that some spillovers may convey industry-specific information. The table presents regressions performed on the sample of individuals in 2004 who become entrepreneurs between 2005 and 2009. The columns present estimates of versions of model (2) for whether the entrepreneurs start firms in each sector. Even columns add as a covariate the share of coworkers who were entrepreneurs in the given column's sector *if* the individual's 2004 establishment is not in that sector (and 0 otherwise). All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=1,456,000. Mean (std dev) of share of coworkers w/ entrepreneurship is 0.064 (0.147).

Table OA.26: Entrepreneurial exposure predicts higher-paying and lower-inequality entrepreneurship, but this is connected to firm size

	Dependent Variable: 2005-2009 Entrepreneurial Entry Year Firm Pay					
	Mean(Log(Earnings))		Var(Log(Earning))		90-10(Log(Earning))	
	(1)	(2)	(3)	(4)	(5)	(6)
Share of coworkers w/ entrepreneurship	0.111***	-0.003	-0.179***	-0.020**	-0.327***	-0.005
	(0.007)	(0.007)	(0.010)	(0.009)	(0.011)	(0.008)
Entry year log(employment)		-0.297***		0.418***		0.845***
		(0.001)		(0.001)		(0.001)
Mean(dep var)	8.884	8.844	1.507	1.507	2.513	2.513

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that exposure to entrepreneurial coworkers predicts higher paying, less unequal firms, but this patterns is largely driven by the fact that the exposure also predicts smaller firms. The table presents regressions performed on the sample of individuals who become entrepreneurs between 2005 and 2009. The columns present estimates of (2) for different measures of entry year firm pay, with controls indicated in the footer (model (1) controls are log establishment employment, own recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects measured at the time of exposure).

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N=1,456,000. Mean (std dev) of the share is 0.064 (0.147); mean (std dev) of entry year log(employment) is 1.928 (1.199).

Table OA.27: Successful and high-earning entrepreneurial coworkers may discourage unsuccessful entrepreneurship

Dependent Variable:	Entrepreneur 2005-2009			Entrepreneur 2005-2009 and top 10% employment			Entrepreneur 2005-2009 and *not* top 10% employment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of coworkers with entrepreneurship	0.025***	0.024***	0.025***	-0.005***	-0.007***	-0.005***	0.029***	0.030***	0.030***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Share of coworkers with entr. and top 10% emp		0.021***			0.032***			-0.011***	
		(0.002)			(0.001)			(0.002)	
Share of coworkers with entr. and earn≥$100k			0.006***			0.017***			-0.010***
			(0.002)			(0.001)			(0.002)
Share earn ≥ $100k			x			x			x

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: This table presents evidence that particularly successful or high-earning entrepreneurial coworkers may dissuade entrepreneurial ventures that are unlikely to succeed, consistent with the negative spillovers estimated by Lerner and Malmendier (2013), in the context of spillovers across Harvard MBA classmates. The columns present estimates of several adaptations of model (1) with the inclusion of measures of exposure to "like-Harvard MBA" entrepreneurial coworkers and controls noted in the footer and measures of entrepreneurial coworkers' success. "Share of coworkers with entr. and top 10% emp," is the share of coworkers who were recently entrepreneurs and whose entrepreneurial firms was in the top 10% of entry year employment, amongst firms that entered in the same year and industry; "Share of coworkers with entr. and earn≥$100k" is the share of coworkers who were recently entrepreneurs and who earn above $100,000 at the firm in 2004 (in 2010 USD). Column 1 presents the main baseline results from Table 2 for comparison.

All columns include model (1) controls (log employment, recent entrepreneurship, demographics, log earnings, and age, industry, and state fixed effects).

Standard errors are robust and clustered at the establishment level. N = 46,680,000. Mean (std dev) of share of coworkers with entrepreneurship is 0.034 (0.095). Mean of dependent variable: column 1-3: 0.031; 4-6: 0.005; 7-9: 0.026.

Figure OA.1: Extensive margin spillovers are marginally higher from more recent entrepreneurship

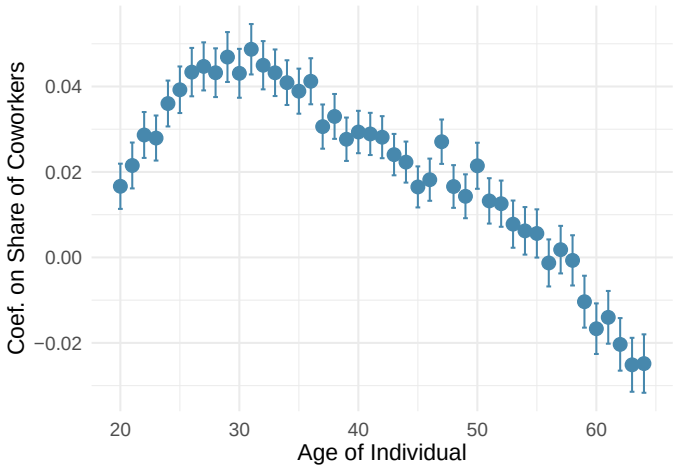
(a) Coefficients

(b) Coefficients times one standard deviation of share X

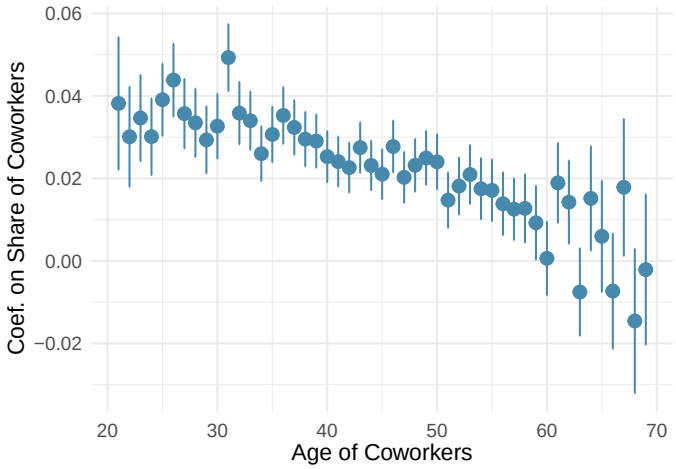
Note: This figure presents evidence that extensive margin spillovers are similar regardless of how recent the entrepreneurship of the coworkers was. The figure presents coefficient and 95% confidence interval estimates of model (1), where the share of coworkers with entrepreneurial experience is separated into separate variables by when the (most recent) entrepreneurship occurred (1-10 years ago), performed on the sample of individuals in 2004, including all controls (akin to column 5 of Table 2). Panel A presents the coefficients. Panel B multiplies the coefficients by one standard deviation of the given variable; there is more variation in the share of coworkers who were more recently entrepreneurs, leading to large value for the exposure to more recent entrepreneurs.

Figure OA.2: Spillovers are driven by younger workers

(a) Spillovers are highest from younger workers



(b) Spillovers are highest for relatively young coworkers



Note: This figure presents evidence that extensive margin spillovers are largest for younger individuals (Panel A), who learn from young and middle aged entrepreneurial coworkers (Panel B). This figure presents coefficient and 95% confidence interval estimates of model (1), modified by interacting the share of coworkers who were recently entrepreneurs with the individual's age (Panel A) or by separating out the share of coworkers who were recently entrepreneurs by the age of the coworkers (and controlling for the share of coworkers who are each age, Panel B). Panel A plots the coefficients on the share of an individual's coworkers who were entrepreneurs between 1999 and 2004 by the age of the individual. Panel B plots coefficients on the share of an individual's coworkers who are both a given age and were entrepreneurs between 1999 and 2004; by the construction of the sample, no 20-year-old coworkers are previous entrepreneurs, so the coefficient for age 20 is omitted. Standard errors are robust and clustered at the establishment level.