DOES INSTITUTIONAL CHANGE IN UNIVERSITIES INFLUENCE HIGH-TECH ENTREPRENEURSHIP? EVIDENCE FROM CHINA'S PROJECT 985

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ABSTRACT

We examine how policies that attempt to change educational institutions to be more innovative affect the beliefs and behaviors of alumni entrepreneurs as well as the performance of firms they start. We address this question by studying how China's Project 985, an educational reform that attempted to foster innovation within a subset of Chinese universities, impacted entrepreneurs' beliefs regarding innovation, the degree to which these entrepreneurs engaged in technologically intensive activities, and the performance of their firms. We find that policies such as educational reforms can affect the beliefs of entrepreneurs, thereby creating changes in the behaviors of entrepreneurs. However, the degree to which these policy-driven changes in entrepreneurial beliefs and behaviors translate into superior performance will depend on the level of consistency between the focal policy and the broader institutional context. We contribute to research at the nexus of policy, institutions, and entrepreneurship by presenting a theoretical account that links together policy, educational institutions, entrepreneurs' beliefs, and their behavior. We also add meaningfully to the discussion regarding how educational institutions—as well as the policies affecting them—actually affect the performance of new ventures.

INTRODUCTION

Policymakers around the world are implementing educational reforms in order to foster innovative, entrepreneurial firms. For example, the municipal government of Hong Kong Special Administrative Region introduced new funding programs to promote the collaboration between universities and industry, stimulate technology and innovation advancement, and foster entrepreneurship (Mok, 2005). In 2012, China introduced a new policy that graduates from the top 100 universities must all take a class in entrepreneurship before graduating (The Ministry of Education of the People's Republic of China, 2012). Similarly, Greece started the New School program with the specific goal of teaching students about the importance of innovation, creativity, and entrepreneurship (EACEA, 2012). Iceland's National Strategy on Education 2020 explicitly attempted to promote innovation among students while simultaneously designating entrepreneurship as a cross-curricular objective at all school levels (EACEA, 2012). The logic behind these and similar policy initiatives is that, by using educational reforms to impart to students the importance of innovation and entrepreneurship, policymakers can predispose these students to start entrepreneurial firms that are more innovative. More generally, these reforms are representative of a broader class of policies that attempt to effect changes to entrepreneurial firms by altering the beliefs and attitudes of the founders. Yet, how such policies actually affect new ventures is not well understood.

There are two relevant streams of research. First, there is research that examines how policymakers attempt to shape entrepreneurial action by changing laws and regulations (Sine and David, 2003; Eesley, 2010). Laws and regulations affect new ventures by enabling certain organizational activities while restricting or preventing others (North, 1990; Scott, 1995; Hiatt et. al. 2007). An example of such a law is the Public Utility Regulatory Policies Act of 1978, which provided for non-utility entities to construct new power generation facilities free from the constraints of regulation (Sine and David, 2003). By making this change to the laws that governed the energy sector, policymakers in the U.S. enabled non-utility producers to enter the utilities market and compete with established electric utilities (Sine, 2001). More specifically, "law-changing" policies can alter barriers to entry and increase the

founding of new firms. For instance, Klapper, Laevena, and Rajan (2006) found that simplifying the licensing necessary for starting firms led to the founding of more firms. Hsu, Roberts, and Eesley (2007) found that reducing the friction of government regulation of certain industries led to greater firm founding rates in those industries. Similarly, changes to laws and regulations can also alter barriers to growth and the odds of failure as well as influence the type of individuals that decide to become entrepreneurs. Eesley (2010) found that the removal of legal barriers that hindered growth in state-controlled industries in China increased the likelihood that individuals with high human capital will become entrepreneurs in these previously inaccessible industries. In a study of U.S. bankruptcy laws, Fan and White (2003) found that greater protection for firm and personal assets during the bankruptcy was associated with higher founding rates among individuals with more at risk. To summarize, policymakers can influence the opportunities available to entrepreneurs by changing the laws and regulations that directly govern entrepreneurial activity, thereby directing the behavior of entrepreneurial firms in the desired manner.

Second, research points to the importance of entrepreneurs' beliefs in shaping their behaviors (Berger and Luckmann, 1967; Aldrich and Fiol, 1994; Scott, 1995). The beliefs and behaviors of entrepreneurs, even within the legal limits, are influenced by a variety of factors, including their experience in entrepreneurship (Baron and Ensley, 2006; Eesley and Roberts, 2012) and their prior organizational affiliations (Beckman, 2006). These beliefs change behaviors and influence performance by guiding how entrepreneurs process information and make decisions (Rindova and Kotha, 2001; Tripsas, 2009). Our theoretical contribution is to propose (and empirically test) a novel mechanism of institutional change - the possibility that policymakers via institutional changes may influence new ventures by altering the beliefs of entrepreneurs. Many policymakers are indeed attempting to turn this possibility into reality. An example is Belgium's Action Plan for Entrepreneurship Education 2011-2014, an education policy that aimed to provide teachers with the necessary training so that they can help create positive attitudes towards entrepreneurship among their students (EACEA, 2012). In contrast with "law-changing" policies, this policy attempted to foster entrepreneurship not by changing the laws that govern what entrepreneurs can and cannot do but by altering the beliefs of potential entrepreneurs. Yet, although

many countries are implementing policies like Belgium's plan, we have little knowledge of how such "belief-changing" policies actually affect entrepreneurs and their firms.

Overall, we know that changing the laws that regulate entrepreneurial activity changes entrepreneurial behavior and affects entrepreneurial firm performance. We also know that entrepreneurs' beliefs influence their behaviors and outcomes. But, we do not know how policies that attempt to alter entrepreneurs' beliefs and attitudes—such reforms to educational institutions—actually affect entrepreneurs and their firms. This is an important gap and our theoretical contribution. The degree to which policies can influence entrepreneurs' beliefs is unclear. Whether or not changes in the entrepreneurs' beliefs translate into changes in their behavior is uncertain. Finally, how such "belief-changing" policies may ultimately impact the performance of new ventures is not well studied.

We address this gap by asking the following question: *how do policies that attempt to alter entrepreneurs' beliefs actually affect entrepreneurs' beliefs, their behaviors, and their firms' performance?* China offers an ideal research setting. To answer our research question, we examine how one of China's educational reforms—Project 985—impacted Chinese entrepreneurs' beliefs regarding innovation, the propensity of the firms founded by these entrepreneurs to engage in innovation, and the performance of these firms within the context of China's economic system[1]. Project 985 is an educational reform initiated for the purpose of constructing world-class Chinese universities, improving China's national technological capabilities, and helping China transition towards an innovation-driven economy (Chen, 2006). Using a differences-in-differences methodology, which controls out time trends and differences across universities, we look at how Project 985 impacted the the alumni entrepreneurs of "985"[2] universities including their beliefs about innovation, their behaviors and performance of the entrepreneurial firms founded by these alumni.

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[1] We do not explicitly study how schools can teach entrepreneurship. Rather, we are concerned more broadly with how "belief-changing" policies in general affect entrepreneurs. To do so, we study how Project 985—a reform program that promoted *innovation*—impact entrepreneurs' beliefs regarding innovation, their activities, and the performance of their firms.

[2] "985" universities denotes universities that were affected by Project 985. Similarly, "985" alumni or "985" entrepreneur denotes an alumni of a "985" university or an entrepreneur who graduated from a "985" university.

We contribute to theory at the nexus of institutional change and entrepreneurship. Prior studies on the relationship between institutions and entrepreneurship predominantly focus on reforms to laws and regulations that permit certain actions or outlaw others (Sine and David, 2003; George, 2005; Eesley, 2012). We contribute theoretically by elucidating how reforms that do not change the laws that directly regulate the activity of new ventures can nevertheless affect entrepreneurs and their firms. Our study reveals that reforms to educational institutions do have an impact on the beliefs of entrepreneurs about the importance of innovation. These beliefs and attitudes then alter how entrepreneurs process information and make decisions, thereby predisposing them to act in accordance with these beliefs. Our study thus adds an important piece of knowledge to our understanding of the relationship between policy, institutions, and entrepreneurship.

We also contribute by clarifying the relationship between "belief-changing" policies (e.g. educational reforms) and entrepreneurial performance. Governmental and popular perspectives on how "belief-changing" policies affect entrepreneurs are either overly optimistic (i.e. educational reforms will lead to the creation of innovative and high-performing firms) or overly pessimistic (i.e. educational reforms will not lead to the creation of high-performing firms because innovation, entrepreneurship, or creativity cannot be taught) (The Ministry of Education of the People's Republic of China, 2005; EACEA, 2012; Askew, 2012). We build on both of these perspectives. Our study shows that "belief-changing" policies—even if they successfully alter the beliefs of entrepreneurs—do not necessarily cause new ventures to perform better. If the policies are inconsistent with the broader institutional environment, then these reforms may actually cause new ventures to perform *worse*. At the same time, our study shows that belief-changing policies can influence entrepreneurs to act in certain ways. By influencing entrepreneurs to behave in certain ways, these policies do affect the performance of new ventures. Thus, "belief-changing" policies can lead to the creation of more innovative, high-performing firms if these reforms are consistent with the larger institutional environment. Overall, we contribute by presenting a more complete view of the relationship between educational institutions, the larger institutional environment, and entrepreneurial performance.

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BACKGROUND

Project 985 is an educational reform program funded and implemented by the government of the People's Republic of China. Project 985 was launched on May 4, 1998, following President Jiang Zemin's declaration that "China must have a number of first-rate universities of international advanced level" (China Education Online, 2008). Thirty-four universities were included in the first phase of the project, with five additional universities being included in the second phase (China Education Online, 2008).

Project 985 has two specific goals. First, it aimed to increase the innovative capabilities of Chinese university graduates in order to boost China's national technological capabilities and effect a transition towards an innovation-driven economy. The project hoped to create a cohort of graduate students that will then form the core of China's creative and innovative capability for years to come (The Ministry of Education of the People's Republic of China, 2005). Second, Project 985 sought to transform member universities into centers for research in advanced technologies (The Ministry of Education of the People's Republic of China, 2005). In doing so, the project hoped to transform member universities into creative platforms where natural scientists, social scientists, engineers, business practitioners, and policymakers could come together and devise innovative solutions to the important problems facing China in the 21st century (The Ministry of Education of the People's Republic of China, 2005).

To accomplish its goals, Project 985 provided a subset of Chinese universities with generous research grants and other forms of funding (The Ministry of Education of the People's Republic of China, 2005). These "985" universities used the funding to promote innovation and foster creativity in a number of ways. For instance, "985" universities used the funding to attract accomplished researchers from overseas institutions and corporations to professorship positions (Yang, 2010). "985" universities also used the funding to construct new facilities and acquire equipment that are necessary for advanced scientific research (Yang, 2010; China Agricultural University, 2010). "985" universities used the funding to support graduate students and young scholars involved in novel research projects (Yang, 2010). Finally, "985" universities used the funding to create new classes and programs on innovation and

commercialization (Shanghai Jiaotong University, 2012; Harbin Institute of Technology, 2012). In conclusion, Project 985 effected changes to a subset of Chinese universities with the hope that these universities would produce innovative individuals that can contribute to the development of China's technological capability and commercial prowess (The Ministry of Education of the People's Republic of China, 2005).

HYPOTHESES

Project 985 influenced student beliefs in variety of ways. First, attracting prominent researchers from overseas was likely to influence student beliefs by exerting role model effects. The education literature suggests that students look up to teachers as models of proper attitudes and behaviors (Prideaux et. al., 2000; Brownell and Cote, 2001). In doing so, students acquire the beliefs and values of their teachers and incorporate these beliefs into their own value systems (Wright, 1996; Yazigi, et. al., 2006). As a result, the beliefs of teachers often have a direct effect on the beliefs, behaviors, and career choices of students (Dusek and Josef, 1983; Good and Brophy, 1984; Jordan, et. al., 2003). In our case, students that studied and worked with the prominent scientists—most of whom were innovative individuals that work at the cutting edge of their fields—were likely to model their beliefs after the conduct of these scientists. The scientists themselves were also likely to directly convey the importance of innovation and creativity. As more of these prominent researchers became faculty at "985" universities, the role model effect they exert would positively influence students' beliefs regarding the importance of innovation.

Second, Project 985 may also have affected student beliefs via changes in the curriculum. The education literature suggests that classes influence the beliefs that students hold, such as business ethics and corporate social responsibility (Bishop, 1992). Classes do this both by directly conveying to students the importance of particular beliefs or values (Epstein, 1989; Oddo, 1997) and by presenting concrete examples for how particular values and beliefs can be applied to make decisions about real-world situations (Parks, 1986). In our case, Project 985 enabled universities to create new classes and programs on innovation and commercialization. These classes directly convey the importance of innovation while simultaneously encouraging students to solve real-world problems in creative ways. By creating classes

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that teach students about the importance of innovation as well as how innovation can be usefully applied, Project 985 would have a positive effect on students' beliefs regarding the importance of innovation.

Finally, Project 985 may have affect students beliefs regarding innovation by increasing students' exposure to innovation. By providing funding for universities to support young scholars, construct new facilities, and acquire new equipment, Project 985 made it possible for more students to directly come into contact with new technology and innovative ideas. Such exposures were likely to reinforce the beliefs, values, and attitude that students acquire from their role models and their classroom experiences by enriching the students' understanding of innovation and creativity. These exposures may also serve as entry points for students into the world of technology innovation and "inspire" the students to conduct research with prominent scientists or take classes on innovation. Thus, increasing students' exposure to innovation may have directly influenced students to view innovation more positively as well as augment the effects of role models and classes on students' beliefs. Overall, we argue that Project 985 was likely to have positively influenced students' beliefs regarding the importance of innovation in a variety of ways.

Within the set of beliefs regarding innovation, how entrepreneurs value IP (intellectual property) may be particularly important, especially in the Chinese context. In general, the IP literature suggests that IP is critical for creativity and innovation (Moser, 2005). For instance, Arora et. al. (2008) found that patents stimulate R&D across a wide range of manufacturing industries. Moreover, the importance of IP as a value may be especially important for innovation in China. The concept of IP is not a widely accepted or even comprehended concept in China. The word "intellectual property" did not exist in Chinese dictionaries before the year 2000 (Jiang, 2009). Many Chinese technological innovations—including the hybrid rice strains developed by Professor Yuan Longping—were not patented by the Chinese researchers who made the breakthroughs simply because these researchers did not understand the importance of intellectual property and felt no need to patent their innovations (Li, 2008). In fact, while Chinese researchers produce approximately 30,000 scientific and technological innovations each year, they only *apply* for patents for 10% of these innovations (Li, 2008). In such an environment, entrepreneurs who understand the importance of IP and take measures to protect and to patent their (and

others') innovations may gain performance advantages, making the importance of IP an especially important value for innovative entrepreneurs. For this reason, we specifically focus on how Project 985 affected Chinese entrepreneurs' view of IP in order to address the broader question of how educational reforms affect entrepreneurs' beliefs.

By positively influencing how students view innovation, Project 985—and similar educational reforms—were likely to have a positive impact on the extent to which students believe that legal protection of innovation is important. Indeed, one of the entrepreneurs we interviewed expressed similar sentiments:

> "Yes Project 985…had a pretty big effect on how I view innovation and IP. The university brought in some overseas professors and opened new classes on innovation…and when you take these classes and communicate with these professors you start to see things differently. Before I had no idea what IP even was…I mean everyone in China downloaded stuff off of the internet and bought [pirated] CD's, and nobody really cared [about IP]. Now I'm starting to see that, if I want to make money off of my innovations, then IP is pretty important."

Given that many students probably had little exposure to IP prior to attending a "985" university, Project 985's role model and curriculum effects were likely to have especially significant influences on students' beliefs regarding IP[3]. As such, we hypothesize that:

> *H1:   Entrepreneurs who graduated from "985" universities after Project 985 was implemented are more likely to have beliefs that intellectual property protection is important.*

Prior literature suggests the beliefs of managers and entrepreneurs often act as guides for how these individuals interpret information and make decisions (Dutton and Dukerich, 1991; Kogut and Zander, 1996; Markides, 2000). As a result, managers and entrepreneurs tend to act in accordance with

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[3] Note that we directly ask entrepreneurs about their beliefs regarding innovation. As such, our measure is tightly linked to our theoretical conception of beliefs regarding innovation.

their beliefs and understandings of the utility and appropriate of particular activities. For instance, Rindova and Kotha (2001) showed that Yahoo!'s identity as a firm composed of "cool" internet surfers shaped the company's beliefs of what was appropriate for the company to do. Yahoo! then used these beliefs to guide its branding and image-building activities. Similarly, Tripsas (2009) showed that Linco's beliefs regarding the company's identity as the "digital photography company" acted as an information filter that determined the appropriateness of the company's branding and retailing strategies. In general, managers' and entrepreneurs' beliefs and understandings shape how they and members of their firm perceive what is appropriate and useful and that thereby guide what the firm does.

We argue that, by influencing Chinese entrepreneurs to believe innovation and IP to be critical, Project 985 predisposed these entrepreneurs to engage in technologically intensive activities and attempt to innovate. Having been educated in a "985" university, the "985" entrepreneurs effectively acquired a set of understandings that emphasized the positive aspects of technology innovation. That the "985" entrepreneurs viewed innovation as more important meant that these entrepreneurs were more likely to view investment in technology innovation as appropriate and strategically critical. Essentially, the belief that innovation is important and useful became an information processing aide that the "985" entrepreneurs utilized to process information and make strategic decisions. This is likely to predispose "985" entrepreneurs to confront strategic challenges by attempting to innovate, which suggests that firms founded by "985" entrepreneurs are more likely to invest in R&D, engage in technologically intensive activities, and attempt to innovate. As such, we hypothesize that:

> H2: Entrepreneurs who graduated from "985" universities after Project 985 was implemented are more likely to attempt engage in technologically intensive activities.

By influencing firms to try to innovate, Project 985 may negatively impact firm performance. Prior studies on firms in emerging economies highlight the inadequate legal framework that protect intellectual property and regulate commercial activity in these economies (Nee, 1992; Peng and Heath, 1996). For instance, Guo (1997) observed that copyright violations, broken contracts, and unfair competitive practices have become prevalent in China. The inadequacy of legal protection for the

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products of innovation increases the risks associated with investment in technology innovation, making these activities less profitable (Li and Atuahene-Gima, 2001). As a result, Project 985 may actually negatively impact firm performance.

Nevertheless, we argue that, by influencing entrepreneurial to attempt to innovate, Project 985 is likely to positively impact firm performance. This is so for three reasons. First, greater investment in innovation improves performance because doing so allows the firm to acquire greater absorptive capacity. Absorptive capacity is defined as the capability of the firm to recognize the value of new information from external sources, assimilate it, and apply it towards commercial ends (Cohen and Levinthal, 1990). Firms that invest more in innovation are thus more capable of identifying and utilizing valuable information from the environment, which increases the firm performance. By influencing entrepreneurs to engage in technologically intensive activities, Project 985 was likely to increase the sensitivity of "985" entrepreneurs to the emergence of radical innovations and new market trends. This, in turn, would increase the ability of "985" entrepreneurs to capitalize on these new innovations and trends, making the firms founded by "985" entrepreneurs more likely to perform well.

Second, greater investment innovation improves performance because doing so enables the firm to situate itself in an advantageous network position. Firms that invest heavily in innovation are more likely to form networks with other innovative firms and individuals (Hargadon and Sutton, 1997). Investment in innovation thus enables the firm to be situated in an advantageous network position, which in turn allows these firms to receive key, innovation-related information that firms in inferior positions might miss (Hargadon and Sutton, 1997; Zaheer and Bell, 2005). In our case, the "985" entrepreneurs that engage in technological intensive activities were more likely to form new ties with prominent scientists as well as strengthen their prior ties with innovative researchers at their alma mater. This was like to put the "985" entrepreneurs in brokerage positions between multiple fields of scientific research, which would then increase the chances of them obtaining key information that would grant their firms competitive advantages.

Finally, greater investment innovation improves performance because engaging in technologically intensive activities and attempting to innovate may actually be profitable strategies for firms operating in emerging economies. Emerging economies are turbulent environments for the same reasons that their laws and regulations are under-developed: the institutional frameworks of these economies are often in a state of transition (Nee, 1992; Boisot and Child, 1996). These turbulent environments trigger "unlearning" of current routines and present opportunities to innovative firms that are capable of capitalizing on novel market trends (Li and Atuahene-Gima, 2001). Indeed, prior studies have found that firms operating in turbulent environments perform better when they pursue product innovation strategies (Covin and Slevin, 1989; Li and Atuahene-Gima, 2001). Thus, while the poor legal frameworks of emerging economies works against entrepreneurs that try to innovate, the turbulence of emerging economies may actually work in favor of these entrepreneurs. Given that China is an emerging economy in a state of transition (Boisot and Child, 1988; Nee, 1992), Project 985, by influencing entrepreneurs to innovate, may ultimately cause the firms they found to perform better.

Overall, we argue that, by influencing entrepreneurs to attempt to innovate, Project 985 would enable these entrepreneurs to gain absorptive capacity, capture advantageous network positions, and capitalize on novel market trends in a turbulent environment. The competitive advantages that entrepreneurs gain from attempting to innovate would more than offset the harmful effects stemming from China's under-developed property and contract laws. As such, we hypothesize that:

> H3: Firms founded by the alumni of "985" member universities who graduated after Project 985 was implemented will exhibit higher performance.

METHODS

Sample

We generate our sample through a survey of the Tsinghua University alumni. Our sample consists of 723 entrepreneurs, all of whom attended Tsinghua at some point in their lives. Of these 723 entrepreneurs, 570 received his or her highest degree from a "985" university and 153 entrepreneurs received his or her highest degree from a non-"985" university.

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Sampling from the Tsinghua alumni enables us to control for entrepreneurs' human and social capital and mitigate selection bias. Sampling from the alumni of Tsinghua enables gathering data from a well-defined population of comparable individuals with comparable human and social capital. Factors such as talent, educational history, and social capital all influence the attitude, behavior, and success of entrepreneurs and can confound the effects of Project 985. Using the Tsinghua alumni survey as the source of our data thus enables us to mitigate possibly confounding effects of differential human and social capital and isolate the effects of Project 985. Indeed, our design is a methodological improvement over prior work that examines socialization in graduate schools but does not collect data on undergraduate education and as a result compares students with very different human and social capital levels (Gottlieb, 1961). Our sample methodology thus mitigates the likelihood that our results are driven by differences in selection across the individuals rather than true differences caused by Project 985 across the universities. Sampling from Tsinghua alumni also mitigates another form of selection bias: since we sent our survey to all alumni of Tsinghua, our sample is not selected based on entrepreneurial success. Overall, our sampling methodology is conceptually similar to collecting a sample of graduate students from China and then dropping observations from the non-Tsinghua alumni to enable the most similar and comparable control group on both observable and unobservable dimensions

That the individuals in our sample differ with respect to where they received their highest degree enables us to test our hypotheses. Prior literature emphasizes the role of graduate schools as institutions that socialize students to the certain values and norms (Hagstrom, 1965; Staton and Darling, 1989; Stuart and Ding, 2006). In particular, by immersing students in teaching and specialized research for an extended period of time, Ph.D. programs are particularly powerful loci of socialization and are likely to have a large influence on the values and beliefs of students (Golde, 1998; Austin, 2002). This line of work suggests that graduate programs have a bigger impact on students' beliefs than undergraduate programs and that Ph.D. programs have a bigger impact on these beliefs than master's programs. In other words, the institution from which the student received his or her highest degree is likely to have the greatest impact on his or her beliefs and values. While everyone in our sample attended Tsinghua at some point in their

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lives, not everyone in our sample received their *highest* degree from Tsinghua. We take advantage of this and divide our sample by where the entrepreneur received his or her highest degree. We examine how Project 985 affected entrepreneurs and their firms by comparing the entrepreneurs that received the highest degree from a "985" university to those that received the highest degree from a non-"985" university.

We developed our survey instrument in collaboration with our partners at Tsinghua University based on an earlier alumni entrepreneurship survey of the Massachusetts Institute of Technology (Hsu, et. al., 2007). We translated our survey instrument from English to Chinese and back to ensure the validity and measurement equivalence of our survey (Brislin, 1970). We refined our measures through in-depth interviews with 42 entrepreneurs, investors, and government officials. These interviews enable us to better understand the context of our study and improve the appropriateness and precision of our survey questions. We also conducted follow-up phone calls with some of our respondents after the surveys were collected to gain better understanding of their answers. We sent the survey to all the alumni of Tsinghua that graduated between 1947 and 2007 with an address on record. The survey could be returned online, via email, or via conventional mail. We received a total of 2,966 surveys, including completed surveys from 723 alumni who founded entrepreneurial ventures. The response rate is 11 percent. As the table below shows, the respondents to our survey are representative of the population of Tsinghua graduates.

[INSERT TABLE 1]

Variables

Dependent Variables. To test hypothesis 1, we use *IP Importance* as our measure of the alumni's beliefs regarding the importance of IP protection.[4] *IP Importance* measures, on a scale of 1 to 6, the importance that the respondents attribute to IP protection.[5]

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[4] While examining how Project 985 affects entrepreneurs' beliefs regarding IP is important, we also want to study how Project 985 influenced entrepreneurs' beliefs regarding innovation more generally. To increase the robustness of our results, we also run our analysis using an alternative measure of beliefs regarding innovation: *Importance of Development Time*. This variable measures, on a scale of 1 to 6, the degree to which respondents believe that taking time to develop products is important.

[5] *IP Importance* was generated from the following survey question: rate on a scale of 1-6 the degree to which you believe that intellectual property is important. The measure is thus tightly linked with our theoretical construct of entrepreneurs' beliefs regarding IP.

To test hypothesis 2, we follow prior research and use *ln(R&D Intensity)* as our measure of entrepreneurs' activities relating to technology innovation (Kim et. al., 2008). R&D intensity is the ratio of R&D expenditure to total sales drawn from the firm in the most recent year. As R&D intensities are highly skewed in their distribution, we took the natural logarithm of the R&D intensity figures we calculated to generate the *ln(R&D Intensity)* variable. Entrepreneurs that engage in technology innovation will generally invest more in R&D. Thus, R&D intensity is a good measure of the degree to which entrepreneurs engage in innovative behavior.

To test hypothesis 3, we use *ln(Revenues)* as our measure of entrepreneurial performance.[6] *Ln(Revenues)* is calculated by taking the logarithm of the reported revenues drawn from the firm in the most recent year. As the distribution of revenues tend to be highly skewed, we took the natural log of revenue figures to generate the *ln(Revenues)* variable. We use *ln(Revenues)* as our measure of performance for several reasons. First, revenue is an effective measure of performance for firms across industries, as all firms ultimately need revenue to survive. Second, since the objective of Project 985 is to ultimately contribute to the development of China' economy, Chinese policymakers are likely to define firm performance in relation to the firm's contribution to the economy. Revenue has a stronger relationship to the firm's economic contribution than measures such as survival and is thus the more pertinent measure for our study. Finally, our collaborators at Tsinghua reveal that Chinese entrepreneurs are often hesitant to reveal detailed figures regarding the performance of their firms. In particular, asking entrepreneurs to reveal the costs of their operations may cause the entrepreneurs to lose face and is generally considered culturally taboo. To ensure both the quality and the quantity of our data, we use revenue as our measure of performance rather than attempting to obtain information on profit or other measures involving cost figures.

Independent Variables.   We explain our research design in greater detail below. Our key independent variable is the differences-in-differences estimator, which allows us to estimate the impact of

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[6] Alternatively, we measure performance using *ln(firm_size)*, which is the natural log of the firm's employee count during the most recent year.

the reform on those who were affected by it relative to those who were not. The differences-in-differences estimator is the interaction of the two variables: *Treated* and *Post985*. The dichotomous variable *Treated* indicates that the individual received his or her most advanced degree from a "985" university. For individuals in the treatment group, *Post985* indicates that the individual received his or her most advanced degree after his or her university was affected by Project 985. For individuals in the control group, *Post985* indicates that the respondent received his or her most advanced degree after the "985" university to which his or her university is matched up was affected by Project 985.

     Control Variables. We control for the prestige of the university from which respondents received their highest degree when we test all three hypotheses. We do so because the prestige of the university affects how entrepreneurs view IP, as prestigious universities tend to have bigger endowments and may be able to spend more on attracting prominent researchers and on classes in innovation and IP. The prestige of the university also affects entrepreneurial innovativeness and firm performance, as the students that graduate from prestigious universities generally possess higher human and social capital and are likely be more innovative and start higher-performing ventures. We measure this control using *Highest University Rank¸* a discrete variable that indicates the national ranking of the university from which the respondents received their highest degree. This is a good measure because university ranking is often closely related to university prestige.

     We control for overseas work and education experience when we test all three hypotheses. We do so because overseas work or education experience exposes the respondents to advanced technology, new research fields, and entrepreneurial firms (Huang, 2008). Such an exposure may affect how entrepreneurs view IP, how much the entrepreneur engages in activities related to innovation, and how well his or her firm performs. We measure overseas experience with *Overseas*, a dichotomous variable that indicates whether or not the respondent has gone overseas for work or education.

     We control for educational level when we test all three hypothesis. We do so because having a graduate degree may make the respondent more innovative or predispose the respondent to pursue an innovative entrepreneurial opportunity. As such, educational level is likely to affect how entrepreneurs

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view innovation, how likely they are to engage in innovative activities, and ultimately how well their firms perform. We control for educational level with two variables: *Masters* and *Phd*. *Masters* is a dichotomous variable that indicates whether the respondent holds a master's degree. *Phd* is a dichotomous variable that indicates whether the respondent holds a doctoral degree.

We control for respondents' political connections when we test all three hypotheses. We do so because, in China, entrepreneurs that possess political connections can better safeguard themselves against contract breaches, unlawful competition, and other opportunistic behavior (Xin and Pearce, 1996; Peng and Luo, 2000; Park and Luo, 2001). Since political connections may act as a substitute for formal IP regulations, entrepreneurs' political connections are likely to influence entrepreneurs' beliefs regarding IP and their activities related to technology innovation. Moreover, entrepreneurs that possess political connections may be able to use these connections to gain competitive advantages over their competitors. As such, political connections are likely to influence entrepreneurial firm performance. We measure entrepreneurs' political connections using three variables: *Govindex, Student Leader,* and *Communist Party*. *Govindex* is a dichotomous variable that indicates whether the respondent's family is well-connected within the Chinese government. This is a good measure because familial relationships in China are generally characterized by unconditional trust and protection (Luo and Chung, 2005), a characteristic that causes social resources to be shared among family members. As a result, the respondents' familial political ties are effectively the respondents' own political ties. *Student Leader* is a dichotomous variable that indicates whether the respondent participated in student government. This is a good measure because student government leaders in China generally have more opportunities to meet government officials and are likely to possess more political ties. *Communist Party* is a dichotomous variable that indicates whether the respondent is a member of the Chinese Communist Party. This measure is important because members of the Communist Party tend to have more opportunities to meet government officials and are likely to possess more political ties.

We control for prior entrepreneurship experience when we test all three hypotheses. We do so because prior entrepreneurship experience may affect how the respondents view IP, how likely the

respondents are to engage in innovative activities, and how well their firms perform. We measure prior entrepreneurship experience using *Serial*, a dichotomous variable that indicates whether the respondent has prior experience working in an entrepreneurial firm.

We control for unobservable effects particular to the time period during which the respondent's most current firm is founded or privatized from a state-owned enterprise when we test all three hypotheses. We do so because events, trends, and influences particular to specific time periods may exert effects on how entrepreneurs view IP, how likely the respondents are to engage in innovative activities, and how well their firms perform. We measure any effects exerted by the particular time period of the most recent firm founding with *Year Founded or Privatized*, which is a discrete variable that indicates the year during which the entrepreneurs founded or privatized their most current venture.

We control for firm size when we test all three hypotheses. We do so because the respondents' views of IP and their likelihood to engage in innovation may be influenced by the size of their firms. Firm size may also be correlated with firm performance. We measure firm size using the variable *ln(Firm Size)*, which is a continuous variable that is the logarithm of the number of employees in the entrepreneurial venture during the most recent year. We take the logarithm to account for the skewed distribution due to a few firms growing very large.

Finally, we control for industry effects when we examine how Project 985 affects *ln(R&D Intensity)* and *ln(Revenues)* (hypotheses 2 and 3). We do so because the characteristics of the industry may be correlated with both R&D intensity and firm revenues in a systematic way. We control for industry by including *Industry Fix Effects* in our econometric models.

Econometrics and Statistical Analysis

Our goal is to infer a causal relationship between Project 985, the innovative behavior of alumni entrepreneurs, and the performance of their firms. To do so, we utilize a differences-in-differences (DID) research design to reduce the confounding effects of omitted variables and better isolate the effects of Project 985. The DID design allows us to estimate the impact of the reform separate from differences across universities and separate from the time trend. The DID design is composed of the treatment group

and the control group. The treatment group consists of observations that are affected by the event of interest. The control group consists of observations that are not affected by the event of interest. The treatment and control groups are matched up against each other along key attributes, such that the two groups are nearly identical in every attribute other than whether they are affected by the event of interest. The pre-post differences exhibited by the control group with respect to a particular dependent variable are then subtracted from the pre-post differences exhibited by the treatment group. In this manner, the DID design differences out the confounding effects of time trends and differences between 985 and non-985 universities and better isolates effects of the event of interest.

Matching. To remove the confounding effects of omitted variables and isolate the effects of Project 985, we match individuals in the treatment and control groups by the characteristics of the universities where these individuals received their highest degrees. Matched-pairs analysis enables the precise control of the effects of confounding factors (Mukhopadhyay and Kekre, 2002). However, matched-pairs analysis also involves a trade-off between control of confounding factors and sample size. Increasing the number of factors used in matching results in better control of confounding factors but reduces sample size (Mukhopadhyaya and Kekre, 2002). To control for confounding factors without sacrificing sample size, we match individuals in the treatment and control groups using three key attributes of the universities where these individuals received their highest degrees: the national ranking of the universities, the geographical location of the universities, and the universities' academic specialty (e.g. technology institute, agricultural institute, etc.). We conduct matched-pairs analysis using these three elements because our field interviews reveal that these elements are important influences on the innovative behavior and performance of entrepreneurs in China. For a full list of the matched universities, please see the table below.

[INSERT TABLE 2]

Statistical Analysis. In our DID research design, the treatment group consists of entrepreneurs who received their highest degrees from a "985" university. The control group consists of entrepreneurs

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who received their highest degrees from a non-"985" university.[7] We are interested in how Project 985 affects the treatment group in comparison to the control group. In other words, we are interested in how individuals in the *Post985*Treated* group, i.e. the group of entrepreneurs that received their highest degree from a "985" university after the initiation of Project 985, are different from all other individuals in our sample as a result of Project 985 along our three dependent variables. As such, we formulate our econometric model as below:

$$Y=f(Post985,\ Treated,\ Post985*Treated,\ Controls,\ Error),\ \text{where Y is the}$$
$$\text{dependent variable and } Post985*Treated \text{ is the DID estimator}$$

Post985 controls for any differences across all graduates after Project 985 was implemented. *Treated* controls for any differences between 985 and non-985 universities. Therefore, the interaction term between these is the DID estimator and gives us the effect of the reform on those graduating from 985 universities after the implementation of Project 985. As the nature of our dependent variables are all different, we use a different model to estimate the effect of *Post985*Treated* on each of our dependent variables. Since *IP Importance* is a discrete variable with a small variance, we estimate a Poisson model of the effect of *Post985*Treated* on the alumni's views regarding the importance of IP. Since *ln(R&D Intensity)* is a continuous variable, we estimate a linear regression model of the effect of *Post985*Treated* on the degree to which entrepreneurs engage in activities related to innovation. Finally, since *ln(Revenues)* is a continuous variable, we estimate a linear regression model of the effect of *Post985*Treated* on entrepreneurial firm performance.

RESULTS

[INSERT TABLES 3 AND 4]

We examine how Project 985 affects the beliefs and behaviors of Chinese entrepreneurs and the performance of their firms. We present descriptive statistics of entrepreneurs who graduated before and after Project 985 in Table 1, panel B. We present a pair-wise correlation matrix in Table 3.

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[7] Because individuals in the control group are also alumni of Tsinghua, a 985 university, those who graduated after 985 may have also been affected by Project 985. Because of this, our results most likely underestimate the effects of Project 985.

Hypothesis 1 posits that entrepreneurs affected by Project 985 are more likely to view technological innovation as important. All models in Table 4 show that the effect of *Post985*Treated* on *IP Importance* is highly and positively significant (p<0.001). The results presented in Table 4 strongly support hypothesis 1.

[INSERT FIGURE 1]

We graphically illustrate the effect of Project 985 on the entrepreneurs' beliefs regarding innovation using the bivariate graphs in Figures 1a and 1b. As the two figures show, the general trend for how entrepreneurial beliefs regarding IP changes over time is a gradual decrease prior to Project 985 and a gradual increase after Project 985. This holds for both the "985" entrepreneurs and the non-"985" entrepreneurs. However, while the degree to which entrepreneurs believed innovation to be important increases over the years for both "985" entrepreneurs and non-"985" entrepreneurs after the initiation of Project 985, the rate of this increase is greater for the "985" entrepreneurs. Thus, we show graphically and analytically that Project 985 had a positive and significant effect on the entrepreneurs' beliefs regarding innovation that is separate from other unobserved trends and factors.

[INSERT TABLE 5]

Hypothesis 2 posits that firms founded by the alumni of "985" universities are more likely to exhibit organizational practices associated with technology innovation. All models except model (5-4) in Table 5 show that the effect of *Post985*Treated* on *ln(R&D Intensity)* is positive and significant (p<0.05). Model (5-4) show that the effect of *Post985*Treated* on *ln(R&D Intensity)* is weakly significant (p<0.1). These results support hypothesis 2.

[INSERT FIGURE 2]

We graphically illustrate the effect of Project 985 on the entrepreneurs' innovative behaviors using bivariate graphs in Figures 2a and 2b. We observe that firms founded by more recent graduates exhibit greater R&D intensity and that this general trend holds for firms founded by both "985" entrepreneurs and non-"985" entrepreneurs. This trend is unsurprising: China's economy has developed significantly since the 80's and is much more of a knowledge-based economy today than it was 30 years

ago. That entrepreneurs are more likely to innovate is natural given the larger trends in China's economic development. We also observe that the rate of increase in R&D intensity experiences an increase after the implementation of Project 985. However, the degree of this increase is significantly greater for "985" entrepreneurs than for the non-"985" entrepreneurs. Once again, we show that Project 985 had an effect on the R&D intensity of entrepreneurial firms that goes beyond the effects of national-level economic patterns or other unobserved factors.

[INSERT TABLE 6]

Hypothesis 3 posits that firms founded by the alumni of "985" universities will be higher performing. All models in Table 5 show that the effect of *Post985*Treated* on *ln(Revenues)* is negative and highly significant (p<0.01). The results presented in Table 6 thus strongly refute this hypothesis. Rather than exhibiting an increase in performance, the firms founded by "985" entrepreneurs actually performed worse after the reform.

Robustness and Other Additional Analyses

Alternative Measures

We tested the robustness of our results by running our analysis with alternative measures. Our results regarding *IP Importance* suggest that Project 985 positively affected how entrepreneurs view IP and, more generally, innovation. To check the robustness of these results, we also examine how Project 985 affected entrepreneurs' beliefs regarding the importance of product development time using the variable *Importance of Development Time*. This variable measures, on a scale of 1 to 6, the degree to which respondents believe that taking time to develop products is important. Since innovative products typically take time to develop, entrepreneurs' beliefs about the length of product development time is reflective of their beliefs regarding the importance of innovation. We re-run our analysis using *Importance of Development Time* in place of *IP Importance* and find that Project 985 positively and significantly affected *Importance of Development Time*. Similarly, we increase the robustness of our results regarding entrepreneurial performance by using *ln(Firm_size)* as an alternative measure of performance. We re-run our analysis using *ln(Firm_size)* in place of *ln(Revenues)* and find that Project

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985 positively and significantly affected *ln(Firm_size)*.[8] We are thus confident that our results are robust to possible imperfections in our measures.

Selection Effects

We consider the possibility that our findings may have been affected by selection, as the individuals who chose to become entrepreneurs are non-randomly selected from the population of Tsinghua alumni. With regards to hypothesis 1, we address this issue by examining how Project 985 affected beliefs regarding IP for *all* the alumni who responded to our survey. We find that Project 985 had a positive and significant effect on the degree to which all alumni we surveyed viewed IP as important. This suggests that the effect of Project 985 on the beliefs on entrepreneurs is not significantly confounded by selection bias. With regards to hypothesis 2 and 3, we address this issue by using a two-step Heckman model to estimate the effect of Project 985 on entrepreneurial innovation and firm performance. We find Project 985 had a positive and significant effect on entrepreneurial innovation but a negative and significant effect on performance even after we correct for selection bias using the Heckman model. We conclude that selection bias does not appear to significantly discount the validity of our findings.

University or Graduate School Effects

We consider the possibility that entrepreneurs who went to a "985" university for both undergraduate and graduate education would be affected to a greater extent by Project 985 than those who went to a "985" university for only undergraduate education. We address this issue by removing the individuals who do not hold graduate degrees from our DID model. We find that the direction and significance of our results persists. We conclude that the inclusion of individuals who only hold undergraduate degrees is not likely to have affected our results.

We consider the possibility that receiving one's highest degree from Tsinghua University or Peking University (also known as Beida) may have affected our results. The argument here is that, being the two most prestigious universities in China, Tsinghua and Beida receive a disproportionately large amount of support from and have a disproportionately large amount of political ties with the Chinese

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[8] This result also rules out the possibility that firms founded by 985 alumni under-reported their revenues.

government. As such, entrepreneurs who graduate from Tsinghua or Beida may possess much greater advantages over other "985" entrepreneurs in terms of both human and social capital. We address this concern by removing the entrepreneurs who received their highest degree from Tsinghua or Beida from our data analysis. We observe that our results persist and remain significant even after we remove the individuals who received their highest degree from Tsinghua or Beida. Thus, the evidence does not support the possibility that the individuals who received their highest degree from Tsinghua or Beida may have skewed our sample and biased our results.

Alternative Explanations

We did further analyses to examine several possible alternative explanations for our results and find that the evidence supports our hypotheses and not these alternatives. One alternative explanation for our results is that Project 985 may have increased the likelihood for individuals with lower human or social capital to start new ventures. These individuals may believe innovation to be important, but their lower human or social capital causes their ventures to be lower performing. Indeed, prior studies have shown that certain reforms may cause individuals with lower human or social capital to become entrepreneurs (Eesley, 2012).

We test this explanation in two ways. First, we compare the human and social capital of entrepreneurs before and after the initiation of Project 985. Second, we use factor analysis to create indexes for human and social capital. We separate our sample by their level of human or social capital and repeat our DID analysis for each level of human or social capital. We find that the human and social capital of post-"985" entrepreneurs is not significantly different from those of pre-"985" entrepreneurs. If anything, post-"985" entrepreneurs possess slightly greater human and social capital. We also find that the effect (coefficients) of *Post985*Treated* on the likelihood of founding a firm are not significant for entrepreneurs at any level of human or social capital. Finally, we find that human or social capital has no significant effect on the likelihood of founding a firm before or after the initiation Project 985. These analyses suggest that the results we present are not likely to be caused by differences in the entrepreneurs' human or social capital before and after Project 985.

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We consider the possibility that "985" entrepreneurs view IP as more important because the innovative ventures they started did perform well. We theorized that Project 985 changed the beliefs of "985" entrepreneurs, which in turn changed the innovative behaviors of the firms they started. These novel behaviors then led to lower performance. However, it is also possible that the altered beliefs of "985" entrepreneurs resulted not from Project 985 but from their poorly performing firms. We test this explanation by examining the effect of Project 985 on how all alumni (not just the ones that started firms) view IP. We find that Project 985 had a positive and significant effect on how important the "985" viewed IP for all the alumni. Since the beliefs of the non-founder alumni could not have been influenced by firm performance, this result confirms that Project 985 had a positive and significant effect on the beliefs of all alumni, including the alumni who became entrepreneurs.

We consider the possibility that industry may have affected how entrepreneurs view IP. We re-run our model for *IP Importance* with industry fixed effects included and find that Project 985 has a positive and significant effect on *IP Importance* even after controlling for industry.

We consider the possibility that "985" entrepreneurs perform worse not because they engage in technological intensive activities to a greater extent but because of some other unobserved factors. We re-run our DID model for *ln(Revenues)* with *ln(R&D intensity)* included. We find that *ln(R&D intensity)* has negative and significant effect on *ln(Revenues)*.

We consider the possibility that Project 985 may have increased the performance of a few firms and created a select number of very high performers. The argument here is that innovation is a high-risk, high-reward strategy. By influencing entrepreneurs to innovate, Project 985 may have led to the founding of a few very high-performing firms—an effect that may be masked by looking at only average performance. We address this possibility by running quantile regressions of entrepreneurial performance. We observe that *Post985*Treated* has a negative effect on *ln(Revenues)* at the 10th, 25th, 75th, and the 90th quantiles. We thus rule out the possibility that Project 985 may have created a select number of firms that were simultaneously very innovative and very high performing.

DISCUSSION

In this study, we look at how policies that attempt to change entrepreneurs' beliefs affect entrepreneurs' beliefs, their behavior, and the performance of their firms. Using on a DID quasi-experimental setup, we specifically look at how China's Project 985 affected entrepreneurs' beliefs, their behaviors, and the performance of their firms. We have several key findings.

Contributions to Research on Institutional Theory and Entrepreneurship

Prior studies on the relationship between institutions and entrepreneurship predominantly focus on how institutional change in the form of reforms to laws and regulations increase the level of entrepreneurial activity (Sine and David, 2003; Hiatt, Sine & Tolbert, 2009). We contribute by theorizing how a distinct and under-explored type of institutional change influences the *character* and *performance* of ventures, rather than simply the *level* of activity. This is important for our understanding of how institutional theory can extend our understanding of how to specifically encourage more innovative, high growth forms of entrepreneurship. We have two major findings regarding how institutional change can affect entrepreneurs' beliefs and behaviors. Our first major finding is that by effecting changes to educational institutions, policy initiatives can successfully alter the beliefs of entrepreneurs. In our case, Project 985 positively influenced "985" entrepreneurs' beliefs regarding the importance of innovation and IP. Our second major finding is that, by altering the beliefs of entrepreneurs, policy initiatives can also influence entrepreneurs to act in accordance with their beliefs. In our case, by increasing the degree to which "985" entrepreneurs believed innovation and IP to be important, Project 985 increased the likelihood that these entrepreneurs would invest in R&D and engage in technologically intensive activities. Overall, our findings provide strong evidence that policy initiatives can alter the beliefs of entrepreneurs and that changing entrepreneurial beliefs will translate into corresponding changes in entrepreneurs' behaviors.

We make two important contributions with our two major findings. First, we contribute by confirming that policies can indeed affect the beliefs and behaviors of entrepreneurs. Policymakers around the world are instituting new programs and new reforms that attempts to foster certain activities and behaviors—such as innovation and entrepreneurship—by changing individuals' beliefs regarding

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these activities and behaviors (The Ministry of Education of the People's Republic of China, 2012; EACEA, 2012). Yet, scholarly working at the nexus of policy and entrepreneurship have mainly focused their attention to how changing laws and regulations may affect entrepreneurs and their firms (Sine and David, 2003; Hsu et. al., 2007; Eesley, 2010) and have not studied in detail whether policies that target entrepreneurs' beliefs can effect changes in entrepreneurial behavior. As a result, although policymakers are trying to effect changes in entrepreneurs' behavior by altering their beliefs, we do not actually know whether this can be successfully done. Our study contributes by confirming that "belief-changing" policies can indeed successfully influence entrepreneurial behavior.

More importantly, we contribute by presenting a theoretical account that links together policy, educational institutions, entrepreneurs' beliefs, and entrepreneurs' behaviors. Prior to our study, attempts at linking together these four concepts have been surprisingly vague. For instance, policymakers often assert that the educational reforms they are implementing will teach students about creativity, foster innovation, and contribute to the creation of innovative new ventures (The Ministry of Education of the People's Republic of China, 2005; EACEA, 2012). Yet, policymakers do not actually specify how educational reforms will change entrepreneurs' beliefs or how changing entrepreneurs' beliefs will lead to corresponding changes in entrepreneurial behaviors. Our findings enable us to address precisely this issue. Specifically, we find that reforms affect entrepreneurs' behaviors by influencing entrepreneurs' beliefs regarding the value of certain activities (e.g. innovation). Doing so then influences how entrepreneurs process information and evaluate decision alternatives, ultimately predisposing entrepreneurs to act in ways that are espoused by the policy reforms. We thus contribute by presenting a theoretical account that links policy, educational institutions, entrepreneurs' beliefs, and entrepreneurs' behaviors without discounting either the capacity of educational reforms to influence entrepreneurs or the agency of entrepreneurs in decision-making.

Contributions to Institutional Theory

While prior work in institutional theory shows that institutional change is often associated with *more* entrepreneurship (Hiatt, Sine & Tolbert, 2009), less work examines the implications of institutional

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change on entrepreneurial performance. Contrary to our third hypothesis, we find that policy initiatives that successfully influence entrepreneurs' beliefs and behaviors do not necessarily improve the performance of the firms they found. In our case, Project 985 caused entrepreneurs to perform worse even as the reform influenced entrepreneurs to believe innovation to be more important and to engage in technologically intensive activities. This finding suggests that the competitive advantages entrepreneurs gain by attempting to innovate—such as greater absorptive capacity or superior network positions—are not enough to offset the harms caused by attempting to innovate in a broader institutional environment that does not adequately support the process of making profit off of innovations.

More generally, this third finding from our study highlights the importance of **institutional consistency**, which we define as the degree to which organizational practices espoused by institutions at the field or industry level are supported by institutions at the national level. As such, policy reforms that target institutions in specific fields or industries are more likely to succeed if they are consistent with the broader, national-level institutional environment. In our case, we argue that Project 985's success in influencing entrepreneurs' beliefs and behaviors may at least be partially attributable to its with national-level beliefs regarding the importance of innovation and IP. Over the past 30 years, stories of innovative and entrepreneurial Silicon Valley firms like Apple, Google, and Facebook have caused the Chinese society to view innovative entrepreneurship in an increasingly positive light (Yi, 2010). The successes of domestic high-tech entrepreneurs, such as Ma Yun of Alibaba (IBTimes, 2008), have also contributed to the belief that innovation is important to the success of entrepreneurial firms. Finally, returnees from Silicon Valley brought with them values, concepts, and thought processes related to the creation of value via technology innovation (Private Equity Daily, 2012). The combined effects of these influences have caused the Chinese society to view innovation as important, profitable, and critical to the development of China—views that are consistent with the beliefs that Project 985 is attempting to instill in students. Thus, that Project 985 espouses beliefs that are becoming increasingly valued in China may have increased the effectiveness of the reform in changing entrepreneurial beliefs and behaviors.

In contrast, Project 985's negative effect on the performance of entrepreneurial firms may be due to its inconsistency with several aspects of China's regulative institutional environment. First, China lacks well-developed laws that protect intellectual property, leading to widespread counterfeiting and piracy (Xin and Pearce, 1996; Li and Zhang, 2007). When laws and regulations protecting IP are absent, innovative entrepreneurs cannot leverage their novel technologies into profit. Second, China lacks well-developed laws safeguarding contracts, such that entrepreneurs generally rely on personal relationships ("guanxi") instead of formal regulations to ensure that their partners uphold contracts (Peng and Luo, 2000). Entrepreneurs who invest heavily in innovation may not have enough resources to build relationships with their business partners, which increases the likelihood that the performance of their firms will suffer due to their partners delivering inferior raw materials, failing to pay, or breaching the contract in some other way (Peng and Luo, 2000; Park and Luo, 2001). Finally, China's under-developed and frequently corrupt judiciary institutions are often unable to resolve disputes in a fair manner, such that entrepreneurs cannot use the legal system to protect their innovations (Xin and Pearce, 1996). The type of innovation that Project 985 promotes cannot be pursued profitably by entrepreneurs without support from national-level regulative and legal institutions. The Chinese economic system, structured around state-owned enterprises and particularistic relationships between government officials and businessmen (Nee, 1992; Boisot and Child, 1996; Peng, 2004), is often incapable of providing this support to nascent innovative firms. Indeed, one of the alumni-entrepreneurs we interviewed expressed similar sentiments:

> "I know that a lot of [Chinese] people are hyped about technology entrepreneurship, but I think that the kind of technology entrepreneurship that happens in Silicon Valley won't work [in China]. People forget that China is still a command economy, and Silicon-Valley style innovation doesn't work so well in a command economy. So even if you innovate, you still have to play by the command economy rules…and that's hard."

By pushing entrepreneurs to behave in ways that are inconsistent with China's national-level regulatory institutions, Project 985 negatively affected the performance of firms founded by 985 alumni entrepreneurs. In sum, Project 985 worsened entrepreneurial performance because the behaviors promoted by the reform were *inconsistent* with China's regulative institutional environment. More generally, we suggest that the broader, national-level institutional environment moderates how

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educational reforms affects entrepreneurs' beliefs and behaviors as well as how these beliefs and behaviors translate into performance outcomes.

Overall, we contribute by elucidating how "belief-changing" policies—such as educational reforms—actually affect entrepreneurial performance. Prior to our study, accounts of how policies like educational reforms affect new venture performance were either overly optimistic or overly pessimistic. Policymakers tended to give an overly-optimistic account (The Ministry of Education of the People's Republic of China, 2005; EACEA, 2012), in which policy initiatives that changed educational institutions led to downstream changes in entrepreneurial behaviors and performance in a deterministic manner (e.g. educational reforms *will* change students' beliefs about innovation and entrepreneurship, and this *will* cause these students to start high-performing, innovative new ventures). In contrast, managers and entrepreneurs tended to give an overly-pessimistic account (Askew, 2012), in which policy initiatives and educational institutions will have little or no effect on entrepreneurial performance (e.g. entrepreneurship cannot be taught, and so educational reforms will not teach entrepreneurs how to start high-performing companies). We contribute by building on both of these accounts and presenting a more realistic and more nuanced story of how policies like educational reforms actually affect entrepreneurial performance. We find that, while educational reforms may not directly teach students how to start high-performing companies, these reforms are able to alter entrepreneurs' beliefs and behaviors in ways that have implications for performance. More generally, we assert that "belief-changing" policies do impact entrepreneurial performance and that the directionality of this impact is determined by the consistency of these policies with the national-level institutional context. While "belief-changing" policies do not directly "teach" entrepreneurs how to perform better, these policies can improve performance by fostering beliefs and behaviors that are consistent with the broader institutional environment.

Theoretically, we also contribute by highlighting the need to examine institutions on **multiple levels**. Prior research examines how institutions on a single level—such as the field level (DiMaggio, 1991; Sine et. al., 2007) or the national level (Boisot and Child, 1988; Hamilton and Biggart, 1992; Chacar and Vissa, 2005)—affect organizations. We contribute by emphasizing that the way an institution

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affects organizations is moderated by the consistency between the focal institution and institutions at other levels. In other words, the consistency between institutions at different levels moderates any direct influence that institutions exert on organizations.

Finally, we contribute to the research on institutions and organizations in emerging by emphasizing the **multi-dimensional aspect** of the national institutional context. Prior research tends to conceptualize the national institutional context as a one-dimensional external influence, emphasizing either the regulative (Peng and Heath, 1996; Khanna and Palepu, 2000) or the cultural aspects (Hofstede, 1991) of this institutional context. On one hand, research on institutions and firm behavior in emerging economies generally conceptualizes the national institutional context as a collection of regulatory institutions (Nee, 1992; Peng and Heath, 1996; Peng and Luo, 2000), such that the cognitive-cultural aspects of the national institutional context are de-emphasized. On the other hand, research on the influence of culture on organizations tends to overemphasize the ability of cultural values to determine organizational behavior (Hofstede, 1980; 1991), neglecting that the relationship between values and organizational behaviors is often influenced by regulative institutions that set the rules for what organizations can and cannot do. We contribute the insight that the national-level institutional context is a multi-dimensional entity composed of laws and regulations as well as beliefs and values, such that different dimensions of the national institutional context affect different aspects of organizations. For instance, we find that the national beliefs and values may have a greater influence on the beliefs and behaviors of entrepreneurs, while national laws and regulations may have a greater influence on entrepreneurial performance. Thus, we contribute by putting forth a more complex and more realistic view of how different dimensions of the national institutional context of impacts organizations.

As policymakers around the world are increasingly attempting to foster innovation and entrepreneurship by changing individuals' beliefs, our study addresses a question that is important for both scholars and policymakers. Our study presents one important implication for public policy: policies that are blindly transposed from one country to another are likely to be ineffective. Popular as well as scholarly opinion often claims that the adoption of a certain set of Western institutions—such as free-

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market reforms, property rights, and liberal democracies—is a necessary, if not sufficient, condition for national economic and technological development (North and Thomas, 1973; Lerner, 2009). Our findings suggest otherwise. Imported policies and reforms that are inconsistent with the native institutional context may not only fail to advance economic and technological development but may contribute to lower economic performance. As many emerging economies possess cultures, histories, and religions that differ drastically from those of Western nations, our results caution the governments of emerging economies against blindly copying the institutions and policies of Western nations in order to advance economic development and build national technological capability.

CONCLUSION

This study examines how policies that attempt to change entrepreneurs' beliefs actually affect entrepreneurs' beliefs, their behavior, and the performance of the firms they start. We find that "belief-changing" policies, particularly those directed at educational institutions, can indeed alter entrepreneur's beliefs and shape their behaviors. Yet, even if they successfully change beliefs and behaviors, these policies can have unintended effects on firm performance. Thus, the success of these policy initiatives in increasing entrepreneurial performance may depend on their consistency with the broader institutional context at the national level. We conclude by noting that policies can alter the beliefs and behaviors of entrepreneurs, but the degree to which these altered entrepreneurial beliefs and behaviors leads to higher performance will depend on that organizations and institutions are all embedded in the national-level institutional environment. Policy initiatives that attempt to influence entrepreneurs and organizations by changing institutions are effective and successful when there are consistent institutions at the national level.

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TABLES AND FIGURES

Table 1: Comparison of Respondents to Tsinghua Alumni Survey to Population of Tsinghua Graduates

Panel A	Percentage of **Survey Respondents** Satisfying Each of the Following Categories	Percentage of **All Tsinghua Graduates** Satisfying Each of the Following Categories
Major		
Engineering	62.2	62.5
Sciences	10.6	11.9
Humanities	13.7	12.9
Others	13.5	12.7
Gender (2007 Data)		
Male	72	70
Female	28	30
Graduate Degree		
Yes	53.9	53.4
No	46.1	46.6

Panel B: Descriptive Statistics of Entrepreneurs Pre- and Post-Project 985	Percent of Entrepreneurs in the Following Categories	
	Pre-985	Post-985
Human Capital		
Has Master's Degree	39.3	82.4
Has Ph.D. Degree	7.5	16.2
Has Prior Entrepreneurship Experience	4.8	5.4
GPA is Ranked Within Top 25% of the Class	46	56.2
Social Capital		
Father is Government Bureaucrat	15.4	18.2
Mother is Government Bureaucrat	5.3	6.8
Has Worked for the Government	18.4	18.7
Member of the Chinese Communist Party	53	61.5

Table 2: List of University Matches

985	non-985
Tsinghua University	Beijing University of Posts and Telecommunications
Peking University	East China University of Science and Technology
Nanjing University	China University of Petroleum
Fudan University	Shanghai University of Finance and Economcis
Shanghai Jiaotong University	Shanghai Academy of Science and Technology
University of Science and Technology of China	Chinese Academy of Sciences
Zhejiang University	China University of Mining and Technology
Xi'an Jiaotong University	Dalian Jiaotong University
Harbin Institute of Technology	Harbin Engineering University
Beijing Institute of Technology	University of International Business and Economics
Nankai University	Bejing Foreign Studies University
Tianjin University	Beijing University of Chinese Medicine
Shandong University	Jinan University
Huazhong University of Science and Technology	Wuhan University of Technology
Jilin University	Shanxi University
Xiamen University	Fuzhou University
Wuhan University	Yunnan University
Southeast University	Hangzhou Teachers College
Ocean University of China	Zhejiang Ocean College
Hunan University	Hunan Normal University
Central South University	Nanchang University
Dalian University of Technology	Beijing University of Technology
Sichuan University	Southwest University of Finance and Economics
Chongqing University	Southwest University
University of Electronic Science and Technology of China	Hefei University of Technology
Sun Yat-Sen University	North China Electric Power University
South China University of Technology	Taiyuan University of Technology
Lanzhou University	Xi'an University of Architecture and Technology
Northeastern University	University of Jiangsu
Tongji University	Shanghai University
Beijing Normal University	Central University of Finance and Economics
Renmin University of China	University of International Business and Economics
Northwestern Polytechnical University	Northwest University
Beijing University of Aeronautics and Astronautics	University of Science and Technology Beijing
China Agricultural University	Huazhong Agricultural University
Minzu University of China	Capital University of Economics and Business
Northwest A & F University	CAS Nanjing Institute of Geology and Limnology
National University of Defense Technology	China University of Geosciences
East China Normal University	Shanghai International Studies University

Table 3: Pair-wise Correlation Matrix

	IP Imp.	ln(R&D Intens.)	ln (Rev.)	Post985	Treated	Post985* Treated	Highest Univ. Rank	Overseas	Govindex	Student Leader	Comm. Party	Phd	Mast.	Year Found/ Priv.	Serial	ln(Firm Size)
IP Importance	1															
ln(R&D Intensity)	0.089	1														
ln(Revenues)	0.066	-0.405	1													
Post985	-0.049	0.227	-0.308	1												
Treated	-0.114	-0.031	-0.066	0.325	1											
Post985*Treated	-0.037	0.25	-0.325	0.978	0.368	1										
Highest University Rank	0.058	0.05	-0.009	-0.267	-0.958	-0.308	1									
Overseas	0.129	0.008	0.026	0.016	-0.083	0.025	0.059	1								
Govindex	0.006	-0.057	0.106	-0.167	-0.222	-0.185	0.184	0.085	1							
Student Leader	0.107	0.027	-0.032	0.081	-0.076	0.078	0.104	0.257	-0.072	1						
Communist Party	-0.063	-0.022	-0.042	0.034	0.117	0.016	-0.081	-0.138	-0.164	0.06	1					
Phd	0.005	0.171	0.018	0.218	0.144	0.226	-0.156	0.19	0.056	0.201	0.004	1				
Masters	0.096	0.137	-0.031	0.274	-0.163	0.258	0.179	0.013	0.057	0.084	-0.191	0.077	1			
Year Founded or Privatized	-0.119	0.138	-0.436	0.192	0.072	0.196	-0.024	0.069	-0.242	-0.034	0.200	-0.098	-0.048	1		
Serial	-0.191	-0.019	0.014	-0.063	0.133	-0.046	-0.161	-0.04	-0.023	0.053	0.181	0.018	-0.204	0.137	1	
ln(Firm Size)	0.056	-0.262	0.576	-0.255	-0.072	-0.248	0.036	0.074	0.225	-0.041	-0.094	-0.069	-0.085	-0.128	-0.036	1

Table 4: IP Importance
Poisson Regression

Variables	Dependent Variable: IP Importance					
	(4-1)	(4-2)	(4-3)	(4-4)	(4-5)	(4-6)
Post985	-0.301***	-0.307***	-0.334***	-0.332***	-0.291***	-0.360***
	(0.049)	(0.057)	(0.054)	(0.048)	(0.06)	(0.065)
Treated	0.01	0.038	0.022	-0.001	-0.001	0.03
	(0.162)	(0.152)	(0.164)	(0.152)	(0.159)	(0.144)
Post985*Treated	0.293***	0.309***	0.325***	0.331***	0.277***	0.362***
	(0.068)	(0.072)	(0.07)	(0.065)	(0.082)	(0.078)
Highest Univ. Rank	0.004	0.007	0.005	0.004	0.003	0.007
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Overseas	0.036	0.047	0.027	0.029	0.037	0.031
	(0.056)	(0.059)	(0.054)	(0.056)	(0.056)	(0.056)
Communist Party		-0.071				-0.083
		(0.05)				(0.048)
Student Leader			0.06			0.049
			(0.055)			(0.055)
Govindex				-0.110		-0.117
				(0.077)		(0.081)
Year Founded or Privatized	0.002	-0.002	0.002	0.001	0.003	-0.002
	(0.018)	(0.018)	(0.018)	(0.019)	(0.017)	(0.019)
ln(Firm Size)	-0.013	-0.015	-0.013	-0.01	-0.009	-0.0065
	(0.022)	(0.022)	(0.022)	(0.021)	(0.022)	(0.022)
Phd	0.077	0.089	0.071	0.086	0.076	0.095
	(0.05)	(0.051)	(0.054)	(0.05)	(0.05)	(0.055)
Masters	0.0056	0.006	-0.005	0.003	0.004	-0.011
	(0.043)	(0.046)	(0.038)	(0.042)	(0.042)	(0.039)
Serial					-0.0547	-0.052
					(0.037)	(0.036)
Controls	-2.290	4.840	-2.797	0.323	-4.825	4.471
	(35.77)	(39.39)	(35.11)	(35.54)	(34.60)	(37.48)
Number of Observations	224	216	224	224	224	216

Robust standard errors. ***, **, and * indicate statistical significance at the 0.1%, 1%, and 5% levels, respectively. Coefficients and standard errors are rounded to the 3rd decimal point.

Table 5: ln(R&D Intensity)
Linear Regression

Variables	Dependent Variable: ln(R&D Intensity)					
	(5-1)	(5-2)	(5-3)	(5-4)	(5-5)	(5-6)
Post985	-0.661*	-0.659**	-0.761*	-0.536*	-0.641*	-0.623*
	(-2.70)	(-2.85)	(-2.61)	(-2.33)	(-2.57)	(-2.32)
Treated	0.962	1.047	0.869	0.908	0.930	0.865
	(1.49)	(1.69)	(1.32)	(1.33)	(1.46)	(1.27)
Post*Treated	0.882*	0.892*	0.999*	0.767+	0.886*	0.896*
	(2.13)	(2.26)	(2.27)	(2.03)	(2.08)	(2.23)
Highest Univ. Rank	0.069*	0.071*	0.064*	0.066*	0.068*	0.063*
	(2.38)	(2.49)	(2.14)	(2.45)	(2.45)	(2.33)
Overseas	-0.365	-0.368	-0.349	-0.315	-0.359	-0.299
	(-1.50)	(-1.55)	(-1.35)	(-1.48)	(-1.46)	(-1.37)
Phd	0.123	0.098	0.088	0.263	0.106	0.189
	(0.69)	(0.51)	(0.39)	(1.54)	(0.69)	(0.84)
Masters	0.102	0.092	0.143	0.116	0.115	0.155
	(0.52)	(0.47)	(0.70)	(0.62)	(0.57)	(0.73)
Year Founded or Privatized	0.053+	0.053+	0.052+	0.056+	0.049	0.052+
	(1.80)	(1.88)	(1.82)	(1.89)	(1.64)	(1.82)
ln(Firm Size)	-0.157+	-0.170*	-0.161+	-0.158+	-0.157+	-0.172+
	(-1.90)	(-2.08)	(-1.90)	(-1.94)	(-1.86)	(-2.06)
Govindex		0.185				0.153
		(1.20)				(1.20)
Communist Party			0.161			0.152
			(1.19)			(1.18)
Student Leader				-0.158		-0.149
				(-1.14)		(-1.16)
Serial					0.160	0.130
					(1.39)	(1.06)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	-104.3+	-105.2+	-103.0+	-109.6+	-96.26	-102.5+
	(-1.77)	(-1.85)	(-1.80)	(-1.85)	(-1.62)	(-1.80)
N	153	153	148	153	153	148

Robust standard errors. ***, **, and * indicate statistical significance at the 0.1%, 1%, and 5% levels, respectively. Coefficients and standard errors are rounded to the 3rd decimal point.

Table 6: ln(Revenues)
Linear Regression

Variables	Dependent Variable: ln(Revenues)					
	(6-1)	(6-2)	(6-3)	(6-4)	(6-5)	(6-6)
Post985	2.323***	2.561***	1.842*	2.330***	2.399**	2.190**
	(3.60)	(4.56)	(2.07)	(3.73)	(3.45)	(2.82)
Treated	-0.367	-0.612	-0.633	-0.423	-0.313	-0.904
	(-0.36)	(-0.67)	(-0.64)	(-0.39)	(-0.31)	(-0.97)
Post985*Treated	-2.694***	-2.972***	-2.196*	-2.691***	-2.733***	-2.531**
	(-4.22)	(-5.08)	(-2.60)	(-4.41)	(-4.08)	(-3.49)
Highest Univ. Rank	-0.041	-0.051	-0.06	-0.044	-0.039	-0.071
	(-0.81)	(-1.12)	(-1.25)	(-0.82)	(-0.79)	(-1.68)
Overseas	0.057	0.133	0.077	0.07	0.026	0.149
	(0.20)	(0.45)	(0.28)	(0.25)	(0.09)	(0.54)
Phd	-0.280	-0.204	-0.480	-0.263	-0.315	-0.426
	(-0.70)	(-0.51)	(-1.17)	(-0.66)	(-0.78)	(-1.04)
Masters	0.432	0.540*	0.601*	0.451+	0.468+	0.784**
	(1.64)	(2.14)	(2.02)	(1.78)	(1.80)	(2.88)
Year Founded or Privatized	-0.291***	-0.296***	-0.304***	-0.291***	-0.299***	-0.319***
	(-5.55)	(-5.95)	(-5.37)	(-5.46)	(-5.78)	(-5.90)
ln(Firm Size)	0.837***	0.933***	0.862***	0.834***	0.832***	0.951***
	(6.33)	(7.60)	(6.77)	(6.31)	(6.50)	(8.13)
Govindexs		-0.915**				-0.940***
		(-3.34)				(-3.56)
Communist Party			0.615+			0.612+
			(1.92)			(2.01)
Student Leader				-0.108		-0.172
				(-0.38)		(-0.61)
Serial					0.338	0.394
					(1.13)	(1.29)
Industry Fixed Effects	Y	Y	Y	Y	Y	Y
Controls	589.6***	601.0***	616.3***	589.9***	604.1***	646.6***
	(5.59)	(5.99)	(5.41)	(5.49)	(5.83)	(5.94)
N	187	187	184	187	187	184

Robust standard errors. ***, **, and * indicate statistical significance at the 0.1%, 1%, and 5% levels, respectively. Coefficients and standard errors are rounded to the 3rd decimal point.
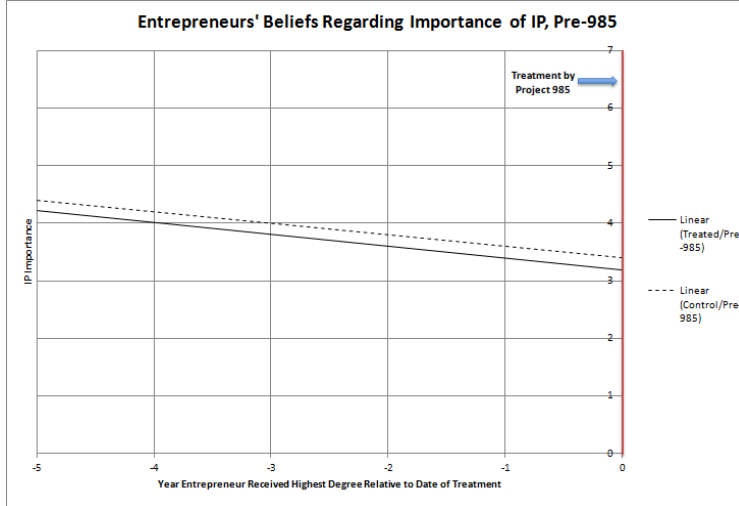
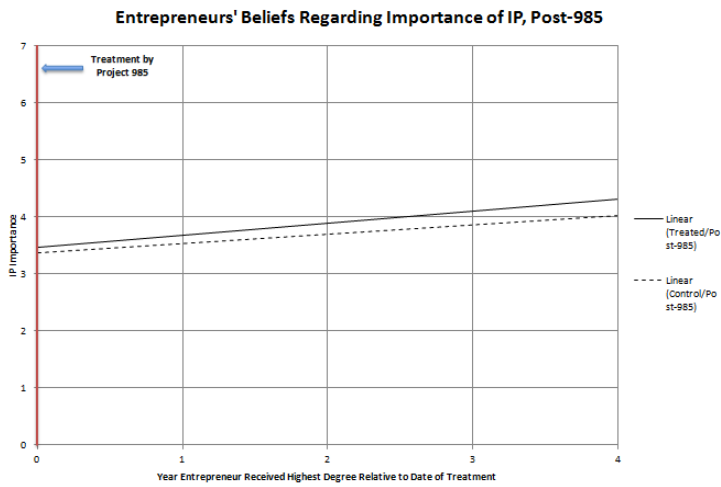**Figure 1a: IP Importance, Pre-985**

Figure 1b: IP Importance, Post-985

Figure 2a: Technology Intensity, Pre-985

Degree to which Entrepreneurs Engaged in Technologically Intensive Behaviors, Pre-985

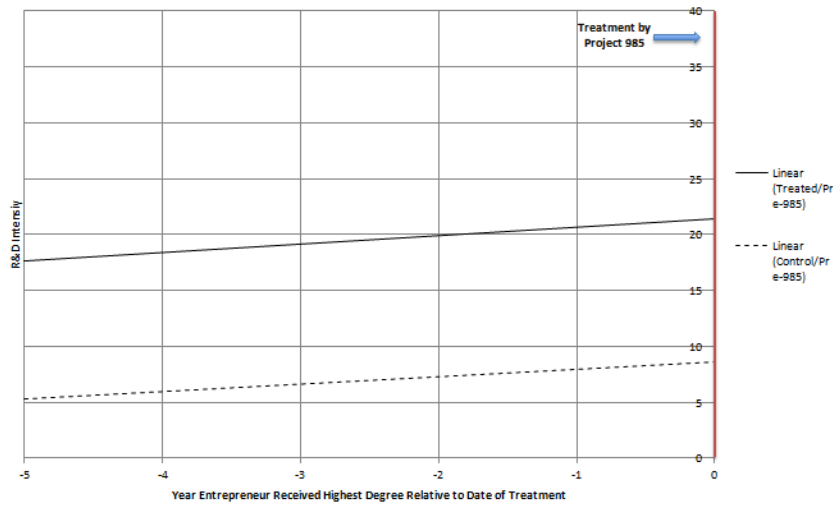**Figure 2b: Technology Intensity, Post-985**

Degree to which Entrepreneurs Engaged in Technologically Intensive Behaviors, Post-985