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Workplace Peers and Entrepreneurship

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We examine whether the likelihood of entrepreneurial activity is related to the prior career experiences of an individual's coworkers, using a unique matched employer–employee panel data set. We argue that coworkers can increase the likelihood that an individual will perceive entrepreneurial opportunities as well as increase his or her motivation to pursue those opportunities. We find that an individual is more likely to become an entrepreneur if his or her coworkers have been entrepreneurs before. Peer influences also appear to be substitutes for other sources of entrepreneurial influence: we find that peer influences are strongest for those who have less exposure to entrepreneurship in other aspects of their lives.

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1. Introduction

What role do social influences play in the decision to become an entrepreneur? A growing literature in entrepreneurship has examined this question, with an aim to better understand the mechanisms that drive the entrepreneurial process. One line of argument suggests that variation in rates of entrepreneurship is due to differential access to both information and resources that might arise from one's social networks (Gompers et al. 2005, Lerner and Malmendier 2008, Saxenian 1994, Sorenson and Audia 2000). Other work has examined the role of social networks in shaping individual career aspirations and attitudes toward entrepreneurship independent of the knowledge required to run a business (Giannetti and Simonov 2009).

In this paper, we focus on a particularly important form of social influence that has not received much attention in the entrepreneurship literature: the role of workplace interactions in influencing the decision to become an entrepreneur. Given the fact that an increasingly large share of productive time is spent at the workplace, coworkers are likely to be an important source of social influence for potential entrepreneurs. Moreover, the vast majority of entrepreneurs launch their new ventures following a period of employment in established organizations (Bhidé 2000, Burton et al. 2002). This fact has sparked a growing interest in the role that the workplace plays in shaping entrepreneurial activity (Gompers et al. 2005, Dobrev and Barnett 2005, Sørensen 2007a, Elfenbein et al. 2010). However, most of the work in this tradition has focused on how formal, structural characteristics of the employing organization shape the rate of entrepreneurial entry. Much less attention has been paid to the characteristics of the people who work in these settings and, in particular, to how the career experiences an individual's coworkers may relate to the decision to become an entrepreneur. The role of these social influences in the workplace is the focus of our study.

One particularly salient aspect of what coworkers bring to the workplace lies in the nature of their career experiences, because these experiences influence their knowledge and attitudes. Prior research has shown that an individual's career experiences affect his or her own entrepreneurial behavior and outcomes through their impact on access to information and ideas (Shane 2000, Sorenson and Audia 2000, Klepper 2001, Shane and Khurana 2003) and access to resources (Burton et al. 2002). We argue that these career experiences not only exert a direct effect on the individual, but could "spill over" to coworkers by influencing the informational and normative environment in which individuals make entrepreneurial entry decisions. In this sense, the career experiences of one's colleagues may indirectly influence individual rates of entrepreneurial activity.

Testing claims about the influence of coworkers poses important challenges. First, a convincing test of these claims demands unusually comprehensive data characterizing the work histories of an individual's workplace peers. This data challenge is especially

daunting given the fact that entrepreneurship is such a rare event, so that sufficient statistical power demands large samples of potential entrepreneurs, and hence correspondingly larger amounts of information on each of these individuals' coworkers. We use a unique matched employer–employee panel data set from Denmark to examine the relationship between the characteristics of an individual's workplace peers and the propensity to become an entrepreneur. Our data set has annual observations on the entire labor market, allowing us to track individuals as they move between spells of employment and self-employment over time. In addition, because we are able to match individuals to firms, we also know who each individual's colleagues are in every year, and can measure their prior career experiences. The richness of the data allows us to directly assess the posited relationship between career histories of coworkers and entrepreneurship, in order to move beyond prior studies looking at such a relationship but measuring them only at a regional or firm level (e.g., Saxenian 1994, Gompers et al. 2005, Giannetti and Simonov 2009).

The second challenge is inferential. With data in hand, it may be straightforward to establish a correlation between certain peer characteristics and rates of entrepreneurship. But this simple correlation is potentially spurious: the observed peer effects may reflect unobserved differences in firm characteristics that influence the kinds of people who work for a firm or may reflect unobserved differences in individual dispositions that drive both the choice of employer and eventual entry into entrepreneurship. Although we do not have the benefit of random assignment of coworkers or a natural experiment in our study, we undertake several additional tests to outline the sources of such endogeneity and to control for such spurious correlations.

The remainder of this paper is organized as follows. In the next section, we develop our theoretical arguments linking the career experiences of workplace peers to entrepreneurship. We then discuss our data sources and the construction of the sample for our analysis, as well as the construction of measures. Following a discussion of the findings (where we outline our steps to control for unobserved heterogeneity), we briefly consider the implications of the results for our understanding of entrepreneurship.

2. Coworkers and Entrepreneurship

Coworkers have a wide variety of characteristics that could influence an individual's attitudes and decisions. In terms of influencing decisions to enter entrepreneurship, however, we believe that some of the most important characteristics individuals bring to the workplace are derived from their career experiences. We focus on a particularly relevant career experience of coworkers: their prior history of entrepreneurship.

We hypothesize that working with former entrepreneurs might positively influence the decision to start one's own business, for several reasons. First, interaction with former entrepreneurs may provide insight into the skills needed to launch a new venture, as well as a way to learn some of those skills. Thus, Gompers et al. (2005, p. 612) argue that when working with colleagues who have been involved in startups, "employees learn from their coworkers about what it takes to start a new firm." Second, spillovers from former entrepreneurs may also make opportunities more attractive. Economic models of entrepreneurship (e.g., Evans and Jovanovic 1989), for example, suggest that the value of an opportunity (and hence the likelihood of entry) depends on the prospective entrepreneur's expected entrepreneurial abilities. In this case, skills and knowledge acquired though interaction with former entrepreneurs should make more entrepreneurial opportunities attractive. In addition, by facilitating access to resources required to start a new business, such contacts can effectively lower the cost of entrepreneurial entry and hence increase the value of entrepreneurial opportunities.

Aside from these tangible benefits, we believe that coworkers also exert an influence on entrepreneurial motivation. Given that these former entrepreneurs are current coworkers, and hence occupy a similar social position, contact with them should play a demystifying role and help convince some individuals that they have what it takes. Furthermore, former entrepreneurs may shape the aspirations of their coworkers by acting as role models. In particular, the example set by these individuals may play an important role in helping individuals construe an alternative to submitting to the authority relationship inherent in paid employment (e.g., Giannetti and Simonov 2009, Hamilton 2000).

It is worth noting that coworkers with entrepreneurial experience will, by definition, no longer be full-time entrepreneurs. In many, if not most, cases, these individuals will have sought paid employment due to the failure or poor performance of their entrepreneurial ventures. One might therefore wonder why the presence of "failed entrepreneurs" would induce others to enter entrepreneurship. Although a coworker's scars of entrepreneurial failure may somewhat dampen entrepreneurial aspiration, there are several reasons to believe that failed entrepreneurs will on balance encourage attempts at entrepreneurship. In part, this is because many of the mechanisms through which former entrepreneurs influence exposure to opportunities (e.g., access to information)

should operate regardless of the success or failure of the entrepreneur. Furthermore, failed entrepreneurs may increase entrepreneurial motivation, despite their lack of entrepreneurial success. The former entrepreneur's presence in the workplace may be reassuring to risk-averse individuals concerned about their prospects in the event that they fail. Entrepreneurial colleagues should therefore play a role in reducing the stigma of failure. Finally, the fact that an individual has left entrepreneurship for paid employment does not mean that he or she regrets the attempt at independence, or no longer feels that self-employment is preferable to paid employment. Consistent with this, Sørensen (2007b) finds that self-employed parents have lasting effects on their children's propensity to enter self-employment, even if the parents' stint in self-employment is short-lived.

Hypothesis 1. *Individual rates of entrepreneurship will be higher in work environments where a greater share of coworkers has prior entrepreneurial experiences*.

In our hypothesis, the influence of peer career experiences arises through a vicarious learning process, through which an individual might learn either about the nature of entrepreneurship or about specific market or business conditions due to their external environment. One way to test the support for our claimed mechanisms is to ask whether factors that are known to increase entrepreneurial opportunities and motivation act as substitutes for the career experiences of an individual's coworkers.

We look at two such factors: First, we look at parental self-employment. Children of the self-employed have been exposed to entrepreneurial role models in the family of origin, and should therefore be more likely to view entrepreneurship as a viable career option (Carroll and Mosakowski 1987); they also attach greater value to entrepreneurial job characteristics (Halaby 2003) and can benefit from resources and information relevant to entrepreneurship. Interacting with former entrepreneurs in the workplace should have less of an impact on their attitudes toward entrepreneurship, or on how much they know about what it takes to be an entrepreneur. Second, we look at the region in which individuals work. Those who work in regions with a greater level of entrepreneurial activity will again be exposed to it more than those who work in regions where this is less prevalent (Saxenian 1994, Giannetti and Simonov 2009). Again, we expect that interacting with former entrepreneurs in the workplace should have less of an impact for those working in regions with higher rates of entrepreneurship because they may have benefitted from such exposure in other aspects of their lives.

Hypothesis 2. *The positive impact of prior entrepreneurial experiences among workplace peers on the rate of entrepreneurship will be reduced for individuals with more exposure to entrepreneurship in other aspects of their lives*.

3. Data

We analyze data from the Integrated Database for Labor Market Research in Denmark, which is maintained by the Danish government and is referred to by its Danish acronym, IDA. This database has a number of features that makes it attractive for this study. First, it is comprehensive: All people legally residing in Denmark in a given year are included in the government registers from which the database is assembled. Individual characteristics are recorded in the IDA on an annual basis, which means that the IDA amounts to an annual census of the population of Denmark.

Second, the IDA covers a wide range of phenomena with respect to labor market status, so that it tracks the firm, industry, and region that an individual works in, as well as their occupation status—so that it is possible to know whether an individual is employed, unemployed, or self-employed (among other occupation codes). In addition, the database has a range of other individual characteristics that serve as important controls in studies of entrepreneurship (such as their age, educational qualifications, annual income, wealth, marital status, and number of children). The data set also contains information of parental occupation, allowing us to identify whether either one of an individual's parents are entrepreneurs in a given year.

Third, the IDA is longitudinal panel data, with annual observations starting in 1980; the data for this study end in 1997. The panel format is particularly attractive because it allows us to study entry into entrepreneurship, rather than just observing a cross-sectional correlation between entrepreneurship and other factors. Furthermore, the longitudinal nature of the data allow us to construct rich measures of individuals' career histories that can then be used as independent variables explaining their colleagues' entry into entrepreneurship.

Finally, the design of the IDA allows individuals to be linked according to a variety of relevant characteristics. For example, employees can be linked to their employers, a fact that allows one to study which other employees an individual came in contact with during their tenure with a given firm. It is this unique matched employer–employee nature of the data that allows us to study the role of peer characteristics in possibly impacting rates of entrepreneurship.

Our sample is constructed with two opposing needs in mind. On one hand, we want to generate rich measures of individual career histories that will be used as explanatory variables. Because these are explanatory variables, they need to have occurred prior to the

time that we study entry into entrepreneurship. On the other hand, we want to study entry into entrepreneurship over a number of years, because entrepreneurship is a rare event (and thus multiple years will generate better power in the regression) and we do not want our results to be driven by the entry rates in any given year (which may be caused by other factors we cannot observe but possibly correlated with our explanatory variables).

We therefore construct a sample of individuals at risk of entering into entrepreneurship between 1990 and 1997. Because the dynamics of serial entrepreneurship are likely different from the initial transition into entrepreneurship, we exclude individuals with a prior history of entrepreneurial activity between 1980 and 1990 in order to be conservative. Because we do not have data on employment status prior to 1980, we limit the sample to individuals between 16 and 40 years of age in 1990, in order to more reliably exclude individuals with prior self-employment experience. Furthermore, because we wish to observe individuals and their peers during their entire history with a particular employer (until entry into entrepreneurship or censoring), we limited the sample to individuals who were newly hired with their employer in 1990 and follow these individuals until they enter entrepreneurship or the data are censored. We exclude from our sample people employed in the primary sector (agriculture and extractive industries) and in industries dominated by the public sector because the labor market dynamics in these sectors are likely very different, and in order to maintain comparability with studies of entrepreneurship in the private sector.[1] Lastly, we exclude individuals who worked for firms founded in 1990, because these individuals may themselves be entrepreneurs rather than employees at risk of becoming entrepreneurs. There are 273,146 individuals in the estimation sample.

We classify individuals as entrepreneurs if they found a business (with or without employees). Although identifying proprietors or owners of unincorporated businesses is easy, we cannot directly identify individuals who found incorporated ventures, because of limitations in the data sources. We therefore attempt to capture such transitions by taking advantage of the fact that the founders of incorporated ventures appear as employees of the new ventures (unless they are passive investors). Individuals who are employees of new firms are therefore coded as entrepreneurs. We assume that all individuals who are employed in new firms with less than three employees are entrepreneurs; in larger firms we only consider those individuals who are top managers or directors to be founders. In the analyses presented below, we pool all three of these types of entrepreneurial entries into a single transition. We have a total of 8,018 transitions to entrepreneurship, implying that about 3% of the individuals became entrepreneurs over the period of our analysis.

[1] Our main results are essentially unchanged when the public sector is included.

Table 1 Descriptive Statistics of Main Covariates

Variable	Number of observations	Mean	Standard deviation
Peer entrepreneurial experience	1,209,693	0.05	0.14
Peer interfirm mobility	1,209,693	1.26	0.55
Own prior job mobility	1,209,693	2.03	1.07
Log *salary in DKR*	1,209,693	11.18	0.78
Nonsalary income (100,000 DKR)	1,209,693	0.09	0.17
Log *debt in DKR*	1,209,693	8.41	4.66
Log *assets in DKR*	1,209,693	9.37	3.01
Gender (female = 1)	1,209,693	0.38	0.48
Age	1,209,693	27.79	6.46
Self-employed parent in past	1,209,693	0.27	0.44
Log *establishment size* (*employees*)	1,209,693	3.78	1.72

Note. All variables (except for *gender* and *whether an individual's parents were self-employed in the past*) are time varying and hence can take a different value for each year the focal individual is in the estimation sample.

3.1. Measuring Peer Characteristics

For each of the focal individuals in the sample, we calculate measures of coworker characteristics for each year between 1990 and 1996 (given that they are employed in a given year). As discussed above, our principal explanatory variable of interest is the *prior entrepreneurial experience* of the focal individual's coworkers. To measure entrepreneurial experience, we first identify every workplace that the focal individual worked in for every year over the period 1990–1996. We then identify all of the focal individual's coworkers in each of those years. For each of these coworkers, we compute the number of years each of these colleagues had been self-employed in the preceding five years.[2] Our measure of entrepreneurial exposure is then the average number of years (of the previous five years) the focal individual's peers were entrepreneurs. This measure potentially changes yearly and is different for each focal individual. Its maximum possible value is five (indicating that all of the peers had spent the preceding five years as entrepreneurs), and the minimum is zero (indicating that none of the peers have any recent entrepreneurial experience). We report the descriptive statistics for this measure and other main covariates of interest in Table 1.

It can be seen that our measure of peer characteristics is such that we cannot directly identify the peers

[2] The choice of a five-year window is somewhat arbitrary, but reflects an assumption that the impact of entrepreneurial experience declines with time. We check that our results are not substantively impacted by the choice of window.

of a focal individual in our sample. Stated differently, we cannot determine how frequently the focal individual comes into contact with a particular coworker in the workplace; rather, our measures weight all coworkers equally. This constraint is imposed by the archival nature of the data.

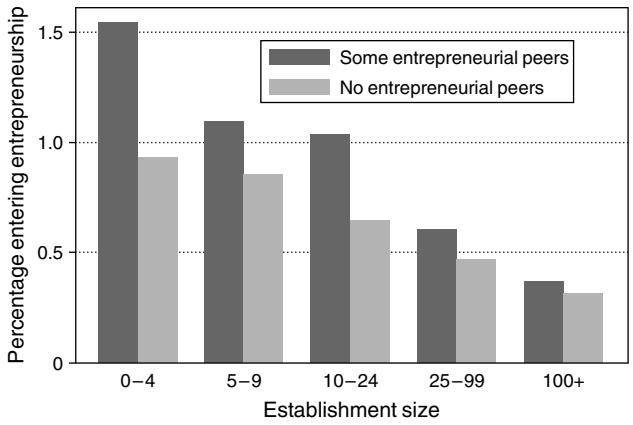
One implication of this is that the reliability of our peer measures decline with firm size. In smaller workplaces, our peer measures likely do a good job of capturing the characteristics of the people the focal individual interacts with on the job; as workplace size increases, this is less true, because the measure then captures the peer characteristics of the hypothetical average individual in the firm. To somewhat overcome this issue, we create our measure of peer characteristics at the *establishment level*. That is, for an individual working at a firm with several establishments, we only calculate the peer characteristics for individuals who are physically colocated with them. Second, because of this limitation of our measure, we directly control for establishment size in our models. Although the results that we report are based on all the establishments in our sample, we also check that our results are substantively unchanged if we restrict our analysis to smaller establishments with less than 25 employees.[3]

Despite the apparent limitation in directly measuring an individual's peers, it is important to note that even with more granular data on an individual's network, it may still be preferable to focus on a broad set of coworkers rather than self-reported interaction partners. Relying on an individual's self-reported network raises endogeneity concerns: individuals may self report being part of a network of more entrepreneurial peers precisely because they are entrepreneurially inclined. By focusing on the risk set rather than the self-reported network, our analysis is less susceptible to this concern. Our measures allow for people to be influenced by their coworkers, even if they do not choose to be friends with them.

4. Results

We begin by considering the bivariate relationships between the career experiences of workplace peers and the individual rate of entry into entrepreneurship. Figure 1 displays the relationship between exposure to entrepreneurial peers and the rate of entrepreneurship, by establishment size. We see that compared to workers who do not have colleagues with prior entrepreneurial experience, those who do are substantially more likely to become entrepreneurs. This is particularly true in smaller establishments; the relationship between entrepreneurial exposure and entry rates attenuates as workplace size increases. Stated differently (and consistent with our discussion in the previous section), the relationship is strongest where we suspect the measure is most accurate. In very small establishments, the presence of entrepreneurial peers is associated with double the rate of entry, whereas the relationship is substantially more modest in large establishments.

Figure 1 **Rate of Entrepreneurial Entry by Peer Entrepreneurial Experience**



The bivariate result in Figure 1 is naturally subject to many caveats. Those who transition to being entrepreneurs in the next period are more likely to have entrepreneurial peers, but are also likely to be more wealthy, have higher salary incomes, be somewhat more educated, be much more likely to be males, and to have parents with prior entrepreneurial experience. To further investigate the relationship between entrepreneurial peers and the transition to entrepreneurship, and to control for these important covariates of entrepreneurship, we turn to multivariate models.

Because we have panel data, we estimate discrete-time event history models of the transition to entrepreneurship using logistic regression. We control for a wide variety of individual attributes including the individual's own prior job mobility, labor force experience, education, wealth, income, parental self-employment, and demographic characteristics such as their marital status and children. We also control for characteristics of the workplace, such as establishment size, firm age, number of establishments in the firm, and industrial diversification of the firm. We cluster standard errors in all the regressions at the establishment level. Table 2 presents the estimated results of these logistic regressions with the full set of control variables. Column (1) shows that individuals are more likely to enter into entrepreneurship if

[3] In our sample, 11% of establishments have more than 25 employees. Moreover, because our peer characteristics are calculated at the establishment level, firms with more than 25 employees may still be represented in the sample (if individual workplaces have fewer than 25 employees).

Table 2 Logistic Regression Estimates of the Transition to Entrepreneurship

	Actual peer group			Placebo	
	Full sample	Full sample	Conditional on turnover	Full sample	Conditional on turnover
Variable	(1)	(2)	(3)	(4)	(5)
Peer entrepreneurial experience	0.300** (0.043)	0.307** (0.045)	0.274** (0.047)		
"Fictitious" peer entrepreneurial experience				0.058 (0.029)	0.056 (0.033)
Peer interfirm mobility		0.213** (0.022)	0.074** (0.023)	0.252** (0.028)	0.075* (0.029)
Own prior job mobility	0.102** (0.014)	0.096** (0.014)	0.015 (0.014)	0.090** (0.017)	0.013 (0.017)
Log *salary*	−0.118** (0.020)	−0.119** (0.020)	0.140** (0.022)	−0.145** (0.023)	0.115** (0.026)
Nonsalary income	0.297** (0.041)	0.294** (0.040)	0.202** (0.052)	0.297** (0.049)	0.210** (0.068)
Log *debt*	0.027** (0.003)	0.027** (0.003)	0.021** (0.003)	0.027** (0.004)	0.022** (0.004)
Log *assets*	0.024** (0.005)	0.025** (0.005)	0.050** (0.005)	0.033** (0.006)	0.058** (0.006)
Gender (female = 1)	−0.767** (0.030)	−0.770** (0.030)	−0.768** (0.031)	−0.765** (0.036)	−0.759** (0.036)
Age	0.118** (0.020)	0.113** (0.020)	0.067** (0.020)	0.105** (0.023)	0.051* (0.023)
Age squared	−0.002** (0.000)	−0.002** (0.000)	−0.001** (0.000)	−0.002** (0.000)	−0.001 (0.000)
Self-employed parent in past	0.257** (0.025)	0.258** (0.025)	0.285** (0.025)	0.270** (0.029)	0.301** (0.029)
Log *establishment size*	−0.167** (0.010)	−0.160** (0.010)	−0.130** (0.011)	−0.157** (0.012)	−0.127** (0.013)
Industry, year, and county fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	1,209,693	1,209,693	438,310	945,105	340,470

Notes. All variables (except for *gender* and *whether an individual's parents were self-employed in the past*) are time varying and hence can take a different value for each year the focal individual is in the estimation sample. All regressions also include unreported control variables for the focal individual's labor force experience, occupation code, job tenure, educational qualifications, citizenship, marital status, and number of children and firm-level controls for the firm age and the number of establishments in the firm for which the focal individual works.

*$p < 0.5$; **$p < 0.01$. Robust standard errors are in parentheses, clustered at the establishment level.

they have coworkers with prior entrepreneurial experience, supporting Hypothesis 1.

Using the coefficient from column (1) of Table 1 suggests that a one standard deviation increase in the entrepreneurial experience measure of coworkers is associated with a 4% increase in the focal individual's predicted rate of entrepreneurship ($\exp(0.300 * 0.14)$). By comparison, having self-employed parents (going from a zero to a one on the parental self-employment coefficient) is associated with a 29% increase in the probability of becoming an entrepreneur. Given that the transition to entrepreneurship is a relatively rare event, a 4% increase has a small absolute effect on the transition rates. However, the magnitudes suggest that relative to the benchmark of having self-employed parents, peers may play an important role in the propensity to become an entrepreneur.

One potential concern with our models is that the measure of entrepreneurial peers captures generic informational effects of interfirm mobility—that may also be associated with information spillovers that influence entrepreneurship (Saxenian 1994, Fallick et al. 2006). To address this concern, we specifically control for the average interfirm mobility of coworkers as one of our covariates in column (2). As with the peer entrepreneurship measure, this is calculated as the average number of different firms each coworker worked at in the prior five years. Both models also control for the number of prior firms the focal individual worked at in the prior five years. As can be seen from Model 2, we find that prior interfirm mobility of coworkers is associated with higher rates of entrepreneurship. However, the measure of peer experience continues to be associated with a greater likelihood of transitioning to entrepreneurship, independent of prior coworker mobility across firms—continuing to provide support for Hypothesis 1.

A second concern (which is a corollary of the first) is that prior entrepreneurial experience of peers may be associated with a general increase in the propensity to leave the firm (say because these peers make for bad colleagues) and that the increase in rates of entrepreneurship we see is just a manifestation of this broader labor market phenomenon. In Model 3, we therefore report the results of transition into entrepreneurship conditional on a turnover event (i.e., restricting the sample to observations where the individual leaves the firm to either become an entrepreneur or work at another firm). If entrepreneurship was just part of a broader trend toward leaving the firm, we should not see a difference in transitions to entrepreneurship, conditional on a turnover event happening. In fact, we see that the association continues to hold, lending credence to our interpretation that the career experiences of peers influence entrepreneurial motivation and opportunity rather than just a motivation to leave the firm.

To address the possibility that regional variation in institutions favoring entrepreneurs may account for the spurious relationship between peer characteristics and entrepreneurship, we include regional (county-level) fixed effects in all our regressions. All our estimates are therefore "within county" and therefore explicitly control for unobserved variation at the regional level that may be driving our results. We also include year fixed effects and industry fixed effects (at the equivalent of the SIC2 level) as additional controls in all regressions.

Despite these controls, our specifications remain subject to the inferential concerns outlined in the

introduction. The central question is whether this association is in fact genuine, or whether it is driven by a spurious correlation that is driven by selection at the individual or firm level.

Our first attempt to address this possible spurious correlation is to run the following placebo test: for each focal individual, we construct a measure of *fictitious peer entrepreneurial experience* by looking at the prior entrepreneurial experience of individuals who worked at the establishment in the two years prior to the individual joining it, but who *did not* work at the firm when the focal individual worked there. The results of this placebo test are reported in columns (4) and (5). Model 4 is the identical regression to Model 2, with the exception of the measure of entrepreneurial peers. By comparing the two columns, it can be seen that the coefficients across all the other covariates are strikingly similar. However, the magnitude of the *fictitious peer entrepreneurial experience* variable is far smaller than that of the equivalent measure of actual peers. In fact, the estimate is not statistically significant. The same is true when comparing Model 5 to Model 3. Because we find that the results of this fictitious peer group are insignificant, it suggests that our findings are related to the actual set of coworkers in the firm at the time the focal individual worked there.[4]

The fact that the placebo test provides a null result is reassuring, but of course does not establish proof of a causal relationship between workplace peers and the decision to become an entrepreneur. It still leaves open the possibility of unobserved heterogeneity at the establishment or individual level at the time the focal individual joined the firm that drives this result.

We, therefore, now turn to attempting to address these concerns. To address unobserved heterogeneity at both the establishment level and individual level, we would also like to include both establishment-level and individual-level fixed effects in our models. However, both fixed effects are identified together only when at least two individuals (in different years) leave the establishment to become entrepreneurs. Given the low transition rate to entrepreneurship, there are very few establishments where this is the case, and those where this is true will tend to be larger in size than those where it is not. This difference in the types of establishments where fixed effects are identified compared to where they are not is in violation of a key assumption of fixed-effects models.

We therefore employ an indirect strategy by partitioning our establishment-level peer measures into fixed and time-varying components. First, we measure the peer characteristics at the time the focal individual enters the establishment. Second, we create a time-varying measure based on the characteristics (i.e., prior entrepreneurial experience and interfirm mobility) of each individual who joins the workplace during the focal individual's tenure. The peer characteristics measured at the time of entry into the establishment capture any fixed, unobserved characteristics of the establishment that influence the baseline level of the entrepreneurial exposure. Because these baseline levels may be driven by unobserved characteristics of the firm, we attach no interpretation to them; instead, we focus on the measure of changes in peer characteristics. By partitioning the measures in this way, we are able to identify how any changes in peer characteristics during an individual's tenure with the firm are associated with their decision to become an entrepreneur.[5] These results are outlined in Table 3. As before, these models include the full set of control variables in Table 2. Column (1) of Table 3 is equivalent to column (2) of Table 2. The coefficients are slightly different because of the slightly fewer observations in Table 3. This is because some individuals only had a single year's tenure at an establishment, so that the change score could not be calculated for them. Column (2) of Table 3 shows that controlling for the peer entrepreneurial experience at entry, an increase in the peer entrepreneurial characteristics is associated with an increase in the likelihood of becoming an entrepreneur. The estimates reinforce the conclusions drawn from Table 2 that Hypothesis 1 is supported.

Coworkers with entrepreneurial experience are, by definition, no longer full-time entrepreneurs. Many of these individuals will have sought paid employment due to the failure or poor performance of their entrepreneurial ventures. In column (3) of Table 3, we separate out peers who started ventures that exited within a year from those who started ventures that lasted longer. Although we cannot say with certainty that those whose ventures survived longer were all successes, it is highly likely that those that lasted only a year were generally failures.[6] Model 3 reports the

[4] We rerun Models 2 and 3 by restricting them to the same number of observations in Models 4 and 5, and confirm that the results continue to hold.

[5] As with establishment-level fixed effects, this approach assumes that the relevant unobserved firm characteristics are fixed over the history of the focal individual's attachment to a firm. We find this assumption reasonable, but cannot rule out the possibility that changes in the peer measures may be driven by unobserved changes in firm policies or culture.

[6] We are limited by our data to measuring success and failure through firm exit rather than by looking at revenue or profits of the firm. There is potential for better measurement of these outcomes using data sets that can explicitly measure the intensive margin of firm-level performance.

Table 3 Logistic Regression Estimates of Changes in Peer Characteristics

Variable	(1)	(2)	(3)
Peer entrepreneurial experience at entry	0.318** (0.045)	0.280** (0.048)	
Change in peer entrepreneurial experience		0.361** (0.106)	
"Failed" entrepreneurial peers at entry			0.473* (0.205)
Change in "failed" entrepreneurial peers			1.750** (0.493)
"Successful" entrepreneurial peers at entry			0.701** (0.131)
Change in "successful" entrepreneurial peers			0.820** (0.314)
Industry, year, and county fixed effects	Yes	Yes	Yes
Number of observations	1,205,777	1,205,777	1,205,777

Notes. All regressions also include the full set of control variables that are included in the regressions in Table 2. There are 3,916 fewer observations in these regressions compared to column (1) of Table 2. This is because some individuals only had a year's tenure in the establishment they worked at. For these individuals, the change in peers at the establishment cannot be calculated and hence are treated as censored in the regressions.

*$p < 0.5$; **$p < 0.01$. Robust standard errors are in parentheses, clustered at the establishment level.

Table 4 Conditional Fixed-Effects Logit Models

Variable	(1)	(2)	(3)
Peer entrepreneurial experience at entry	0.967** (0.050)	0.907** (0.050)	
Change in peer entrepreneurial experience		1.233** (0.091)	
"Failed" entrepreneurial peers at entry			1.425** (0.419)
Change in "failed" entrepreneurial peers			1.139** (0.268)
"Successful" entrepreneurial peers at entry			4.015** (0.897)
Change in "successful" entrepreneurial peers			1.846** (0.551)
Industry, year, and county fixed effects	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes
Number of observations	56,001	56,001	56,001

Note. The smaller number of observations is because conditional fixed-effects logit models are only identified for individuals who ultimately became entrepreneurs.

*$p < 0.5$; **$p < 0.01$. Robust standard errors are in parentheses.

results separately for these two types of peers. Focusing on the coefficient estimates for the change variables, we see that the addition of both failed and more successful entrepreneurs to the work environment are associated with an increase in the rate of entrepreneurial entry.[7] The fact that even the least successful entrepreneurial peers are positively associated with the rate of entrepreneurship may strike some as surprising. However, we believe that it is consistent with our arguments about the ways in which entrepreneurial peers shape entrepreneurial motivation and opportunity. "Failed" entrepreneurs who have found employment may, in particular, play an important role in reducing risk aversion and any "stigma of failure" associated with entrepreneurship (Landier 2005).

In Table 4, we look at ways to address the possibility that our associations are biased by unobserved heterogeneity in fixed individual characteristics. For example, those with a taste for entrepreneurship or certain risk preferences may also seek out similar, entrepreneurial peers. To address this concern, we combine our estimation procedure in Table 3 with an individual fixed-effects estimation strategy. We estimate discrete-time hazard rate models using conditional logit models, because this is the nearest approximation to including individual fixed effects in a hazard rate model (Allison and Christakis 2006). These models estimate the rate of entrepreneurship using within-career variation in individual and firm characteristics. As with all fixed-effects models, they are identified only in instances where there is variation in the outcome of interest. Therefore, in this case, these models are only estimated on the set of individuals who eventually transition to entrepreneurship.[8]

Estimates from conditional fixed-effects logistic regression models are presented in Table 4. These models estimate the rate of entrepreneurship as a function of within-career variation in firm characteristics. That is, controlling for (fixed) inherent

[7] The point estimates for changes in the proportion of failed entrepreneurial peers appear larger than the point estimates for successful entrepreneurs; however, these differences are not statistically significant.

[8] Although individual fixed-effects models are very useful in this context, we should note two important limitations. First, the use of a fixed-effects estimator only addresses the issue of fixed unobserved heterogeneity among individuals. It leaves open the possibility that people's preferences for entrepreneurship may vary in unobserved, time-varying ways that also impact the choice of employer prior to entrepreneurial entry. Second, the nature of the conditional fixed-effects estimator in a hazard rate context limits the range of time-varying individual characteristics that can be controlled. In particular, the conditional fixed-effects estimator will lead to biased estimates of any variables that are correlated with time (Allison and Christakis 2006). This is a consequence of the fact that when studying a nonrepeatable event, such as the first transition to entrepreneurship, the event necessarily occurs at the end of the observation period. Duration at risk is therefore a perfect predictor of the event, and any variable that is correlated with duration at risk will appear to be correlated with the hazard rate, even if the true correlation is zero. This fact rules out a wide range of variables plausibly related to the decision to enter entrepreneurship, including such factors as income and wealth, because they tend to increase with time.

Table 5 Coworker Influences Relative to Other Sources of Entrepreneurial Exposure Conditional Fixed-Effects Logit Models

Variable	(1)	(2)	(3)
Peer entrepreneurial experience at entry	0.907** (0.050)	0.911** (0.050)	0.905** (0.050)
Change in peer entrepreneurial experience	1.233** (0.091)	1.490** (0.111)	1.133** (0.101)
Self-employed parents × change in entrepreneurial experience		−0.768** (0.193)	
More entrepreneurial region × change in entrepreneurial experience			−0.559* (0.241)
Industry, year, and county fixed effects	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes
Number of observations	56,001	56,001	56,001

Note. The smaller number of observations is because conditional fixed-effects logit models are only identified for individuals who ultimately became entrepreneurs.

*$p < 0.5$; **$p < 0.01$. Robust standard errors are in parentheses.

entrepreneurial tendencies of different individuals, they examine whether individuals are more likely to become entrepreneurs in years when the measures of peer characteristics are highest. Again, the estimates in Table 4 reinforce our earlier results, and suggest that the estimated associations are not spurious consequences of sorting on fixed individual characteristics. As with Table 3, the models in Table 4 show that both "failed" and "more successful" peers are associated with the propensity to become an entrepreneur, even when controlling for fixed individual traits.

Having shown that Hypothesis 1 is robust to several different attempts to control for unobserved heterogeneity, we turn to an exploration of Hypothesis 2. We first look at whether the coworker association is less strong for those whose parents were entrepreneurs in the past. Our main variable of interest is thus the interaction between the prior entrepreneurial experience of the focal individual's parents and the focal individual's coworkers. The results for this estimation are outlined in Model 2 of Table 5. We should note that the main effect of parental self-employment is not reported because it is a fixed individual attribute and hence is absorbed in the individual fixed effects. We find that, indeed, the interaction is negative and statistically significant, suggesting that those whose parents were self-employed in the past are less influenced by entrepreneurial coworkers than those who were not exposed to entrepreneurship in their family.

To examine this hypothesis further, we look at another measure of exposure to entrepreneurship: the region where individuals work. To calculate the level of entrepreneurship across regions, we calculate the prior entrepreneurial experience (in the prior five years) for all individuals in the labor market in 1989. We then average these individual-level entrepreneurial measures by county and create a dummy variable that takes a value of one if the county is one with above median rates of entrepreneurship. We then interact this dummy with the measure of peer entrepreneurial experience, as with Model 2. That is, we examine whether the role of workplace peers is stronger or weaker when the focal individual works in a more entrepreneurial county. Again, the main effect of whether a county is more entrepreneurial is not reported because it is absorbed by the county fixed effects. Similar to Model 2, the coefficient on the interaction is negative, suggesting that those who work in counties with lower rates of entrepreneurship benefit more from entrepreneurial peers than those who work in counties where entrepreneurship is more prevalent. This is consistent with the findings of Giannetti and Simonov (2009) using different measures of entrepreneurship. Overall, our results support the hypothesis that coworker influences act as substitutes for those who have less exposure to entrepreneurship in other aspects of their lives, although we cannot rule out the possibility that those with entrepreneurial parents also have a latent characteristic that makes them less likely to be influenced by their peers.

5. Conclusion

Who your coworkers are, and in particular what they have done in their own careers, is associated with the likelihood that you will become an entrepreneur. We find that employees are more likely to become entrepreneurs if their coworkers have had prior self-employment experience. Our analyses suggest that the career experiences of peers in the workplace play an important role in defining the informational and normative environment within which individuals reach the decision to become entrepreneurs. In addition, our interaction effects suggest that environmental influences from one aspect of one's life can act as substitutes for the environmental influences from the workplace. We interpret this as suggestive evidence that entrepreneurial parents and colleagues might exert similar types of influences, for example, by conveying information about the entrepreneurial process and by changing attitudes toward entrepreneurship. We find similar results for individuals working in regions with more entrepreneurial colleagues.

These results are robust to controlling for fixed region-, firm-, and individual-level attributes, suggesting that they are not the results of a spurious correlation due to fixed, unobserved individual-, firm-, or region-level factors. Nevertheless, because we do not have a "natural experiment," we cannot completely rule out the possibility of spurious correlation, for example, arising from time-varying individual- or firm-level attributes.

Our results have a number of implications for our understanding of entrepreneurship. First, our theory and evidence speak to calls to focus on the role of individual motivation in the entrepreneurial process. Critics of structural approaches to entrepreneurship argue that these approaches "have resulted in insufficient consideration of the role of the human motivation in the entrepreneurial process" because "variance across people in [their] motivations will influence who pursues entrepreneurial opportunities, who assembles resources, and how people undertake the entrepreneurial process" (Shane et al. 2003, p. 258). Our results speak to the importance of contextual and social influences on entrepreneurial motivation, and suggest that a focus on entrepreneurial motivation does not require a focus on fixed, dispositional traits. That is, whereas individual variation in innate traits such as extraversion or risk-taking ability may shape entry into entrepreneurship (Nicolaou et al. 2008), the composition of an individual's peer group may influence the likelihood of entrepreneurial activity as well. Our study is one of several recent studies that demonstrate this in different contexts (Gompers et al. 2005, Giannetti and Simonov 2009, Lerner and Malmendier 2008, Stuart and Ding 2006, Xu and Ruef 2004).

Second, we provide further evidence of the importance of the workplace in the entrepreneurial process (Freeman 1986, Burton et al. 2002, Wagner 2004, Dobrev and Barnett 2005, Gompers et al. 2005, Sørensen 2007a, Elfenbein et al. 2010, Parker 2009). Where previous research has emphasized formal, structural features of the workplace such as firm size and age, our analyses show that we can better understand firm-level variation in rates of entrepreneurial spawning by attending to the social composition of the workplace as well. Moreover, they suggest that firm policies and practices related to hiring and retention may have indirect consequences for entrepreneurial activity. As noted earlier, the workplace is a particularly important source of entrepreneurial influence in modern societies, because it is the dominant arena in which individuals have limited discretion over who their interaction partners are. As a result, the workplace becomes a setting for unexpected influences, and for the serendipitous flow of information and ideas that may spark entrepreneurial activity.

Finally, our results speak in important ways to the literature on regional variation in entrepreneurship, and the role of both entrepreneurial culture and knowledge spillovers in generating clusters of economic activity (Saxenian 1994, Sorenson and Audia 2000, Fallick et al. 2006, Giannetti and Simonov 2009). Whereas this literature has generally relied on inferences from aggregate data on labor flows and entrepreneurship, we provide evidence from microdata that support these analyses, lending further credence to the role of social influences in driving regional variation in rates of entrepreneurship. A stigma of failure attached to entrepreneurship may thus affect not only the cost-benefit analyses of people considering entrepreneurship (Landier 2005), but also the supply of prospective entrepreneurs itself.

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