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Bureaucracy and Entrepreneurship: Workplace Effects on Entrepreneurial Entry

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Using a study of the relationship between bureaucratic work environments and individual rates of entrepreneurship, I revisit a fundamental premise of sociological approaches to entrepreneurship, namely, that the social context shapes the likelihood of entrepreneurial activity, above and beyond any effects of individual characteristics. Establishing such contextual effects empirically is complicated by the possibility that unobserved individual traits influence both the contexts in which people are observed and their likelihood of becoming entrepreneurs. This paper presents the first systematic study of the effects of bureaucracy on entrepreneurship that accounts for such unobserved sorting processes. Analyses of data on labor market attachments and transitions to entrepreneurship in Denmark between 1990 and 1997 show that people who work for large and old firms are less likely to become entrepreneurs, net of a host of observable individual characteristics. Moreover, there is strong evidence to suggest that this negative effect of bureaucracy does not spuriously reflect self-selection by nascent entrepreneurs into different types of firms. An important implication of this finding is that the structure of organizational populations affects the supply of nascent entrepreneurs, as well as the availability of entrepreneurial opportunities.●

One of the central and most long-lasting debates in entrepreneurship research is between contextual and dispositional approaches to explaining entrepreneurial activity (for reviews, see Thornton, 1999; Aldrich, 1999; Shane, 2003). Contextual accounts, rooted primarily in sociology, hold that features of a position in social structure may encourage or retard entrepreneurial activity independent of the characteristics of the position's occupants. As sociological interest in entrepreneurship has grown, scholars have suggested a number of structural influences on entrepreneurial activity, including the family of origin (Halaby, 2003; Sørensen, 2007), work environment (Freeman, 1986; Dobrev and Barnett, 2005), social networks (Stuart and Sorenson, 2005), and the regional cultural and material environment (Saxenian, 1994; Sorenson and Audia, 2000; Romanelli and Schoonhoven, 2001). Dispositional accounts, by contrast, emphasize that stable individual traits lead to entrepreneurial activity, independent of context. A large body of research, for example, links individual differences in risk aversion to entrepreneurship (Kihlstrom and Laffont, 1979; Cramer et al., 2002; Ekelund et al., 2005; for a skeptical view, see Xu and Ruef, 2004). Others link entrepreneurial activity to individual differences in entrepreneurial ability (Lucas, 1978; Dunn and Holtz-Eakin, 2000), the need for achievement (McClelland, 1961), and other aspects of personality (Zhao and Seibert, 2006).

Many advocates of contextual approaches are dismissive of dispositional explanations for entrepreneurship (Brockhaus and Horwitz, 1986; Aldrich and Zimmer, 1986; Gartner, 1988; Thornton, 1999). To a large extent, this is due to the perception that evidence in support of the dispositional approach is weak, or that dispositional factors are relatively unimportant. Thornton (1999: 23), for example, concluded that "there has been little progress in relating types of entrepreneurs to the

formation of new ventures." More forcefully, Aldrich (1999: 76) argued that "a major problem for entrepreneurship and organization theorists has been the pervasive belief that the explanation for entrepreneurial achievements must be sought in personal traits . . . personal traits, taken out of context, simply do not explain very much."

But unconvincing or weak evidence for dispositional explanations does not constitute strong evidence for contextual arguments. A central challenge for sociological approaches to entrepreneurship is that much of the evidence marshaled in support of contextual arguments does not adequately address potential alternative explanations rooted in dispositional effects. This is perhaps most easily seen in the growing number of studies that document how the characteristics of employers, such as age, size, and prestige, affect rates of entrepreneurship (Gompers, Lerner, and Scharfstein, 2005; Dobrev and Barnett, 2005; Stuart and Ding, 2006). The interpretation of these empirical relationships is complicated by the fact that individuals choose where they work, for reasons generally not observable to the researcher but potentially related to their entry into entrepreneurship. The choice of whether to work for a large or small firm, for example, may be driven by the same factors, such as risk attitudes and personality, that dispositional researchers claim drive entrepreneurial entry. This naturally raises the concern that the observed contextual effects are spurious.

The sociological study of entrepreneurship is hindered to the extent that such interpretive ambiguity persists, for three reasons. First, interpretive ambiguity creates barriers to advances in theory among both dispositional and contextual researchers, particularly to the extent that it hinders productive dialogue between scholars. As Shane (2003) pointed out, much of the debate between dispositional and contextual approaches has been limited to mutual criticism, with each side focusing on faulting the evidence put forward by the other. Second, disputes over the interpretation of basic empirical patterns create substantial doubt concerning the field's understanding of the dynamics of entrepreneurship. The inability to point convincingly to drivers of entrepreneurship limits the potential impact of scholarship on entrepreneurship. Third, to the extent that sociologists are unable to address the dispositional alternative convincingly, their role in explaining entrepreneurial activity is likely to be seen as limited to providing "demand-side" explanations (Thornton, 1999), focusing on factors that influence the availability of entrepreneurial opportunities. Yet there is no a priori reason to expect that sociological theories of entrepreneurship should not include explaining why some people respond to opportunities while others do not (Shane and Venkataraman, 2000), or why some individuals try to pursue entrepreneurial opportunities that may not be there (Sørensen and Sorenson, 2003).

One contextual argument that is particularly vulnerable to charges of spuriousness is the long-standing idea that bureaucratic work environments suppress individual rates of entrepreneurship. The idea that bureaucracy suppresses entrepreneurship has deep roots in organizational theory,

reaching back to the classic studies of bureaucracy of the 1950s, which held that the growth of the modern bureaucratic organization created workers lacking in entrepreneurial spirit, if not hostile to entrepreneurial activity (Schumpeter, 1950; Whyte, 1956; Merton, 1968). Recent years have seen a renewed interest in the effects of work environments and entrepreneurship, driven by the more general argument that existing firms play an important role in structuring the exposure of individuals to entrepreneurial opportunities and in shaping their desire and willingness to engage in entrepreneurship (Freeman, 1986; Carroll and Mosakowski, 1987; Romanelli, 1989; Thornton, 1999; Shane, 2000; Romanelli and Schoonhoven, 2001).

The empirical relationship between bureaucracy and entrepreneurship is an appealing focus because it is one for which alternative explanations rooted in dispositional factors are particularly plausible. It is not hard to imagine that the traits that would lead people to enter into entrepreneurship are also traits that would lead them to try to avoid employment in bureaucratic firms. Parker (2006), for example, developed a theoretical model that implies a negative relationship between firm size and rates of entrepreneurship due to the self-selection of less risk-averse individuals into small firms with more variable wages. Along similar lines, recent research based on twin studies suggests that there is a heritable component to both job values and interests (Keller et al., 1992; Lykken et al., 1993) and entrepreneurial activity (Nicolaou et al., 2006). Although the precise mechanisms linking genetic factors to entrepreneurial activity are far from clear, these studies raise the possibility that genetic determinants shape both workplace choice and subsequent entry into entrepreneurship.

Methodologically, the major challenge in isolating a contextual effect of bureaucracy on entrepreneurship is to address the sorting of individuals with different observed and unobserved characteristics into firms with varying levels of bureaucratization. Barring experimental data, accounting for such sorting processes requires longitudinal data in which individuals are observed as they move between firms with varying levels of bureaucratization. I therefore analyzed the relationship between bureaucracy and entrepreneurship using a rich, longitudinal, matched employer-employee data set characterizing individuals in the Danish labor market between 1990 and 1997. These data allowed me to address, to a much greater extent than in prior research, the concern that individuals with entrepreneurial inclinations self-select into particular types of organizations.

THE EFFECTS OF BUREAUCRACY ON ENTREPRENEURSHIP

Bureaucracy and entrepreneurship are both widely studied topics and are both characterized by a wide variety of conceptual definitions. Explicit definitions of these central terms are therefore important. In line with traditional discussions in organizational theory, I take the bureaucratization of organizations to consist of a number of common processes, including increased role differentiation and specialization within the

firm, the emergence of specialized roles devoted to coordina-
tion and administration, the routinization of activities through
the adoption of standard operating procedures, and the emer-
gence of career tracks within an organizational hierarchy
(Bendix, 1956; March and Simon, 1958; Weber, 1968; Blau
and Schoenherr, 1971). I define entrepreneurship in terms of
two elements common to many conceptualizations. First,
entrepreneurship involves perceiving and trying to exploit
new business opportunities, whether these turn out to be
disruptive Schumpeterian innovations or more modest oppor-
tunities arising from market disequilibria (Schumpeter, 1934;
Kirzner, 1973; Venkataraman, 1997; Shane, 2003). Second,
entrepreneurship involves organizing, operating, and assum-
ing the risk of a new business venture (Aldrich, 1999; Cas-
son, 2003). In this conception, entrepreneurs stand in con-
trast to workers, and thus entering entrepreneurship is a
labor market transition: leaving employment with established
organizations for self-employment, whether or not that
involves employing others (Shane, 2003; Parker, 2004).

A review of the literature suggests at least four different and
possibly complementary contextual mechanisms through
which bureaucracy might influence entrepreneurial transi-
tions. First, as emphasized in the classic discussions of
bureaucratic life, bureaucracies may influence the attitudes
and mental dispositions of their employees in ways that
make them less likely to enter entrepreneurship. Second,
work in bureaucracies may hinder development of the skills
necessary for successful entrepreneurship and may therefore
lower the expected value of entrepreneurial opportunities.
Third, an employer's level of bureaucratization may shape the
exposure of employees to entrepreneurial opportunities and
activities. Finally, bureaucracies create job stability and inter-
nal routes of advancement, thereby increasing the opportuni-
ty costs of leaving paid employment to found a new venture.
I discuss each of these possible paths of influence in turn.

First, bureaucracies have long been accused of creating timid
and conforming workers who are unlikely to challenge the
existing order by pursuing entrepreneurial opportunities
(Whyte, 1956). Merton (1968: 255) suggested that bureaucra-
cies—with their rigidly defined roles, elaborated hierarchies,
and emphasis on rules and routines—"lead to an over-con-
cern with strict adherence to regulations which induces
timidity, conservatism, and technicism." Similarly, Schum-
peter (1950: 133, 207) held that "rationalized and specialized
office work will eventually blot out personality, the calculable
result, the 'vision'" and that "the bureaucratic method of
transacting business and the moral atmosphere it spreads . . .
exert a depressing influence on the most active minds."
Empirical support for these ideas can be found in a long line
of sociological research on work and personality characteris-
tics, which has shown that workers exhibit less intellectual
flexibility and greater social conformity when they work in
jobs that are routinized, substantively simple and closely
supervised and monitored, precisely the characteristics of
many jobs in bureaucratic organizations (Kohn and Schooler,
1982; see Spenner, 1988, for a review).

Second, bureaucracy may also lower rates of entrepreneurship by hindering the development of entrepreneurial skills. Lazear (2005) argued that if successful entrepreneurial activity requires the mastery of a wide variety of roles, then individuals with diverse work experiences will find entrepreneurial opportunities more attractive. Employees of bureaucratic firms are more likely to undertake a narrow range of tasks; although some may rotate through functional responsibilities, the prototypical job ladder rewards depth of skills as opposed to breadth. The average diversity of work experiences should therefore be higher among workers in firms without an elaborate division of labor, implying that rates of entrepreneurship will be lower among employees of bureaucratic firms.

Third, other scholars have argued that employees with a broad knowledge of the firm's external environment are in a better position to identify entrepreneurial opportunities and are more likely to have access to a network of buyers and suppliers (Saxenian, 1994; Sorenson and Audia, 2000; Gompers, Lerner, and Scharfstein, 2005). As bureaucratization progresses, however, administrative functions devoted to coordination and control become more prevalent, making workers in more bureaucratic firms more inwardly focused on average. They are therefore less likely to understand the entrepreneurial landscape, because they either have less direct experience of the environment or have fewer social ties to actors in the environment that might serve as sources of resources and information. This again suggests that a more fine-grained division of labor should lead to lower rates of entrepreneurship.[1]

Finally, employment in established, bureaucratic organizations is often deemed more desirable than employment in smaller, less formalized organizations. The formalization of roles and responsibilities means that an employee's career prospects within a bureaucratic organization are less dependent on personal relationships. Furthermore, the existence of an elaborated organizational hierarchy allows for internal advancement as a viable career, whether or not the organization has a formal internal labor market. Because these factors increase the opportunity cost of leaving to launch a risky entrepreneurial venture, employees of bureaucratic organizations should be less likely to enter into entrepreneurship.[2]

Prior Research

Although the classic treatises on bureaucracy did not provide direct evidence of its negative impact on entrepreneurship, more recent research does provide evidence consistent with the hypothesis. Saxenian's (1994) historical and qualitative comparison of Silicon Valley and Boston's Route 128, for example, attributes the differences in entrepreneurial activity in the two regions to differences in the size distribution of local high-technology firms. In Saxenian's interpretation, the dominance of Route 128 by large, bureaucratic firms such as Digital Equipment Corporation meant that employees of these firms were overly insulated from entrepreneurial experiences and opportunities. Gompers, Lerner, and Scharfstein (2005) showed that venture-capital-backed firms are more likely to be started by former employees of younger and

1
Ideally, the effects of exposure to the entrepreneurial environment, as well as the breadth of job experiences, could be tested directly with detailed information on individual job responsibilities and interaction patterns. Unfortunately, such information was not available in the data set used here.

2
Plausible theoretical accounts hold that bureaucracies encourage entrepreneurship because these firms generate more innovations than they are willing or able to pursue (Freeman, 1986; Gompers, Lerner, and Scharfstein, 2005). Although existing research (discussed below) has found a negative correlation between bureaucracy and entrepreneurship, it is possible that sorting processes obscure the potential positive effects of bureaucracy. This reinforces the importance of addressing sorting processes in the empirical analysis.

smaller established firms. They attributed this to the impact of the work environment: ". . . the breeding grounds for entrepreneurial firms are more likely to be other entrepreneurial firms. It is in these environments that employees learn from their co-workers about what it takes to start a new firm and are exposed to a network of suppliers and customers who are used to dealing with start-up companies" (Gompers, Lerner, and Scharfstein, 2005: 612). Wagner (2004), using a cross-sectional survey of the German population, found that people working for young and small firms were more likely to self-identify as being in the process of launching an entrepreneurial venture. Eriksson and Kuhn (2006), using register data on the Danish population, found that employees of large firms were less likely to found entrepreneurial ventures. Finally, Dobrev and Barnett (2005), studying career histories of business school alumni, found that employees are less likely to enter entrepreneurship if they work for old and large firms. They attributed this empirical pattern to the increased role differentiation and routinization that accompany bureaucratization.

The evidence in these studies for a negative relationship between bureaucracy and entrepreneurship seemingly bolsters the claim that contextual effects are important drivers of entrepreneurial behavior (cf. Dobrev and Barnett, 2005: 445). From a dispositional perspective, however, existing contextual explanations for the observed correlation between bureaucratic work conditions and entrepreneurship are questionable, given the potential association between individual traits and employment choices. Individuals are not assigned to employers randomly. Rather, labor market matches occur through choices by both employers and employees. Individuals choose where to work based in part on the employer's characteristics; extensive research suggests that people choose jobs consistent with their work values, such as preferences for autonomy (e.g., Mortimer and Lorence, 1979; Spenner, 1988; Halaby, 2003). Furthermore, employers are selective in choosing whom they hire and retain; a rigidly bureaucratic employer, for example, may not tolerate employees who refuse to follow prescribed procedures.

Although it has not been widely studied empirically, there is indirect empirical evidence of people with entrepreneurial tendencies choosing to work for less bureaucratic firms. Halaby (2003), for example, showed that children of self-employed fathers attached greater value to jobs that offered variety and less value to jobs that offered long-term security in the form of pensions. Halaby's findings are important clues to potential sorting, since children of self-employed parents are substantially more likely to become self-employed themselves (Aldrich, Renzulli, and Langton, 1998; Dunn and Holtz-Eakin, 2000). Their higher self-employment rate is at least in part due to the impact of the parents' self-employment on their children's aspirations and job values (Sørensen, 2007). More direct evidence that people with entrepreneurial tendencies work for less bureaucratic employers can be found by considering the association between an employee's workplace characteristics and his or her parents' self-employment status. Figure 1 presents the distribution of parental self-

Figure 1. Workers with self-employed parents, by size of employer.
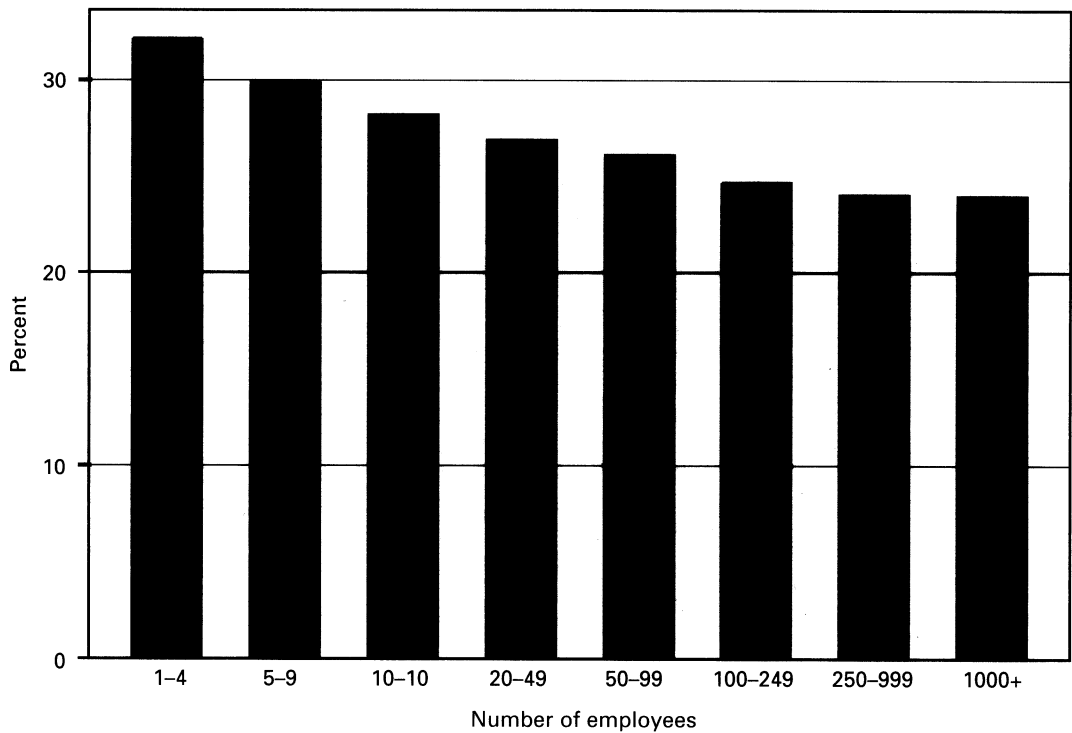
employment by employer size in Denmark.[3] Figure 1 shows that children of the self-employed are overrepresented in small firms; similarly, individuals with prior self-employment experience of their own are more likely to work for small firms (not shown). This suggests that the correlation between firm size and rates of entrepreneurship detected in prior research may be caused, at least in part, by sorting processes. The central challenge in establishing contextual effects of workplace characteristics on entrepreneurship is therefore to develop strategies to account for the sorting of individuals into firms, which I discuss below.

METHOD

Data and Measures

I analyzed data on the Danish labor market from a database called the Integrated Database for Labor Market Research (known by its Danish acronym, IDA). Most accounts of the Danish labor market characterize it as very flexible and dynamic. It is comparable to the U.S. labor market in the level of employment protection (Bingley and Westergård-Nielsen, 2003), average firm tenure (OECD, 1997), and rates of job creation and destruction (Davis and Haltiwanger, 1992; Albæk and Sørensen, 1998). Also, generous social support means that few are "pushed" into entrepreneurship (Carrasco and Ejrnæs, 2003); only 5.4 percent of surveyed entrepreneurs felt that they had had no better option—the third lowest rate among the 23 nations in the Global Entrepreneurship Monitor (Hancock and Bager, 2001). There are also few formal barriers to entry into entrepreneurship (e.g., licensing requirements) in Denmark.

3
The data for this figure come from the sample of the Danish labor market described below.

The IDA is constructed from governmental registers and maintained by Statistics Denmark for research purposes. It contains a wealth of demographic information characterizing the entire population of Denmark, as well as information on employment status and income. The IDA is a matched employer-employee database, so employees can be linked to their employers, and transitions from paid employment to entrepreneurship can be measured. The data in this study came from a specialized extract from the IDA commissioned for a broader project on entrepreneurship. This extract covers all people residing legally in Denmark in 1994 who were between the ages of 15 and 74. These individuals are tracked back in time until the first year of IDA data, 1980. They are also tracked forward in time until 1997. These restrictions mean that some of those in the labor force in earlier years are not in the sample, primarily those over the age of 60 in 1980. Because I restricted the analysis sample to individuals between the ages of 16 and 40 in 1990, non-random attrition is a minor concern. And although the measures of firm size do not account for employees over the age of 70 in 1990, the resulting measurement bias is likely very small.

From this database, I constructed a sample for the current analyses, guided by two principles. First, because the dynamics of serial entrepreneurship are likely different from the initial transition into entrepreneurship, I restricted the analysis to the first transition to entrepreneurship. Second, to avoid the biases introduced by left-censoring in hazard-rate models (Tuma and Hannan, 1984), employees should be observed from when they are first at risk of leaving a particular employer for entrepreneurship. As a result, the sample consists of individuals who (a) were employed in 1990; (b) were newly hired by their employer in 1990; (c) had no self-employment experience between 1980 and 1990; (d) were between the ages of 16 and 40 in 1990; (e) were not employed in the primary sector (agriculture and extractive industries) or in industries dominated by the public sector; and (f) whose employer was not a new employer in 1990. The decision to focus on people employed in 1990 grew out of the desire to exclude serial entrepreneurs. Entrepreneurial experience prior to 1980 is unobservable in the IDA, so I used data from 1980 and 1990 to exclude individuals with entrepreneurial experience during that time. In combination with the age restriction, this should capture the vast majority of repeat entrepreneurs. Similarly, the restriction to new hires ensures that individuals are followed from when they are first at risk of leaving their employer to enter entrepreneurship, though they remain in the sample if they change employers. I excluded individuals in the primary sector and in industries dominated by the public sector because the dynamics of entrepreneurial activity may be substantially different in these sectors. Finally, I excluded employees of newly founded firms in 1990 because they might have been entrepreneurs. These selection criteria resulted in an estimation sample of 282,911 individuals.

Measurement of entrepreneurship. I measured transitions to entrepreneurship in two ways. First, Statistics Denmark supplied an occupational classification scheme that differentiates between a wide variety of labor force attachments,

including employment with established firms (subdivided into seven broad, hierarchical categories), unemployment, schooling, not in the labor force, and self-employment. Statistics Denmark employs two primary categories for self-employment. The first captures individuals who are unincorporated proprietors with employees; the second captures self-employed individuals with no employees. I treated entry into either of these two categories as transitions to entrepreneurship, consistent with the notion that a key component of the transition to entrepreneurship is the movement from paid employment to self-employment.

A shortcoming of relying on the occupational data is that it does not capture people who founded incorporated ventures. Unfortunately, the founders of incorporated ventures cannot be identified and linked to the primary labor market data. Because such transitions could not be measured directly, I took advantage of the fact that incorporated ventures appear as new employers, with the founders of the incorporated ventures as employees.[4] I therefore coded individuals who were employees of newly founded firms as entrepreneurs, along with the other people who enter self-employment. Most of the new employers identified in the data set are quite small, but there are a small number of large firms. It seems unreasonable to assume that all of the initial employees of these firms are entrepreneurs. Instead, I assumed that all employees of new firms with three or fewer employees were founders; for new firms with more than three employees, I identified founders as those whose occupational titles classified them as directors or top managers. In most of the analyses presented below, I pooled all three of these types of entrepreneurial entry into a single transition, but I also ran robustness checks in which I considered each type of transition separately.

I censored transitions to entrepreneurship when unemployment intervened between employment in one year and self-employment the next. Similarly, in most analyses, I censored transitions to entrepreneurship that occurred simultaneously with the failure of the individual's employer, primarily to be conservative. Empirically, censoring these two types of transitions avoids any confounding effects of firm characteristics on either the rate of entry into unemployment or the rate of firm failure. Conceptually, an important component of entry into entrepreneurship as defined in this paper is the decision to forsake employment with an established firm; this decision process is presumably different for the unemployed. Separate analyses (not shown here), as well as the analyses of displaced workers below, showed that this decision is not consequential for the conclusions of this paper.

Measurement of bureaucracy. An organization's degree of bureaucratization is not directly observable. Moreover, constructing and collecting specialized measures of hierarchy, role specialization, and routinization in the large samples needed to capture transitions to entrepreneurship is prohibitively difficult. Instead, I focused on two easily observable organizational characteristics—firm size and age—and examined how they affect individual rates of entrepreneurial activity (cf. Dobrev and Barnett, 2005).

4
Individuals who incorporate ventures but take only capital income from them will not appear as employees of the venture. This means that passive investors will not be identified as entrepreneurs.

Organizational size has well-established implications for the degree of role specialization, the routinization of activities, and the extent of hierarchy. A long line of research suggests that larger firms generally have a more fine-grained division of labor and more elaborate organizational hierarchies (e.g., Blau and Schoenherr, 1971). Furthermore, the coordination challenges faced by large firms also leads to a greater reliance on standard operating procedures. Organizational size is therefore a key measure of how bureaucratic a firm is. I measured firm size as the (log of) the number of employees in a given year.

The effects of organizational age have also been extensively studied, particularly by organizational ecologists (e.g., Freeman, Carroll, and Hannan, 1983; Hannan, 1998; Sørensen and Stuart, 2000). Holding size constant, the primary impact of organizational aging is to increase routinization (Stinchcombe, 1965). For example, Sørensen and Stuart (2000) found that, holding size constant, older organizations were less likely to engage in exploratory innovation but, instead, more likely to exploit established competencies. Firm age was measured as the number of years since the founding of the firm. The founding date of firms can only be determined for employers founded after 1981, however, as it is inferred from the appearance of the firm in the IDA registers. I therefore used dummy variables to differentiate between different age groups. Because a firm's routines are likely to be established relatively early in its life, I settled on three age groups: zero to two years old, three to nine years old, and ten or more years old. Experimentation with alternative specifications yielded substantively similar results.

Analytic Strategy

Analytically, it is helpful to distinguish between three different ways in which the sorting of individuals into firms may lead to biased estimates of the effects of workplace characteristics on entrepreneurship. First, individuals may be differentially allocated across firms in terms of their observable characteristics. These observable factors may be fixed (e.g., sex) or variable over time (e.g., education). Second, people may be sorted across firms on unobserved traits, such as levels of risk-aversion or features of personality, that are stable over time. These traits may be unobserved due to the limitations of large-scale data sets or due to the difficulties of measuring such constructs. Finally, spurious effects of workplace characteristics may arise if people engage in "strategic sorting," in this case, by choosing employers that they believe will help them achieve their ultimate goal of entering entrepreneurship. For example, a person who plans to start a venture may choose to gain relevant experience by working for an existing entrepreneurial firm.

Accounting for sorting on observable characteristics is straightforward in a multivariate regression framework, provided individual-level data are available. Methodologically, the most widespread method for addressing bias due to sorting on fixed unobserved traits is to include individual fixed effects in regression models (Halaby, 2004). Like other labor market transitions, however, the analysis of entry to entrepre-

neurship is best done using hazard rate models (Tuma and Hannan, 1984). There is no standard fixed-effects methodology for hazard rate models; rather, the closest approximation is to use conditional logistic regression as a fixed-effects discrete time model (Allison and Christakis, 2007). I adopted this method, although it has two major limitations. First, the analysis was limited to individuals who eventually entered into entrepreneurship. Estimation of individual fixed-effects requires variation in the dependent variable within individuals; such variation is only present among those who transitioned to entrepreneurship. This sample restriction suggests that the results should be interpreted with caution. Second, within-in-person models rely on between-firm variation in levels of bureaucracy, which may be correlated with other, unobserved firm characteristics that affect the rate of entrepreneurship, such as a particular corporate culture or firm promotion policies. This could generate a spurious within-person correlation between bureaucracy and entrepreneurship. Unfortunately, firm fixed effects are not identified when individual fixed effects are included and the event is non-repeatable, as is the case here.[5] This forces a choice between individual and firm fixed effects. In light of the evidence in figure 1 that individual sorting processes may be substantial, I focused on estimating models that address the possible effects of unobserved heterogeneity at the individual level.

Two other limitations of the estimation strategy deserve brief mention. First, because (non-repeatable) events necessarily occur at the end of the observation period, the estimates of any variables that are correlated with time will be biased (Allison and Christakis, 2007). This rules out a wide range of variables, such as income and wealth, which tend to increase with time. Second, the fact that individuals are only included in the sample if they transition to entrepreneurship means individual career histories are sampled proportional to employer size, even if size is uncorrelated with the transition rate. This oversampling of transitions from large firms will upwardly bias estimates of the effects of organizational characteristics correlated with size. To account for this, I weighted each individual's contribution to the likelihood function by the inverse probability of the organization's inclusion in the sample (details are available upon request).

Finally, the use of a fixed-effects estimator only addresses the issue of fixed unobserved heterogeneity among individuals, not the possibility of strategic sorting. For example, exogenous changes in aspirations may lead people to move to smaller firms to develop entrepreneurial skills and knowledge. Though there is no standard methodological solution to strategic sorting, I addressed the issue in two ways. First, I considered whether there was evidence consistent with the idea that the pattern of movement between firms of different sizes is different for individuals who eventually enter entrepreneurship. Second, I examined whether the effects of workplace characteristics are attenuated among individuals who experience windfall gains in personal wealth, events that have been shown to increase the likelihood of entrepreneurial entry (Lindh and Ohlsson, 1996).

[5]
The simultaneous inclusion of individual and firm fixed effects would restrict the sample to the period when the individual worked for the firm that he or she eventually left for entrepreneurship. In short, each individual's history would be restricted to an attachment to a single firm. In this case, the individual and firm fixed effects cannot be separately identified, except when multiple people from the same firm experience the event.

RESULTS

Figure 2 presents descriptive evidence of the relationship between the rate of entrepreneurship and firm size, while figure 3 graphs the relationship with firm age. Both figures distinguish between entry into self-employment, measured using occupational codes, and transitions by individuals who are employees of a new firm, which I term "team entry." Fig-

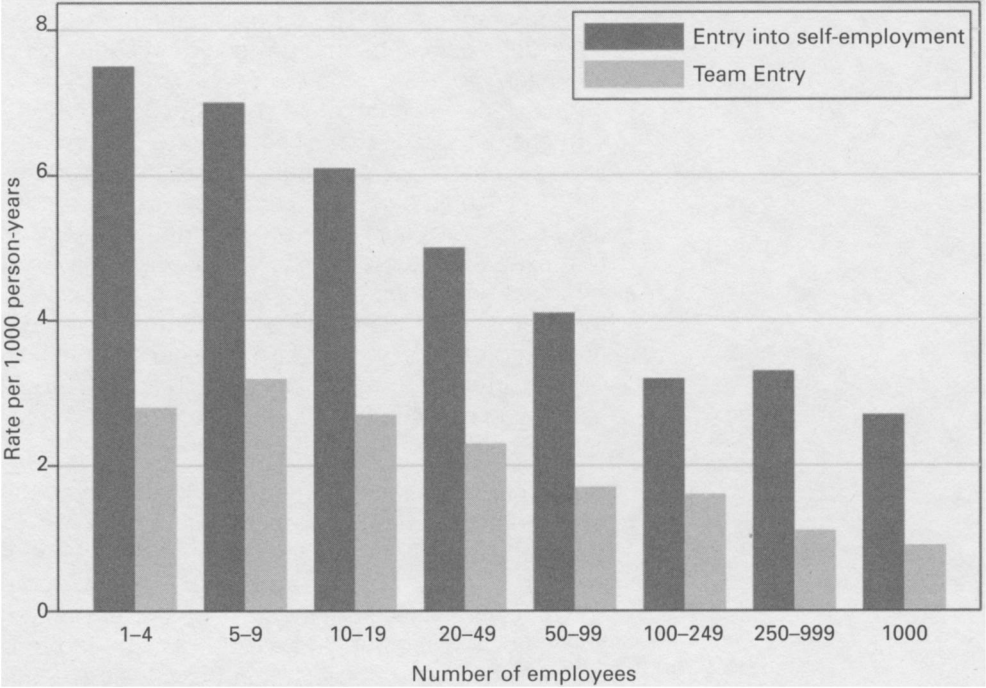**Figure 2. Entry into entrepreneurship by size of employer.**

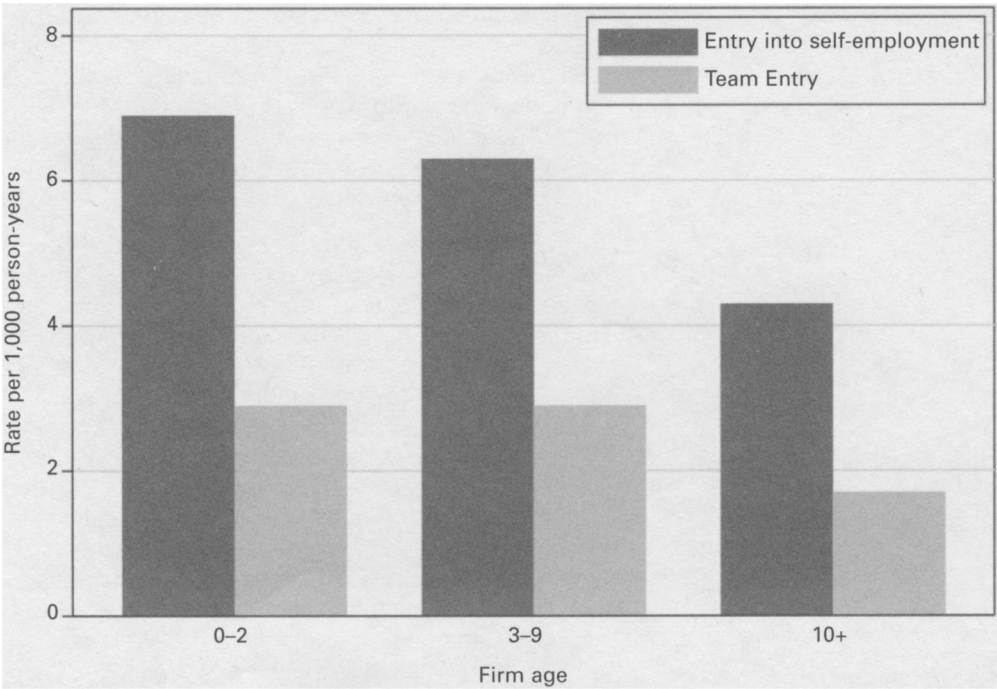**Figure 3. Entry into entrepreneurship by age of employer.**

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ure 2 displays a clear negative relationship between firm size and the rate of entry into self-employment. The effect of firm size on team entry is also generally negative, although rates in the smallest firm size category (1–4 employees) are somewhat lower than in firms with 5–9 employees. The effect of firm size is dramatic: for either type of transition, the rate of entrepreneurial entry among people working for firms with four or fewer employees is 2.8 times higher than among individuals in firms with more than 1,000 employees. Figure 3 demonstrates that rates of entrepreneurship also decline with firm age, although the pattern is not as clear as for firm size. Nonetheless, individuals working for firms less than three years old are 60 percent more likely to become self-employed in a given year than people working for firms more than ten years old.

The bivariate effects of firm size and age apparent in figures 2 and 3 may be spurious consequences of the fact that different kinds of people choose to work for small and large firms, or young and old firms. I focused on sorting on observable characteristics first, by estimating multivariate hazard rate models that control for a host of individual characteristics. Fortunately, the IDA contains a rich set of observable characteristics. Table 1 presents the mean values for selected individual characteristics, calculated for four different firm size categories. The sample is representative of the population of (new) employees but is not representative of the population of firms. Most individuals work for large and older firms: the average work attachment is with a firm that has 1,137 employees, while over 84 percent of spells cover individuals working for firms ten or more years old. The average firm in the sample is considerably smaller (approximately 36 employees) and somewhat younger (73 percent are 10 or more years old). Most demographic and labor market variables in table 1 are self-explanatory. All monetary values, such as income, assets, and debts, are deflated to 1980 values. For individuals already in the labor force in 1980, I measured labor force experience by imputing the expected years of labor force experience based on age and educational attainment and then added the number of years employed

Table 1

Mean Values of Selected Covariates, by Size of Employer

	Number of employees			
Variable	1–9	10–49	50–99	100+
Female	0.390	0.327	0.337	0.399
Age	27.361	27.997	28.673	28.915
Danish	0.977	0.978	0.975	0.974
Married	0.260	0.281	0.310	0.324
Children present	0.340	0.352	0.377	0.387
Log labor force experience	7.810	8.453	8.773	8.803
Log salary	10.953	11.179	11.286	11.321
Non-salary income	10,548.800	9,052.920	8,810.221	8,161.397
Log assets	8.959	9.323	9.470	9.510
Log debts	7.651	8.268	8.653	8.715
Transition to entrepreneurship	0.009	0.007	0.005	0.004
N of spells	267,067	402,142	148,330	628,663

between 1980 and 1990. The means of the independent vari-
ables show few strong patterns of association with firm size.
The most notable pattern suggests that the employees of
large firms are generally more well established in their
careers and lives than the employees of small firms. People
working for large firms are slightly older and somewhat more
likely to be married and have children than employees of
small firms. They also have more labor force experience on
average, earn larger salaries, and have greater assets and
debts.

Table 2 presents estimates from discrete-time event history
models of the transition to entrepreneurship, estimated using

Table 2

Discrete Time Event History Models of the First Transition to Entrepreneurship*

Variable	(1)	(2)	(3)	(4)
Tenure: 0–1 years	.440**	.474**	.406**	.413**
	(.061)	(.063)	(.060)	(.060)
Tenure: 1–2 years	.371**	.401**	.343**	.348**
	(.061)	(.062)	(.061)	(.061)
Tenure: 2–4 years	.297**	.320**	.281**	.286**
	(.065)	(.066)	(.065)	(.065)
Tenure: 4–6 years	.194**	.222**	.192**	.197**
	(.065)	(.065)	(.065)	(.065)
Female	−.706**	−.716**	−.788**	−.788**
	(.030)	(.031)	(.031)	(.031)
Danish born	−.592**	−.611**	−.515**	−.513**
	(.069)	(.069)	(.068)	(.068)
Age	.129**	.125**	.122**	.120**
	(.020)	(.020)	(.020)	(.020)
Age squared	−.002**	−.002**	−.002**	−.002**
	(.000)	(.000)	(.000)	(.000)
Married	.088**	.086**	.088**	.089**
	(.032)	(.032)	(.032)	(.032)
Children present	−.053	−.057	−.030	−.029
	(.031)	(.031)	(.031)	(.031)
Log labor force experience	.369**	.393**	.363**	.361**
	(.038)	(.038)	(.038)	(.038)
Log salary income	−.074**	−.108**	−.075**	−.076**
	(.020)	(.020)	(.021)	(.021)
Non–salary income	.297**	.306**	.298**	.300**
	(.039)	(.039)	(.041)	(.041)
Log debts	.028**	.027**	.027**	.027**
	(.003)	(.003)	(.003)	(.003)
Log assets	.017**	.016**	.023**	.023**
	(.005)	(.005)	(.005)	(.005)
Parents self–employed before 1990	.224**	.252**	.230**	.230**
	(.025)	(.025)	(.025)	(.025)
Employer's no. of establishments/100	.068**	−.056	.039**	.010
	(.016)	(.044)	(.015)	(.015)
Employer diversified	.060	−.240**	−.018	−.052
	(.063)	(.072)	(.058)	(.058)
Employer age: 0–2 years	.122*	.314**	.085	.090
	(.049)	(.051)	(.049)	(.050)
Employer age: 3–9 years	.127**	.295**	.089*	.093**
	(.035)	(.035)	(.035)	(.035)
Log employer size	−.171**		−.116**	
	(.008)		(.008)	
Log employer size (standardized)		−.109**		−.180**
		(.015)		(.013)
Employer industry fixed effects?	No	No	Yes	Yes

• $p < .05$; •• $p < .01$; two-tailed tests.
* Robust standard errors are in parentheses. All models include dummy variables for highest educational level
achieved, educational major, and broad occupational categories. N of person-year spells = 1,232,201.

logistic regression. Not presented in table 2, but included in the models, are dummy variables for the broad occupational category of employment (e.g., upper white collar, lower blue collar), highest level of education completed, and educational major (coded in a 14-category scheme). In addition to the individual characteristics, the models in table 2 include controls for the employer's number of establishments and for whether the employer operated in more than one industry. The four models in table 2 vary two factors: the measure of employer size (unstandardized and standardized) and the inclusion/exclusion of industry fixed effects. The industry fixed effects absorb industry differences in the rate of entrepreneurship that may be correlated with firm size and age. Because technological and environmental differences across industries may lead to different relationships between firm size and the degree of bureaucratization, the standardized size measure expresses firm size in a constant metric relative to the mean and standard deviation of log firm size in the firm's industry in a given year. Although employer age distributions may also vary across industries, this variable could not be standardized due to the left-truncation of the data.

The models in table 2 demonstrate that the pattern of results in figures 2 and 3, particularly the effects of firm size, cannot be attributed to differences in the composition of firms in terms of workers' observable characteristics. Across specifications, people working for large firms are substantially less likely to enter into entrepreneurship. The estimate for the effect of the unstandardized firm size variable in model 3 suggests that the rate of entrepreneurship of an employee in a firm with five employees is 57 percent higher than the rate for an observationally equivalent employee working in a firm with 250 employees. A person working in a firm with 250 employees is 17 percent more likely to become an entrepreneur than someone working in a firm with 1,000 employees. The estimates in model 4 imply that a one standard-deviation increase in employer size (relative to the industry's size distribution) lowers the rate of entrepreneurship by almost 18 percent. Because the results using the standardized size variable have a less intuitive interpretation, I present results using the unstandardized variable in the remainder of the paper. All models have also been estimated using the standardized variable, however, and this choice does not affect the substance of the conclusions.

The effects of firm age in table 2 are more sensitive to the inclusion of industry fixed effects than are the effects of firm size. In particular, while both figure 3 and the first two models in table 2 would suggest that rates of entrepreneurship are higher among employees of firms less than three years of age, this effect appears to be due to differences across industries in average firm age and rates of entrepreneurship. When unobserved industry differences are controlled for, employees of these very young firms are no more likely to become entrepreneurs than are employees of firms ten years of age or older. Employees of firms between three and nine years of age, however, have a 9 percent higher rate of entrepreneurship than employees of other firms. As the results of subsequent analyses will show, however, these conclusions

are sensitive to attempts to control for unobserved individual differences.

Table 3 presents robustness analyses for the operational definition of entrepreneurship. The models distinguish between the three different types of entrepreneurial transitions that can be identified in the data: team entry, self-employment with employees, and self-employment without employees; in each case, the alternative types of transitions are censored. These estimates reinforce the importance of firm size as a predictor of different types of entrepreneurial activity. Firm size lowers the likelihood of all three types of transitions, although it is interesting to note that the negative effect of firm size is approximately half as large for people who launch new ventures without employees. The effects of firm age, however, are inconsistent across specifications of the dependent variable. Transitions to self-employment without employees appear to be substantially more likely among people working for firms zero to two years of age. For the two types of transitions that involve starting a new organization, rates are highest among people working for firms between three and nine years of age, although the effect is not significant for self-employed employers.

As a further robustness check, I considered whether the observed effects of firm size merely reflect a more general impact of firm size on the turnover rate, as opposed to a distinct effect on entrepreneurship. To examine this, I restricted the sample to individuals who experience a turnover event and asked whether people from small (or young) firms were more likely to enter into entrepreneurship, conditional on turnover. To address the potential endogeneity of the turnover event, I distinguished between those turnover events that arise through displacement (i.e., the failure of an employer) and those that do not (Gibbons and Katz, 1991). These analyses suggest that the effects of firm size on entrepreneurship are not simply an effect on turnover. Figure 4

Table 3

Discrete Time Event History Models of the First Transition to Entrepreneurship, by Type of Entrepreneurial Transition*

| | | Self-Employed | |
Variable	Team Entry	With employees	Without employees
Employer's no. of establishments/100	.058**	.056**	.022
	(.022)	(.021)	(.021)
Employer diversified	−.033	.066	−.037
	(.103)	(.108)	(.084)
Employer age: 0–2 years	.083	−.082	.146*
	(.084)	(.111)	(.071)
Employer age: 3–9 years	.131*	.111	.047
	(.058)	(.073)	(.052)
Log employer size	−.144**	−.161**	−.084**
	(.013)	(.017)	(.013)
Employer industry fixed effects?	Yes	Yes	Yes
N of transitions	2,685	1,652	3,664

* $p < .05$; ** $p < .01$; two-tailed tests.
* Robust standard errors are in parentheses. All models include the full set of control variables estimated in table 2. No. of person-year spells = 1,232,201.

Figure 4. Entry into entrepreneurship conditional on turnover, by employer size.
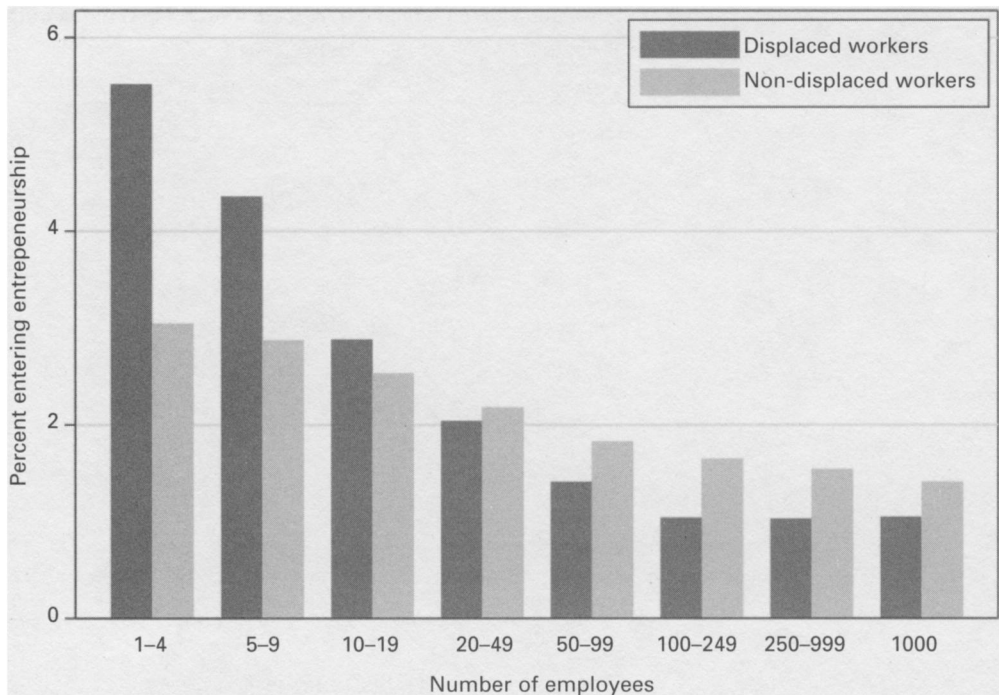
shows that the percentage of both displaced and non-displaced workers who enter entrepreneurship following a turnover event declines strongly with firm size. To test the robustness of this conclusion, I estimated a logit model (not shown here) of entrepreneurial entry on the full sample of individuals who experienced a turnover event that included industry fixed effects and the full set of covariates in the models in table 2. The estimated coefficient for log firm size in this model was –0.125, with a standard error of 0.009. Firm age had no significant effect on the probability of entering entrepreneurship in these analyses. Similar analyses performed conditional on displacement support the same conclusions.

Unobserved sorting. To consider whether unobserved sorting processes lead to spurious estimates of the effects of firm size and age, I estimated conditional fixed-effects logit models of the transition to entrepreneurship for those individuals in the original sample who entered into entrepreneurship between 1990 and 1997. The results are shown in table 4. Because firm age is positively correlated with duration, I included dummy variables for firm age at the time of an individual's entry to the firm. As before, I estimated models with industry fixed effects.

In the first model in table 4, the estimated effect of firm size is highly significant statistically. Within a person's career, entry into entrepreneurship is much more likely if the employer is small relative to other employers a person has worked for. This result lends substantial confidence to the earlier results. The negative effect of firm size does not reflect a sorting process in which people with (fixed) entrepreneurial tendencies are more likely to work for small firms.

Table 4

Conditional Fixed Effects Logistic Regression Estimates of the First Transition to Entrepreneurship*

Variable	(1)	(2)
Married	1.836**	1.832**
	(.037)	(.037)
Children present	.638**	.630**
	(.023)	(.023)
Employer's no. of establishments/100	−2.822**	−1.688**
	(.261)	(.222)
Employer diversified	.961**	1.018**
	(.073)	(.073)
Employer age at entry: 0–2 years	.209**	.133**
	(.025)	(.026)
Employer age at entry: 3–9 years	−.059*	−.114**
	(.023)	(.024)
Log employer size	−.381**	
	(.008)	
Log employer size at entry		−.502**
		(.009)
Employer industry fixed effects?	Yes	Yes

* $p < .05$; ** $p < .01$; two-tailed tests.
* Standard errors are in parentheses. All models include dummy variables for broad occupational category. No. of person-year spells = 61,520.

One concern with this estimate, however, is that firm size can change during an individual's employment with a given firm as a result of a firm's growth or decline. The negative firm size effect may then simply reflect the consequences of firm growth or decline: people in growing firms may not leave due to the opportunities within the firm, and those in declining firms may seek to get out. I therefore reestimated the model focusing only on between-employer variation in firm size by including a measure of employer size at the time of entry into the firm. The second column of table 4 shows the results of this model. The strong negative effect of firm size again reinforces the conclusion that people are less likely to become entrepreneurs when they work for large firms.

Although the substantive effects of firm size do not change after the inclusion of individual fixed effects, the effects of firm age do change substantially. The estimates in table 4 indicate that, within a career, people are more likely to become entrepreneurs if they joined an employer in its formative years (i.e., less than three years of age). Though the models without fixed effects suggested that there was no contemporaneous effect of working for a very young firm, this result suggests that those who entered early in the firm's history are more likely to become entrepreneurs after the firm has matured. This is consistent with the idea that these individuals leave the firm as it becomes more established and routinized. Surprisingly, however, people are significantly less likely to leave a firm for entrepreneurship if they joined the firm when it was between three and nine years of age.

The fixed-effects results speak to the major challenge to a contextual interpretation of the effects of firm size and age, but it is still possible that the results may be due to strategic sorting. I addressed this issue by first examining whether patterns of mobility are consistent with the idea that people

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sort strategically and, second, by considering the effect of windfall gains in personal wealth.

One plausible type of strategic sorting involves nascent entrepreneurs moving to smaller firms prior to entering entrepreneurship in order to gain relevant experience. Such behavior would imply that the pattern of mobility between firms would differ depending on whether or not an individual eventually entered entrepreneurship. A simple way to test this intuition is to perform log-linear analyses of a mobility table that cross-classifies three variables: whether an individual's attachment to the current firm ended with entry into entrepreneurship (0/1); the size of the current employer (using the size categories in figure 2); and the size of the immediately prior employer. Strategic sorting would imply a significant three-way interaction; in other words, the pattern of movement between established firms should be different for those who enter entrepreneurship compared with those who do not. I performed this analysis using the same data as in the full models in table 2 but used the individual-firm attachment as the unit of observation, as opposed to the yearly spell (analyses using yearly spells yielded the same results).

The results of the log-linear analysis are presented in table 5. The model with all two-way interactions (model 5) fits the data extremely well, despite being fit to a table with over 646,000 individual-firm attachments. This model is also the best-fitting model according to the widely accepted Bayesian Information Criterion (BIC; Raftery, 1986). This result suggests two important conclusions. First, there is no support for the idea that the effect of firm size on entrepreneurship can be explained by nascent entrepreneurs strategically seeking out smaller firms before entry. Second, the significant two-way interaction between prior firm size and entrepreneurial entry (model 5 vs. model 4) indicates that the effects of firm size are not limited to the current work environment. In other words, working in a large firm has lasting effects on the rate of entrepreneurship: among employees of a small firm, those with prior employment in a large firm are less likely to enter entrepreneurship.

These conclusions are further supported in a multivariate context in table 6. The first model in table 6 extends the models estimated in table 2 for the full sample by including

Table 5

Log-linear Models of the Association between Entry into Entrepreneurship and Size of Prior and Current Employers*

Model	G^2	D.f.	p	BIC
1. [P][C][E]	53429.12	112	.00	52885.69
2. [PC][E]	759.97	63	.00	454.27
3. [PC][PE]	50.84	56	.00	229.13
4. [PC][CE]	159.50	56	.00	−112.21
5. [PC][PE][CE]	53.85	49	.31	−183.90

* P = Prior employer's size; C = Current employer's size; E = Entered entrepreneurship. A single variable in brackets indicates that only the main effect of the variable is fitted. Two variables in brackets indicate that their interaction is fitted, along with the corresponding main effects. No. of person-employer attachments = 646,345.

(log) prior employer size and its interaction with current employer size. The main effect of prior employer size is negative and significant, reinforcing the conclusion that employer size has a lasting effect on entrepreneurial tendencies. Also in line with the log-linear models, the interaction effect is not significant. The third model in table 6 estimates the corresponding model in a conditional fixed-effects framework. Here again, people are less likely to become entrepreneurs if, controlling for the size of their current employer, their previous employer was large, although in this model there is a significant, positive interaction effect between prior and current employer size. For example, if two employees are working for a firm with five employees, and one has previously worked for a large firm (with 200 employees) while the other worked for a small firm (with five employees), the predicted multiplier of the rate for the employee from the large firm is less than half the multiplier of the rate for the employee from a small firm (.16 vs. .33).[6]

These results lend further confidence to the conclusion that the estimated negative effect of firm size on rates of entrepreneurship cannot be attributed to an unobserved sorting of individuals with (fixed or time-varying) entrepreneurial tendencies into small firms. This conclusion can be further strengthened by considering the effects of a sudden easing of any financial constraints on entering entrepreneurship. Sudden or windfall increases in personal wealth have been shown to

[6]
The interaction effect does not cancel out the main effect of current employer size for any reasonable values of prior employer size.

Table 6

Tests of the Impact of Potential Exogenous Time-varying Changes in Entrepreneurial Propensity*

Variable	Discrete Time Event History		Conditional Fixed Effects	
	(1)	(2)	(3)	(4)
Employer's no. of establishments/100	.035*	.039**	-2.905**	-2.818**
	(.016)	(.015)	(.301)	(.261)
Employer diversified	-.004	-.017	.898**	.979**
	(.063)	(.058)	(.085)	(.073)
Employer age: 0–2 years	.070	.091	.217**	.216**
	(.054)	(.049)	(.031)	(.025)
Employer age: 3–9 years	.068	.093**	.019	-.061**
	(.038)	(.035)	(.029)	(.023)
Log employer size	-.121**	-.117**	-.472**	-.380**
	(.013)	(.008)	(.015)	(.008)
Log size of prior employer	-.065**		-.223**	
	(.011)		(.010)	
Prior × Current employer size	.003		.012**	
	(.002)		(.004)	
Windfall		.648**		.951**
		(.215)		(.149)
Windfall × Log employer size		.058		-.120**
		(.044)		(.045)
Windfall × Employer age 0–2 years		-.651		-.675**
		(.519)		(.165)
Windfall × Employer age 3–9 years		-.365		.250
		(.288)		(.139)
Employer industry fixed effects?	Yes	Yes	Yes	Yes

* p < .05; ** p < .01; two-tailed tests.
* Standard errors are in parentheses. Discrete time event history models include the full set of control variables estimated in table 2. Conditional fixed effects models include the full set of control variables estimated in table 4.

increase the rate of entrepreneurship (Lindh and Ohlsson, 1996). I therefore used windfall gains as an indicator of exogenous lowering of the barriers to entering entrepreneurship. A windfall gain was indicated in any year in which personal wealth increased by more than 250,000 Danish kroner, which is in the top percentile of observed changes in wealth in the data. If the estimated effects of firm characteristics reflect unobserved changes in the desire to enter entrepreneurship, one would expect that the effects of firm age and size should be attenuated for people experiencing windfall gains.

The results of this analysis are also presented in table 6. In the second model, estimated on the full sample, windfall gains have a strong and significant effect on the likelihood of entering into entrepreneurship. This is consistent with prior research. At the same time, however, none of the interaction effects between the dummy variable for windfall gains and firm age and size are significant. This means, for example, that the effect of firm size is the same in the population of individuals experiencing windfall gains as it is in the remainder of the population. The estimates of the conditional fixed-effects model in the fourth column show a slightly different pattern. The estimates indicate, as before, that individuals are substantially more likely to become entrepreneurs in a year in which they experience a windfall gain. Furthermore, there is no evidence that the employer size effect is attenuated among those experiencing windfall gains; quite to the contrary, firm size appears to have a stronger negative effect in this group. There is some evidence, however, that the effect of firm age may be due to unobserved sorting processes, as individuals in recently founded firms are substantially less likely to enter entrepreneurship if they experience windfall gains.

DISCUSSION

The results of this study provide strong support for the contextual claim that working in more bureaucratic organizations makes people less likely to launch their own business ventures. Net of a wide range of observable individual characteristics, people who work for large and old firms are substantially less likely to become entrepreneurs. Moreover, a variety of analyses suggest that these effects are not a spurious consequence of unobserved sorting processes. This conclusion is particularly robust when it comes to the effects of organizational size, which has long been seen as a driver of bureaucratic structures and processes in organizations. Moreover, the effects of working conditions are not limited to shaping the exposure of workers to entrepreneurial opportunities, as evidenced by the statistically significant effects of prior and current employer size observed in this study. Organizational age shows less consistent effects across different model specifications (particularly with respect to the effects among young firms), although in general they suggest that individuals who work for older firms are less likely to enter entrepreneurship.

Small, young organizations are important engines of individual entrepreneurial activity. This is not, however, the same as

saying that small firms produce more entrepreneurs than large firms. The employment distribution (in Denmark as elsewhere) is skewed such that a relatively small number of large firms account for a large proportion of employment. Because of its larger employment base, a large firm is more likely to generate an entrepreneur in a given year than a small firm. Nevertheless, individuals are more likely to become entrepreneurs if they work for a small firm.

Several issues remain to be addressed in future research. First, with strong evidence of contextual effects in hand, research should turn to deepening our understanding of the mechanisms through which bureaucracy suppresses entrepreneurship. Providing evidence on the relevance of the four (or more) different channels of bureaucratic influence—on attitudes, skills, environmental exposure, and opportunity costs—requires different research designs and approaches to data collection. The analyses conditional on turnover suggest that although the benefits of employment in bureaucratic organizations may help suppress entrepreneurship, these opportunity costs are not the whole story. Similarly, the lasting effects of organizational size are consistent with the idea that bureaucratic working conditions influence attitudes toward entrepreneurship and the development of entrepreneurial skills but do not allow for adjudication between these two types of mechanisms. Much work remains to be done on how, for example, bureaucracies may influence their employees' perception and valuation of entrepreneurial opportunities.

While the organizational size effects are robust across specifications, it is less clear why the effects of organizational age are not. Two possibilities are worth considering. First, the age effects are particularly sensitive to the use of the conditional fixed-effects estimator. Unobserved sorting processes may therefore play an especially important role with respect to the effects of organizational age. Within a career, people are most likely to leave an employer for entrepreneurship if they joined it when it was very young. But they may first leave when the firm has matured somewhat, which would explain the higher rates for employees of firms aged three to nine years in the pooled analyses. Second, if firm age, when controlling for firm size, primarily captures differences among firms of the same size in routinization and exploitation in organizational learning (Sørensen and Stuart, 2000), the inconsistent effects may indicate that these factors have weak or unpredictable direct effects on entrepreneurial entry.

The breadth gained through a large sample of employers and employees comes at the expense of depth, particularly with respect to the measurement of organizational characteristics. For example, the effects attributed to bureaucracy may reflect the effects of unmeasured firm characteristics correlated with firm size and age. One might worry, for instance, that the different rates observed in small and large firms do not derive from differences in role specialization and routinization but, rather, factors such as organizational culture or employment policies. Similarly, while firm size and age have the virtue of being easy to observe in large sample studies, they are imperfect measures of bureaucratization; for exam-

ple, firms of the same size may vary in their bureaucratization due to conscious managerial choices (e.g., Saxenian, 1994). Resolving such measurement challenges while preserving the ability to address biases due to sorting should be an important goal for future research.

CONCLUSION

This paper presents compelling evidence that the observed effects of organizational size and age can be attributed to the effects of the work environment and are not spurious consequences of unobserved sorting processes. Although such conclusions can never be definitive in the absence of experimental data, the conditional fixed-effects models, along with the analyses of strategic sorting, provide the strongest evidence available that the differences between small and large firms in entrepreneurship rates cannot simply be attributed to their likelihood of attracting "entrepreneurial types." These results therefore substantially buttress the sociological approach to the study of entrepreneurship. While dispositional factors may also drive entrepreneurial activity, context matters. Entrepreneurs are made, not simply born.

For sociological theory, this paper provides new insight into how the structural characteristics of existing organizational populations shape entrepreneurial activity and industry dynamics. Because such structural characteristics influence the availability of resources, macro-organizational theories are often characterized as only relevant to explaining the demand for entrepreneurs (Thornton, 1999). Contextual effects of organizational size and age, however, imply that the structural features of a population influence the supply of entrepreneurs, not only the availability of entrepreneurial opportunities. Simple differences in firm size and age distributions can help explain variation in rates of entrepreneurial activity across regions or industries through their impact on the supply of entrepreneurs. For example, regions with a greater share of employment in smaller firms can be expected to generate a larger number of entrepreneurs than regions with employment concentrated in large firms, even holding constant the available entrepreneurial opportunities. Fully understanding the impact of existing organizations on the entrepreneurial process therefore requires a consideration of their impact on work experiences and how these experiences shape the decision to become an entrepreneur.

These results have important policy implications as well. Policies to promote entrepreneurial activity often focus on improving the entrepreneurial infrastructure and facilitating access to necessary resources in an industry or region. Such policies focus on removing obstacles to entrepreneurship, on the (perhaps implicit) assumption that there is a supply of entrepreneurs ready to take advantage of entrepreneurial opportunities once the barriers to doing so have been removed. Yet the impact of firm size and age on individual rates of entrepreneurship suggests that such policies may be less likely to succeed in precisely those settings where they may be most likely to be tried. Policy makers often attempt to encourage entrepreneurship in economically stagnant regions or industries dominated by large but declining firms.

But in these settings, the average employee is more likely to work for a bureaucratic firm and thus less likely to take the initiative to launch a new venture. Moreover, the importance of small, young firms as incubators of new ventures highlights the importance of considering the indirect effects of policies not directly related to entrepreneurship, such as policies that directly or indirectly support and sustain large, established firms. Not only may such policies saddle new ventures with a competitive disadvantage (and thereby discourage entry), they may also indirectly limit the supply of individuals considering entrepreneurship as a viable career option.

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