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Far from the Tree? Do Private Entrepreneurs Agglomerate Around Public Sector Incumbents During Economic Transition?

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Abstract. While it is well known that state enterprises in transition economies were displaced by private enterprises at a macro level, little is known about whether private entrepreneurs emerged in a way that helped preserve or shift preexisting agglomerations of industrial activity at a microgeographic level. To address this question, we integrate competing perspectives on the role of large, bureaucratic incumbents in spawning entrepreneurs. We conceptualize a trade-off between two countervailing effects of large incumbents on potential entrepreneurs: bureaucratic socialization and exposure to capabilities. This yields novel predictions about how different kinds of startups agglomerate around different kinds of incumbents. We test these predictions using fine-grained geographic data on founding rates by private entrepreneurs in China's bicycle manufacturing industry. Consistent with our theorized trade-off, we find evidence of a nonmonotonic effect of incumbent size on local founding rates by private entrepreneurs. Additional moderating effects are consistent with boundary conditions on the hypothesized mechanisms. Our results provide the first empirical investigation of the extent to which entrepreneurial activity agglomerated around public sector incumbents during economic transition. We discuss how these insights add to the understanding of economic transition as well as how the context of economic transition adds to the understanding of entrepreneurial spawning.

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Keywords: entrepreneurship • spawning • agglomeration • regulatory environment • economic transition

Introduction

Schumpeter's (1942) account of creative destruction has long been central to understanding the link between entrepreneurship and macroeconomic growth. When existing products, technologies, and organizations become obsolete, they get displaced by new, superior ones. A context in which this dynamic has been especially salient is China's transition from a centrally planned economy to a market-based economy. Following decades of stagnation under a system dominated by large, bureaucratic state enterprises, the central government began steps in 1978 to allow individuals to establish private businesses outside of the state sector. Since then, the private sector has grown dramatically, while state enterprises have struggled to survive. Following the prototypical Schumpeterian logic, macroeconomic models have depicted China's transition as a process of private enterprises emerging and outcompeting less productive enterprise state (e.g., Song et al. 2011).

An important question that has remained unanswered by such accounts, however, is *where* private enterprises emerged, particularly with respect to preexisting industrial activity in the state sector. Whether traditional centers of industrial activity persisted or declined as a result of market reforms is important for understanding the degree to which the transition was a process of creative destruction or "reform without losers" (Lau et al. 2000). One of the original policy hopes behind permitting private enterprises was for new employment opportunities to emerge that could absorb labor from inefficient state enterprises (Qian 1996, Nee and Opper 2012). In the ideal, this goal could be met most effectively if private enterprises were to emerge in the vicinity of incumbent state enterprises in the same industries. If private enterprises were to emerge in the same areas where state enterprises previously dominated, then traditional centers of industrial activity could persist. Creative destruction at the macro level, where one form of organization is displaced by another, would not require the economic decline of entire communities.

However, the alternative was also plausible. It is possible that in spite of top-down policy changes to *permit* private entrepreneurship, communities dominated by state enterprises simply lacked individuals who were willing and able to found private enterprises in the first place. In general, the emergence of

market opportunity does not in and of itself bring about the existence of new organizations or impart on individuals the capabilities to build and run complex organizations (Agarwal et al. 2007). Even in developed market economies with favorable institutional conditions, this know-how is not uniformly available to all potential entrepreneurs. In the context of a transition economy, where the private sector as a whole had been formally suppressed for decades, the question of how individuals suddenly learned to become private entrepreneurs is even more important. Scholars, including Schumpeter (1942), have argued that bureaucratic work environments suppress the kind of independent, holistic thinking that is typically associated with entrepreneurs (e.g., Sørensen 2007, Elfenbein et al. 2010). Under the explicitly anticapitalist ideology of the Mao era, bureaucratic socialization against entrepreneurship occurred in an especially literal sense—and nowhere more so than within state enterprises, which formed the backbone of the central-planning ideal. If communities dominated by state enterprises were antithetical to socializing individuals for entrepreneurship, then it is possible that the displacement of the state sector by the private sector, which has long been observed at the macro level, has actually been masking an unobserved rise and decline of different geographic regions at the micro level.

To address this question, we draw on the growing body of research on the role of incumbent organizations as training grounds for future entrepreneurs (e.g., Klepper 2001, Agarwal et al. 2004, Gompers et al. 2005, Audia and Rider 2005, Klepper 2007, Buenstorf and Klepper 2009). Our theory development focuses on reconciling two competing perspectives on the role of large, bureaucratic organizations in spawning entrepreneurs. On the one hand, research has argued that large, bureaucratic organizations—like China's state enterprises—are the least fertile spawning grounds for entrepreneurs (e.g., Sørensen 2007, Elfenbein et al. 2010). On the other hand, research has argued that large organizations are often rich repositories of capabilities, which make them more fertile as spawning grounds for entrepreneurs (e.g., Klepper 2002, Klepper and Sleeper 2005, Franco and Filson 2006, Buenstorf and Klepper 2009, Chatterji 2009).

We reconcile these competing perspectives by conceptualizing a trade-off between two countervailing conditions associated with large organizations: bureaucratic socialization and exposure to capabilities. Given the trade-off between less sophisticated experience in smaller organizations and more bureaucratic socialization in larger organizations, we suggest that the effectiveness with which individuals are prepared for entrepreneurship will neither monotonically increase nor decrease with organization size. Instead, the most effective training grounds for entrepreneurs will be in medium-size organizations, which offer a balance between the advantages and trade-offs of large and small organizations. Departing from prior research, this suggests a nonmonotonic effect of incumbent organization size on the agglomeration of subsequently entrepreneurial activity.

We test our predictions using fine-grained geographic data on the founding rates of private startups in China's bicycle manufacturing industry. Consistent with our theorized trade-off between bureaucratic socialization and exposure to capabilities, we find evidence of a nonmonotonic effect of incumbent organization size on local founding rates by private entrepreneurs. We also find moderating effects that are consistent with the hypothesized mechanisms behind the nonmonotonic effect of size. In follow-on analysis of failure rates, we show that the agglomeration dynamics in our context are driven only by higher founding rates near incumbents—not by survival advantages. We discuss how our results are consistent with entrepreneurial spawning as an agglomeration mechanism and distinct from predictions based on Marshallian agglomeration advantages (e.g., Buenstorf and Klepper 2009, Sorenson and Audia 2000). Our results provide the first empirical investigation of the extent to which entrepreneurial activity emerged in the vicinity of incumbents from the state sector.

Entrepreneurial Spawning by Large Incumbents

In general, the emergence of market opportunity does not in and of itself bring about the existence of new organizations or impart on individuals the capabilities to build and run complex organizations (Agarwal et al. 2007). Building a new organization requires founders to acquire a complex array of skills. Even in developed economies with established market institutions, this is no trivial task. Existing organizations—themselves the successful products of organization-building capabilities—often provide the most effective training grounds for future organization founders (e.g., Klepper 2001, Agarwal et al. 2004, Gompers et al. 2005, Audia and Rider 2007, Agarwal et al. 2007, Klepper 2007).

An important implication of this argument is the geographic agglomeration of entrepreneurial activity around incumbents. As recent studies have argued, entrepreneurial spawning provides a novel explanation for industry agglomeration that does not require the assumption of traditional Marshallian mechanisms such as cost, knowledge, or other performance advantages from agglomerations (e.g., Sorenson and Audia 2000, Buenstorf and Klepper 2009). Instead, the need for training grounds where individuals acquire

the know-how to build and run complex organizations is sufficient for explaining the agglomeration of entrepreneurial activity around incumbents.

In the context of the economic transition in China, where the private sector as a whole had been formally suppressed for decades, this perspective is especially relevant. At its heart, the market reform was an attempt to transition toward better ways of organizing and managing economic activity. Yet the allowance of private entrepreneurship by top-down market reforms did not suddenly bring about a population of trained entrepreneurs. Much of the prior literature has taken a top-down, macroinstitutional perspective, which abstracts away from the question of where individuals learned to be organization founders (e.g., Weingast 1995, Sachs and Woo 1994). This leaves a significant gap in the understanding of economic transition—and one that the entrepreneurial spawning perspective is uniquely suited to address.

To apply this perspective to the context of economic transition, we first reconcile two competing views on entrepreneurial spawning. At the advent of market reforms, China's economy was dominated by large, bureaucratic state enterprises. On the one hand, research has argued that such organizations are the least fertile spawning grounds for entrepreneurs (e.g., Sørensen 2007, Elfenbein et al. 2010). The core logic is that bureaucratic work environments suppress the kind of independent, holistic thinking that is typically associated with entrepreneurs. Large organizations tend be characterized by narrowly defined jobs within elaborate hierarchies and divisions of labor, which limit employees' opportunities to learn the wide variety of functions needed to build new organizations (Lazear 2005). They tend to select or socialize individuals against creative initiative (Schumpeter 1942, p. 207).[1] They insulate individuals against exposure to external contacts—such as with customers, suppliers, and resource providers—that would be useful for potential entrepreneurs. Research has therefore argued that the most fertile spawning grounds for entrepreneurs are organizations that are themselves small, entrepreneurial ventures (e.g., Cooper 1985, Gompers et al. 2005).

On the other hand, other research has argued that large organizations should be more fertile as spawning grounds for entrepreneurs. Even if large organizations are bureaucratic, they are often rich repositories of capabilities. Operations within large organizations tend to be more complex. They can use technologies and processes that are not possible at smaller scales. They also coordinate more varied and complex relationships with resources providers and other external constituents. Exposure to these capabilities from the inside makes employees better able than those without this exposure to reproduce similar operations (e.g., Klepper 2002, Klepper and Sleeper 2005, Franco and Filson 2006, Buenstorf and Klepper 2009, Chatterji 2009).

To reconcile these competing perspectives, we suggest a nonmonotonic relationship between incumbent organization size and local entrepreneurial activity. To the extent that more sophisticated levels of experience make individuals better prepared for entrepreneurship, the likelihood of spawning entrepreneurial ventures should initially increase with organization size. Working in a bootstrapped, garage-based startup is not likely to be very effective at training individuals to build and run a large-scale, investor-backed startup, nor is it likely to provide much credibility for attracting external investors on a large scale (Burton et al. 2002, Audia and Rider 2005). While individuals may gain holistic exposure to multiple facets of an organization's operations, the value of this holistic exposure is limited by the scale and complexity of these operations. Compared to the smallest incumbents, incumbents with larger scale operations should be more effective at spawning entrepreneurs (Klepper 2002, Buenstorf and Klepper 2009).

At some point, however, the incremental value of exposure to larger-scale capabilities becomes offset by increased bureaucratization in larger organizations. As organizations increase in size, so too does the number of levels that individuals have to pass through to reach the point of gaining holistic management experience. More of the work that individuals must do along the way will resemble the narrow, compartmentalized, formalistic work of the classic bureaucracy rather than the fluid, multifaceted work of the classic entrepreneur. Through socialization and selection, larger bureaucratic organizations reduce the likelihood that those who rise to leadership positions will diverge from these organizations' prevailing practices and beliefs. By conceptualizing these competing mechanisms in terms of a trade-off, our theory suggests a nonmonotonic effect of incumbent size on the agglomeration of subsequent entrepreneurial activity. The most fertile training grounds for entrepreneurs will be in medium-size organizations, which offer a balance between exposure to capabilities on the one hand and bureaucratic socialization on the other.

This argument is based on two key assumptions. First, it assumes that sophisticated levels of management experience—e.g., capabilities inherited from a parent (Klepper 2002, Buenstorf and Klepper 2009, Chatterji 2009)—are important for entrepreneurship. For the purposes of building and running a large-scale, complex operation from scratch and convincing external investors of an individual's ability to do so, such experience may indeed be necessary. But entrepreneurship can take a spectrum of forms, from larger-scale, investor-backed ventures (e.g., Gompers et al. 2005) to smaller-scale self-employment (Hamilton 2000). For

the purposes of entering entrepreneurship on a smaller scale, such as self-employment, such experience is less critical. Candidates for small-scale entrepreneurship may come from small organizations or lower levels of large organizations, where the effect of bureaucratic socialization and selection will be weaker. Such individuals will likely not have exposure to sophisticated organizational capabilities, but they will also not have passed through as many levels of bureaucracy as those who have advanced to higher levels in large organizations. For entrepreneurship at small scales, the trade-off that generates the nonmonotonic effect of size becomes less relevant, so the relative advantage of medium-size organizations over small and large organizations should become weaker.

Second, the argument that large bureaucratic organizations socialize individuals against entrepreneurship assumes that individuals are socialized only or primarily via the work environments of their employers. While this may be true in some contexts, individuals can in general also be exposed to entrepreneurial socialization outside of their work environments. Research has recognized that, beyond the boundaries of individual organizations, entire regions can develop entrepreneurial cultures as a result of dense concentrations of entrepreneurial activity (e.g., Saxenian 1994, Romanelli and Khessina 2005). In regions with high concentrations of entrepreneurial activity, individuals have more opportunities to come into contact with entrepreneurs, employees in entrepreneurial ventures, and external constituents—such as customers, suppliers, and investors—who work with entrepreneurial ventures. Research has found, for instance, that independently of firm size, being located in a highly entrepreneurial region makes firms more likely to spawn entrepreneurs (Gompers et al. 2005). If bureaucratic socialization is what deters individuals within large organizations, then the concentration of entrepreneurial activity in the vicinity of large organizations should mitigate this effect by providing an alternative source of socialization outside of the workplace.

Entrepreneurial Founding Rates Around State, Collective, and Private Enterprises

Using these theoretical insights, we now compare the three major types of organizations that operated during China's economic transition—state, collective, and private enterprises—in terms of their effects on local entrepreneurial founding rates. The distinctions among these three types, which have long been used throughout the prior literature, are useful for our purposes because they correspond cleanly to size and degree of bureaucratization (e.g., Walder 1995).

Of the three types, state enterprises were by far the largest. In 1992, the average state enterprise produced more than five times as much output per organization and employed more than three times as many people per organization as the average collective enterprise (Walder 1995). Given their primacy in the central-planning system, state enterprises overwhelmingly received the highest priority in terms of resource allocations and were able to attain significantly greater levels of capital intensity, technological sophistication, and economies of scale than nonstate enterprises (Jefferson and Rawski 1994).

State enterprises also managed the most complex relationships with resource providers and external constituents in the economy. In developed market economies, one of the reasons why prior experience in large incumbents is valuable is that it provides opportunities for entrepreneurs to gain experience with the regulatory environment of business (Chatterji 2009). In China, learning to navigate the complex regulatory environment is often cited as the most critical challenge facing managers (Boisot and Child 1999, Tsai 2005). Numerous agencies have powers that can influence fundamental business matters such as obtaining access to land and materials, enforcing contracts, and protecting property. Working in the state sector can provide aspiring entrepreneurs with "links with the bureaucracy to obtain officially mediated resources that enhance profit and protection" (Wank 1996). These also provide channels for learning about forthcoming policy changes and nuances of how these are being interpreted and implemented by local officials. In this respect, work experience in a state enterprise provided the most complex and high-profile opportunities for acquiring political exposure and experience in Chinese society. State enterprises had the highest bureaucratic status and were the most extensively embedded in the supply and oversight connections that made up the central-planning system. For individuals who left the public sector for entrepreneurship, the benefits of their prior experience "increase with the bureaucratic status of an entrepreneur's prior public unit" (Wank 1996, p. 831).

However, the scale of state enterprises and their institutional proximity to the locus of regulation also made them the most overwhelmingly bureaucratic type of organization in Chinese society. In general, dependence on state agencies for vital resources is thought to give rise to an emphasis on bureaucratic "rule-boundedness and formal rationality" (DiMaggio and Powell 1983, p. 155). In concrete terms, state enterprises in China were both internally more hierarchical and supervised by more levels and divisions of government bureaucracy. As research has noted, "Each of these bureaucracies makes slightly different demands, many of which run counter to the demand for strong financial performance" (Walder 1995, p. 287). Managerial work in state enterprises revolved heavily around

gaming the formal reporting process to the various bureaucracies in order to secure more favorable production targets and resource allocations.

Internal selection and promotion of managers also mirrored the selection and promotion process of government officials. Jobs in state enterprises were among the most coveted in society because of the prospects for lifelong careers and advancement in the bureaucratic elite. However, in an economic system designed around Marxist redistributive principles, the structures and routines within state enterprises were explicitly antithetical to capitalism and the seeking of external opportunities for autonomy from the state—i.e., the very essence of private entrepreneurship. The evaluation of individuals for managerial positions was overseen by Communist Party Organization Departments, based on "information gained through bureaucratic channels," and primarily reflected adherence to political values rather than business initiative (Qian 1996). State enterprises were therefore among the strongest mechanisms in Chinese society for socialization against private entrepreneurship.

In comparison to state enterprises, collective enterprises were much smaller and less bureaucratic. Like state enterprises, collective enterprises were officially public organizations, under the control of the state. However, from an organizational standpoint, research has characterized collective enterprises as an intermediate entity between private and state enterprises (Nee 1992, Oi 1995). Collective enterprises tended to fall under the immediate authority of local governments rather than the central government—hence the denotation of being "collectively-owned" by the members of a community. Under the central-planning system, collective enterprises were not expected to play a major role in meeting industrial production targets. They therefore received the lowest priority in terms of resource allocations and investment in large-scale, technologically sophisticated operations.

This, however, meant that collective enterprises faced less government bureaucracy compared to state enterprises (Walder 1995). Unlike state enterprises, collective bicycle manufacturers did not have budgets that were allocated by higher-level government bodies, and unlike the central government, local governments could not use debt financing to support failing enterprises. Collective enterprises therefore faced harder budget constraints and stronger pressures to improve efficiency and seek new sources of profit. There was little to be gained from gaming the formal reporting and planning process.

Career advancement was consequently also less politically oriented than in state enterprises. Local government officials still played a role in selecting managers. However, these officials more directly bore the costs of poor enterprise performance than those who appointed state enterprise managers. As a result, there were stronger incentives to select and promote managers on the basis of business ability. These conditions made collective enterprises more conducive than state enterprises to socializing individuals for entrepreneurship.

Of the three types of organizations, private enterprises were by far the smallest and least bureaucratic. The move to allow private enterprise was a major departure from the Marxist values that dominated under the Mao era. Unlike collective and state enterprises, private enterprises were entirely independent from the government. Even in collective enterprises, profit-seeking managers still had to maintain political palatability by helping local officials meet certain public welfare goals, such as bolstering employment levels (Jin and Qian 1998). In contrast, private entrepreneurs had free rein to run their ventures as they saw fit and retained all profits from their ventures.

However, private enterprises were also overwhelmingly the smallest organizations during the economic transition. In 1992, the average private enterprise produced one-tenth as much output per organization and employed one-tenth as many people per organization as the average collective enterprise (Walder 1995). This was due primarily to the absence of formal connections with the state sector. Whereas even collective bicycle manufacturers could rely on formal linkages with local officials to broker access to state-controlled resources (Nee 1992, Oi 1995), private enterprises had to rely on informal, interpersonal networking to fulfill basic business needs. Working in a private enterprise therefore provided the least favorable opportunities for acquiring political exposure and experience.

Following our theory, we expect the most effective training grounds to have been within collective enterprises. As an intermediate form between private and state enterprises, collective enterprises offered a balance between providing exposure to the complexities of larger-scale operations and limiting exposure to bureaucratic socialization.

Hypothesis 1. *The presence of collective enterprises in a region should have a positive effect on local founding rates of private startups.*

Hypothesis 2A. *The effect of collective enterprises on founding rates of private startups should be stronger than the effect of private enterprises.*

Hypothesis 2B. *The effect of collective enterprises on founding rates of private startups should be stronger than the effect of state enterprises.*

A key assumption behind the prediction that collective enterprises were most effective at spawning entrepreneurs is that entrepreneurs benefit from exposure to sophisticated levels of managerial experience.

For the purposes of building a large-scale venture and gaining confidence from potential investors, such experience may indeed be important. However, for the purposes of entering entrepreneurship on a smaller scale, such as self-employment, managerial experience becomes less important. If individuals need not attain sophisticated levels of managerial experience to enter small-scale entrepreneurship, then providing a balance between exposure to sophisticated levels of managerial experience and limiting exposure to bureaucratic socialization matters less. The positive effects of collective enterprises should therefore be weaker for small-scale entrepreneurship than for large-scale entrepreneurship.

Hypothesis 3A. *The effect of collective enterprises on founding rates should be weaker for small startups than for large startups.*

Hypothesis 3B. *The difference in effect size between collective and private enterprises should be larger for the founding rates of large startups than for the founding rates of small startups.*

Hypothesis 3C. *The difference in effect size between collective and state enterprises should be larger for the founding rates of large startups than for the founding rates of small startups.*

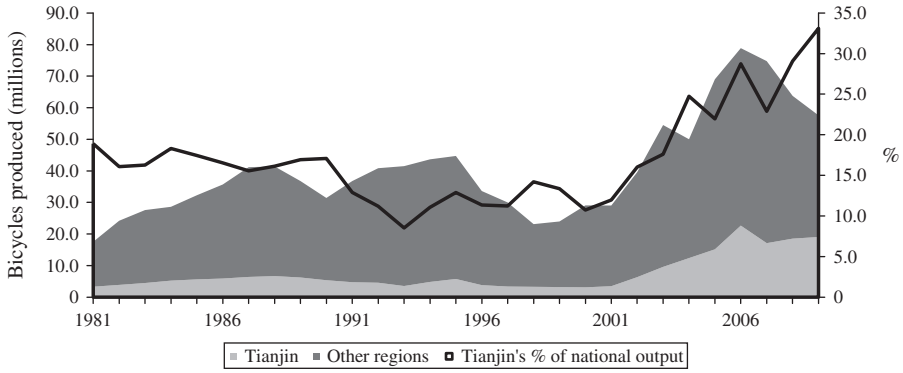
Another key assumption behind the argument that collective enterprises were more effective than state enterprises at spawning entrepreneurs is that the work environments within state were the primary sources of socialization for employees. This was certainly plausible, especially in the early stages of reform. State enterprises were monolithic entities that often encompassed every aspect of their employees' lives (Walder 1995). However, as the private sector grew, it became more conceivable that individuals were also exposed to sources of entrepreneurial socialization outside of work. Recent research has proposed that in areas with large concentrations of private enterprises, further entrepreneurship was facilitated by the presence of better exposure to socialization for starting private businesses (Nee and Opper 2012). In general, individuals are known to be socialized toward entrepreneurship through contact with other entrepreneurs, especially spatially proximate ones (Nanda and Sørensen 2010, Kacperczyk 2013). Survey evidence from China shows that individuals with friends in entrepreneurship are more likely to enter into entrepreneurship, especially in pursuit of opportunities rather than out of necessity (Djankov et al. 2006). Similarly, evidence has shown that 57% of founders indicate that the decision to start a business was influenced by someone else's experience of starting a business (Nee and Opper 2012). If bureaucratic socialization within state enterprises is what dissuades individuals from entrepreneurship, then the concentration of private enterprises in the vicinity should mitigate this effect by providing an alternative source of socialization outside of the workplace.

Hypothesis 4. *The presence of private enterprises in a region should have a positive interaction effect with the presence of state enterprises on local founding rates of private startups.*

Empirical Setting and Data

Our empirical setting is the bicycle manufacturing industry in China from 1978 through 2008. After decades of central planning, the reforms of 1978 for the first time permitted businesses to be founded outside of the heavily regulated state sector. The bicycle industry provides a particularly useful window for examining this shift because it epitomized the central issues around economic transition. Both socially and economically, the bicycle industry played a significant role in Chinese society, analogous to the automobile industry in the United States. Socially, bicycle ownership was closely tied to prosperity and status. Flying Pigeon, the

Figure 1. Annual Bicycle Production in China, 1981–2009



Source. China Statistical Yearbook.

most well-known and coveted brand before the reform, was called the Buick for Chinese workers (Kurtenbach 2008). Economically, a bicycle was the biggest purchase in an average worker's lifetime (Browne 1992), costing several months to a year of wages (Rocks and Wu 2004). The bicycle industry therefore took on economic and social importance during the economic transition. Just as prosperity in the United States was associated with "a car in every garage," Deng Xiaoping defined prosperity as a "Flying Pigeon in every household."

Under central planning, the bicycle industry was deemed strategically important and therefore heavily regulated. The market for bicycles was characterized by few choices, inefficient production, and chronic shortages. All bicycles were produced by a few state enterprises, each offering essentially one model. There were long waiting lists, and workers needed ration coupons to buy bicycles (Browne 1992, Koeppel 2007). After the start of economic reforms, growing income levels added to the already high levels of unmet demand for bicycles (Zhang 1992, p. 5). This created an opportunity for private entrepreneurs. Eventually, the iconic Flying Pigeon, the oldest and once largest bicycle producer, was "almost destroyed by homegrown Chinese entrepreneurs who respond quickly to trends and slash labor and production costs" (Browne 2006).

Our analysis is based on a novel data set of private entrepreneurial startups and industry incumbents in the oldest and largest bicycle-producing region of China: the municipality of Tianjin.[2] We selected this city because it has been seen as China's Detroit for bicycle manufacturing, accounting for a quarter of the world's bicycle production (Koeppel 2007). Table 1 and Figure 1 show bicycle production in Tianjin compared to other regions in China. While the municipality occupies only 0.12% of the country's land area and 0.89% of the national population, it accounted for 33% of the total number of bicycles produced in China in 2008. It was also the home of Flying Pigeon, the first bicycle manufacturer established under the Communist government and at one point the largest bicycle manufacturer in China.

Focusing on one region was important for collecting fine-grained location data and analyzing the scale of geographic variation needed to examine the hypothesized mechanisms in this study. Within the land area of Tianjin, bicycle production exhibits substantial variation at the scale of colocation effects documented in past studies (Buenstorf and Klepper 2009). The municipality covers an area of 11,760 square kilometers, spanning 187 kilometers (116 miles) from north to south and 117 kilometers (73 miles) from east to west.[3] Within this land area, all bicycle manufacturing in 2008 fell within 360 1-km^2 grid cells, or just 3.1% of the municipality's total land area. Figure 2 shows the geographic distribution of private, collective, and state bicycle manufacturers that were active in Tianjin between 1978 and 2008.

Table 1. Major Bicycle-Producing Regions in China

	2006 production (million bicycles)	Percentage of national output (%)	Cumulative percentage of national output (%)
Tianjin	22.7	29	29
Guangdong	17.1	22	50
Zhejiang	15.3	19	70
Jiangsu	13.1	17	86
Shanghai	7.9	10	96
National total	78.9		

Source. China Statistical Yearbook.

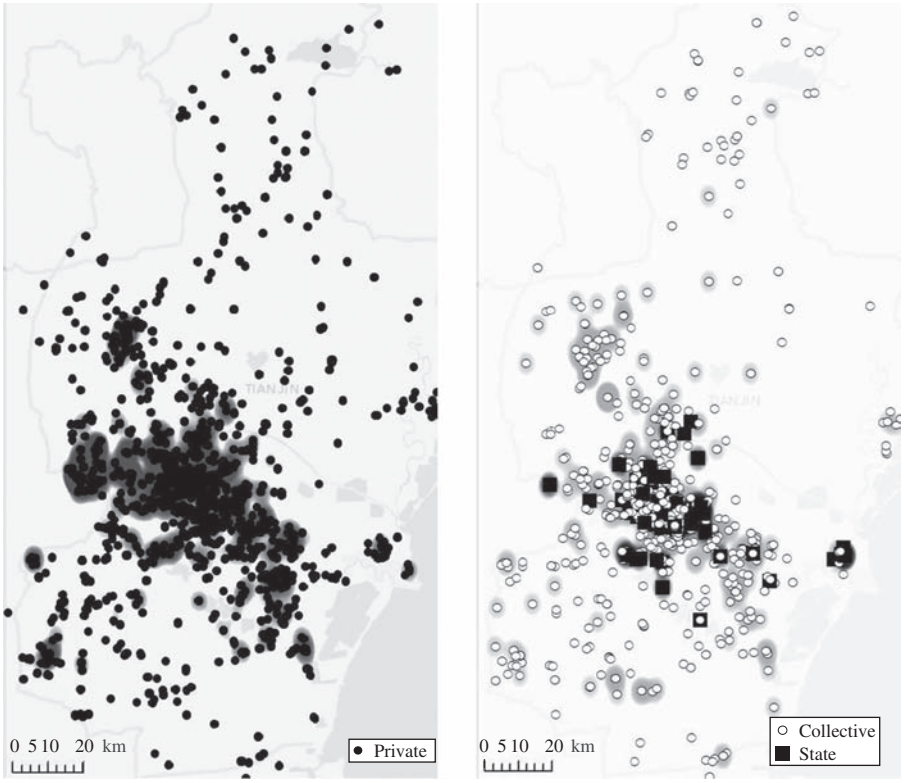
Data come from the Tianjin Municipal Administration for Industry and Commerce. This is the office responsible for granting business licenses in Tianjin. All entrepreneurs must obtain a license to begin operating and must maintain the license by continuing to pay taxes. A license is revoked if a business is forced to liquidate or cancelled if a business fails to pay taxes. This permits accurate measurement of start and end dates for businesses in our sample.

Our sample consists of 1,760 private bicycle manufacturers founded between 1978 and 2008. For these firms, we collected data on their registered capital and addresses. Registered capital consists of all assets at startup, including property and cash.[4] In our founding rate analysis, we split private startups into large, medium, and small sizes based on terciles of registered capital. In inflation-adjusted year 2000 values, the average registered capital is ¥3,418,749 for large startups, ¥187,558 for medium-size startups, and ¥25,726 for small startups. In our failure analysis, the log of registered capital, adjusted for inflation, is included as a continuous independent variable (ln(*registered capital*)).

To analyze founding rates, we divide the area of Tianjin into a grid consisting of 1-km^2 cells, with each cell representing an area at risk of a founding event occurring. To measure the presence of other preexisting bicycle manufacturers, we collected data on the addresses of all 333 collectively owned and 37 state-owned bicycle manufacturers that were active from 1978 through 2008 in addition to the private enterprises in our sample. For a given cell i at time t, we identify the number of bicycle manufacturers that were active in the prior month within a five-kilometer radius.[5] Following Sorenson and Audia (2000), we weight each manufacturer j inversely by its distance d_{ij} from the center of cell i and take a sum of these to arrive at a distance weighted count of manufacturers around cell i at time t: $C_{it} = \sum_j 1/1 + d_{ij}$.

In all analyses, we include a variety of controls at the district level. There are 16 districts in the Tianjin municipality. In addition to district fixed effects, we

Figure 2. Locations of Bicycle Manufacturers in Tianjin



Notes. Black dots indicate the locations of *Private bicycle manufacturers* that were active between 1978 and 2008. White dots and black squares indicate the locations of *Collective bicycle manufacturers* and *State bicycle manufacturers*, respectively, that were active during this same period. Gray shading indicates the geographic concentration of manufacturers in a given area, with darker shading indicating areas with higher concentrations.

include total population (ln(*district population*)), population density per square kilometer (*Population density*), and population growth rate (*Population growth*), computed as year-over-year change in population divided by the prior year's population. Data at the district level come from annual editions of the *Tianjin Statistical Yearbook*.

Additionally, we include controls for local economic activity, government spending, and education. As controls for size of the private sector in a district, we include the log number of private enterprises in the district across all industries, not just bicycle manufacturing (ln(# *private enterprises, all industries*)) and the percentage of the district's population that is employed in the private sector (*% of population employed by private enterprises, all industries*). As a control for overall economic output, we include district-level gross domestic product, adjusted for inflation (ln(*GDP*)). To measure the degree to which a district is rural or agrarian, we compute the percentage of households in a district that are agricultural (*% of households agricultural*). To measure economic activity across different industry sectors, we compute the percentage of GDP from primary, secondary, and tertiary industries. This classification is used in all national accounting in China. Primary industries refer to activities associated with the extraction of natural resources. Secondary industries refer to activities associated with processing, which includes all manufacturing industries (*% of GDP in secondary industries*). Tertiary industries refer to activities associated with services, such as sales and logistics (*% of GDP in tertiary industries*). In models that include these variables, the percentage of GDP due to primary industries is used as the base category. To measure local government spending, we include district-level government revenue (ln(*government revenue*)) and expenditures (ln(*government expenditures*)). To control for local education, we include district-level educational expenditures (ln(*educational expenditures*)), number of secondary schools (# *secondary schools*), and enrollment in secondary schools (*Secondary school enrollment*). All dollar figures are adjusted for inflation. Table 2 provides descriptive statistics.

Data on local population are consistently reported every year for each district. Other data at the district level were not reported consistently until the mid-1990s. Data on local economic activity, government spending, and education were therefore collected in five-year intervals for 1990, 1995, 2000, and 2005. Fortunately, in this region, the emergence and growth of the private sector did not occur until the 1990s. As

Table 2. Descriptive Statistics

$N = 228{,}828$	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ln(*district population*)	3.836	0.390							
(2) *Population density*	0.318	0.739	0.26						
(3) *Population growth*	0.008	0.009	−0.14	−0.17					
(4) ln(*GDP*)	13.066	0.832	0.12	−0.22	0.30				
(5) *% of households agricultural*	0.642	0.274	−0.01	−0.83	−0.05	0.20			
(6) *% of GDP in secondary industries*	0.505	0.144	−0.49	−0.73	0.34	0.44	0.58		
(7) *% of GDP in tertiary industries*	0.370	0.182	0.25	0.83	−0.17	−0.19	−0.83	−0.84	
(8) ln(*government revenue*)	10.116	0.625	−0.05	−0.01	0.46	0.76	−0.13	0.28	0.02
(9) ln(*government expenditures*)	10.272	0.752	0.19	0.11	0.41	0.82	−0.20	0.11	0.19
(10) ln(*educational expenditures*)	9.086	0.621	0.46	0.21	0.23	0.78	−0.22	−0.07	0.29
(11) *# secondary schools*	38.082	19.358	0.87	0.05	−0.17	−0.03	0.18	−0.34	−0.01
(12) *Secondary school enrollment*	2.601	1.470	0.82	0.17	−0.13	0.19	0.02	−0.42	0.24
(13) ln(*# private enterprises, all industries*)	9.231	0.438	0.72	0.07	−0.03	0.46	0.10	−0.20	0.13
(14) *% of population employed by private enterprises, all industries*	0.071	0.048	−0.42	−0.19	0.52	0.62	0.02	0.50	−0.12
(15) *Private bicycle manufacturers*	2.740	12.543	0.12	−0.02	0.02	0.16	0.03	−0.01	0.02
(16) *Collective bicycle manufacturers*	0.515	1.248	−0.06	0.25	−0.13	−0.19	−0.22	−0.20	0.24
(17) *State bicycle manufacturers*	0.098	0.352	−0.04	0.28	−0.04	−0.08	−0.27	−0.20	0.26

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(9) ln(*government expenditures*)	0.87								
(10) ln(*educational expenditures*)	0.71	0.92							
(11) *# secondary schools*	−0.24	−0.05	0.17						
(12) *Secondary school enrollment*	0.06	0.29	0.50	0.72					
(13) ln(*# private enterprises, all industries*)	0.21	0.44	0.62	0.54	0.67				
(14) *% of population employed by private enterprises, all industries*	0.69	0.63	0.39	−0.50	−0.28	0.08			
(15) *Private bicycle manufacturers*	0.16	0.18	0.19	0.03	0.12	0.17	0.05		
(16) *Collective bicycle manufacturers*	−0.12	−0.12	−0.10	−0.08	−0.06	−0.03	−0.07	0.06	
(17) *State bicycle manufacturers*	0.01	0.00	0.02	−0.09	−0.05	−0.05	−0.02	0.06	0.59

Notes. This table reports descriptive statistics for our sample. The unit of observation is a 1-km^2 cell-month.

prior research has reported, as late as 1988, only 4% of the workforce in Tianjin worked in the private sector (Bian and Logan 1996). This is consistent with the founding rate of private enterprises in our sample, which took off after 1992 (Figure 3).[6] In our analyses, we present results from the entire 1978 to 2008 sample, as well as from the 1990 to 2008 sample, which includes all district-level controls. Our results are robust across both samples.

Main Results: Founding Rates

In our analysis of founding rates, the unit of analysis is the grid cell-month. When founding events occur, the mean number of foundings in a cell-month is 1.3, and the median and mode are both 1. Hence, variation in founding rates at the cell-month level is primarily binary. We therefore analyze the likelihood of founding using a logit model.

Table 3 reports logit models of the likelihood that a private bicycle manufacturer is founded in a given cell-month. Column 1 reports the baseline model. This model includes a distance-weighted count of all bicycle manufacturers within a five-kilometer radius of a cell, which does not differentiate among types of organizations. In column 1, this variable has a significant positive effect on the likelihood of a private bicycle startups being founded. This suggests that new private startups tend to agglomerate around preexisting enterprises in the same industry.

Column 2 reports a model in which the distance-weighted count measure is broken out by the three types of organizations: state, collective, and private enterprises. In this model, *Private bicycle manufacturers* and *Collective bicycle manufacturers* have significant positive effects on the likelihood of founding, but *State bicycle manufacturers* do not. The significant positive effect of *Collective bicycle manufacturers* provides support for Hypothesis 1.

Figure 3. Founding rates of private bicycle manufacturers in Tianjin

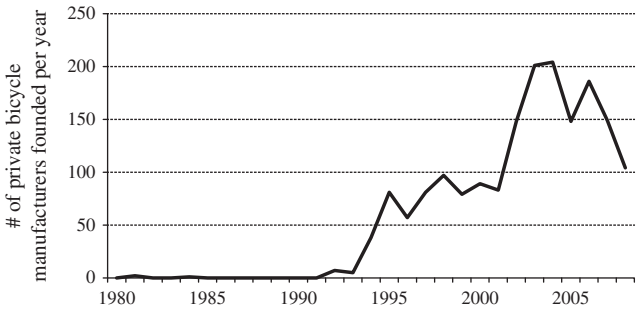


Table 3. Likelihood of a New Private Bicycle Startup Being Founded

	(1)	(2)	(3)	(4)	(5)	(7)	(8)	(9)
	Venture size					Venture size		
	All	All	Large	Medium	Small	High	Medium	Low
District level variables								
ln(*district population*)	18.144*	17.211**	1.526	44.248*	39.837*	−1.85	10.162	10.021
	(4.704)	(5.646)	(5.228)	(4.987)	(16.556)	(3.810)	(8.040)	(12.149)
Population density	−9.072*	−9.528*	−4.915**	−10.269**	−82.129*	−4.408**	−4.127+	−54.713+
	(1.945)	(2.114)	(1.632)	(3.664)	(35.044)	(1.622)	(2.441)	(28.233)
Population growth	13.818	17.268+	7.521	17.829	47.725+	−8.639	11.815	18.018
	(8.962)	(10.206)	(4.750)	(20.905)	(28.922)	(7.574)	(14.747)	(20.269)
ln(*GDP*)						−0.711+	0.216	0.913
						(0.432)	(0.670)	(0.818)
% of households agricultural						6.396*	−11.433*	−0.732
						(3.135)	(5.548)	(9.035)
% of GDP in secondary industries						10.365*	4.949	10.506
						(3.005)	(5.304)	(7.129)
% of GDP in tertiary industries						5.404+	−8.407	7.262
						(3.085)	(6.927)	(5.901)
ln(*government revenue*)						−0.995	0.331	3.575
						(0.828)	(1.520)	(3.050)
ln(*government expenditures*)						2.323*	1.386	−3.303
						(1.039)	(1.816)	(2.512)
ln(*educational expenditures*)						0.483	−1.252	−3.153+
						(0.741)	(1.153)	(1.728)
# secondary schools						0.022	0.017	−0.009
						(0.016)	(0.023)	(0.036)
Secondary school enrollment						−0.038	1.541+	0.343+
						(0.077)	(0.883)	(0.208)
ln(*# private enterprises, all industries*)						0.498	−0.365	−0.403
						(0.397)	(1.247)	(3.233)
% of population employed by private enterprises, all industries						3.379	2.233	8.325
						(2.454)	(5.800)	(6.296)
Cell level variables								
All bicycle manufacturers	0.025*							
	(0.001)							
Private bicycle manufacturers		0.025*	0.022*	0.026*	0.025*	0.023*	0.028*	0.026*
		(0.000)	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)
Collective bicycle manufacturers		0.331*	0.383*	0.239*	0.250*	0.400*	0.278*	0.278*
		(0.020)	(0.040)	(0.047)	(0.037)	(0.042)	(0.061)	(0.044)
State bicycle manufacturers		0.026	−0.132	0.435	0.574*	−0.065	0.488	0.623*
		(0.190)	(0.195)	(0.413)	(0.284)	(0.169)	(0.414)	(0.292)
Constant	−69.357*	−66.139*	−12.743	−162.260*	−144.670*	−29.363+	−46.732	−32.616
	(16.483)	(19.818)	(18.084)	(17.339)	(56.813)	(17.215)	(32.544)	(43.358)
Log-likelihood	−7,222.502	−7,080.078	−3,781.92	−2,889.156	−1,944.135	−3,633.376	−2,822.912	−1,902.225
Pseudo-*R* sqr.	0.177	0.193	0.153	0.233	0.22	0.145	0.237	0.228
Observations	267,492	267,492	267,492	226,032	209,088	218,352	205,488	203,592
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes. This table reports results from logit models of the likelihood of a private bicycle manufacturer being founded. The unit of observation is a cell-month. Each cell has an area of 1-km^2. Results are based on the likelihood of at least one founding event occurring in a given cell-month. Fixed effects (FE) and clustered errors are at the district level.

Standard errors in parentheses; $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$.

Columns 3–5 report models in which the dependent variable, likelihood of a private bicycle manufacturer being founded, is broken out by venture size. Ventures are split into large, medium, and small sizes based on terciles of registered capital. In column 3, the dependent variable is the likelihood of a large private bicycle manufacturer being founded. In this model, *Private bicycle manufacturers* and *Collective bicycle manufacturers* have significant positive effects on the likelihood of a large-scale private enterprise being founded, but *State bicycle manufacturers* do not. Consistent with Hypothesis 2A, the coefficient for *Collective bicycle manufacturers*

is larger than the coefficient for *Private bicycle manufacturers* (0.383 > 0.022). A two-tailed test of the null hypothesis that the two coefficients are equal can be rejected at a level of $p = 0.000$. Consistent with Hypothesis 2B, the coefficient for *Collective bicycle manufacturers* is larger than the coefficient for *State bicycle manufacturers* (0.383 > −0.132). A two-tailed test of the null hypothesis that the two coefficients are equal can be rejected at a level of $p = 0.006$.

In column 4, the dependent variable is the likelihood of a medium-size private bicycle manufacturer being founded. In this model, *Private bicycle manufacturers* and *Collective bicycle manufacturers* have significant positive effects on the likelihood of a medium-size private enterprise being founded, but *State bicycle manufacturers* do not. In column 4, the dependent variable is the likelihood of a small-scale private bicycle manufacturer being founded. In this model, the three types of organizations—*State bicycle manufacturers*, *Collective bicycle manufacturers*, and *Private bicycle manufacturers*—all have significant positive effects on the likelihood of a small-scale private enterprise being founded.

Consistent with Hypothesis 3A, the coefficient for *Collective bicycle manufacturers* is larger for the founding rates of large startups than for the founding rates of small startups (0.383 > 0.250). A two-tailed test of the null hypothesis that the two coefficients are equal can be rejected at a level of $p = 0.061$. Consistent with Hypothesis 3B, the difference between the coefficients for *Collective bicycle manufacturers* and *Private bicycle manufacturers* is larger for the founding rates of large startups (0.383 − 0.022 = 0.361) than for the founding rates of small startups (0.250 − 0.025 = 0.225). A two-tailed test of the null hypothesis that these differences are equal (0.361 = 0.225) can be rejected at a level of $p = 0.006$. Consistent with Hypothesis 3C, the difference between the coefficients for *Collective bicycle manufacturers* and *State bicycle manufacturers* is larger for the founding rates of large startups (0.383 − (−0.132) = 0.515) than for the founding rates of small startups (0.383 − 0.574 = −0.324). A two-tailed test of the null hypothesis that these differences are equal (0.515 = −0.324) can be rejected at a level of $p = 0.031$.

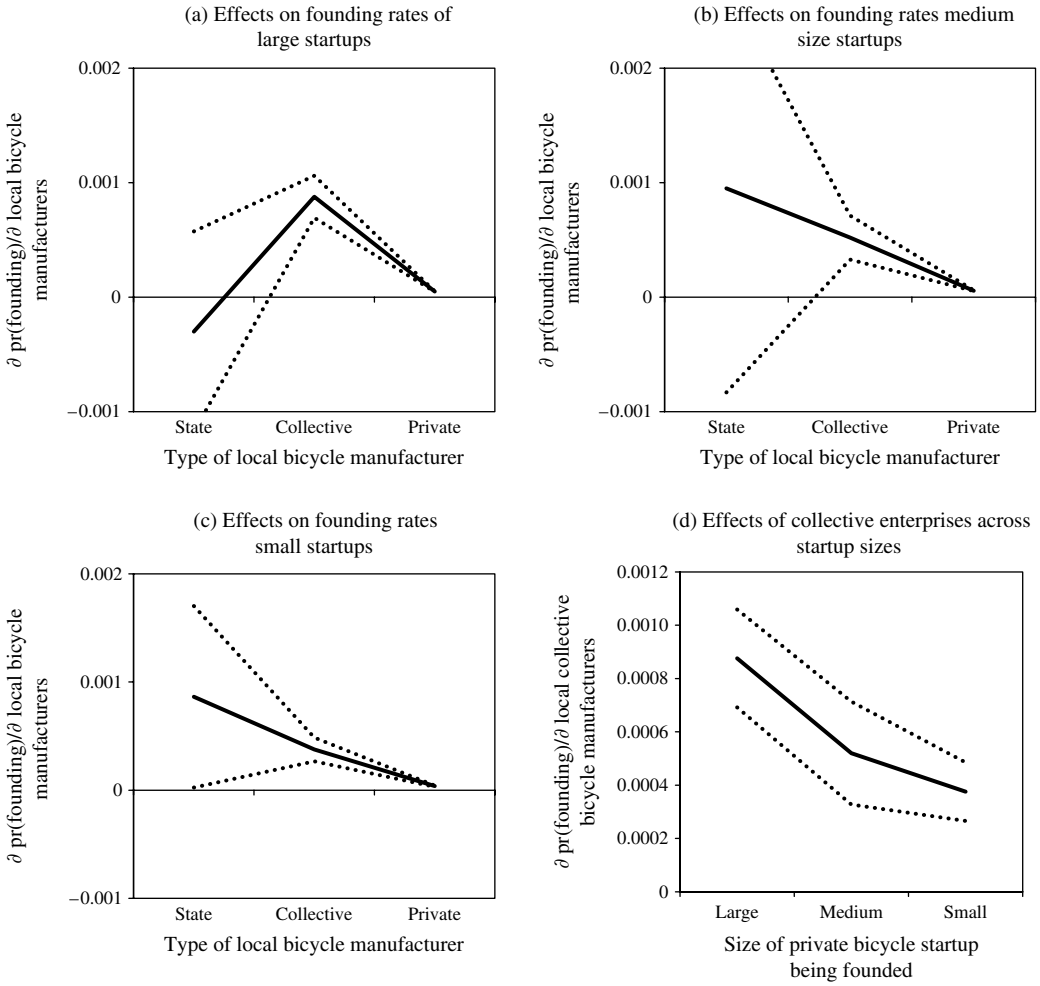
To show these results graphically, Figure 4 plots the marginal effects of *State bicycle manufacturers*, *Collective bicycle manufacturers*, and *Private bicycle manufacturers* on the likelihood of founding for large, medium, and small private bicycle startups. The relative sizes of marginal effects are consistent with Hypotheses 2A, 2B, 3A, 3B, and 3C. Figure 4 also helps facilitate interpretation of practical effect sizes. In Panel (a), the average marginal effect (solid line) indicates that the presence of one additional collective enterprise in a cell results in an increase of 0.0009 in the probability of a large startup being founded in a given cell-month. While this may seem small, it is of practical significance given that the unconditional probability of a large startup being founded in a given cell-month is only 0.0007.[7] The presence of one additional collective enterprise more than doubles the probability of a large startup being founded. By comparison, the presence of one additional private enterprise in a cell results in an increase of only 0.00005, an order of magnitude smaller than the effect of an additional collective enterprise. The presence of an additional state enterprise has no significant effect.

Panel (d) shows how the effect of *Collective bicycle manufacturers* varies across different startup sizes. The average marginal effect (solid line) indicates that the presence of one additional collective enterprise in a cell results in an increase of 0.0004 in the probability of a small startup being founded. This is still of practical significance, given that the unconditional probability of a small startup being founded in a given cell-month is only 0.0006. However, the effect is significantly weaker than the effect on the probability of a large startup being founded, as indicated by the fact that the 95% confidence intervals for the marginal effects for small and large startups do not overlap. This provides support for Hypothesis 3A. Columns 7–9 of Table 3 show that these results are robust to including the full range of controls for local economic activity, government spending, and education.

Table 4 reports models that add an interaction between *Private bicycle manufacturers* and *State bicycle manufacturers*. In column 1, the dependent variable is the likelihood of a private bicycle startup (of any size) being founded. In this model, the main effect of *State bicycle manufacturers* remains the same as before, negative and not significant. However, the interaction with *Private bicycle manufacturers* is positive and significant. Columns 2–4 report models in which the dependent variable is broken out into large, medium-size, and small startups. In all models, the main effect of *State bicycle manufacturers* is negative and not significant, but the interaction with *Private bicycle manufacturers* is positive and significant.

The effect of *State bicycle manufacturers* on the likelihood of a large private bicycle startup being founded is notable because the main effect was the weakest and not significant in the prior results that did not include an interaction. Panel (a) of Figure 5 plots the marginal effect of *State bicycle manufacturers* on the likelihood of a large private bicycle startup being founded, computed at different distance-weighted counts of *Private bicycle manufacturers*. When there are no private enterprises at all within a five-kilometer radius of a cell, the presence of one additional state enterprise in a cell has no significant effect on the likelihood of a new large private startup being founded. When there are sufficiently many private enterprises nearby, however,

Figure 4. Marginal Effects of Existing Bicycle Manufacturers on Founding Rates of New Private Bicycle Startups



Notes. In this figure, the vertical axis is the marginal effect of a one unit increase in the distance-weighted count of preexisting bicycle manufacturers on the likelihood of a private bicycle startup being founded. The distance-weighted count of preexisting bicycle manufacturers within a five-kilometer radius of a focal cell is computed as $C_{it} = \sum_j 1/(1 + d_{ij})$. Given the denominator for weighting each manufacturer, an increase of one unit of this variable can be interpreted as the presence of one additional manufacturer zero kilometers away from the center of the cell, or two additional manufacturers one kilometer away, and so on. Marginal effects are computed for each observation using observed values of independent variables and coefficient estimates from columns 3–5 of Table 3. The solid line shows the average marginal effect, while the dotted lines show the 95% confidence interval. Panels (a)–(c) compare the effects of *Collective bicycle manufacturers* against the effects of *State bicycle manufacturers* and *Private bicycle manufacturers*, for different startup sizes. Panel (d) compares the effects of *Collective bicycle manufacturers* for different startup sizes.

the marginal effect of state enterprises becomes positive and significant. For instance, when the distance-weighted count of private enterprises reaches 30, the presence of one additional state enterprise results in an increase of 0.0010 in the probability of a large private startup being founded in a given cell-month. This is of practical significance given that the unconditional probability of a large private startup being founded in a given cell-month is 0.0007. The same pattern holds for the founding rates of medium-size and small startups. Panel (b) of Figure 5 plots marginal effects of *State bicycle manufacturers* on the likelihood of a small private bicycle startup being founded. The significance of the positive interaction between *State bicycle manufacturers* and *Private bicycle manufacturers* provides support for Hypothesis 4.

To check that this is reflecting the presence of entrepreneurial activity in the bicycle industry—as opposed to picking up the effect of broader shifts in the economic or political environment favoring the private sector—column 5 adds two interaction terms. First, it adds an interaction between *State bicycle manufacturers* and the variable ln(# *private enterprises, all industries*). Second, it adds an interaction between *State bicycle manufacturers* and the variable for % *of population employed by private enterprises, all industries*. As the results in column 5 show, neither of these interactions is significant, while the interaction with *Private bicycle manufacturers* remains positive and significant. These interactions are

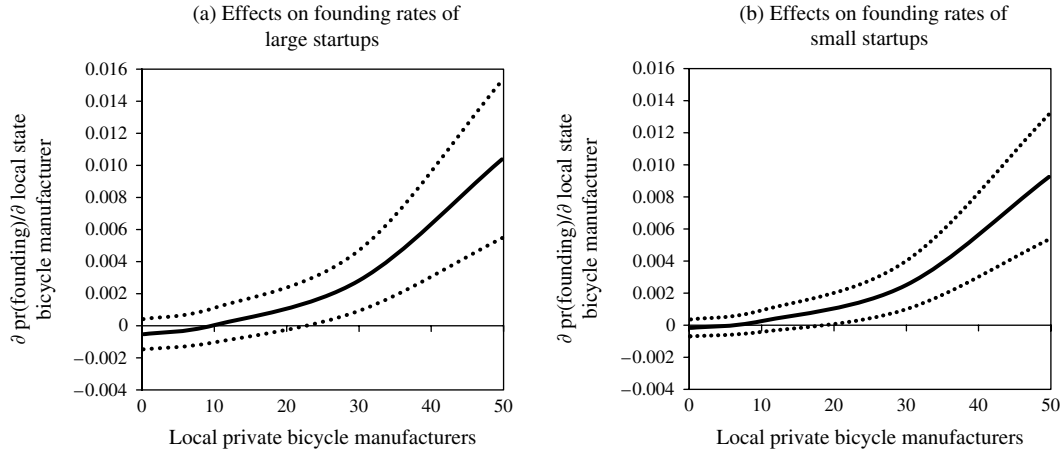
Table 4. Likelihood of a New Private Bicycle Startup Being Founded

	(1)	(2)	(3)	(4)	(5)
			Venture size		
	All	Large	Medium	Small	All
District level variables					
ln(*district population*)	0.139	−2.367	8.289	5.864	0.378
	(3.598)	(4.035)	(7.920)	(10.979)	(3.668)
Population density	−4.205*	−4.174*	−3.838+	−42.021*	−4.340*
	(1.097)	(1.777)	(2.133)	(17.068)	(1.055)
Population growth	−0.241	−9.097	9.837	14.179	−0.289
	(5.934)	(7.872)	(12.694)	(17.043)	(6.015)
ln(*GDP*)	−0.714*	−0.722+	0.319	0.735	−0.775*
	(0.322)	(0.433)	(0.648)	(0.799)	(0.350)
% of households agricultural	2.999	6.186*	−13.084*	−0.851	3.574
	(3.052)	(3.156)	(5.684)	(9.286)	(3.411)
% of GDP in secondary industries	9.866**	10.138*	3.414	8.262	9.992**
	(3.334)	(2.996)	(5.815)	(6.065)	(3.363)
% of GDP in tertiary industries	3.26	5.371+	−8.462	6.799	3.277
	(3.279)	(3.112)	(7.121)	(5.252)	(3.369)
ln(*government revenue*)	−0.306	−1.015	0.24	3.533	−0.271
	(0.698)	(0.826)	(1.649)	(2.566)	(0.768)
ln(*government expenditures*)	1.094+	2.360*	1.634	−3.111	1.066
	(0.665)	(1.029)	(1.880)	(2.135)	(0.692)
ln(*educational expenditures*)	0.016	0.558	−1.025	−2.546	0.028
	(0.563)	(0.712)	(1.124)	(1.673)	(0.611)
# secondary schools	0.025*	0.022	0.02	0	0.026+
	(0.012)	(0.016)	(0.023)	(0.032)	(0.013)
Secondary school enrollment	0.109*	−0.047	1.556+	0.286	0.073
	(0.049)	(0.077)	(0.884)	(0.180)	(0.059)
ln(*# private enterprises, all industries*)	0.162	0.495	−0.368	−0.45	0.483
	(0.494)	(0.399)	(1.324)	(2.713)	(0.595)
% of population employed by private enterprises, all industries	6.068**	3.234	1.655	9.534+	5.910*
	(2.163)	(2.410)	(5.274)	(5.461)	(2.366)
Cell-level variables					
Private bicycle manufacturers	0.025*	0.022*	0.026*	0.024*	0.025*
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Collective bicycle manufacturers	0.378*	0.408*	0.331*	0.362*	0.381*
	(0.021)	(0.051)	(0.045)	(0.041)	(0.024)
State bicycle manufacturers	−0.279	−0.25	−0.123	−0.185	7.192
	(0.203)	(0.224)	(0.369)	(0.287)	(4.796)
Private bicycle manufacturers × *State bicycle manufacturers*	0.038*	0.026*	0.037*	0.039*	0.044*
	(0.003)	(0.005)	(0.005)	(0.005)	(0.006)
% of population employed by private enterprises, all industries × *State bicycle manufacturers*					−0.546
					(1.584)
ln(*# private enterprises, all industries*) × *State bicycle manufacturers*					−0.818
					(0.538)
Constant	−18.222	−27.924	−43.201	−21.639	−21.724+
	(13.648)	(17.753)	(31.591)	(38.565)	(12.954)
Log-likelihood	−6,808.43	−3,625.418	−2,795.948	−1,872.587	−6,804.504
Pseudo-*R* sqr.	0.194	0.147	0.244	0.24	0.195
Observations	228,828	218,352	205,488	203,592	228,828
District FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y

Notes. This table reports results from logit models of the likelihood of a private bicycle manufacturer being founded. The unit of observation is a cell-month. Each cell has an area of 1-km^2. Results are based on the likelihood of at least one founding event occurring in a given cell-month. Fixed-effects (FE) and clustered errors are at the district level.

Standard errors in parentheses; $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$.

Figure 5. Marginal Effect of State Bicycle Manufacturers on Founding Rates of Private Bicycle Startups



not significant when the interaction term with *Private bicycle manufacturers* is removed. This is also the case when the dependent variable is broken out by venture size (unreported to conserve space). These results suggest that the moderating effect of *Private bicycle manufacturers* on *State bicycle manufacturers* is not just acting as a proxy for general trends in the private sector.[8]

Entrepreneurial Spawning vs. Marshallian Agglomeration Advantages

In the same vein as Buenstorf and Klepper (2009) and Sorenson and Audia (2000), our theory describes how entrepreneurial spawning can serve as a mechanism for generating industry agglomeration. To distinguish entrepreneurial spawning as a unique theory of agglomeration, prior studies have pointed to a number of distinctive empirical implications that are not predicted by Marshallian accounts. First, as Buenstorf and Klepper (2009) point out, Marshallian accounts do not make predictions that distinguish among different kinds of incumbents or different kinds of entrants. Their theory suggests that better incumbents tend to spawn more and better new entrants. For instance, using size as a measure of competence, Buenstorf and Klepper (2009) find that larger incumbents tend to spawn larger entrants. Second, as Sorenson and Audia (2000) point out, Marshallian accounts are based on the assumption of performance advantages in an agglomeration. The entrepreneurial spawning mechanism, on the other hand, is based on higher founding rates of new entrants, which are not necessarily assumed to enjoy ongoing performance advantages after founding. Sorenson and Audia (2000) find that while agglomerations tend to generate higher rates of founding, agglomerations also generate higher rates of failure, presumably due to increased competition. Similarly, Buenstorf and Klepper (2009) find that while producers in agglomerations have significantly lower failure rates, this effect goes away after accounting for entrants that were spinoffs and, specifically, entrants that were spinoffs from better incumbents. The overall theme of these results is, that unlike traditional Marshallian advantages, the geographic effects of entrepreneurial spawning (1) do not emanate equally from all incumbents, (2) do not equally affect all new entrants, and (3) do not provide ongoing performance advantages beyond what was inherited from an incumbent at the point of founding.

In general, our choices of geographic scope and industry help to mitigate the role of Marshallian advantages. Like footwear manufacturing (Sorenson and Audia 2000), bicycle manufacturing is a labor-intensive industry in which proximity to demand has little impact on the location of production; 70% of China's bicycle output in 2003 was exported, with a third of exported bicycles going to the United States (Mygatt 2005). Total transportation costs therefore vary negligibly with producer location within China and even less so with location within a province or city. Traditional economic mechanisms rooted in transportation cost of inputs or outputs would not explain colocation at the short distances in our study.

With respect to (1), our results show that not all incumbents have equally strong spillover effects on local entrepreneurial founding rates. In the spirit of Buenstorf and Klepper (2009), our results suggest that certain types of organizations are "better" at facilitating entrepreneurial foundings. Collective enterprises, which have larger-scale operations than private enterprises, tend to provide more sophisticated levels of experience for entrepreneurs. At the same time, they provide better socialization for entrepreneurship than do state enterprises, which are larger in scale but also much more bureaucratic. The fact that organization size does not have a monotonic effect on local founding rates is a notable contrast from what would be expected under Marshallian accounts. At the advent of

market reforms, the vast majority of trained labor and suppliers were concentrated around state enterprises. If the primary mechanism behind agglomeration was the concentration of labor and suppliers, then the presence of state enterprises should have had the strongest effects on local founding rates. Marshallian accounts also do not make predictions about interaction effects between different types of organizations. Our results show that the presence of private enterprises resulted in an increase in the effects of state enterprises on local entrepreneurial foundings.

With respect to (2), our results show that the spillover effects of collective enterprises are stronger for the founding rates of large startups than for the founding rates of small startups. In general, Marshallian accounts do not make predictions about what kinds of entrants are more strongly affected by agglomerations. In fact, if the choice of locating in an agglomeration is driven by performance advantages, then arguably the opposite might be expected. Agglomerations might be expected to lower the bar for entry, attracting smaller, weaker entrants. In contrast, the spawning mechanism suggests that larger, stronger entrants will be founded in agglomerations, as a result of inheriting capabilities from local incumbents (Buenstorf and Klepper 2009). Our finding that collective enterprises have stronger effects compared to state enterprises on founding rates of large startups is further distinguished from Marshallian expectations. If the sheer volume of production activity in an agglomeration helps to drive down variable costs, then one could argue that this would allow for larger-scale entrants with higher fixed-cost operations. However, if this were the case, then state enterprises should have had the strongest spillover effects on founding rates of large ventures. As our arguments suggest, however, what makes an incumbent "better" for spawning large-scale ventures is not just monotonically larger size but a balance between providing exposure to capabilities and limiting exposure to bureaucratic socialization.

Failure Rate Analysis

With respect to (3), we now follow prior research in analyzing the failure rates of entrepreneurial startups founded near incumbents. To do this, we model the hazard of failure of the private startups in our sample. In this analysis, the unit of time is the venture-month. We record a startup as having failed in the month in which its business license is either revoked or canceled, indicating, respectively, that the business was forced to liquidate or failed to pay taxes. In both cases, the exit event is involuntary. The business ceases to be a legal entity and no longer has the right to operate. Private startups that did not experience one of these exit events by the end of our observation period (through 2008) are treated as censored.

Because we have no theoretical priors about the functional form of the baseline hazard rate, we use a piecewise-constant exponential model, which allows for arbitrary patterns of time dependence.[9] In addition to time pieces to account for time dependence over a startup's life, we include fixed effects for years and for districts. As before, we include controls for ln(*district population*), *Population density*, and *Population growth* rate at the district level. Table 5 reports results. The key independent variables in these models are the distance-weighted counts of *State bicycle manufacturers at founding*, *Collective bicycle manufacturers at founding*, and *Private bicycle manufacturers at founding* within a five-kilometer radius. For the purposes of the failure rate analysis, distances are measured from the focal venture's location, and counts are based on enterprises that were active in the month prior to the focal venture's founding. The failure rate analysis therefore mirrors the founding rate analysis by examining how the incumbents that were present at the point of a startup's founding subsequently affected the startup's survival.

Column 1 includes the distance-weighted counts for the three types of incumbent organizations. For all three types, the coefficients are consistently positive and significant, indicating an increased hazard of failure. This implies that startups founded near high concentrations of incumbents are less likely to survive. Notably, *Collective bicycle manufacturers at founding*, which we theorized as being especially effective at spawning entrepreneurs, significantly increase the hazard of failure for private startups founded in their vicinity. This is consistent with Sorenson and Audia's (2000) finding that agglomerations generate both higher founding rates and higher failure rates. In contrast to Marshallian accounts, the entrepreneurial spawning mechanism is specific to the role of incumbents in facilitating foundings. It does not predict that the agglomeration of incumbents also provides performance advantages.

Column 2 adds the variable for *Venture size* (ln(*registered capital*)). This was used in the founding rate analysis to partition startups into groups based on size. In the failure rate analysis, since the focal unit is the startup, *Venture size* (ln(*registered capital*)) can be included directly as a continuous variable. In column 2, the variable for *Venture size* (ln(*registered capital*)) has a significant negative coefficient, indicating a decreased hazard of failure. This implies that large startups are less likely to fail than small startups. Notably, the addition of *Venture size* (ln(*registered capital*)) results in the coefficient for *Collective bicycle manufacturers at founding* increasing. Our previous results showed that collective enterprises facilitate the founding of large startups. Without controlling for the larger average size of startups founded near collective enterprises, the effect of being founded near collective enterprises seems less

Table 5. Hazard of Failure of Private Bicycle Startups

	(1)	(2)	(3)
ln(*district population*)	1.061	1.917	−7.355
	(6.019)	(5.310)	(5.157)
Population density	−3.720*	−3.790**	−1.768
	(1.562)	(1.387)	(2.043)
Population growth	−3.086	−3.832	−11.528
	(5.826)	(5.898)	(9.091)
ln(*GDP*)			−0.866*
			(0.405)
% of households agricultural			1.301
			(4.013)
% of GDP in secondary industries			−11.053*
			(4.467)
% of GDP in tertiary industries			−14.261**
			(4.503)
ln(*government revenue*)			−2.012*
			(0.948)
ln(*government expenditures*)			1.564
			(0.970)
ln(*educational expenditures*)			1.106+
			(0.648)
# secondary schools			−0.025+
			(0.015)
Secondary school enrollment			−0.318*
			(0.087)
ln(*# private enterprises, all industries*)			1.641*
			(0.775)
% of population employed by private enterprises, all industries			11.002*
			(4.771)
Private bicycle manufacturers at founding	0.002**	0.002**	0.002**
	(0.001)	(0.001)	(0.001)
Collective bicycle manufacturers at founding	0.067**	0.105*	0.103*
	(0.025)	(0.020)	(0.019)
State bicycle manufacturers at founding	0.233*	0.102	0.082
	(0.113)	(0.134)	(0.143)
Venture size (ln(*registered capital*))		−0.306*	−0.306*
		(0.021)	(0.022)
Log-likelihood	−1,449.437	−1,375.913	−1,361.825
Observations	90,025	89,704	89,255
District FE	Y	Y	Y
Year FE	Y	Y	Y

Notes. This table reports results from piecewise exponential models of hazard of failure for private bicycle startups. The unit of observation is a venture-month. Fixed effects (FE) and clustered errors are at the district level.

Standard errors in parentheses; $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$.

detrimental, since it is confounded with the beneficial effect of size. After controlling for size, the effect of being founded near collective enterprises becomes more detrimental. Column 3 shows that these results are robust after including the full range of controls for local economic activity, government spending, and education.

While we do not directly observe hereditary linkages between specific startups and incumbents, the combination of results from our founding and failure rate analyses are consistent with Buenstorf and Klepper's (2009) results showing that the benefits of agglomeration are due to what is inherited at the point of founding from nearby incumbents. They show that better parents result in startups with higher levels of capitalization at founding, which in turn reduce hazard of failure. Controlling for the effects of heritage, the survival advantages of agglomerations go away. More generally, Marshallian accounts would not explain why the agglomeration of incumbents would have beneficial effects on founding rates but detrimental effects on subsequent venture survival.

Discussion

Better incumbents are thought to generate agglomerations of more and better entrepreneurial entrants (Buenstorf and Klepper 2009). By comparing the effects of different types of organizations on founding rates of different-sized startups, we shed light on the question of what makes an incumbent "better" at spawning entrepreneurs. Prior research has argued both that larger organizations should be less fertile and more fertile as spawning grounds for entrepreneurs. For entrepreneurial spawning to advance as an alternative to traditional Marshallian theories of agglomeration, it is important for these seemingly competing insights to be reconciled. We contribute to this literature by showing how insights from both of these perspectives can be integrated and applied towards generating novel predictions about agglomeration dynamics. Departing from a monotonic view, we have conceptualized the effect of organization size in terms of a tradeoff between bureaucratic socialization and exposure to capabilities. Drawing from the large organization perspective on spawning, we recognize that large organizations provide better training for managing large-scale operations with complex internal and external interdependencies. But reconciling this with the small organization perspective, we recognize that in larger organizations, individuals will need to pass through more levels of bureaucratic socialization to reach the point of gaining this holistic, managerial experience.

These insights are important for understanding the nature of entrepreneurship as a mechanism for sustaining—and potentially reinvigorating—geographic regions dominated by large, bureaucratic incumbents. Our results suggest that, during China's economic transition, large-scale private startups that could potentially employ more workers in the same industry did not, in general, tend to agglomerate around state enterprises. Instead, the agglomeration of private startups around state enterprises tended to be by small startups. These findings are notable because while bureaucratic socialization has been widely recognized as hindering economic growth via inefficiency within state enterprises (Tan 2001), prior research has not considered the potential for spillover effects of state enterprises on local entrepreneurial activity. Consistent with anecdotal accounts, our results suggest that private entrepreneurship in the shadow of state enterprises tended to be limited to small scale ventures (e.g., Qian 1996, Tsai 2005, Nee and Opper 2012). Large-scale private ventures tended instead to agglomerate around collective enterprises. Collective enterprises were intermediate between private enterprises and state enterprises both in terms of size and degree of bureaucratization. Prior research has argued that these intermediate attributes allowed collective enterprises to combine benefits from both sectors of the economy (e.g., Nee 1992, Tan 2002). They could operate larger-scale, more sophisticated operations than could private enterprises but also foster greater innovativeness and productivity than could state enterprises. However, no prior study has considered the spillover effects of collective enterprises on private entrepreneurial activity. Our study suggests that the balance offered by collective enterprises made them effective spawning grounds for private entrepreneurs.

Importantly, our theory and results suggest that the disadvantage of state enterprises in spawning large-scale entrepreneurial activity may have reflected untapped potential—rather than the absence of potential. Few would argue that state enterprises were exemplars of efficiency. However, scholars have long attributed this inefficiency to greater levels of top-down government interference and distorted incentives facing state enterprise managers. At the advent of market reforms, state enterprises enjoyed overwhelmingly privileged access to scarce resources, equipment, university graduates, and skilled labor (Jefferson and Rawski 1994). Yet the central-planning system gave managers systematic incentives to underrepresent their firms' capabilities and overreport their input needs (Zhang 1992, p. 93; Braguinsky and Yavlinsky 2000, pp. 87–101). Officially reported levels of productivity therefore did not represent ceilings for what state enterprise managers were capable of producing. Our theory suggests that, while inefficient in their own operations, large bureaucratic state enterprises represented repositories of untapped capabilities that could potentially have been channeled toward entrepreneurial activity given the appropriate external socialization. Our empirical results show that in regions with high levels of private entrepreneurial activity, the presence of state bicycle manufacturers did indeed have positive effects on local founding rates of private ventures, including large-scale ventures. This is consistent with prior research arguing that the concentration of entrepreneurial activity in a region provides an alternative source of socialization beyond the boundaries of individual organizations (e.g., Saxenian 1994, Romanelli and Khessina 2005).

More generally, our study contributes a novel organizational perspective to understanding how the state and private sectors interact to shape entrepreneurial activity in a transition economy. Economists have long argued that economic growth hinges on attracting capable individuals into entrepreneurship and away from rent-seeking activities, such as working in government bureaucracies (Murphy et al. 1991). In Japan's early cotton spinning industry, for instance, the government attempted to catch up to Western levels of industrialization by subsidizing a small set of government-selected firms (Braguinsky and Hounshell 2016).

However, the industry only took off after entry by private entrepreneurs who were able to build more productive firms free of government interference. Prior macroeconomic models of China have depicted the growth of private enterprises over state enterprises in much the same way: private enterprises emerging exogenously with respect to the state sector and overtaking the state sector via greater productivity (Song et al. 2011). However, a close look reveals some key differences in the organizational sources of entrepreneurs. At the advent of market reforms in China, private entrepreneurs had very limited access to global markets for knowledge and talent. In contrast, entrepreneurs in Japan's early cotton industry could hire individuals with experience in the more industrialized cotton industry in England (Braguinsky and Hounshell 2016). They did not need to work in government-sponsored firms to acquire operational experience. Additionally, entrepreneurs in China had to become experienced in dealing with government bureaucracy in order to found large-scale private ventures, since the fulfillment of basic business needs, such as financing, material resources, property rights protection, and contract enforcement had to be brokered through government officials.

These differences suggest that in contexts where governments retain significant control over basic business needs, the locus of entrepreneurial spawning is likely to be around organizations with some degree of government connection. Such organizations are likely to be able to operate at larger scales and provide entrepreneurs with better operational and regulatory training for founding their own large-scale ventures. While second best compared to free markets for entrepreneurial inputs, the mechanisms described here may, under transition economy conditions, provide certain advantages for growing the private sector compared to entrepreneurship emerging completely independently of the state sector.

Beyond the context of transition economies, a more generalizable insight for the understanding of entrepreneurial spawning is that larger firms will provide better exposure to those aspects of firm capabilities that were most responsible for these firms attaining their present sizes. In terms of whether this should yield a nonmonotonic relationship between firm size and entrepreneurial spawning, an important boundary condition is the degree to which the critical capabilities in a particular context are inherently more entrepreneurial or bureaucratic in nature. Some types of capabilities, while valuable for entrepreneurs to be exposed to, do not foster internal organizational environments that socialize individuals toward entrepreneurship. Even in developed market economies, there are some industries in which regulatory connections are more critical than in others (Chatterji 2009). In our context, it was certainly the case that resources needed for growth tended to flow toward firms with stronger political connections. This is the primary reason why state enterprises were able to attain larger scales than collective enterprises and private enterprises. In such contexts, bureaucratization increases with size not just because of greater organizational size per se (e.g., Sørensen 2007) but also because greater size is driven by more inherently bureaucratic capabilities. This mutually reinforcing dynamic contributes to a tendency for increased levels of bureaucratic socialization to offset the benefits of working for a larger firm. In other contexts, however, size may be driven by more inherently entrepreneurial capabilities. In developed market economies, for instance, firms that began as venture capital-backed startups, may continue to have highly entrepreneurial internal environments even after having grown in size (Gompers et al. 2005). In such contexts, large firms might become the most fertile entrepreneurial spawning grounds because the capabilities that made these firms successful serve to mitigate rather than magnify the effects of bureaucratization. A fruitful avenue for future research would be to examine whether this boundary condition helps to explain variation in the relationship between size and entrepreneurial spawning.

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Endnotes

[1] "The bureaucratic method of transacting business and the moral atmosphere it spreads doubtless often exert a depressing influence on the most active minds. . . Often the machine gives little scope for initiative and much scope for vicious attempts at smothering it. From this a sense of frustration and of futility may result which in turn induces a habit of mind that revels in blighting criticism of the efforts of others" (Schumpeter 1942, p. 207).

[2] Tianjin is one of four cities in China with the same administrative status as provinces and under direct control of the central government. The others are Beijing, Shanghai, Nanjing, and Chongqing.

[3] This is roughly the size of the greater Detroit or Boston area in the United States.

[4] It is a crime to misrepresent registered capital, and a number of measures are taken during the registration process to ensure that the claimed registered capital has indeed been contributed. After founding, a business's registered capital may only be used towards that business's operations; i.e., cannot be transferred into a bank account temporarily for the registration process.

[5] Using a fixed radius helps to mitigate potential spatial autocorrelation by reducing the extent to which the same organization may appear in the measures for multiple observations. The effect of organizations beyond five kilometers becomes negligible. Our results are the same if we expand to a 10-kilometer radius.

[6] This corresponds to Deng Xiaoping's 1992 southern tour, which bolstered confidence in the future of market reforms in the wake of the 1989 Tiananmen Square protests and the fear of a power shift towards party hardliners.

[7] To put our baseline founding rate of 0.0007 per month per km^2 into perspective, in Buenstorf and Klepper's (2009) study of the Akron tire cluster, the average founding rate per month per square kilometer in Summit County, Ohio, between 1905 and 1930 was 0.0001 (37 foundings over 25 years over an area of 1,067 km^2). If the founding rate of bicycle producers in Tianjin were scaled to a region the size of Summit County, the implied founding rate per year would be nine, compared to a founding rate per year of 1.5 for tire producers in Summit County.

[8] In unreported results, we also test for interactions between the effects of *State bicycle manufacturers* and time dummies indicating later periods of the economic transition. This provides another way to check whether the presence of *Private bicycle manufacturers* is picking up the effects of broader shifts in the economic or political environment favoring the private sector. When the interaction between *Private bicycle manufacturers* and *State bicycle manufacturers* is *not included*, the interactions with dummies for later time periods are positive and significant, indicating that the effect of *State bicycle manufacturers* is stronger in later periods of the economic transition. However, when the interaction between *Private bicycle manufacturers* and *State bicycle manufacturers* is included, the interaction with *Private bicycle manufacturers* becomes significant and the interactions with time dummies go away.

[9] We examined life tables and performed exploratory analysis to determine a well-fitting and parsimonious specification of time periods. This yields a specification with time pieces at the following intervals: $t < 1$ year, $1 = t < 5$ years, $5 = t < 10$ years, $10 = t < 15$ years, $15 = t < 20$ years, and $t = 20$ years.

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