

WHO HAS 'THE RIGHT STUFF'?
HUMAN CAPITAL, ENTREPRENEURSHIP AND INSTITUTIONAL CHANGE IN
CHINA

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Abstract

Our understanding of the connection between institutions and entrepreneurship is limited. Through their impact on barriers to entry and to growth in entrepreneurship, institutions will influence the types of individuals (specifically their level of human capital) who choose to engage in entrepreneurial activities. This paper shows that when barriers to the growth of entrepreneurial firms are reduced, individuals with higher human capital become entrepreneurs. By exploiting a natural experiment – embodied in the 1999 Chinese constitutional amendment – it is possible to implement a differences-in-differences approach to analyze the causal impact of institutional change on entrepreneurship. Unique data were collected through survey responses from 2,966 alumni who graduated from a leading technical university in China between 1947 and 2007. The results show that the greatest increase in the transition to entrepreneurship was generated by individuals belonging to the top quartiles of a human capital distribution.

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A key question for researchers interested in organizations and strategy is how the environment influences the actions of organizations and managers. At the field level, research on institutional theory has demonstrated the impact of institutions on aggregate founding rates of new organizations (Sine, Haveman and Tolbert, 2005; Russo, 2001). At the individual level, a diverse literature has shown that certain individual characteristics are associated with a higher likelihood of founding a firm (Sørensen, 2007a; 2007b). Yet, scholars have largely neglected to bring these two levels together in entrepreneurial settings, and so to understand how institutions influence which types of individuals are likely to found new organizations. This paper addresses this question.

Work in organizational theory and sociology has long been interested in how the prevailing institutional and opportunity structure relates to founding rates of new organizations (Stinchcombe, 1965; Romanelli, 1989; Aldrich, 1999). Research has been slow to explicitly focus on the varied ways that the institutional environment influences individuals of different types to found firms. There is an important gap in our understanding of the way institutions increase the likelihood of founding new organizations for certain individuals more than others. As a result, the view of how institutions influence certain individuals (and not others) to form organizations is missing.

Even beyond entrepreneurship, our theoretical understanding of the diverse effects that different kinds of institutions have on heterogeneous individuals has been limited. This study addresses this gap. In doing so, it also responds to calls in the literature for greater development of theory that explains how institutional change affects the overall heterogeneity of entrepreneurs and firms (Sine, Haveman and Tolbert, 2005). There is a need to examine the institutional contexts that are more conducive to producing new types of entrepreneurs (Stuart and Sorenson,

2003; Thornton, 1999). Addressing this oversight is important for two reasons. First, institutional theory highlights the effects of institutions on organizations, but has neglected the ways that this influence works through effects on people. Second, we know that different individual characteristics of founders are associated with higher growth and more successful organizations (Eisenhardt and Schoonhoven, 1990).

At one level, we have work on institutions, indicating that they shape the attractiveness of organizational forms, sectors, or practices and result in shifts in aggregate founding rates over time (Baumol, 1990; Russo, 2001). Mainly one broad mechanism has been examined and that is the lowering of entry barriers via certain forms of increased legitimacy. At the individual level, a great deal of research has look at individual characteristics associated with transitioning to entrepreneurship (Sørensen, 2007a; 2007b). Most of this work at the individual level has been static in that it does not look at differences over time or across contexts in the characteristics associated with higher rates of entrepreneurship. Very little work has examined the role of the institutional environment in determining entrepreneurial activity by shaping the self-selection of individuals with high or low levels of human capital into entrepreneurship. In particular, the existing literature does not help us understand which institutional arrangements are more effective in enhancing entrepreneurial behavior among high human capital individuals.

This paper asks how a particular institutional change draws in certain types of individuals to entrepreneurship. It also shows that when different types of individuals start firms, they tend to create firms with different (growth) characteristics. Using data on 2,966 individuals graduating from Tsinghua University in China between 1947 and 2007 I test the idea that institutional reform shifts the type of individuals deciding to become entrepreneurs. The data were supplemented with fieldwork, including interviews with entrepreneurs, government

officials and investors to deepen the understanding of the context and the phenomenon. The key finding of this paper is that a stronger increase occurred in the propensity for entrepreneurship among those with higher human capital levels when barriers to growth are lowered. In addition, these higher human capital individuals were more likely to found firms which were more profitable, larger, and more innovative. The study makes two main contributions. First, it contributes to institutional theory by showing how institutions affect individual decisions – a link that had been central, but left implicit in prior work focusing on the impacts on organizations. Second, it contributes by showing that high and low human capital individuals are influenced to found organizations by different concerns and separate aspects of the institutional environment.

THEORY AND HYPOTHESES

Institutions are defined as the laws, norms, or beliefs, which form the ‘rules of the game’ (North, 1990; Williamson, 2000). By altering the constraints and structure of opportunities in an economy, institutions direct self-interested behavior towards either more or less economically productive activity (Baumol, 1990; Nee, 1996). Existing work in institutional theory has focused on legitimacy of organizational forms or practices (Meyer and Rowan, 1977) or efforts to increase the legitimacy of a sector (Powell, 1991; Aldrich, et al, 1994; Deeds, Mang and Frandsen, 2004). The institutional arrangements to enhance entrepreneurship are framed in terms of increasing legitimacy (Aldrich, et al, 1994; Powell, 1991) and easing constraints to allow those who previously could not overcome certain obstacles to become entrepreneurs (Holtz-Eakin, Joulfaian and Rosen, 1994; Suchman, 1995). Yet, this view is contradicted by evidence of high levels of entrepreneurship in some of the poorest countries with the least developed institutions that have high constraints to entry (Gollin, 2002).

At the individual level, a rapidly growing literature examines the link between career experience, human capital and entry into entrepreneurship (Boeker, 1989; Haveman, 1993; Haveman and Cohen, 1994; Phillips, 2002; Beckman, Burton and O'Reilly, 2007). Following the prior literature, I define human capital as the possession of productivity-enhancing skills and knowledge (Hallen, 2008, Becker, 1964; Eisenhardt and Schoonhoven, 1996; Shane and Stuart, 2002; Hsu, 2007). The human capital of the founding team, including educational and management achievements have reliably been shown to predict the new organization's performance (Beckman, Burton, and O'Reilly, 2007; Eisenhardt and Schoonhoven, 1990; Baum and Silverman, 2004). However, when look at entry, some have found that find that those who transitioned to self-employment had relatively lower wages (Amit, Glosten and Muller, 1990; Amit, Muller and Cockburn, 1995; Evans and Leighton, 1989). In contrast, others find little evidence for wage differences between would-be entrepreneurs and non-entrepreneurs (Hamilton, 2000), or that higher performing individuals become entrepreneurs at higher rates (Groysberg et al, 2007). Previous literature has presented the idea that some are "pushed" into entrepreneurship, when the individual cannot get a traditional employment job (Amit, Muller and Cockburn, 1995). Alternatively, "pull" entrepreneurship occurs when an individual is drawn into entrepreneurship because of the attractiveness of an opportunity that is too good to pass up (Amit, Muller and Cockburn, 1995). Overall, the evidence whether low or high human capital individuals have higher propensities for entrepreneurship appears mixed. Beyond the literature emphasizing the characteristics of the individuals (Evans and Leighton, 1989; Roberts, 1991; Shane and Khurana, 2003; Stuart and Ding, 2005) others have looked at the role of parent firms (Burton, Sørensen and Beckman, 2002; Gompers, Lerner and Scharfstein, 2005; Sørensen, 2007)

job roles and context (Dobrev and Barnett, 2005) and industry liquidity events (Stuart and Sorenson, 2003) as important determinants of the rate of entrepreneurship.

Some work has begun to focus on how individuals shape institutions, but rarely has the opposite direction of how institutions impact individuals been explicitly theorized (DiMaggio, 1988). Almost no work has examined the broader institutional contexts which influence people of particular characteristics and not others to found firms. However, we might expect institutions to do more than shaping aggregate founding rates. Human capital is clearly an important determinant of the likelihood of entrepreneurship, yet the relationship between human capital, institutional environments, and entrepreneurship is unclear. It may be that only through linking macro-level, institutional effects together with micro-level, individual effects that the previously conflicting patterns may become clearer. Evidence from less-developed countries (LDCs) is useful for three reasons. First, LDCs more frequently see larger variations in the institutional environment in the direction of lowering barriers to entry and in terms of lowering barriers to growth, allowing opportunities for identification. Second, typically LDCs have not yet developed well-organized industry associations to lobby for reforms, reducing concerns of reverse causation. Third, more variation exists in the human capital distribution in less-developed countries where some families are able to send their children overseas for a high quality education yet overall enrollment in tertiary education is lower. Finally, the vast majority of the related literature on market entry/entrepreneurship and innovation focuses on well-developed economies. Entrepreneurship (and innovation) in transitional and developing countries are rarely part of the scholarly dialogue which still largely thinks of new products being developed in rich countries and moved to low-wage countries (Vernon, 1966; Puga and Trefler, 2005).

Institutional reforms may have the effect of broadening the number of individuals engaged in entrepreneurship either among the same types of people who were already becoming entrepreneurs or they may induce those of different human capital levels to become entrepreneurs. From prior work, we know that people tend to react to expected changes in outcomes, rather than shifts in outcomes themselves (Kahneman and Tversky, 1979; Thaler, 1980). Also, it has been shown that perceptions of change in outcomes are proportional to the relative size of the change, not the absolute size. If entrepreneurship shifts from being seen as illegal or illegitimate to something not only accepted but increasingly resulting in vastly improved standard of living for individual entrepreneurs then the proportional change perceived would be quite large.

The institutional environment has typically been modeled as altering the hurdles to entry, whether they be regulatory or the legitimacy necessary to acquire the resources to get started. However, the institutional environment also affects the growth of firms and thus the perceived relative payoff to skills in entrepreneurship. Through subsidies for investment, regulatory barriers, or other mechanisms, changes in the institutional environment for entrepreneurship will raise (or lower), the perceived returns to human capital in entrepreneurship, which should impact the expected payoff to entrepreneurship differentially according to human capital levels. High human capital individuals expect to be in the top of the firm size distribution and so are most constrained by barriers to growth. When barriers to growth are lowered, the effect on the relative expected returns occurs because existing private firms are suddenly able to grow significantly larger, but do not pass the increased profits on to employees proportionally. Instead the founders tend to keep part of the increase rather than pass it all down to higher salaries for employees. In this way being an employee looks less and less attractive relative to starting one's own firm to

benefit (if one has high human capital) from the increased size possible for private firms. High human capital individuals prefer to be in a higher variance outcome sector since they expect to be at the top of the distribution.

First, consider two simple alternative formulations of the relationship between human capital and institutional change. The new institutional environment lowers the average costs or barriers to starting a firm, allowing those who could not overcome these barriers or who had lower value ideas to start a firm. If this is true, then if the change in the institutional environment reduces the barriers to entry, the increase in entrepreneurship comes primarily from those who are relatively lower on the human capital distribution. Sine and colleagues (2005) show how different types of institutions can make entrepreneurship less risky and alter the choice of technologies on entry, but view the actual entrepreneurs as homogeneous. Their study supports the idea that higher expected returns (via reduced risk) increase entrepreneurship, but it does not predict whether the new firms and entrepreneurs will be more or less productive relative to prior founders.

An alternative mechanism for increased entrepreneurship is higher expected returns to entrepreneurship leading to relatively more talented entrepreneurs. This view sees institutions for entrepreneurship as raising the expected returns conditional on entrepreneurial entry rather than lowering the bar to enter in the first place. According to this idea, overcoming fixed start-up costs is relatively easy, but the difficulty is in growing the firm to a significant size or in appropriating the returns that the firm generates. In this situation, institutional reform has the effect of increasing expected returns for entrepreneurs and higher outcomes then encourage more individuals of higher human capital and with better wage employment options to become entrepreneurs. Examples of this type of institutional change are those that lower barriers to firm

growth such as policies awarding government contracts to small businesses, industrial policies aimed at small businesses and institutions conducive to merger and acquisition or initial public offerings, or decreased tax rates targeted at high growth entrepreneurial firms. This type of change may induce entry but does not actually make accumulating the fixed start-up resources for forming the firm easier. Stuart and Sorenson (2003) explain the increase in founding rates in geographic proximity to liquidity events by the increase in liquidity (the easing of funding constraints to entry) of the senior executives. Another possibility mentioned in their discussion is that liquidity events are strong signals of the wealth-generating opportunities in the immediate environment. The level of expected returns (rather than fixed start-up costs) may be more important for high human capital individuals who are potential entrepreneurs. An environment where we increase the expected returns to entrepreneurship relative to wage work should draw more entrepreneurs from relatively higher in the distribution of human capital.

Hypothesis 1: An institutional change reducing barriers to growth (or to the returns from growth) will increase entrepreneurship among individuals located relatively higher in the human capital distribution.

A difference may exist in the types of firms created by those who are induced to enter entrepreneurship by a different institutional environment. Certain institutional environments may be required for higher human capital individuals to be able to start high performance firms. These individuals will be more likely to start firms if they can expect to attain higher performance in entrepreneurship, which is more likely when barriers to growth are lowered. The individuals in the highest growth firms are the most constrained by institutional barriers to growth. Thus, when these barriers are removed, high human capital individuals benefit the most and lower human capital individuals who are more likely to have smaller, less productive firms are less likely to notice the difference. If more talented individuals are increasingly entering

entrepreneurship due to increasing expected returns, then the start-ups they create should have higher performance levels on average. On the other hand, if human capital has no bearing on entrepreneurial performance, then this result would call into question whether the expectation of higher performance is driving the increased entry.

If there is no component of human capital that is transferrable from the wage sector to the act of entrepreneurship, then this would make both finding empirical results and policy prescriptions more difficult. Thus, the type of human capital that is of interest is a component which results in greater productivity due to knowledge or skills and is transferrable from wage work to entrepreneurship (Eisenhardt and Schoonhoven, 1996; Hallen, 2008; Hsu, 2007). If the marginal individual being drawn into entrepreneurship is shifting higher in the distribution of human capital, then one should also expect that human capital measures should be associated with higher firm performance levels. A second implication is consistent both with this idea and with the prior results that when risk is lower, entrepreneurs choose more innovative technologies (Sine, Haveman, Tolbert, 2005). The firms created by higher human capital individuals are expected to be higher growth and more likely to innovate.

Hypothesis 2a: Individuals higher in the human capital distribution will experience higher returns to their talent in entrepreneurship after an institutional change lowering barriers to growth.

Hypothesis 2b: Individuals higher in the human capital distribution will found companies that are higher growth and more innovative.

While there are likely to be institutional changes with effects on both entry and growth barriers, most reforms will primarily impact either the capacity (or inclination) to gather the initial resources necessary to enter or the capacity post-entry to expand and grow the firm. For instance, difficulties raising early, seed stage funding or the number of days and hurdles necessary in registering the business might be more likely to prevent firm formation but do not

affect growth post-entry (the reduced competition might in fact facilitate growth). Once the firm is established, subsidies for R&D, tax credits, treaties for international trade, or ease of access to public capital markets and expansion stage capital availability might facilitate growth without necessarily making it any easier for a brand new firm to be created. The traditional mechanism focused on in the literature increases regulatory, cognitive or normative legitimacy and lowers barriers to entry (Russo, 2001; Sine, Haveman, Tolbert, 2005). Institutional reform then acts to lower the barriers, in which case we would find an increase in relatively less talented individuals becoming entrepreneurs. If there is sufficient correlation in the skills rewarded by wage work and those rewarded by entrepreneurship, then lowering entry barriers has the effect of driving more low human capital individuals to entrepreneurship. The lower human capital individuals would expect lower returns to entrepreneurship (compared to more talented individuals) and have less incentive to save and accumulate the resources needed for entry so they are impacted more by a reduction in fixed start-up costs. Recent work shows that in response to an increased cost of external financing, the greatest decrease in entrepreneurial behavior came from those of lowest ability (Nanda, 2008). This result indicates that decreasing the cost of start-up capital has its greatest impact among lower ability entrepreneurs.

Hypothesis 3: An institutional change reducing barriers to entry will increase the propensity for entrepreneurship among individuals located relatively lower in the human capital distribution.

METHODOLOGY

I examine the choice to become an entrepreneur by university alumni graduating over a 60 year span of time. The challenge to answering this question is finding an empirical setting with sufficient variation in the institutional environment for entrepreneurship and also detailed human capital data on a comparable set of individuals at risk for entrepreneurship. A context is

needed where there was an exogenous shift in the institutional environment (ideally in terms of both lowering barriers to entry and barriers to growth at separate times) and where we have measures of human capital levels. One setting in which the first requirement is fulfilled is in China where a 1999 Chinese Constitutional amendment aimed to end discriminatory practices against domestic private firms. This shift is exploited and data on individuals collected through a unique survey of alumni from Tsinghua University, located in Beijing, China.

China's Institutional Reform

The Chinese context provides a particularly appropriate context to study as a case for looking at human capital and institutional constraints on entrepreneurship. China offers a natural experiment in the 1999 amendment to the Constitution that lowered barriers to growth. This reform reversed policies aimed at bolstering foreign-invested and state-owned firms and discriminating against the growth of domestic private firms. This shift allows the separation of factors affecting the supply of entrepreneurs from demand-side changes. The Chinese context also offers an earlier 1988 policy shift reducing high barriers to entry.

China's reforms in the late 1980s and early 1990s eliminated restrictions and providing legitimacy to entrepreneurship. Most significantly, in 1988 the state officially recognized the growing number of private businesses (known in Mandarin as '*saying qiye*') with eight or more employees (Xu and Zhao, 2008). Significant increases in entrepreneurship occurred in the years that followed because businesses that required more than 8 employees to function could now form and those existing agricultural and township and village small enterprises wanting to expand past eight employees could do so. Yet the years before 1999 had been characterized by direct discrimination in favor of foreign-invested and state-owned firms as China pursued a development policy focused on foreign direct investment (FDI) (Huang, 2003). A political

pecking order of ownership types had developed where private entrepreneurial firms were increasingly allowed to exist but kept small in size while foreign-invested and state-owned enterprises were at the top of the priority list of regulatory approvals, expansion funding and other forms of support. In the spring of 1999, the Second Plenary of the Ninth People's Congress approved an amendment to the Constitution which put the private sector on the same legal footing as the public sector (*People's Daily*, April 9, 1999, Liu, 2008). The amendment essentially did three things: 1) officially ended discriminatory practices against domestic owned private firms; 2) provided some assurance that private property would be defended; and 3) signaled to local governments the importance of entrepreneurship (*China Daily*, March 16, 1999, Qian 2000). Immediately after the amendment, local governments were reported to start to relax restrictions on private enterprises (*People's Daily*, April 9, 1999; Liu and White, 2001).

While some impact on entry barriers may have occurred, it is clear that the main thrust of the changes were on barriers to growth since the reforms of the prior decade had focused on entry and increasing the legitimacy of entrepreneurship. In contrast changes after 1988 lowered entry barriers and legitimized entrepreneurship, broadly defined, but without as many specific institutions and policies to support growth of already established entrepreneurial firms. Yingqiu Liu, Professor of Economics at the Chinese Academy of Social Sciences (CASS), notes that the amendment created a more level playing field for businesses for the first time since the Communist revolution (Liu, 2008). A large number of provincial governments issued documents promoting the rapid growth and development of private enterprises. In 2000, Zeng Peiyan, minister at the State Development Planning Commission, issued a statement saying “[We will] eliminate all restrictive and discriminatory regulations that are not friendly towards private investment and private economic development. In the area of stock listings, private enterprise

should enjoy equal opportunity which was enjoyed by the state-owned enterprises.” Overall, the institutional environment shifted to encourage the growth of entrepreneurial firms through office space, R&D tax incentives, and later stage funding. In accordance with hypothesis 2, the lifting of constraints on growth should have had the greatest impact on high human capital individuals who would have felt those constraints most intensely.

Interviews with entrepreneurs and investors in China, conducted in the summer of 2007 by the author, suggest 1999 was widely perceived as a key year. There was a perception that China had moved towards an institutional environment which could support high growth start-ups like those making individuals very rich during the dotcom boom in the US. The perception spread that one could now become very wealthy through the creation of technology start-ups in China, whereas that was not possible in the past. Although creating smaller scale start-ups was certainly possible. The institutional environment prior to 1999 was not prohibitive for entry, but it did make growth difficult. One Chinese entrepreneur who founded her firm before 2000, reported that she had to get each new product approved.

I spent an entire year just looking for the right office space...because ...each product must be registered and approved by the government. It's an expensive and time-consuming procedure. I eventually found space for the company's first store in a children's museum which was perfect since they were selling toy bears aimed at children. This also allowed the start-up to hide from government inspectors. – Beijing entrepreneur

The institutional environment post-2000 appears to have been much more attractive to start firms for high human capital individuals. One pair of founders had very high human capital with one being a lawyer and an MBA and the other having a Ph.D. Interviews with them made it clear that before the 1999 reform, they did not perceive the Chinese context to be ready for them to found a firm there. However, in the time after the reform they could perceive a difference and felt that it was appropriate to move from the U.S. to now start a successful company in China.

They started the company in 2003 and the female co-founder indicated how thorough she had been in assessing where and when to start her company:

I spent 20 years in the Bay area in life sciences companies. In the mid-1990s I came back to China to survey biotech companies in China and found that the environment was not ready yet. – Shanghai entrepreneur

The analyses will exploit both the 1988 reform lowering entry barriers and most importantly, the 1999 amendment supporting the growth of existing firms and moving away from practices that discriminated against private firms and kept them at a smaller size.¹

Sample and Data Sources

A survey of alumni has the advantage of being a well-defined population, not biased by government collection towards classification of private firms as state-owned and not selected based on success in entrepreneurship or in traditional employment. Such a survey allows us to track the work experiences after graduation of both entrepreneurs and non-entrepreneurs over long periods of time. An alumni survey boosts response rates and confidence for respondents in answering sensitive financial questions due to the university connection. However, it does not generate a nationally representative sample of Chinese society. Such a nationally representative sample would more accurately allow the calculation of social welfare impacts of institutional change. However to generate enough entrepreneurship observations it would be prohibitively expensive and would necessarily include a large rural sample whose quality of education is extremely heterogeneous and whose only option to make a living in many cases may be entrepreneurship. The university alumni sample provides data on individuals with high enough education levels that many have a real choice among career paths, including entrepreneurship.

¹ A more detailed discussion of the Chinese context, particularly as it pertains to entrepreneurship and science and technology policy is in a separate paper (Eesley, 2009) and has been written about elsewhere (Steinfeld, 1998; Huang, 2008; Wang, 2008).

The survey instrument was developed by the author, a fellow Chinese Ph.D. student at our institution, an M.I.T. professor, and a professor of management at Tsinghua University. Although it is more of a concern in cross-national research, I took steps to be sure of measurement equivalence when the questionnaire was converted from English to Mandarin (Mullen, 1995). The questionnaire was translated into Mandarin by two bilingual scholars, pretested in China, and revisions were made based on pretesting results and expert consultation. The questionnaire was independently back-translated to ensure validity (Brislin, 1970). To ensure accuracy, comparisons and revisions were made during the process. The Tsinghua Alumni Association assisted with endorsing, mailing, and collecting the survey results. The survey was sent to all alumni, across departments, with an address on record (a total of 30,000 according to the alumni association) and could be returned online or via regular mail. The working definition of entrepreneurship here is more focused and narrower than a representative national sample of self-employment. Alumni were asked if they participated in founding a new company. Respondents also answered questions about privatizing a state-owned enterprise since this is also considered to be “entrepreneurship” in China. A total of 2,966 surveys have been received online and via paper and email (including 718 entrepreneurs). Of the 2,966, I eliminate (for certain analyses) the 144 alumni who responded from outside of China since changes in policies in China should have less effect on them. The final number of observations for the main analysis is the 1,821 alumni who responded to all of the variables used.

The response rate is 10 percent. To assess non-response bias, mean characteristics of respondents who were among the first 90 percent to respond are compared with the last 10 percent of respondents who answered only following multiple reminders. This extrapolation method rests on the assumption that individuals who respond less readily resemble non-

respondents. The method is useful when trying to determine the direction of bias and a survey of non-respondents or archival methods cannot be conducted (Donald, 1960; Lehman, 1963; Rogelberg and Luong, 1998). The appendix shows t -tests of the null hypothesis that the average (observed) characteristics of the responders and non-responders are roughly the same statistically. Only the variables *gpa rank*, *age*, *entrepreneur*, *privatized*, and *high salary* show statistically significant differences in means at below the 1 percent level. It appears that non-respondents were more likely to be entrepreneurs, were slightly older, had higher salaries, less likely to have been academics, and slightly more likely to have held a greater number of job positions, to have a higher GPA, and more likely to come from more wealthy families. Years of education is significant, but the means are very similar. Since there is evidence of some non-response bias, weights were created using logistic regression and calculated as one over the predicted probabilities of responding. Results are robust to using and also not using these weights. Older founders appear to have been equally likely as younger founders to respond. The 10th, 25th, 50th, 75th, and 90th percentiles of graduation years were also checked and are similar; offering some reassurance that there were not large differences over time in the response rates.

The advantages of this survey over existing datasets include a panel of detailed work history and education data, information on family background, coverage over many years of graduates, and less bias on funding and performance measures than government surveys where Chinese entrepreneurs are known to misreport their earnings and firm status as state-owned (*wearing the red hat*) to avoid discriminatory practices. In addition, the data include notes from interviews with 42 people (including entrepreneurs, investors, and government officials), along with follow-up phone calls to probe more deeply. The Tsinghua Alumni Association set up 42 interviews in Beijing, Shanghai and Xi'an. I requested interviews with some who had not been

successful. The representativeness of these interviews cannot be established. Any bias might be more on the basis of performance than on reasons for selection into entrepreneurship.

Measures and Data

The primary dependent variable is the event of founding a firm for the first time. To test hypothesis 2a, as measures of returns to human capital in entrepreneurship, I use the log of the profit margin and the reported income drawn from the firm in the most recent year. Since initial public offerings and acquisitions were rare in China during this time, these are more appropriate measures than equity or valuations. Testing hypothesis 2b requires firm productivity measures. For these I use measures of the firm profit margin, revenues and employees (in the most recent year available) and survival. I also use as a measure of innovation the entrepreneur's response to whether innovation (defined as intellectual property) is important for the success of the firm.

Individual Human Capital Measures. First, I operationalize seven independent observable variables to measure human capital and look for robustness across them. Consistent with prior literature on human capital as productivity-enhancing skills and knowledge, I include both educational and career-based variables (Baum and Silverman, 2004; Beckman, Burton, and O'Reilly, 2007; Eisenhardt and Schoonhoven, 1990, 1996; Hallen, 2008; Hsu, 2007; Shane and Stuart, 2002). I use indicator variables for whether the individual has a Master's or Doctorate degree. I also have self-reported measures of which quartile in the GPA distribution the individual was in and code this into simply above the median or below the median. I include career measures including the number of years work experience and whether the individual was promoted to a position of general manager or technical manager. I also capture the individual's salary in six salary bands and use only the pre-entrepreneurship salary for the entrepreneurs. Finally I also use parents' education, which has been found in the psychology literature to

correlate with the child's test scores (Keefe et al., 2005) and has been used as an instrument in the labor economics literature since it is correlated with the child's human capital (Lemke and Rischall, 2003). The results are also robust to including an indicator for whether the parents' education level was above the median. Finally, interviews in China suggested the inclusion of whether the individual held one of the higher ranking student leader positions. An alternative measure of whether an entrepreneur takes advantage of their own human capital investments (Klepper, 2009) is whether the Bachelor's or Masters major matches the industry of the start-up that the individual founded. This proportion goes from just under 30 percent before the 1999 reform lowering barriers to growth to 40 percent post-1999 ($p < 0.05$; $t = 1.759$).

Unobservable human capital measures. Any study of human capital and entrepreneurship must reflect concern about unobserved ability levels. At least four drawbacks exist to using the observable measures. The first is that the observable measures of human capital are not pure measures of underlying ability and may be conflated by the influence that family background may have on both the likelihood of being able to afford and attend graduate school and having access to the resources necessary to become an entrepreneur. Similarly, being promoted, having a higher salary and even a higher GPA could potentially be influenced by the family socio-economic status and likelihood of paying for tutoring or having important family connections. The second concern with the observable measures is that with the market development of the institutional environment, the salaries available in the wage sector should have been improving as well and in that case, increasingly, only those who are truly talented (or who happen upon very good entrepreneurial opportunities) would become entrepreneurs, even if the institutional environment for entrepreneurship was not improving. Third, there may be shifts in the marginal individual obtaining a graduate degree, or becoming promoted as conditions change. Fourth, it

may be more convenient to have a more continuous underlying measure of human capital to be able to test changes in the shape of the distribution of those becoming entrepreneurs. To address these possibilities, the next section explores the impact of alternative measures.

Finding a measure of underlying ability is challenging. Some have used cross-sectional salary levels; however, these may be more a function of contemporaneous external labor markets, macroeconomic conditions, opportunity costs, or specific career path choices than underlying ability (Elfenbein, Hamilton and Zenger, 2008). The method used in this paper exploits the data on salaries at the end of each job spell and uses the residuals from a wage regression. It is possible to use higher or lower than expected performance in the most recent job to generate an underlying ability measure. In the first stage, a regression is performed with the most recent (pre-entrepreneurial) income as the dependent variable and independent variables include the year, job type (business, academia, government, etc.), tenure, graduation year, etc. The residuals from this regression can then be thought of as either positive or negative shocks to the salary level relative to what the individual might have expected given her family socio-economic status, education and career choices. General measurement error will also be present, but should reduce the likelihood of a significant finding. Many factors and components of ability or skill will still be amalgamated in this residual term including potentially social skills, social network, and any other individual capabilities which influence higher salaries in the wage sector. Nonetheless, methodologically this is a step in the right direction. Since the last (pre-entrepreneurship) salary for the entrepreneurs would be farther in the past than for the non-entrepreneurs, a 2:1 matched sample of non-entrepreneurs was created by matching on both graduation year and last job year for the entrepreneurs. This reduces the sample size, but allows for a control for the year that the salary is measured which should control for inflation and the increase in wage sector salaries.

A component of the residuals indicates performance in each job which can be contributed to the individual controlling for education, year and work history. An ordered logit specification is used because the dependent variable is the pre-entrepreneurship salary for each job (six categories for salary bands earned at the end of each job spell). The regression is of the form:

$$Y_i = \alpha + \gamma_i X_i + \varepsilon_i$$

where Y_i is each individual's total income (including bonuses) and X_{it} is a vector of education, work experience, job type, graduation year, and regional variables. The results of this regression show that individuals having worked in business, having higher education levels, overseas educational and work experiences, and a higher parental economic status are all associated with higher salaries. Individual fixed effects from an income regression are also used as an alternative measure, where Y_{it} is each individual's total income (including bonuses) in job t are also calculated with year dummies as controls.

Controls. Gender has previously been shown to be related to entrepreneurship so it is included as a control. Prior work suggests that wealth levels influence entrepreneurship (Nanda, 2008) and so we control for *family wealth*. Individuals were asked to rank their family's wealth level when they were in school relative to the rest of Chinese society. Work experience has also been related to entrepreneurship (Burton, Sorensen and Beckman, 2002) so we control for academic and government jobs (including recently held and held in the past). Work history in business is the excluded (baseline) category in the analysis. Like academic jobs, positions in government have been historically very prestigious and stable so it is expected that individuals will be less likely to transition from these jobs to entrepreneurship. There is an on-going debate; however, about the extent to which elites in transitional economies have been able to translate their power into economic benefits and the mechanisms that allow such a transfer (Nee, 1996;

Walder, 2002; Walder, 2003). Lazear (2004) found that the *number of job positions* was correlated with entrepreneurship so I control for this factor as well. I control for whether the individual has gone abroad for education or work experience with the variable *overseas* as an indicator for a returnee. Returnees as they are called are frequently noted anecdotally as becoming entrepreneurs once back to China after being exposed to it in the U.S. (Huang, 2008). Since having parents who were entrepreneurs has often been found to be associated with becoming an entrepreneur, we control for *Entrepreneurial parent* (Sorensen, 2007). To control out cohort effects, I include Bachelor's graduation year and dummy variables for Bachelor's major (academic department) and region (province) effects. Finally, in addition to time period controls for 1991-1999 and 2000 to 2007 (1978-1990 is the baseline period), I include a control for whether the individual was a *Communist party member* or not. Regressions on firm level performance and strategy include controls for the natural log of firm age, registered capital, income drawn from the firm, and whether the firm was bought or privatized.

Statistical Methods

An event-history analysis is used to determine how institutional reforms affect the likelihood that different types of individuals found a new firm. I also use quartile regression (described below) to estimate effects at different places in the human capital distribution. The individual is the unit of analysis for the main results. Since the most recent graduation classes have not had much time to gain work experience and found firms, right side censoring is a concern. The analyses employ Cox (1972) hazard regression models for two reasons. First, the model is semi-parametric, so that we can estimate the impact of independent variables on the hazard of founding a firm while being agnostic about the baseline hazard function. It does assume that the hazard functions (in this case, the probability of founding a firm, conditional on

time) at different levels of an independent variable are proportional to the baseline hazard function. The standard procedure to test this assumption is to examine the graphs of the natural logarithms of cumulative baseline hazard functions (Anderson, 1982). The functions appeared to be approximately proportional to one another, offering reassurance that the proportionality assumption was not violated. Second, the model explicitly takes the timing of events into account (by estimating the probability of founding a firm in a given year conditional on not having founded a firm up until that time period), and adjusts for the right-censoring of the data. In these regressions subjects start being “at risk” of founding a firm at the time of their graduation, and a “failure” event occurs the year the individual founds a first firm (otherwise, the founding year is considered censored for that individual as of the year 2008). Reported coefficients are hazard ratios, with values above 1.0 representing increases in the hazard of founding a firm and vice-versa for values below 1.0. The main results are robust to using a logit as well. The Breslow method is the default for handling ties, but the results are robust to using exact marginal likelihood and exact partial likelihood. The specification of the model is:

$$\lambda(t | X) = \lambda_0(t) \exp(X' \beta) \quad (1)$$

where the vector X includes our founder and work experience characteristics. $\lambda(t | X)$ is the rate at which founders will start a firm at any particular date, given that they have not founded a firm up until that point in time. Equation (1) specifies the hazard rate as the product of two components: a function of the period length (i.e. delay time since graduation), $\lambda_0(t)$ or baseline hazard, and a function of the observable characteristics, denoted by the vector X . The Cox nonparametric estimation allows the estimation of β without needing to make a distributional assumption about $\lambda_0(t)$.

To determine whether changes took place in the market development of the institutional environment over time which had a differential impact on those with higher human capital, a differences-in-differences regression analysis is performed. Differences-in-differences allows the testing of whether rates of entrepreneurship differed before and after the institutional reform and had different effects on individuals according to their type. The differences-in-differences estimate is identified by interacting the post-1999 variable with the various human capital measures to see how the propensity for entrepreneurship for more talented individuals changed in the post period relative to those lower in the talent distribution. For instance, the interaction term would be between Master's degree and a dummy variable which equals 1 if the individual was 'at risk' of founding a first firm in 2000 to 2007 (to be at risk the individual must not have founded a firm previously and be below age 65). Identification of a panel differences-in-differences estimator requires the assumption that trends are parallel before and after the reform. A placebo regression available from the author using 1997 as the reform year provides evidence that pre-reform trends among higher human capital individuals were not significantly different and year by year interactions (appendix) show that the post-reform trend is flat as well. To test hypothesis 2, Tobit regression models are used in a differences-in-differences framework to test whether the returns to entrepreneurship increased for high human capital individuals. Tobit was used since the dependent variables for those with negative profits or no revenues can be considered censored at zero. The results are robust to using a Poisson model.

RESULTS

Insert Figures 2 and 3 here

Figure 2 shows that there was an increase in firm size after the institutional change. Figure 3 shows results of the institutional change different for those with comparatively high vs.

low human capital levels using residuals from an income regression (described in more detail below). A wide range of industries including aerospace, biotech, chemicals, consumer products, energy, machinery, materials, medical devices, publishing and telecom are represented with Internet, electronics and software firms being the most common (41 percent). Table 2 presents pair-wise correlations. Overall the measures have low correlations, except some of the human capital measures have moderate correlation and so these measures are run in separate models.

Insert Table 2 about here

In comparison to a representative sample of rural and urban households from the China Health and Nutrition Survey (<http://www.cpc.unc.edu/projects/china>) the Tsinghua sample is 8.7 years older on average, much more likely to be male, less likely to be married, more highly educated, and slightly more likely to have founded a firm. The differences in age and education most likely contribute to differences in the entrepreneurship rates. The data were also benchmarked against a representative sample from the National Bureau of Statistics (NBS 1999 survey). In comparison the Tsinghua sample is significantly older, less likely to be self-employed, has more years of education, but similar in terms of parent's education and parental self-employment. It appears that the sample is not weighted towards more recent alumni.

Testing hypothesis 1, Table 2 reports the Cox regression analysis examining the impact of lowering barriers to growth on the rate of entrepreneurship across observable measures of human capital. Those individuals holding a larger number of job positions were significantly more likely to found firms. Those with Master's degrees were significantly less likely to become entrepreneurs. I argued that high human capital individuals would be more likely to found firms after the 1999 reform lowering barriers to growth (H1). The interaction term is greater than one and statistically significant ($p < .10$, two-tailed test), indicating that post-reform, Master's degree

holders were more likely to found firms. The coefficients indicate that pre-1999, an individual with a Master's degree was 44 percent less likely than the baseline rate to found a firm, but after the reform was 77 percent more likely to found a firm than the baseline. The same interaction was included with Doctorate degree recipients though the coefficient there is positive but does not reach statistical significance.

In Models 2-2 through 2-7, the results for the controls are largely the same with the exception that in some models, returnees who were educated or worked abroad are less likely to found firms. Models 2-2 through 2-7 substitute a series of measures of human capital into the equation. In general, they show the robustness of the results to various observable measures of human capital including parents' education, whether the individual was promoted to general or technical manager, higher GPA, higher salary and whether the individual held one of the higher ranking student leader positions. The results are also robust to including an indicator for whether the parents' education level was above the median. The number of years of work experience is the only measure where the result does not come out as significant. In all models, the coefficient on the human capital measure (not the interaction term) is below one and significant indicating a lower likelihood of founding a firm for those with higher human capital during the pre-1999 period. The main results are mostly robust to the calculation of Huber/White robust standard errors. This result can be interpreted as consistent with H1. The appendix shows more detail on the time trends of the effect. Wald tests show differences at the 5 percent level between 1995-1997 and 2002-04 and 2006.

Table 3 uses differences-in-differences estimates to test the argument (H2a) that the expected returns in entrepreneurship to human capital increased with the lowering of barriers to growth. The dependent variable in Models 3-1 to 3-4 is the natural log of the average profit

margin for the firm. Models 3-5 to 3-8 use the log of the income of the founder from the business as a robustness check on the dependent variable. The regressions interact the human capital measures with a variable indicating whether the individual founded the firm in the post-period. The results robustly support the idea that higher human capital individuals appear to have had higher returns to entrepreneurship after the institutional reform. The significance level of the results becomes even stronger when run with one-tailed tests and without using robust standard errors. Using the salary data, the same analysis was run (in appendix and available from the author) for non-entrepreneurs. Results show they did not experience an increase in returns to human capital during the post-reform timeframe.

Table 4 tests the hypothesis that higher human capital individuals are more likely to found larger and more innovative firms (H2a). The results show a significant, positive association between profit margins and the underlying human capital measure of wage residuals. The residuals are also associated with a greater likelihood of innovation. Those who were promoted or had higher levels of education started firms with more employees. The more highly educated were also more likely to innovate in their firms. As a check on the innovation measure, as expected those who had worked in R&D positions were also more innovative. In addition to controls for whether the firm was bought, privatized and its age, industry, city, founding year, and graduation year fixed effects are included in all models. For the unobserved human capital measure calculated from the wage regression residuals, these residuals are recalculated on just the sample of the founders for the performance analysis.

Insert Tables 3 and 4 about here

Next I ask whether after the 1988 reform reducing entry barriers entrepreneurs were drawn from lower in the human capital distribution (H3). Table 5 shows Cox hazard rate

regression results, but just including individuals at-risk for founding a firm between 1988 and 1999. The results are that those founding firms during this period were more likely to be drawn from the lower end of the human capital distribution. Those with Master's and Doctorate degrees, high levels of work experience, higher educational performance (GPA), and higher salaries were significantly less likely to found firms. The results hold when all human capital measures are simultaneously included and along with prior empirical work (Nanda, 2008, Xu and Zhao, 2008) are consistent with hypothesis 3.

Insert Tables 5 and 6 about here

Robustness

In addition to the two mechanisms outlined above, at least two other possible mechanisms might be behind an observation of reforms in the institutional environment and increased entrepreneurship. First, entrepreneurs may be causing the improvement in institutions (reverse causality). Work on the political economy of private entrepreneurs in China suggests that they have not coalesced into a unified political movement, reducing concerns of lobbying for institutional reforms (Tsai, 2005). Second, market opportunities may be driving both changed institutions and increased entrepreneurship. Either anticipated technological opportunities or poor wage employment opportunities might be causing both an increase in entrepreneurship and efforts to improve the institutional environment. This endogeneity concern is not easily ruled out, but several factors alleviate the concern. Prior literature using instrumental variables techniques suggests that there is a direct causal effect of institutions on economic growth (Acemoglu and Johnson, 2005). Since 1986, the government had attempted to encourage high tech entrepreneurship so this was not new as of 1999 (Zhang, Li and Schoonhoven, 2008).

Robustness to different talent measures. The results have already been shown to be robust to using many observable human capital measures. Since the observable human capital measures all have certain drawbacks, I develop underlying, unobserved human capital measures that do not suffer from these limitations. To further examine hypothesis 1, Panel A of Table 6 shows the results from a quantile regression using the income residuals described earlier as an unobservable human capital measure (Koenker and Hallock, 2001). The regression predicts where an individual is located in the human capital distribution conditional on the time period when they founded a firm. Since heteroscedasticity is one of the motivations for using quantile regression, the bootstrap method (with 100 repetitions) is used to generate standard errors (Rogers, 1992; Horowitz, 2001). The post-1999 time period is the one of interest and the 1990s is used as a comparison as well as the pre-1990 time period. Column 1 (10th percentile) compared to Column 5 (the 90th percentile) shows that those at the bottom of the distribution were more likely to found firms in earlier time periods and those of highest underlying human capital are significantly more likely to found firms during the post-1999 time period. Panel B uses quantile regression to show that individuals higher in the human capital distribution were associated with more profitable firms. The results support hypothesis 1 and provide evidence against the alternative that there was less entrepreneurship among individuals lower in the distribution of human capital. The results provide evidence for *hypothesis 3*, that lower human capital individuals were more likely to found firms in the years after the reduction in barriers to entry.

Time invariant underlying ability. The results (available from the author and in the Appendix) show that the results are robust to using individual fixed effects generated from the income regression as an underlying performance measure. Specifically, those above the median were significantly more likely to found firms after the reform and that the effect was particularly

strong for those in the top 90th quartile of individual fixed effects but was not statistically significant for those in the both 10th quartile. The main results are also robust to using a logit rather than the hazard model as well as to using a negative binomial rather than the ordered logit.

The number of responses was lower for graduates during 1947-1951 and 1970-1980. The first period is the time of the Communist revolution and the second period is the time of the Cultural Revolution during which university activities were impaired. Due to possible response bias during these times, the analyses were repeated dropping all observations during these two time periods and the results hold. Finally, access to a similar dataset from the U.S. (Hsu, Roberts and Eesley, 2007), allows us to test whether the results are particular to the Chinese context. In the U.S. during the dotcom boom, there was the perception, if not the reality that the returns to entrepreneurship in the software sector had increased dramatically. Anecdotally, the media reports stories of top tier MBA students dropping out to start internet ventures. Appendix Table 8 shows that on a subsample of U.S. software firms only and only electrical engineering and computer science graduates then Master's and Doctorate degree holders were significantly more likely to found firms during the dotcom boom years than at other times when they are significantly less likely. When I extend the subsample to graduates from all departments then the effect gets weaker and when the sample is extended to all graduates and all industry sectors then as expected the significance goes away entirely. These results are strong evidence that the main result is not due to idiosyncratic factors in the Chinese dataset or context. While the Chinese context provides stronger identification, the U.S. data provides reassurance on generalizability.

To further reduce concerns of technological opportunity or demand-side shifts I remove internet and software industries (the most likely candidates for anticipated technological opportunities in China) and find similar results. Also, the alternative story suggests that

government bureaucrats saw technological opportunities arising and that they then designed institutions to reduce growth barriers. Yet, despite the 1999 amendment being intended to move China toward a market economy, accounts do not describe it as intending to encourage more talented entrepreneurs (Qian, 2000; Organization for Economic Co-operation and Development, 2007). Yearly data on several measures of the broader economic environment in China were compiled mainly from the Chinese National Bureau of Statistics² and filled in with data from the World Bank and Chinese statistical yearbooks. These variables were regressed on the number of new start-up firms established. These results are reported in the Appendix. Negative binomial regressions are used and the independent variables are lagged by 1 year. Dummy variables for 1988 (indicating the reform allowing eight or more employees in a private firm) and for 1999 are significant and positive, supporting the idea that the 1999 and 1988 institutional reforms led to higher levels of entrepreneurship even when controlling for other macro-economic factors.

DISCUSSION

Overall the results support the main thesis of this paper. Reforms in the institutional environment in the period after 2000 reduced constraints to growth and returns to entrepreneurship increased relative to wage employment. It is useful to keep in mind three data-related issues: representativeness, response rates and self-reporting. First, I do not claim generalizability across the spectrum of entrepreneurial activity; however, there is sufficient variance to find results. To the extent that individuals at the bottom of the talent distribution are excluded, the exact slope estimates will be biased. A second issue is possible response bias. Graduates who started a company but were unsuccessful may well not have reported these failed firms. The sample should suffer less from success bias than most datasets that condition on venture capital funding or an initial public offering. Next is the issue of self-reporting. Older

² <http://www.stats.gov.cn/english/>, accessed February 1, 2009.

respondents, especially those who have started multiple companies, may display a memory bias in which some companies, possibly those which were relatively unsuccessful, are not reported. Older entrepreneurs may have been less likely to respond to a university survey if such alumni ties weaken over time. During the interviews many older alumni assured that they feel a very strong bond with Tsinghua and the Alumni Association, which reassures us that there were not large biases in the age of respondents.

Two more conceptual issues should be considered. The first is identification and there are two main concerns. It is not unambiguous that the 1999 policy reform only lowered barriers to growth without also lowering barriers to entry. If the effect of the reform was primarily to lower barriers to entry then the results could be interpreted as consistent with the conventional view. Five pieces of evidence help to allay concerns. First, access to a similar survey of MIT alumni enables a robustness check (Hsu, Roberts and Eesley, 2007). During the dotcom boom years of 1998-2000 there was a perception of increased returns to entrepreneurship. If an increase in expected returns is the mechanism behind the results in China, then a similar effect should hold in the U.S. for software firms during this period. Results for a similar differences-in-differences hazard rate analysis using the MIT alumni dataset reinforce the findings, but only for software firms and most strongly for graduates with computer science degrees. The interaction term between graduate degrees and a time period variable equal to 1 if the individual was 'at-risk' of a first firm founding during 1998-2000 is greater than one and statistically significant. Results for a 'placebo' regression using the pre-boom years (1995-1998) were insignificant. Second, in the data from Tsinghua, 'placebo' regressions were run using 1997 and 1998 as the cutoff year instead of post-1999. As expected, the differences-in-differences estimates lose statistical significance when the wrong year is chosen for the policy change. Third,

the results in Tables 5 and 6 more directly test whether increased returns to entrepreneurship occurred after the reform. Fourth, results from income regressions show that there were not higher returns to talent in wage employment during this time period, alleviating concerns that the reform had broader effects (Appendix Table 5). Fifth, qualitative evidence from interviews indicates that lower barriers to entry were not perceived as a result of the reform, but rather that it was possible to create a high growth business during the post-1999 time period. As long as the primary effect was to increase returns to talent in entrepreneurship, if entry barriers were marginally lowered then the interpretation here is still sound. If other changes were happening in China that were both highly co-linear with the changes in the institutional environment post-1999 and acted primarily to increase the returns to human capital in entrepreneurship, they would be difficult to disentangle. It is possible that the analysis may pick up the effects of earlier reforms. However, this would introduce the ‘treatment’ effect in the pre-2000 time period and should be making it harder to see an effect. Next, the fixed effects robustness check alleviates concerns of unobserved heterogeneity, however there may be unobservable attributes of the past work experience which drives the distinction between the measure of human capital and are also correlated with entrepreneurship. One of the advantages of our dataset is the relative uniformity of Tsinghua alumni which provides a level of uniformity in unobservable characteristics, especially compared to other datasets of entrepreneurs.

Boundary Conditions

The results appear to open up an interesting line of research. However, given the complexity and diversity of entrepreneurs and of institutional environments, lowering barriers to entry is unlikely to draw increased entrepreneurial behavior from those lower in the talent distribution in all research samples. Similarly, lower barriers to growth may not always increase

the propensity for entrepreneurship among individuals higher in the talent distribution. Considering the sample used, it is vital to outline certain boundary conditions. The theory should apply outside of the context of Tsinghua graduates so long as at least four boundary conditions hold. First if the skills that are useful for generating returns in entrepreneurship are unrelated to the skills (or endowments) needed to overcome entry barriers then the theory will not hold. Second, if increases in entrepreneurship by those of higher human capital increase competition significantly then this feedback mechanism should act to bring expected returns to entrepreneurship back down. Third, in some cases the relationship between human capital and returns to entrepreneurship may be initially represented by a line or curve that begins below the curve for returns to wage work and only intersects at the high end of the distribution. A shift upwards in the curve for returns to talent in entrepreneurship would then increase entrepreneurship among those of relatively lower talent levels than those who had previously been entrepreneurs. Finally, for research settings without sufficient variation in the talent distribution it should be more difficult empirically to find results.

CONCLUSIONS

I have examined two separate mechanisms for how institutions affect the decisions of certain types of individuals to become entrepreneurs. Taking the analysis one step further, I have focused on how the types of firms created depend on the human capital of the founder. This paper is one of the first to combine a dynamic view of institutional change with a view on specifically who is most affected by changing institutions. The main results come in three stages. First, a change in the institutional environment that lowered the barriers to entrepreneurial firm growth resulted in a greater increase in high human capital individuals becoming entrepreneurs. Second, the results show that various measures of human capital are associated with founding

firms that are larger, more profitable, and more likely to innovate. Finally, when the institutional change lowers barriers to entry, but not growth, individuals lower in the human capital distribution are more likely to select to become entrepreneurs. The findings of this study have important implications for the growing literature on institutional theory and entrepreneurship.

Mechanisms of Institutional Effects

The findings contribute to institutional theory in three key ways. First, it shows that institutions impact individual's choices. This link had been key to prior theories about how institutions make certain organizational forms and practices acceptable, but had not been explicitly examined on its own. Institutional theorists have focused on the legitimacy of organizational forms and practices as well as the factors increasing organizational homogeneity. But they have neglected that the effects of institutions act via individuals. Second, it improves our understanding of the two ways that the institutional environment shift individual choices to create new organizations. One is through lowering barriers to entry and the other, novel mechanism is via lowering various barriers to growth. Third, it shows how institutions, depending on their mechanism of action, can impact certain types of individuals and not others. In addition, the differential impact across individuals results in effects on the population of organizations. Specifically, institutions can alter both the self-selection process of individuals of different human capital levels to found firms and in doing so, affect the firm birth process generating variation in new organizations. This study shows that the heterogeneity of individuals yields predictions that different institutional changes impact specific individuals more than others. The specific interactions between the institutional level and the individual level have been largely excluded from prior analysis. Prior work has either looked at the institutional level over time or at the individual level at a slice in time, but not the interaction of the two across

time. While many have looked at the interaction of the institutional and organizational levels, the link between institutions to individuals who then make organizational change has been underexplored. This link can provide a deeper and more accurate understanding of the diverse impact of institutional processes. For instance, when new institutions alter the organizational form or choice of technology, is this due involving new types of individuals? If institutions alter the likelihood that all individuals choose the new form, we are left with a puzzle of why mimicry is not completely uniform?

Some have already begun to unbundle institutions (Scott, 2001; Sine, Haveman and Tolbert, 2005), but much of this work has still focused on institutional mechanisms resulting in persistence, mimicry and homogeneity (Mizruchi and Fein, 1999; Dacin, Goodstein, and Scott, 2002). Less work in institutional research has examined mechanisms that increase diversity (Haveman and Rao, 1997; Schneiberg, 2002). This study responds to a call in the literature to look more at the effects of institutional change via the mechanism of shifts in populations over time and changes in the generation process creating new organizations (Dacin, Goldstein and Scott, 2002). Studies examining changes over time in a single population will systematically miss important processes of renewal and the change created by new firms emerging. Sine and colleagues (2005) distinguish between the effects of this dynamic renewal process for changes in legitimacy of an entire sector compared to that of a particular organizational form within a sector.

Prior work by DiMaggio and Powell (1983) among others has suggested that diversity in organizations is reduced as political/technical and cultural institutions develop. The results show that depending on the type of institutional change, different types of potential entrepreneurs and more innovative organizations may develop. Institutional change can affect all firms in the same way (for example, increasing growth rates) yet result in a different mix of firm types due to

different impact on individuals according to their type. The diversity in organizations increases as new types of individuals join the population and begin to start high growth and more innovative types of firms. Rather than a single format for institutional development, multiples paths and outcomes are possible. Institutional reforms alter the selection into entrepreneurship, not only by reducing barriers to entry, but by shifting the channels for mobility and opportunity structures in society and thus the directions in which high human capital individuals channel their energies (Stinchcombe, 1965; Romanelli, 1989; Powell, 1991). One important implication is that there may be two separate classes of institutional effects on organizations that previous analysis had condensed together, one that lowers barriers to entry and another, which lowers barriers to firm growth. These results are novel, not only for documenting for the first time that a policy change results in higher growth entrepreneurship, but because they change the way we think about the mechanisms through which institutions affect populations of organizations.

This study presents the counter-intuitive dilemma that societies can increase entrepreneurship; yet remain in stasis with low-growth, homogeneous organizations. One institutional arrangement results in greater ease and legitimacy of entry, but growth remains difficult, resulting in lower human capital entrepreneurs and many small, low-growth firms. Another results in high barriers to entry, but correspondingly high growth, selecting for high human capital entrepreneurs and larger, more innovative firms. For some, the optimal path may be a combination of the two. In this way, the results have implications for developing economies as well, particularly those looking to foster entrepreneurship as a driver of growth. The results here may allow for targeted programs to encourage entrepreneurship among those more likely to create high-growth organizations by focusing on growth of firms.

Institutional theory has often been thought of as affecting resource accumulation via the decisions of resource providers and the actions of entrepreneurs to build acceptance (Aldrich and Fiol, 1994; Suchman, 1995). Institutions are thought to affect access to, or even valuation of the resources (Sine, Haveman, and Tolbert, 2005; Sine and Lee, 2009). However, a different, potentially more important mechanism is the effect the institutional environment has on barriers to growth and the various activities and resources necessary to expand existing organizations. This effect not only impacts existing firms but also has a differential impact across heterogeneous individuals in shaping their career decisions. In a similar spirit, Fligstein (1987) argues that changes in the environment shifted the strategy and structure of organizations. The result was the rise of finance personnel to top leadership positions. The results in this paper suggest that these shifts in the environment also change the career trajectory of talented individuals towards positions that now appear to offer more opportunity. I make a distinction between institutions that have different mechanisms of action at different stages in a firm's emergence and growth. These latter changes are distinguished by the characteristic that they tend to shift growth rates but do not impact the ease of forming the organization.

Contributions for Entrepreneurship

Understanding how the institutional environment affects which individuals leave traditional employment to become entrepreneurs has important implications for the performance of start-up firms in the economy. It is also important for policymakers interested in how firm productivity, strategy, and competition via new entrants are affected by government interventions. For entrepreneurship scholars studying individuals, this paper provides a theory of when and why human capital may flow in the direction of smaller firms. This paper takes a step towards showing the type of institutional change that can induce individuals who are more likely

to succeed to become entrepreneurs. The results also show that prior conflicting results on the human capital characteristics associated with entrepreneurship may be due to differences in context (Amit, Glosten and Muller, 1990; Haveman and Cohen, 1994; Groysberg et al, 2007). It reinforces arguments in the literature that examining the contexts surrounding individual-level behaviors and characteristics is needed (Dobrev and Barnett, 2005; Thornton, 1999).

Previous work finds that institutions which reduce the perceived risk in new sectors appear to result in greater use of novel technology by entrepreneurs (Sine, Haveman and Tolbert, 2005). Similarly, the results of this study show that individuals who were more likely to innovate (the more highly educated) were more likely to found firms after the reform lowering barriers to growth. Since the new firm creation process is often considered central to innovation and innovation is often a strategy for firm growth, the paper also provides groundwork for a deeper understanding of shifts in the direction innovation. While I have examined a national level change, shifts of this type could occur across fields as well. If more highly educated individuals can be induced to enter particular sectors through shifts in the institutional and opportunity structure, society might gain mechanisms for shifting the direction of innovation.

For strategy, the findings contribute to our understanding of changes in the type of firms and competition in the market. Savvy entrepreneurs may capitalize on an awareness of shifts in the institutional environment to begin recruiting more talented cofounders. Changes in the institutional environment could alter the basis of competition, or open up new markets if it brings about entrepreneurial entry by a different group of people. Particularly in fast-paced industries, there may be room for the strategic influencing of perceived payoffs in a particular market or for managers to avoid competition by searching for markets and technologies with payoffs that are falsely perceived to be lower than elsewhere. In a particular field with higher firm growth, a

higher propensity for more talented individuals to become entrepreneurs may result in stronger competition or the growing need to use an innovation strategy to avoid direct competition.

Nations, regions, even cities typically encourage entrepreneurship in the expectation that it drives economic growth (Schumpeter, 1934; 1942; Djankov, et al, 2002). This study challenges the conventional wisdom that over-optimistically equates more entrepreneurship with better entrepreneurship. There is a clear need to ask about the type of entrepreneurship being generated when the societies with the highest founding rates are the poorest, least institutionally-developed countries on earth (Gollin, 2002). Rather than ‘letting a thousand flowers bloom’, the environment may be structured to select for certain types of flowers. Prior literature has examined a more direct effect of institutions, where potential entrepreneurs are considering entry and are concerned primarily with whether the resources necessary to begin the business can be gathered. Yet there is another less direct effect on high human capital individuals who already have or are capable enough to creatively acquire the necessary resources to get started in business. Yet, they have good options in the wage sector and may be concerned more with whether the size and type of business they wish to start can be achieved. The results show that policymakers can craft institutions to encourage more market entry by those who are more likely to create high-growth, innovative firms. I provide evidence consistent with a story that the institutional environment may be shaped to encourage a more high growth, Schumpeterian-type of creative destruction rather than to increase marginal new firm creation by those who do not have the ‘right stuff’ (Schumpeter, 1942).

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FIGURE 1

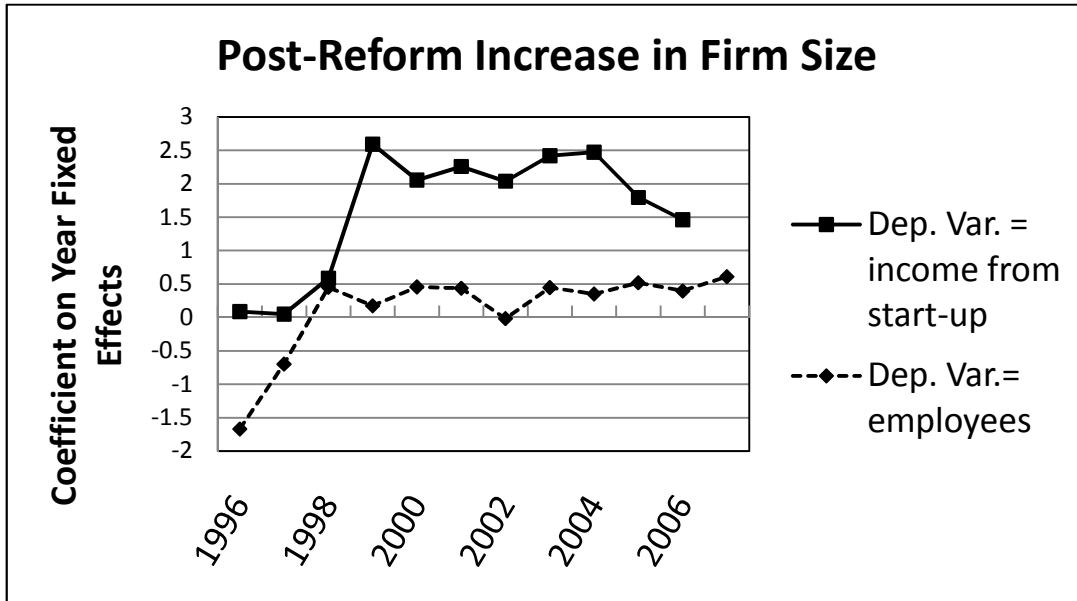


FIGURE 2

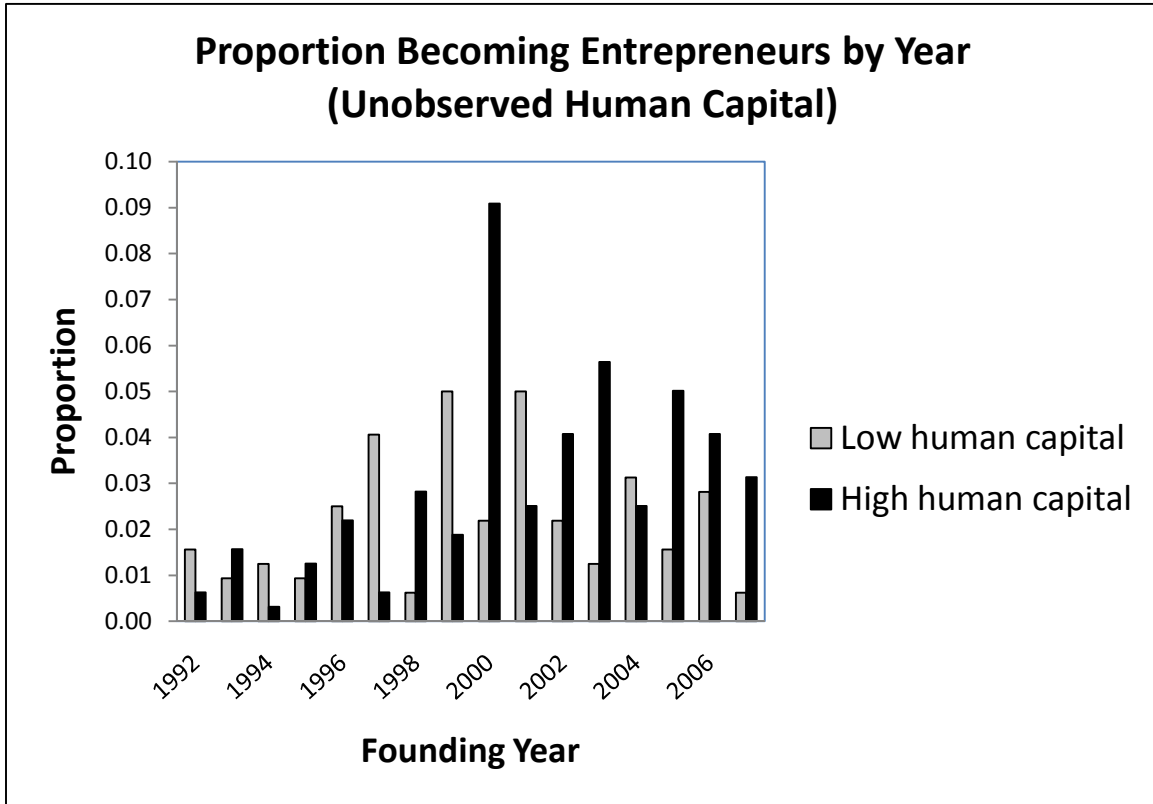


TABLE 1
Pairwise Correlations

		1	2	3	4	5	8	9	10	11	12	13	14	15	17	18	19	20	21	
1	<i>Last job academia</i>	1																		
2	<i>Last job business</i>	-0.618	1																	
3	<i>High government</i>	-0.051	-0.080	1																
4	<i>Low government</i>	-0.102	-0.385	-0.105	1															
5	<i>Ever job academia</i>	0.425	-0.085	-0.009	-0.056	1														
8	<i>Number of Positions</i>	-0.149	0.175	-0.011	0.036	0.135	1													
9	<i>Avg. Tenure</i>	0.047	-0.088	-0.036	0.077	-0.117	-0.060	1												
10	<i>Gender</i>	-0.046	0.047	-0.029	0.007	0.008	0.120	0.032	1											
11	<i>Entrepreneur Parents</i>	-0.041	0.002	0.018	-0.004	-0.058	0.054	-0.048	-0.016	1										
12	<i>High Salary</i>	-0.138	0.320	-0.050	-0.180	0.158	0.284	-0.305	0.057	0.009	1									
13	<i>Family economic status</i>	-0.030	-0.018	-0.004	0.030	-0.054	-0.081	0.098	0.154	-0.115	-0.196	1								
14	<i>Student Leader</i>	0.009	-0.028	0.011	0.051	0.011	0.075	-0.130	-0.010	0.043	0.144	-0.070	1							
15	<i>Communist Party</i>	-0.002	-0.092	-0.019	0.114	-0.043	-0.011	0.071	0.034	-0.037	-0.070	0.037	0.008	1						
17	<i>Master's</i>	0.037	0.053	-0.025	-0.032	0.103	0.119	-0.278	-0.013	-0.014	0.317	-0.090	0.234	-0.092	1					
18	<i>PhD</i>	0.273	-0.176	-0.021	-0.022	0.114	-0.017	-0.114	0.030	0.040	0.121	-0.040	0.142	-0.025	0.215	1				
19	<i>Overseas Experience</i>	-0.029	0.088	0.013	-0.101	0.030	0.093	-0.083	0.009	0.059	0.240	-0.097	0.076	-0.044	0.147	0.130	1			
20	<i>Bachelor's Grad Year</i>	-0.159	0.268	0.027	-0.136	0.014	0.098	-0.433	-0.031	0.083	0.460	-0.104	0.242	-0.130	0.457	0.160	0.232	1		
21	<i>Age</i>	0.154	-0.273	-0.028	0.142	-0.023	-0.099	0.438	0.036	-0.087	-0.475	0.117	-0.236	0.136	-0.471	-0.171	-0.240	-0.989	1	

TABLE 2
Cox Hazard Rate Regressions

Independent Variables	Dependent Variable = Start-up founded (subjects start being at risk upon graduation)													
	Note: reported coefficients are hazard ratios, coefficients above 1.0 represent an increased likelihood of entrepreneurship; (N=1,821)													
	(2-1)	(2-2)	(2-3)	(2-4)	(2-5)	(2-6)	(2-7)							
<i>Master's degree</i>	0.444***	(0.121)												
<i>Master's x POST</i>	1.771*	(0.581)												
<i>Doctorate degree</i>	1.131	(0.630)												
<i>Doctorate x POST</i>	0.889	(0.549)												
<i>Parents' edu.</i>		0.724***	(0.040)											
<i>Parent edu.xPOST</i>		1.417***	(0.089)											
<i>Log (Work exp.)</i>			0.832***	(0.022)										
<i>Log(Work) xPOST</i>			0.999	(0.027)										
<i>Promoted</i>					0.216***	(0.112)								
<i>Promoted x POST</i>					3.361**	(1.953)								
<i>High GPA</i>								0.350***	(0.111)					
<i>GPA x POST</i>								1.811*	(0.651)					
<i>Highest salary (pre-founding)</i>										0.771**	(0.079)			
<i>Salary x POST</i>										1.225*	(0.147)			
<i>Student leader</i>												0.718**	(0.097)	
<i>Leader x POST</i>												1.336*	(0.209)	
<i>Years 2000-07</i>	0.054***	(0.016)	0.002***	(0.001)	0.060***	(0.019)	0.012***	(0.007)	0.020***	(0.006)	0.007***	(0.004)	0.027***	(0.007)
<i>Years 1991-99</i>	0.064***	(0.010)	0.043***	(0.008)	0.056***	(0.012)	0.067***	(0.011)	0.064***	(0.012)	0.050***	(0.009)	0.068***	(0.012)
<i>Overseas</i>	0.860	(0.151)	0.675**	(0.135)	0.555***	(0.124)	0.622**	(0.123)	0.595**	(0.120)	0.754	(0.150)	0.615**	(0.122)
<i>Last job acad.</i>	0.734	(0.233)	0.390***	(0.138)	0.205***	(0.085)	0.440**	(0.157)	0.512*	(0.184)	0.369**	(0.144)	0.482**	(0.170)
<i>Last job govt.</i>	0.657	(0.190)	0.879	(0.278)	0.377**	(0.144)	0.607	(0.190)	0.563*	(0.185)	0.654	(0.220)	0.599	(0.188)
<i>High govt.(ever)</i>	0.772	(0.288)	0.896	(0.356)	1.139	(0.452)	0.913	(0.361)	1.015	(0.383)	0.775	(0.320)	0.954	(0.370)
<i>Low govt (ever)</i>	1.322	(0.301)	1.143	(0.274)	0.916	(0.256)	1.306	(0.306)	1.385	(0.333)	1.310	(0.328)	1.417	(0.333)
<i>Ever job acad.</i>	1.195	(0.265)	1.517**	(0.313)	1.531*	(0.352)	1.491**	(0.302)	1.236	(0.262)	1.423*	(0.301)	1.506**	(0.309)
<i>Num. positions</i>	1.361***	(0.077)	1.305***	(0.075)	1.353***	(0.088)	1.412***	(0.088)	1.324***	(0.077)	1.300***	(0.080)	1.345***	(0.077)
<i>Gender</i>	1.437	(0.454)	2.551***	(0.859)	1.820	(0.668)	1.990**	(0.638)	2.633***	(0.879)	2.083**	(0.710)	2.151**	(0.696)
<i>Entrep. parent</i>	0.947	(0.071)	0.54	(0.236)	0.486	(0.246)	0.450*	(0.197)	0.482*	(0.213)	0.5.9	(0.261)	0.488*	(0.210)
<i>Family Wealth</i>	0.971	(0.141)	1.078	(0.097)	1.110	(0.090)	1.015	(0.076)	0.953	(0.074)	0.982	(0.079)	1.001	(0.075)
<i>Communist Party</i>	0.86	(0.151)	0.929	(0.141)	1.080	(0.182)	0.967	(0.144)	1.025	(0.153)	0.803	(0.124)	1.033	(0.155)

Note: POST=Years 2000-07; 308 failures; 44,248 total years at risk; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. All models include controls for Bachelor's graduation year (age), Bachelor's Major (academic department), and region fixed effects.

TABLE 3
Tobit Models: Returns to Human Capital in Entrepreneurship Increase Post-1999

Independent Variables	Log(profit margin)				Log(income from start-up)			
	(3-1)	(3-2)	(3-3)	(3-4)	(3-5)	(3-6)	(3-7)	(3-8)
<i>POST-1999 founding</i>	-0.301 (0.455)	-0.448 (0.598)	-0.753 (0.563)	-2.200** (0.937)	-1.329 (0.977)	-0.139 (0.686)	1.027 (0.819)	-6.443*** (1.861)
<i>Master's degree</i>				-0.269 (0.340)	-1.037 (0.905)			0.090 (0.928)
<i>POST x Master's degree</i>				-0.111 (0.412)	1.783* (1.039)			0.163 (1.054)
<i>High GPA</i>		-0.279 (0.427)		-0.523 (0.589)		-1.191 (0.737)		-1.417 (0.903)
<i>POST x High GPA</i>		0.639 (0.453)		0.866 (0.595)		2.348*** (0.887)		2.376** (1.042)
<i>Income residual</i>			0.073 (0.255)	--			-3.239*** (0.901)	--
<i>POST x income residual</i>			0.152 (0.312)	--			2.624** (0.987)	--
<i>Promoted</i>				-0.900 (0.611)				-1.123 (1.182)
<i>POST x Promoted</i>				1.751** (0.768)				5.803*** (1.678)
<i>Privatized</i>	-0.297 (0.400)	-0.385 (0.363)	-0.083 (0.758)	-0.423 (0.388)	0.986 (1.043)	0.921 (1.015)	-1.307 (1.432)	1.264 (1.141)
<i>Bought</i>	-0.079 (0.586)	-0.106 (0.620)	-0.022 (0.660)	-0.189 (0.577)	3.233*** (1.165)	2.919*** (1.034)	3.004** (1.430)	2.721*** (0.975)
<i>Log(revenues)</i>	0.275*** (0.089)	0.274*** (0.093)	0.234** (0.098)	0.242*** (0.089)	0.334* (0.194)	0.324 (0.203)	0.058 (0.249)	0.207 (0.155)
<i>Log(registered capital)</i>	-0.226** (0.111)	-0.225** (0.112)	-0.305** (0.126)	-0.210* (0.111)	-0.036 (0.256)	0.044 (0.253)	-0.451 (0.377)	0.029 (0.252)
<i>Log(employees)</i>	0.027 (0.152)	0.024 (0.156)	-0.056 (0.175)	-0.001 (0.154)	0.116 (0.392)	0.021 (0.416)	1.018* (0.548)	-0.015 (0.351)
<i>Log(firm age)</i>	0.438 (0.486)	0.614 (0.541)	0.087 (0.562)	0.388 (0.583)	2.742* (1.413)	0.804 (0.561)	1.157 (0.782)	0.635 (0.513)
<i>Overseas</i>	--	-0.175 (0.299)	0.272 (0.404)	-0.234 (0.274)	0.772 (0.978)	0.557 (0.935)	1.119 (1.147)	0.283 (0.891)
<i>Coastal province</i>	0.137 (0.254)	0.222 (0.262)	-0.592 (0.385)	0.191 (0.260)	-0.563 (1.002)	-0.709 (1.106)	0.657 (1.320)	-0.396 (1.056)
<i>Bach. Grad. year</i>	0.011 (0.012)	0.013 (0.012)	0.022** (0.011)	0.021* (0.012)	-0.052 (0.036)	-0.037 (0.037)	-0.028 (0.039)	-0.008 (0.035)
<i>Constant</i>	-237.31 (239.94)	-320.76 (278.33)	-152.01 (267.88)	-213.95 (301.93)	-876.14 (643.57)	76.92 (75.60)	50.50 (77.01)	23.04 (70.12)
Observations	149	147	94	147	150	148	93	148
R-squared	0.27	0.27	0.31	0.35	0.15	0.15	0.17	0.18

Standard errors are robust. The dependent variable is potentially censored below zero. Main results are robust to a Poisson specification (as well as not taking the natural log). All independent variables are not run together due to collinearity. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. All models include controls for year and region fixed effects.

TABLE 4
Productivity

Independent Variables	Log(profit margin) (1)		Log(revenues) (2)		Log(employees) (3)		Log(survival) (4)		Pr(IPR important) (5)	
<i>Promoted</i>	-0.118	(0.228)	0.116	(0.369)	0.380*	(0.211)	-0.045	(0.046)	0.042	(0.966)
<i>Log(work experience)</i>	0.986	(1.230)	-2.965	(2.328)	-2.447**	(1.094)	-0.009	(0.214)	0.668	(4.723)
<i>Years of Educ.</i>	0.004	(0.086)	0.018	(0.149)	0.152*	(0.082)	-0.008	(0.018)	0.850**	(0.407)
<i>Wage residual</i>	0.410**	(0.180)	-0.243	(0.323)	-0.12	(0.159)	0.007	(0.034)	1.535*	(0.837)
<i>Prior salary</i>	-0.442**	(0.170)	0.036	(0.336)	0.173	(0.150)	0.025	(0.031)	-0.231	(0.727)
<i>Overseas</i>	0.731**	(0.359)	-0.804	(0.580)	0.128	(0.305)	-0.07	(0.060)	2.120	(1.672)
<i>High GPA</i>	0.308	(0.232)	-0.628	(0.427)	-0.321	(0.213)	0.011	(0.047)	-0.848	(0.914)
<i>Worked in R&D</i>	-		-		-		-		1.639*	(0.925)
Controls										
<i>Log(employees)</i>	0.246**	(0.107)	1.234***	(0.187)	-		-		-	
<i>Privatized</i>	-0.979*	(0.539)	1.293	(0.894)	0.984**	(0.464)	0.075	(0.107)	(3.365)	(2.955)
<i>Log(survival)</i>	(0.280)	(0.504)	0.606	(0.851)	0.674	(0.453)	-		-	
<i>Bought</i>	0.005	(0.519)	-1.406*	(0.782)	0.666	(0.498)	(0.023)	(0.111)	(2.961)	(2.138)
<i>Industry Effects</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>City Effects</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>Founding Year</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>Graduation Year</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>Constant</i>	2.369	(5.321)	15.983**	(7.581)	3.308	(2.895)	2.065***	(0.620)	-53.413	-
<i>Observations</i>	176		156		207		234		131	
<i>R-squared</i>	0.55		0.81		0.70		0.92		0.51	

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE 5
Years 1988 – 1999

Independent Variables	Dependent Variable = Start-up founded (subjects start being at risk upon graduation)					
	Note: reported coefficients are hazard ratios (N=1,540 individuals)					
	(5-1)	(5-2)	(5-3)	(5-4)	(5-5)	(5-6)
<i>Master's degree</i>	0.675* (0.158)					0.562** (0.152)
<i>Doctorate degree</i>	0.344** (0.166)					0.641 (0.323)
<i>Low work exper. (0-10 yrs.)</i>		1.333 (0.351)				1.500 (0.442)
<i>High work exper. (>30 yrs.)</i>		0.060*** (0.039)				dropped -
<i>Promoted</i>			0.689 (0.251)			0.686 (0.270)
<i>High GPA (above median)</i>				0.685* (0.150)		1.288 (0.325)
<i>Last Salary (Pre-founding)</i>					0.667*** (0.065)	0.694*** (0.071)
<i>Overseas</i>	0.914 (0.247)	0.745 (0.199)	0.807 (0.217)	0.775 (0.211)	1.154 (0.329)	0.929 (0.280)
<i>Last job acad.</i>	0.973 (0.413)	0.744 (0.314)	0.830 (0.349)	1.020 (0.434)	0.862 (0.408)	0.778 (0.384)
<i>Last job govt</i>	0.504 (0.219)	0.513 (0.219)	0.509 (0.217)	0.425* (0.194)	0.340** (0.169)	0.402* (0.206)
<i>High govt.(ever)</i>	0.841 (0.504)	0.964 (0.578)	0.883 (0.528)	0.807 (0.485)	0.987 (0.602)	0.916 (0.557)
<i>Low govt (ever)</i>	1.202 (0.356)	0.985 (0.289)	1.079 (0.313)	0.927 (0.277)	1.137 (0.358)	0.963 (0.318)
<i>Ever job academia</i>	1.312 (0.419)	1.105 (0.352)	1.155 (0.367)	1.184 (0.380)	1.227 (0.405)	1.425 (0.492)
<i>Number of positions</i>	1.530*** (0.120)	1.489*** (0.115)	1.499*** (0.118)	1.527*** (0.126)	1.414*** (0.120)	1.288*** (0.117)
<i>Gender</i>	1.062 (0.428)	0.934 (0.375)	1.018 (0.410)	1.134 (0.456)	1.118 (0.478)	1.045 (0.464)
<i>Family Wealth</i>	0.753*** (0.078)	0.769*** (0.078)	0.750*** (0.077)	0.798** (0.083)	0.768** (0.089)	0.787* (0.097)
<i>Communist Party</i>	0.76 (0.167)	0.807 (0.176)	0.77 (0.169)	0.774 (0.173)	0.776 (0.185)	0.808 (0.195)
<i>Bach.Grad. Yr.</i>	1.154*** (0.023)	1.090*** (0.026)	1.145*** (0.022)	1.107*** (0.022)	1.099*** (0.025)	1.067** (0.029)

Note: coefficients below 1.0 represent a decreased likelihood of entrepreneurship; 102 failures; 30,716 total years at risk; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. All models include controls for Bachelor's graduation year (age), and region fixed effects

TABLE 6
Quantile Regression on Unobservable Human Capital

<i>Panel A</i>	<i>Dependent variable = income residuals</i>				
<i>Percentiles</i>	<i>10</i>	<i>25</i>	<i>50</i>	<i>75</i>	<i>90</i>
<i>Founded in 1978-89</i>	0.737*** (0.229)	0.502*** (0.151)	0.085** (0.039)	-0.362** (0.175)	-1.427* (0.777)
<i>Founded in 1990-99</i>	0.771*** (0.143)	0.344*** (0.131)	0.034 (0.063)	-0.094 (0.201)	0.206 (0.655)
<i>Founded in 2000-07</i>	0.571*** (0.181)	0.740*** (0.158)	0.429*** (0.122)	0.736*** (0.189)	0.586** (0.232)
Constant	-1.556*** (0.110)	-0.894*** (0.098)	-0.156*** (0.049)	0.420*** (0.110)	1.184*** (0.107)
Observations	595	595	595	595	595
Pseudo R-squared	0.058	0.034	0.021	0.042	0.023
<i>Panel B</i>	<i>Dependent variable = income residuals (Entrepreneurs only)</i>				
<i>Percentiles</i>	<i>10</i>	<i>25</i>	<i>50</i>	<i>75</i>	<i>90</i>
<i>Ln(profit)</i>	0.215 (0.295)	0.093 (0.234)	0.195 (0.155)	0.242** (0.123)	0.246** (0.126)
Controls					
<i>Ln(firm age)</i>	0.479 (0.483)	0.332 (0.434)	0.273 (0.403)	0.241 (0.379)	0.196 (0.415)
<i>Ln(registered capital)</i>	0.154 (0.207)	0.110 (0.146)	-0.037 (0.109)	-0.022 (0.109)	0.010 (0.104)
<i>Privatized</i>	1.308 (1.182)	0.406 (0.901)	0.687 (0.690)	0.435 (0.666)	0.242 (0.752)
<i>Bought</i>	0.857 (1.324)	0.537 (1.189)	0.616 (0.847)	0.690 (0.566)	0.852 (0.544)
<i>Ln(income from firm)</i>	-0.068 (0.112)	-0.074 (0.089)	-0.05 (0.063)	-0.015 (0.062)	-0.050 (0.053)
Constant	-90.977 (98.614)	-61.093 (86.086)	-28.173 (62.509)	-17.581 (62.713)	-28.286 (70.683)
Observations	132	132	132	132	132
Pseudo R-squared	0.461	0.360	0.293	0.418	0.601

The top of the talent distribution was more likely to found a firm after 1999 and conditional on founding a firm, had higher profits. Dependent variable is the residual from the income regression in Appendix Table 4. Bootstrapped standard errors (100 repetitions); Panel B uses newly generated residuals from the sample of entrepreneurs only and includes founding year, industry, coastal region, Beijing and Shanghai controls; ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Sample includes non-entrepreneurs matched on graduation year and job ending year.