Are Elite University Graduates Aiding China's Transition to an Innovation-based Economy? Results from a Career Choices Survey among Would-be Innovators in China and the United States

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Abstract

This paper reports on a survey conducted among more than 800 engineering students at elite universities in China and the United States. Results from the survey reveal that US and Chinese students are roughly equivalent in their desire to form or join startup ventures. Far more US students, however, plan on actually doing so. In contrast, Chinese students are more likely to join the state/government sector. Our results also reveal a wide gap in perceptions on the availability of financing, mentorship and other innovation resources. The findings suggest that the innovation ecosystem in China remains underdeveloped in certain important respects.

Key words: innovation, development, China,

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China's Twelfth Five Year Plan (2011-15) states that China hopes to become an innovative economy by 2025 (Central People's Government, 2011). After decades of growth based on favorable demographics, investments in capital, and expansion of international trade (Naughton 2007), China's leaders mostly agree that in order to sustain growth China will need to become more innovative. Indeed, upper income countries with advanced economies must rely on innovation-based productivity growth (Gillis et al. 1996)

There is ample reason to believe that the state is intent on bringing about this change. Investment into research and development has grown by 20 percent a year since 2000, reaching nearly RMB900 billion (US$143 billion) in 2011 (China Statistical Yearbook 2011). The country's ambitious and generously funded 985 plan aims to transform the university system into one of the world's finest (China Education Center 2012). China's leaders have announced plans to stimulate the sectors of the economy that will serve as the foundation of future innovation (McGregor 2010).

However, despite unambiguous intent and ambition, the world has seen little in the way of progress in China insofar as creating an economy that can generate sustained productivity—yet. There are hints that China may be facing barriers that are suppressing the release of creativity and innovation (Anon. 2012; OECD 2008). The country's firms seem to be more commonly associated with intellectual property theft and quality control problems than exciting ideas (Heckman 2005; OECD 2008). There are questions about the nature of the education system and the environment needed to drive sustained

innovation (Niu and Sternberg 2003). Why isn't China moving more clearly in the direction of becoming innovative, given its intent and substantial investments?

While this debate on China's capacity to innovate has attracted considerable attention, few assessments have been based on empirical analysis. The goal of this paper is to report on the findings of a survey of nearly 1000 students enrolled in the engineering departments of elite universities in China and the US. We use those findings to assess one dimension of China's capacity to transition from an economy fueled by inputs and trade to one powered by entrepreneurial innovation. The survey was comprised of a series of questions on students' thoughts and plans regarding their future career paths. Our analysis of the data is based primarily on a comparison of student responses from China, which aspires to be an innovative economy, to those of their peers in the US, which is the world's leading innovative economy (OECD 2011). It is hoped that our analysis can lend some empirically-based findings to the ongoing debate about whether China is prepared to innovate.

We restricted our sample to engineering students at elite universities for several reasons. We chose only elite universities because often such institutions account for a disproportionately high number of university patent filings in the US (WIPO 2011). We chose engineering students as proxies for would-be innovators because engineering-related fields account for the largest volume of patent filings worldwide and are the largest contributors to increases in patents filings in China (WIPO 2011). It is also true that a high proportion of employees in innovation hubs such as Silicon Valley in the US and Zhongguancun in China are graduates of engineering programs (Geron 2011).

Data-driven assessments of nuanced questions like the one we are concerned with here are difficult and costly to undertake. As such it is natural that the current study is subject to certain limitations with regard to external validity. Among these would be the small sample, which is not nationally representative and should not be considered as such. The choice of universities in the sample also limits external validity. All universities in the sample—Peking University, Tsinghua University, Beijing Normal University and Stanford University—are located near innovation hubs in their respective countries—Silicon Valley in the US and Zhongguancun in China. It is possible therefore that student perception on the availability of support for innovation reported here would appear at the higher end of a more representative distribution. However, since both sets of students live in similar environments (relative to the innovative hubs of their respective economies), we hope that there are lessons to be learned from the empirical analysis.

This paper is divided into five sections. The next section will survey the salient features of China's growth path over the past several decades and review the most frequently cited reasons why growth in this manner is untenable over the long term. The section following that will present our data from the four university survey. The fourth and fifth sections will discuss the findings and conclude.

Drivers of growth in China, past and future

With increases of on average 10 percent a year for three decades, China's rates of GDP growth have long been the envy of governments the world over. Much of this economic expansion has been rooted in three sources of growth: a substantial and favorable demographic dividend (that is, increased input of labor), large-scale capital

investments (that is, increased input of capital) and the expansion of China's domestic markets and international trade with the rest of the world (Naughton 2007). We examine each of these sources of growth in the rest of this section.

In the 1950s and 1960s, China experienced a high rate of fertility that contributed to growth in the 1980s and 90s. In the 1950s and 60s, the crude fertility rate fluctuated around 35 to 45 per 1,000, peaking in 1963 following the great famine (Naughton 2007). The children from the period of high fertility in the 1960s were growing up and entering the workforce precisely as China was introducing its market reforms into the economy in the 1980s. The high number of individuals entering the workforce over this period of time generated growth in the economy due to the rising number of laborers (Wang and Mason 2008). During this time (the 1980s and 1990s), increasing number of laborers served as a major driver of growth.

Another source of China's growth in the reform era came from the input of new sources of capital. China's economic reforms allowed for new capital investments form diverse sources. Reforms in the late 1970s opened the country to foreign investment (Naughton 2007). Increases over time in output and rising prosperity meant that the state accrued fiscal resources that it could deploy in the form of roads, railways, ports, factories and other infrastructure capital (Naughton 2007). China's own firms were also increasingly able to reinvest profits to further enhance their expansion (Paolino 2009). Since the onset of the reforms, investment has remained high. China's capital stock has risen sharply since the 1970s and productivity has tended to surge as a result (Chow and Li 2002).

Another major driver of growth in China since the late 1970s has been an expansion of domestic markets and international trade. Huang and Rozelle (2006) document the rise in markets domestically in the agricultural sector. Naughton (2007) describes broader trends in market integration across a wider set of commodities. China indeed has been shown to have a highly integrated and efficient market (Huang and Rozelle 2006). This has encouraged specialization and exchange of ideas and other sources of growth.

China also grew because of rising economic trade and integration into world markets. During the central planning era, China engaged in little trade with the outside world (Naughton 2007). Subsequent market reforms, however, opened up the economy to foreign investment and allowed China to enter the global production chain for goods and services (Hale and Long 2011). A key feature of China's entry into global trade networks has been its comparative advantage in low cost manufacturing. Due to plentiful labor after reforms, the cost of producing relatively simple goods remained low. These goods were sold abroad to wealthier nations and domestically to the expanding upper and middle classes. China also imported raw materials that were of limited domestic supply as well as complex goods, technologies and services that it could not produce itself. Along with labor and capital this trade contributed significantly to China's high rates of growth (Ching, et al. 2011).

Unfortunately, neither of these main drivers of growth from which China has benefitted – trade, capital and labor inputs – are likely to lead to sustained growth in the long run. Standard economic growth theory suggests that non-human capital is subject to diminishing returns (Barro and Sala-i-Martin 2004). Indeed, while China achieved

significant growth through early capital investment (Naughton 2007), it is almost inevitable that subsequent investments will yield lower returns – particularly without substantially increased investment in human capital. Insofar as internal market integration and trade ties internationally are concerned, China today is one of the world's great trading nations and already has reaped substantial rewards from internal market liberalization (Sachs and Woo 2000). Its merchandise trade volume is second only to that of the United States (World Trade Organization 2011). Hence, the biggest gains to be had from an expansion of domestic and international markets have by and large already been achieved.

China will also soon cease to benefit from its "demographic dividend" (Wang and Mason 2008). Since the 1970s the one child policy and a steady increase in household income have gradually eroded rates of fertility in China (Naughton 2007). The nation's fertility rates now approximate those in advanced economies (World Bank 2012). At the same time, individuals that entered the labor market in such high numbers in the 1980s have begun to retire. Because fertility rates have dropped, there are fewer people entering the workforce to replace the growing number of retirees. Hence, it is likely that the growth that the country enjoyed on account of high numbers of new workers will continue to diminish over time as those workers retire.

Given the limited capacity for inputs and trade to continue to drive growth in China, observers tend to agree that growth in the future will slow (Eichengreen, et al. 2011). Growth in the future will increasingly rely upon gains made possible through innovation, not merely through increased use of inputs or further market liberalization.

What does it take to innovate?

Innovation can emerge from many sources, including university laboratories and private research and development facilities (Harvard Business Review 2001). However, grassroots-style entrepreneurship accounts for a disproportionately high amount of the world's most important breakthroughs (Baumol 2005). Today, several of the world's largest companies by market capitalization—Apple, Google and Microsoft, for example—began in the last few decades as small innovative companies founded by independent entrepreneurs (Financial Times 2011). As such, grassroots-style entrepreneurship is an important part of building an innovation-based economy.

Previous research suggests that grassroots-style entrepreneurship is best encouraged when institutions and policies come together to create an ecosystem that nurtures them (Hippel 1988). Scholars frequently cite four components as being important in maintaining an effective innovation ecosystem. These four components include a vibrant university system (Kwo et al. 2004), high levels of well-targeted research and development (R&D) funding (Allen et al. 2005), a robust venture capital sector (Mowery and Rosenburg 1998), and a legal system that adequately protects intellectual property rights (IPR; Scotchmer 2004).

China has made strides in many of these areas. Its investments in higher education have led to dramatic increases in enrollment (Ministry of Education 2006). New laws have been passed to protect intellectual rights (Reddy, 2011). Targeted R&D investments have led to great technological advancements, such as in aerospace (McGregor 2010). Angel investors and venture capitalists are now facilitating new enterprises (Hu, 2011).

However, there is room for improvement. For example, China's university system (and educational system at large) is frequently perceived as stifling creativity (Niu and

Sternberg 2003). While China's rigorous testing regimen throughout grade school (starting from grade 1 and continuing through grade 12) means that Chinese students are typically ahead of students in other countries in test scores of technical subjects when they enter university (US Department of Education 2009), many scholars worry that a single-minded focus on testing may deprive Chinese students of the freedom necessary to learn to think and reason creatively (Niu and Sternberg 2003). While many educators in China are deeply aware of these issues and have begun to focus on open-ended evaluation that encourages creative and "outside-the-box" thinking, the culture of test-based evaluation appears to be deeply embedded in Chinese universities. Stifled creativity and poor incentives for academic exploration may serve to hamper China's young people from thinking in innovative ways (Li, Journal of Economic Perspectives, forthcoming).

High levels of well-targeted research and development funds are also important in innovative economies because they support basic research that can later be converted into new devices, methods, processes and services (Brown et al. 2009). China's government has ramped up investment into research and development over the past decade: since 2000, the spending of China's government on R&D has increased by 20 percent a year since 2000, reaching nearly RMB900 billion (US$143 billion) in 2011. Although China boasts impressive investments in R&D, much of the funds are invested into state-owned enterprises ("SOEs") and government-sponsored research institutes (Song, et al. 2011). Some innovation experts worry that this financing strategy many not be a productive way of generating innovation (Boyreau-Debray, et al. 2005). The primary concern is that government bureaucrats, rather than scientists, have primary control over choosing R&D projects and setting spending priorities (McGregor 2010). While this top-down model of

innovation is not necessarily destined for failure, China remains far behind most developed countries in producing original innovations.

A vibrant, responsive system of venture capital supply and investment is key for helping to incubate new ideas. Venture capital (VC) firms provide both funding and expertise (Dauterive 2004). Venture capital has increased dramatically since private companies began to proliferate in China during the late 1990s. However, China still lags far behind developed economies in availability of venture capital. Anecdotal evidence reveals that under most circumstances, a group of university graduates with a clever idea in China might have difficulty accessing the expertise and financing of a venture capital firm. Companies interested in foreign venture capital often must establish convoluted offshore deal structuring arrangements to get it (Bruton and Ahlstrom 2003). Such arrangements may be out of reach for many would-be innovators in China.

Intellectual property protections help ensure the rewards of innovating exceed the costs. In 2012, China was the world's second largest economy. In contrast, China ranks 79th in the world in terms of the World Bank's *Ease of Doing Business* index (World Bank 2011). Global innovative powers like the United States rank much higher on the index. Although China has steadily improved its legal environment for innovation, major hurdles remain. Companies in China, both foreign and domestic, lose huge profits because their products are copied without punishment (Fleisher, et al., 2012). It is possible that loose IPR protections serve as a serious disincentive to innovate.

Uncertainties regarding the development of these four common features of an innovative ecosystem—a creativity-fostering university system, well-targeted research and development funding, venture capital, and intellectual property protections—lead us

to undertake the current survey. In this survey we compare China's would-be innovators to their counterparts in the United States. It is hoped such a comparison will yield some clues for understanding the state of entrepreneurial innovation in China today.

Data

In this paper we use a set of data that we collected ourselves in 2010 and 2011. The survey was conducted among undergraduate university students enrolled in an engineering program at three elite universities in China and one in the US. We surveyed the students in China first (in Chinese) and then in the US (in English). The questions on the survey were nearly identical in the Chinese and English versions.[2] Respondents in both countries were informed that the surveys were voluntary, anonymous, and that the information in them would only be used for research purposes.

We distributed the survey in China in the engineering departments of three different top tier Chinese universities in Beijing, including Peking University, Tsinghua University, and Beijing Normal University. In total, we collected 435 completed surveys from engineering students at these universities. The breakdown by university includes: 156 students from Peking University, 198 from Tsinghua University, and 99 from Beijing Normal University (Table 1, column 2). We then conducted the survey among engineering students at Stanford University. In total we collected 350 completed surveys from engineering undergraduates at Stanford (Table 1, column 2, row 5). Our total survey,

[2] There were some minor differences between the survey due to conditions particular to either the US or China. For example, students in the US were not asked about their household registration status, while students in China were.

including the components completed in China and the US, included 803 engineering undergraduates. For clarity, we call this survey the China-US Career Innovation Survey.

The content of the survey was relatively straightforward. First we asked students general questions regarding gender and family background. We then asked each student a series of questions about their career interests and plans. Specifically, students were asked to grade in order of preference certain categories of jobs, including joining or starting a new company, working for an established private firm, working for the state sector, joining academia or a not for profit research entity, or "other." Students were asked which of these sectors they were interested in joining as well as which they planned to join. Finally, students were asked about their perceptions regarding the availability, in their experience, of scholarships and/or financial aid, internships, research funding, mentoring for innovation, startup funds and/or venture capital.

Career choices among would-be innovators

In order to use our data to assess China's capacity to transition from an economy fueled by inputs and trade to one powered by entrepreneurial innovation, we compare the responses of students from China, which aspires to be an innovative economy, to those of their peers in the US, the world's leading innovative economy. Our assessment is based on how similar or different responses to the questions are. We have divided the main findings of our analysis of responses is into two parts: a.) career interests versus career plans; and b.) availability of innovation resources.

Career Interests vs Plans

The survey sought to determine whether China's top undergraduates were willing to found or join a startup company. When asked whether students harbored an interest in doing so, responses among US and Chinese students were roughly similar. Half (50 percent) of Chinese students either reported "very interested" or "somewhat interested" in joining or starting a new business. In the case of the US students, 65 percent recorded similar responses. Hence, from these answers, we can conclude that at a significant fraction—at least half—of sample students from both countries are intrigued by the notion of joining or starting a new business. This would bode well for China if students from the colleges of engineering from Beijing University, Tsinghua and Beijing Normal University were able to pursue their interests by joining a start up company.

Unfortunately, when sample students were asked to report whether they actually planned on founding or joining a startup, a much starker disparity emerged. Specifically, less than 3% of Chinese students ranked "starting or joining a new business" as their top career plan (Table 2, row 2). This was the lowest ranked career plan on the survey, losing out even to "other." In contrast, 22% of American students—nearly ten times the percentage of Chinese students—stated that they wanted to start or join a new business as their top choice of career. According to our data, there clearly is a difference between what students are interested in doing (joining a start up) and what they believe they actually will be doing (not joining a start up).

Additionally, the survey results indicate that students believe the overall business environment for start-ups in the United States may be better than that of China. While a majority of students in each country (70 percent in the case of China; 89 percent in the

case of the US) would rather found a business in their own country (given perfect language skills in either country), nearly three times more Chinese students choose the US (30%), than US students choose China (11%; Table 2 columns 2 and 4, rows 4 and 5). Given this preference, it appears that that a large fraction of China's most talented students still view the US as a more attractive environment to join or start a business.

So what did Chinese students say they would be doing after graduation? Rather than planning on joining or starting a new business, a majority (52 percent) of Chinese respondents instead reported plans to join either the government or the state sector as their top choice following graduation (Table 2, row 3). In contrast, only 5 percent of US students surveyed ranked a career in government as their top choice. The attraction of a job in the government/state sector for some of the best students in China is perhaps worrisome, if one does not believe the government or state sector can be innovative.

Availability of Innovation Resources

The gap between interests and expected job prospects, of course, is an important question. So, why is it that roughly 1/3 of American students interested in starting a business actually plan on doing so (table 2, column 4, rows 2 and 3), while only 1/20 of interested Chinese students plan to do so (Table 2, column 2, rows 2 and 3)? The substantial gap between the percentage of Chinese students interested in entrepreneurship (50%; Table 2, column 2 row 2) and the percentage that plans to actually pursue an entrepreneurial career (3%; Table 2, column 2, row 3), and the fact that so large a fraction of Chinese graduates would prefer to join or start a new company in the US, may suggest

that significant barriers exist that prevent Chinese students from pursuing an entrepreneurial career at home.

Clues to this puzzle can be found in the responses from another portion of our survey that aimed to compare perceptions on the availability of resources that foster entrepreneurship among sample students. The survey revealed that respondents in China were between 3 and 12 times less likely than their US counterparts to believe any of these resources were available to them in college (Table 3, column 5, rows 1-5). Without ready access to such resources it is unclear how students in China with a clever idea might be encouraged to develop or bring it to market.

Specifically, Chinese students were substantially less likely than American students to believe that internship opportunities, mentoring for innovation, and scholarships and financial aid resources are "Very Available"[3] them (Table 3, column 5, rows 1-4). The perceived scarcity among Chinese students of these extracurricular resources to encourage entrepreneurship may exacerbate the potential problems for entrepreneurship generated by China's test-focused education system.

Our data also show that only 2% of Chinese students believe that funding to start a business is "Very Available" to them (Table 3, column 5, row 5). This scarcity of money to fund potential entrepreneurial ventures among Chinese students may create two significant barriers to entry for entrepreneurship. First, it may discourage Chinese students from considering entrepreneurship as truly financially viable career path. Secondly, without ready access to venture capital it is unclear how students in China with a clever idea might be encouraged to develop or bring it to market. In contrast, nearly one

[3] For convenience, "very available" here represents the number of students who reported with either a 1 or a 2 for each resource on a five point scale in which 1=Very available and 5=Not available at all.

in five American students—ten-fold the percentage of Chinese respondents—reported that venture capital was within reach.

Similarly, less than 10% of Chinese students feel that funding for research is very available (Table 3, column 2, row 3). This is significantly less than the 25% of American students that believe research funding is "Very Available." This perception on behalf of Chinese students may hinder the development of promising research that could someday benefit a start-up business. This is particularly true when one considers that our sample was composed of students in technical fields; an area of study where hands-on research is particularly important and research can lead directly or indirectly to marketable products.

Conclusion: Are China's University Students Ready to Innovate?

Many observers agree that economic growth in China will increasingly depend on innovation (Eichengreen, et al. 2011). In many modern economies, ground breaking ideas frequently emerge from a grassroots innovation ecosystem that encourages rewards for good ideas (Hippel 1988). Salient features of such an innovation ecosystem include a strong university system, well targeted research and development funding, easy access to venture capital, and robust protection of intellectual property rights (Kwo et al. 2004; Allen et al. 2005; Mowery and Rosenburg 1998; Scotchmer 2004).

Our survey suggests that across at least three of these four features of a functioning innovation ecosystem—including a strong university system, availability of research funding, and availability startup funding—Chinese students report feeling underserved when compared to their US counterparts.

Potentially as a result of these perceptions, there is a marked difference between

the career choices reported by Chinese and US students. Chinese students report a rate of interest in starting or joining a new firm that is comparable to US students but far fewer actually plan on doing so. Instead, a large percent plan on entering the state sector, something that relatively few American respondents plan to do. This may reflect the stability and high pay often associated with a state sector job in China.

Because the incentives and protections for risk-takers appear to be underdeveloped in China, many graduates seem to conclude that the rewards of taking risks out of college are not worth the potential costs. Our survey suggests that in many cases this means new graduates look for a position in the government or a state-owned enterprise rather than starting a new business or trying to discover "the next big thing."

What is the problem with the decision—that may be rational for students—for the economy in the long run? Research has shown that the dynamism in China's economy is mostly generated by non-state firms (Unirule Institute of Economics 2011). From 1999 to 2009 the state's share of industrial output by value fell from 49% to 27%. In 1999 government-controlled firms owned 67% of industrial capital; a decade later their share had fallen to 41%. But in the industries that pay the highest salaries, state firms dominate. Such firms also might be in sectors—mining; transport; utilities—that will not be at the cutting edge of new technologies in the 2020s and 2030s. Government jobs and positions in the state-owned sector are attractive because they offer a dependable paycheck and serve as a bastion of security in a highly competitive society. In an uncertain environment with limited social protection, landing such a secure job may appear to be the safest way to ensure quality of life. However, such incentives may be attracting the best students and innovative minds away from the sectors that will be best able to innovate.

Experience in the developed world suggests that a system that rewards those who play it safe and punish those who take risks is unlikely to foster innovation (Audretsch 2006). Innovating requires risk-taking. Risk-taking requires dependable rewards. If there are no rewards for taking risks, then bright minds may not take risks to innovate. Countries with innovative economies endeavor to establish conditions that are conducive to risk-taking. They educate their young people as best as possible to provide them with adequate technical training (Kwo et al. 2004). They support potential innovators with grants, partnerships, and other opportunities that can help cultivate novel ideas. They provide funding for start-up costs (Mowery and Rosenburg 1998). They provide a legal environment where ideas are protected from theft and copycats (Scotchmer 2004). All of these factors contribute to an environment in which risk-takers can be rewarded—often handsomely—for acting on bold new ideas.

It is likely that creating better incentives and protections will require difficult reforms—reforms that allow more creativity in China's classrooms, decentralize R&D spending, allow more room for venture capital to maneuver, and create a regulatory environment that delivers real protection for innovative ideas. Without these changes China's young people and future labor force may find themselves facing some substantial headwinds. Evidence suggests that the job market shepherds bright young minds into a state owned sector that may not be the most productive area of the economy. This apparent trend, perhaps exacerbated by inadequate venture capital infrastructure and notoriously poor intellectual property protections, paint a discouraging picture of China's capacity to build innovative university graduates, just as the country's growth increasingly depends on them.

So, is China likely to face a low-growth future due to its inability to innovate? In fact, China's policy makers have faced daunting challenges in the past and met them commendably. Building a truly innovative economy is a particularly complex and costly venture that involves considerable risk. A proactive, crosscutting approach may upset deeply vested interests in the status quo. Yet no matter how high the costs of action are on this vital front, surely the costs of inaction are higher—for China and the world.

Table 1. Summary of Sample Students by University and Country

	Number
China	
Peking University	156
Tsinghua University	198
Beijing Normal University	99
Subtotal	453
United States	
Stanford University	350
Total	803

Source: *Author's US and China University Student Innovation Survey*

Table 2. Comparison by Country of Sample Students' Career Plans.

	China		United States		Ratio
	Number	Percent (se)	Number	Percent (se)	US:China
Interested in starting or joining startup company	226	50 (2.3)	227	65 (2.5)	1.3:1
Plan to start or join a startup company	14	3 (0.8)	77	22 (2.2)	7.3:1
Plan to join the government	236	52 (2.3)	18	5 (1.2)	0.1:1
If possible, prefer to start or join a start up in the United States	136	30 (2.2)	311	89 (1.7)	3:1
If possible, prefer to start or join a start up in China	317	70 (2.2)	39	11 (1.7)	0.15:1

Source: *Author's US and China University Student Innovation Survey*

Table 3. Comparison by Country of Sample Students Who Believe Innovation Resources are Available to Them.*

	China		United States		Ratio
	Number	Percent (se)	Number	Percent (se)	US:China
Scholarships/Financial Aid	27	6 (1.1)	130	37 (2.6)	6.2:1
Internships	23	5 (1.0)	167	58 (2.6)	11.6:1
Research Funding	36	8 (1.3)	89	25 (2.3)	3.1:1
Mentoring for Innovation	23	5 (1.0)	100	29 (2.4)	5.8:1
Startup Funds/Venture Capital	9	2 (0.7)	59	17 (2.0)	8.5:1

Source: *Author's US and China University Student Innovation Survey*

**Note: Availability in this table is represented by the number of students who reported with either a 1 or a 2 for each resource on a five point scale in which 1=Very available and 5=Not available at all.*

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