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Career Choice and Economic Innovation: A Comparison Between China, Germany and the USA

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Abstract

This paper investigates some individual career choices in China, Germany and the US that have an impact on economic innovation. It presents evidence that public administration in China attracts highly educated and talented people, while those who create firms tend to have low educational attainment and do not stand out in terms of talent. In contrast, Americans of high ability tend to go in the private sector either as employees or as entrepreneurs. While education generates attractive alternatives to creating one's own firm, educated American entrepreneurs are highly successful, suggesting that they engage in frontier innovation. We then discuss some policy recommendations that may help increase the attractiveness of creating one's own firm in China.

1. Introduction

Occupational choice and the allocation of talent in an economy are crucial for economic innovation. In this paper, we relate these issues to economic culture and investigate two related sets of questions in a comparative study including China, Germany and the US.

The first set of questions focuses on who are the people creating new firms and what is the profile of those who are successful. Considerable academic and anecdotal evidence suggests that innovators introduce new products, techniques, and technologies by creating their own firms. Furthermore, small firms account for a large share of total employment worldwide. For example, in the US more than 60 per cent of the workforce is employed in firms of less than 1000 employees. Next, we try to investigate the educational credentials, inherent ability or talent, and beliefs and attitudes make an entrepreneur successful and how that set of characteristics compares to those that led them to create firms in the first place.

The second set of questions is related to the choice to become low- or medium-level government administrators. In developed economies, the state employs between 12 and 20 per cent of the workforce and a large share of them are low and medium level civil servants with little to no labour mobility. In China, that percentage is even higher. In many countries working as a civil servant has a long tradition of prestige, along with very advantageous pay and good retirement plans. One concern that arises in such countries is that the state may be attracting the best and the brightest into jobs that generate less value added than some alternative jobs in the

private sector. In this context, we are interested to see whether the hiring policy of the government administrators has the unintended consequence of depriving the rest of the economy of much-needed talent.

We investigate these questions using data from the World Value Survey covering the periods 1996 – 2002 and 2005-2006. Our empirical analysis is based on the classical Roy Model of occupational choice, but along with the traditional demographic characteristics of the individuals we also include a set of variables that represent individual beliefs and attitudes about work and the economy, as well as a set of variables that capture prevailing views in the community.

Our main result suggests that civil service careers attract highly educated people with high inherent ability, and their pay is largely determined by educational degree and seniority with very little variation due to differences in inherent ability. At the same time, people with high educational attainment are less likely to create their own firms, and the individuals who do so do not stand out in terms of their inherent ability from the rest of the population. Furthermore, education does not appear to have any effect on the successfulness of the company. Chinese entrepreneurs also appear to be influenced by the economic values prevailing in the community.

In the US in contrast, while government positions still attract highly educated people, the more talented individuals enter the private sector or create their own firm rather than take positions in public administration. They also tend to have attractive alternatives to entrepreneurship, which results in a decline in the probability of creating a firm with higher education after a bachelor's degree. However, conditional on creating a firm, its success, measured by the income of the founder, increases monotonically with education. Moreover, there is very strong evidence that the people

with the highest inherent ability tend to create their own companies. These findings suggest that American start-ups are education/skill intensive and as such are likely to involve the creation of products, technologies or techniques that are completely new. Furthermore, we find that Americans with a drive for achievement a and willingness to contribute to the welfare of the larger community are very likely to create new firms and are also likely to succeed.

Germany appears to be somewhere in between the US and China. Selection into civil service in Germany has very similar pattern to that in the US. However, while the demographic pattern for those who create new firms is also similar to that in the US, we find that higher education does not have a positive effect on the income of the entrepreneur. Also, we find no positive selection into entrepreneurship on the basis of inherent talent. These evidence suggest that, as in China, entrepreneurship in Germany is related to the adoption on a local level of already existing products, technologies, and techniques. Interestingly, we note that individual beliefs and attitudes play a crucial role in the career decisions of Germans.

Our analysis provides the base for some limited policy recommendations. In the context of China, we suggest several policy directions intended to increase economic innovation. The basic goal of these suggestions is to improve the relative attractiveness of the private sector and entrepreneurship relative to jobs in low and medium-level public administration, while maintaining the quality of the public services. With respect to public administration, we suggest that the implementation of information technology and the creation of an ‘electronic government’ can eliminate the need for many low and intermediate level administrative positions, streamline documentation and requirements, and decrease processing time. Moreover, the

introduction of such a system could be the first step on the road to the adoption of real time policy analysis using the accumulated 'big data'.

With respect to entrepreneurship, we recognize that new businesses receive credit at high interest rates and that very often their founders lack skills in financial and business planning. These issues suggest the need for specialized institutions that can help entrepreneurs develop their financial and business plan and that can then match them with potential venture capitalists. Another way to increase access to credit and decrease interest rates is by creating institutions that could securitise loans to small and medium-size firms, similar to the government-sponsored US mortgage enterprises,. The other major barrier to entry and successful growth of small companies is their small scale of operation, which prevents them from gaining in productivity from specialization and scale. We think that the emerging 'sharing economy' could help start-ups overcome these disadvantages through shared use of assets and services.

Ultimately, we recognize that there appears to be no clear recipe for entrepreneurial success and that most people learn what works and what does not through trial and error. This conclusion implies that business education should be more oriented towards learning-by-doing, through simulation games and case studies, accumulation of experience in firms, and training.

Our work relates to a large literature on economic innovation and here we provide only a few basic references. Economic innovation has been central in many macroeconomic models in growth theory, particularly those that followed from the Schumpeterian tradition. The seminal paper Aghion and Howitt (1992) provides an early example of this literature. Most recently, Acemoglu and Cao (2011), Aghion,

Howitt and Prantl (2012) and Akcigit, Hanley, and Serrano-Velarde (2012) extend the basic model of this literature by developing increasingly more realistic specification of research and development. The macroeconomic framework has also given rise to several micro firm-level studies testing key predictions of the models, such as Aghion, Bloom, Blundell, Griffith, Howitt (2005), Aghion, Blundell, Griffith, Howitt, Prantl (2006). Another strand in the literature is based entirely on reduced form micro studies based on firm-level data. Recently, there have been several studies on the operations of firms based on US census data with Haltiwangler, Jarmin, Miranda (2009) and Qian (2007) being two of the more prominent examples.

The rest of the paper is organized as follows. Section 2 motivates our work and presents our empirical framework. Section 3 summarizes the data and section 4 presents our results. Section 5 presents our policy recommendations and section 6 concludes.

2. Motivation and Model Framework

We consider two interrelated career choices: the selection into low and medium level government administration and the decision to create a new firm. Conditional on these choices, we then examine income. The effects of the following factors on the choice and the resulting income are of primary interest to us: education, inherent ability, individual beliefs and attitudes, and the prevailing economic values in the society. To perform our analysis, we apply the framework of the classical Roy Model of occupational choice.

2.1 Creation of New Firms

We focus on the creation of new firms for two reasons. New firms are one of the main channels for the introduction of new products, technologies and production techniques. This is an empirical fact in most countries. Two economic explanations provide a rationalization for this phenomenon. The first one is related to agency problems. The employees of a company may be reluctant to share their ideas with their superiors because they may be afraid that at best the latter will want to share the future benefits and at worst they may try to steal them, or improve upon the original and propose a better alternative. Moreover, to be realized, the individual idea will have to become a joint project for the whole firm, entailing a loss of control and a loss of a unique claim on all the subsequent profits. All of these considerations may entice an employee with a novel idea to quit his or her job and create a new firm to develop and try their idea in practice.

The other explanation of the empirical regularity is more subtle. Ideas at their initial stages hinge on intuitions, past experiences, imagination, and outright leaps of faith. No centralized hierarchical system, private or public, would consent to make its life and death decisions on such a basis. Common past experiences, shared views, mutual trust, nonverbal communication are a few of the factors that determine whether one individual can share his idea with another. Unfortunately, or fortunately, no government agency or private firm, i.e. a hierarchical centralized decision-making entity, allows such forms of communication across different hierarchical levels. Indeed, centralization requires unification and formalization of communication, which makes it uniquely unsuitable for the purpose of sharing and developing the original ideas of a subordinate. This communication issue implies that centralized hierarchical

structures may be well-suited for many tasks but trying out new things is not one of them. We do not say that they are necessarily hostile to innovation, we just say that hierarchical structures and centralized decision-making are not predisposed to be receptive to new ideas and change.

When considered together, these two factors may explain why so many people, across the world, have chosen to create firms for the purpose of testing their ideas in practice. In fact, we believe that almost all firms are created because their founders wanted to try out something new: it is hard to believe that someone would bear all the risk and forgo a secure income for the purpose of replicating what a neighbour does already. At this stage, it is worth mentioning that we distinguish, just as the Schumpeterian tradition does, between different types of innovation. In particular, we distinguish between frontier innovation and adoption. As the names themselves suggest, frontier innovation relates to the creation of new products, technologies, and techniques that are new in the context of the whole world, while adoption relates to their subsequent spread across different economies.

Once a new idea is implemented successfully, the innovators have a choice: to sell the business and the claims on future profits to a large established company, to establish a long-term contractual relation with an established large company, or to compete with the established firms. The choice depends on the industry and its characteristics: in the IT sector, developers usually sell their successful products or business to large companies; in manufacturing, new firms usually develop products, parts, machines, or technologies which are related to existing products or production lines, so the usual choice of new firms is to enter into an exclusive long-term contractual relation with an established company. Competing with the established

firms is rare for various reasons: absence of sufficient credit, competition with the incumbents is not profitable, labour market restrictions, etc.

We are also interested in the motivations behind start-ups because the resulting small and medium-size companies are a major provider of employment in both industrializing and developed countries. For example, according to the US Bureau of Labour Statistics, slightly more than 60 per cent of the employed work in firms of less than 1000 employees. In Germany, small and medium-size companies, the so-called *mittelstand companies*, have a long, proud, and successful history. Thus, small and medium-size companies account for more than half of the employment and, as a result, they provide the foundations of strong domestic consumption in these countries.

2.2 Who Wants to be a Civil Servant?

The other issue that we study in this paper is the selection of individuals into low and medium level administrative jobs in the public sector. In short, we are interested in what kind of person decides to become a bureaucrat and for what reasons. We exclude from our analysis high level managerial positions in the public sector because their career dynamics and obligations are distinctly different from that of low or medium level administrators. In the developed countries, high level managers in the private sector are often invited to senior government positions, and they return to the private sector after their term expires. In China, due to the large share of the economyunder direct or indirect government supervision, the high-level managerial positions involve great responsibility and the resulting decisions affect the lives of many.

Numerous studies show that once people enter the civil service at a low or medium-level position they usually stay in the civil service. Also, many studies show that people in low and medium-level government positions generate lower value added than they would have done in a job in the private sector. So althought the work of public administration is vital for the smooth functioning of the economy and the well-being of a nation's citizens, the question arises: do societies optimally allocate their scarce human talent?

There is much academic and anecdotal evidence to the effect that workers learn most about how to perform their duties on the job. This certainly seems to be the case for filling in government forms, their processing, and the application of administrative procedures and practices. In such cases, the returns to higher education must be very low in comparison with what an individual can accomplish in a non-administrative position. If the best and brightest in a country decide to go for an administrative position, one may doubt to what extent their choice is socially optimal from the perspective of generating the maximum social return on an education. The same argument applies not only to education but also to inherent ability or talent and other individual characteristics.

Of course, people do not make their occupational choice in isolation from the incentives that the government provides through its compensation and retirement policy for administrators, nor in isolation from the competition for each position. We also recognize that in many societies there is a great prestige and non-pecuniary rewards associated with the status of civil servants. People make their choices by comparing the costs and benefits associated with administrative and non

administrative work. Thus, it is the government employment policy that is at least partially responsible for the resulting selection of talent in the economy.

Naturally, when the brightest and the best end-up in medium level administrative positions, the pool of talent that is available for other purposes, in particular economic innovation and the creation of start-ups decreases. Indeed, in the extreme, if the government administration is sufficiently large, it can suck up all the talent in the economy, leading to low economic innovation and, as a result, mediocre economic performance.

2.3 Economic Values

The opening of new trade routes in the 15th and 16th century, the financial innovations of the 14th-17th century and the first Industrial Revolution undermined traditionalist views of society. Time and again, individual initiative, audacity, insubordination, and reckless leaps into the unknown showed that individuals could achieve their aspirations with hard work, perseverance, self-confidence, and a little bit of luck. They found the grounds for self-expression in the new value attached to the individual, to his or her aspirations, ingenuity, and capabilities; in classical liberalism, which asserted that good societies should allow individuals to attain the fullest extent of their potential; and in the design of the modern capitalist economic system.

The new values asserted that competition and freedom of initiative lead to a more prosperous, efficient and, as a result, better society. They thereby contrasted markedly with traditional values, which emphasized coordination and regulation as the path to a strong, harmonious society with a rich social fabric. Traditional values were based on the certitudes of divinely-inspired social relations between the

individual and the family, between the individual and his community or lord, between the subjects and their sovereign.

In our previous work, we have emphasized the importance of economic culture to economic performance. This is the first attempt to study how individual beliefs and attitudes, as well as the prevailing economic values, affect individual career choices and economic innovation. In our empirical results, we report the beliefs, attitudes, and values that have significant effect on occupational choice, on the decision to create a new firm and on the subsequent individual income.

2.4 Occupational Choice and Economic Innovation

The goal of our empirical study here is to study the effect of education and economic values, beliefs and attitudes on the decision to join the civil service, the decision to create a start-up, and conditional on these decisions, on individual income. We perform our analysis using the classical Roy Model of occupational choice. Within this framework, we examine relative levels of income conditional on the selection choice of the individual. The analysis of individual decisions is conducted under the assumption of complete information and of no effect of individual choices on equilibrium wages and prices. While one important limitation of our framework is that it is static, we believe that it is nevertheless well-adapted to represent the choice to join public administration and, with some reservations, is also applicable to the decision to create a new firm.

We study the two choices using individual-level data for each of the following countries: China, Germany and the US. Due to data limitations we choose to study only people below the age of 40, which allows us to focus on firms that have been

created in the last 10 to 15 years. Thus, any heterogeneity in the companies and the possible implications of inheritance are limited.

As noted above, the goal is to see how education, inherent ability, individual beliefs and attitudes, and prevailing economic values affect individual choices and outcomes. For each country, we consider several specifications. We start with a model in which individual choices are driven entirely by observed demographic characteristics, the most important of which is education. Then we introduce economic values and individual beliefs and attitudes. The limitations in the data force us to maintain the assumption that individual beliefs and attitudes are stable over time. This is very strong assumption, but we find some comfort in the fact that in our previous analysis individual preferences about the workplace exhibited remarkable stability in the 1990s and the 2000s.

3. Data

We use individual level data from the World Values Survey (WVS). The data for the analysis of entrepreneurial activity comes from the surveys conducted between 1995 and 2002. Unfortunately, data limitations have forced us to study the selection into the public sector on an alternative dataset based on the surveys from 2005 and 2006. The WVS contains data on self-employment status, individual income, size of firm, and profession, education, and some basic demographic characteristics of the responding individuals, who are selected to form a representative sample for each country. The data also contain a number of questions related to individual beliefs and attitudes towards competition, social trust, risk-aversion, and work preferences. A more detailed data description can be found in Bojilov and Phelps (2010).

4. Empirical Results

The empirical results are organized in two subsections. The first is devoted to the creation and the success of new firms and the second to the choice to become a low or medium-level government official. What connects the two issues is the problem of the allocation of talent in the economy. We perform a comparative study involving China, Germany and the US. The last section concludes by combining the insights from the previous two.

4.1 Creation of New Firms

We treat the income of the creator and manager of the start-up as the measure of success of a recently created firm. The reasoning behind this is simple: new firms are usually small or medium-size, private and the relation between the income of the founder and manager is strongly correlated with the performance of the company itself. For the analysis, we use data from the WVS waves in the late 1990s and the early 2000s. Unfortunately, of the unavailability of data for questions related to economic culture prevented us from also using the most recent wave. We recognize that investment decisions necessarily introduce dynamics into the analysis of the success of a new company. Nevertheless, we believe that, controlling for individual characteristics, it provides a proxy for the success of a new firm, similar to firm size. Also, since the analysis here is country-specific issues related to international differences in taxation, financial markets, etc. are somewhat mitigated. We have experimented with various specifications of education and report the one that is most generous to the effect of education.

We start the analysis of decisions to create new firms in China and their success with a simple model based only on individual demographics. The results are reported in Table 1. We find that women and older people are less likely to create new firms. We find that higher education has a negative effect on the probability of creating a new firm. Conditional on creating such a firm, education does not appear to have any effect on income, largely because of the relatively low educational attainment of the people who create firms in the first place. Thus, we find negative selection on education which implies that many new firms that are created in China are not particularly intensive in education-related assets. That is, Chinese firms tend to engage in adoption rather than frontier innovation which does not require particularly high technical and scientific foundations. We also do not find any evidence for selection of workers with very high inherent productivity (ability from now on) in the creation of new firms. Finally, we also find relatively little variation in the income of the creators of Chinese start-ups.

Table 1. China: determinants of the decision to create a start-up and of the following income, excluding economic values

	Income		Create Start-Up	
Explanatory variables:	Coef.	z	Coef.	z
Female	0.0584	0.74	-0.1435	-2.5
Age	-0.0169	-0.7	-0.0138	-5.08
age sqr	0.0002	0.59	0.0002	2.56
Single	-0.1673	-0.77	-0.7244	-5.84
Child	-0.2715	-1.37	0.0138	0.11
years of education	-0.0006	-0.04	-0.0316	-2.59
years of education, sqr	0.0000	1.19	0.0000	0.53
Constant	3.1514	5.15	-0.5122	-1.9
Rho	-0.0007	0.2168		
Sigma	0.7614	0.0257		
Lambda	-0.0006	0.1651		

Obs. = 2721

Next, we consider a model that includes economic values and beliefs, reported in table 2. The estimated results for the effect of education, age, and gender remain virtually unchanged compared to the previous specification. Again, we find negative selection in the creation of start-ups based on education. Women and older people are less likely to create new firms, but conditional on creating a firm, their income is not negatively affected by these individual characteristics. There is no evidence for selection on inherent ability.

Economic values, however, appear to play an important role in the decision to create a start-up. Still, what appears to be important is not the individual beliefs and attitudes, but the prevailing beliefs and attitudes in the region. Awareness of the need to contribute has a positive and significant effect on the willingness to create a start-up. Surprisingly, we find that people who want interesting and engaging work do not

select into the creation of start-ups. This finding suggests that most start-ups are not technological leaders in their sectors, an implication suggested also by the negative correlation with educational attainment. The dynamics of individual choice and regional acceptance of government intervention is complex.

Table 2. China: determinants of the decision to create a start-up and of the following income, including economic values

	Income		Create Start-Up	
Explanatory variables:	Coef.	z	Coef.	z
Female	0.0188	0.26	-0.1058	-1.62
Age	-0.0079	-0.37	0.0073	0.36
age sqr	0.0001	0.32	-0.0002	-1.03
Single	0.0023	0.16	-0.0504	-3.89
Child	0.0000	1.3	0.0000	1.37
years of education	-0.1195	-0.61	-0.6567	-4.38
years of education, sqr	-0.2491	-1.31	-0.1077	-0.71
possibility to contribute, region			3.9833	5.87
interesting job, region			-2.4186	-3.94
government intervention, region	-1.0139	-2.61	-1.7317	-3.06
government intervention, region sqr	0.1196	1.97	0.1704	3.2
Constant	5.8616	3.68	3.2541	2.09
Rho	0.0001	0.2562		
Sigma	0.6447	0.0234		
Lambda	0.0000	0.1652		

Obs. = 2721

Table 3 presents the results for Germany. Interestingly, the results based on demographics for Germany are very close to those for China. We find a negative effect from age and gender on the probability of creating a new firm, but conditional on creation these individual characteristics have no significant effect on income. The results indicate that education is not a major determinant of the decision to create a new firm nor on its subsequent success. Moreover, we do not find evidence that people with inherent high ability create new firms.

The individual beliefs and attitudes that motivate the Germans in creating their own companies is, however, very rich and diverse. Economic values appear to play a

crucial role. Patient people who do not insist on high pay immediately are more likely to create a company on their own, as this action is associated with considerable initial pecuniary and non-pecuniary investments. People who want increased freedom of initiative are also more likely to create a company of their own. The potential entrepreneurs are also willing to forgo some job security in order to try something interesting. Preference for leisure has a negative effect on income, conditional on entry. Intergenerational effects are very important, reflecting traditional values and the tendency of children to inherit some assets from their parents. Finally, the creators of start-ups also do not believe in government intervention and do not believe that competition is

harmful.

Table 3. Germany: determinants of the decision to create a start-up and of the following income, including economic values

	Income		Create Start-Up	
Explanatory variables:	Coef.	Z	Coef.	z
female	-5.6499	-1.62	-0.3795	-3.94
age	0.8901	1.05	0.0886	3.87
age sqr	-0.0114	-1.3	-0.0010	-4.15
single	1.6729	2.41	-0.0240	-0.98
child	-0.0007	-2.22	0.0000	1.12
years of education	-0.5607	-0.08	-0.2155	-1.12
years of education, sqr	6.1438	1.05	0.0940	0.6
pay			-0.2378	-2.33
not much pressure	-7.1201	-1.93		
job security			-0.4318	-4.26
initiative			0.4827	4.52
possibility to contribute	3.0847	1.09		
interesting job, region			1.8522	2.24
parents responsible for children	4.5312	2.18	0.0951	1.45
government intervention			-0.0478	-2.44
competition harms			-0.0601	-2.32
constant	-22.4028	-0.84	-3.0790	-3.82
rho	0.1918	0.2760		
sigma	13.8739	1.1100		
lambda	2.6606	3.9457		

Obs.=4734

Table 4. US: determinants of the decision to create a start-up and of the following income, including economic values

	Income		Create Start-Up	
Explanatory variables:	Coef.	Z	Coef.	z
female	-11.6734	-2.25	-0.2367	-3.28
age	0.4087	2.48	0.0067	3.1
age sqr	-23.3390	-2.98	-0.2360	-2.09
single	-18.4112	-2.68	-0.2986	-3.04
child	2.9054	3.56	0.0319	2.76
years of education	0.0004	1.76	0.0000	-1.52
years of education, sqr	2.5837	1.98	-0.2919	-3.84
possibility to contribute	14.5886	2.67	0.1837	2.44
achievement	17.2093	3.89	2.7203	4.31
constant	-28.8665	-6.68	-4.2355	-8.23
rho	0.98	0.0008		
sigma	65.7921	5.2848		
lambda	63.7198	5.3062		

Obs. =6291

Table 4 presents the results for the decision to create new firms and their success in the US. As with the other two countries, we find negative selection on female gender and age. However, these demographics appear also to have a negative effect on income, conditional on firm creation, which we find surprising. Education has a very interesting role for entrepreneurship. More educated people are less likely to create their own firms because of attractive alternative offers from already existing firms. However, if they enter, the returns to education are actually increasing with education. We believe that this finding provides evidence that US start-ups tend to be knowledge and skill intensive.

Moreover, we find that people with very high inherent ability are likely to create their own companies. The overwhelming part of the variation in income is explained by the variance in inherent ability, which is much higher than in China or Germany. Somewhat surprisingly to us, the only two individual beliefs and attitudes

that appear to influence the decision to create a start-up in the US are the individual drive for achievement and desire to contribute to the welfare of the society. The motivation to achieve appears to be particularly strong.

The comparison between China, on one hand, and the US and Germany on the other shows some similarities in the effect of age and gender. We also find that in all countries education either has negative or no effect on the probability of creating a new firm. However, conditional on creating a firm, only in the US higher education has a strong positive effect on income. This result suggest that new firms in the US are more skill and knowledge intensive than their counterparts in China and Germany. We also find that Americans with inherent high ability are more likely to create new start-ups and that the variation in income among American entrepreneurs is highest.

For all three countries, we found evidence of how individual beliefs and attitudes are closely related to the decision to create new firms and to those firms' success. Yet, there are major differences across countries in the mix of beliefs and attitudes that propel people into action. The Chinese appear to take into account the prevailing economic values and beliefs in the community, while the Americans and the Germans are primarily driven by their own individual beliefs and attitudes. While for the Americans the most important issues are the drive to achieve one's full potential and the ability to contribute, Germans are motivated by a much more complex mixture of beliefs and attitudes.

Table 5 . China: determinants of the decision to join the civil service and of the following income.

	Income		Civil Servant	
Explanatory variables:	Coef.	z	Coef.	z
female	0.3375	2.37	0.1376	1.52
age	-0.0870	-2.14	0.0277	1.05
age sqr	0.0012	2.83	0.0000	0.03
single	-0.0619	-0.14	0.3458	1.47
child	0.1674	0.43	0.0431	0.19
elementary	0.5480	1.61	0.6925	3.83
complete professional	2.0608	3.98	1.8298	9.81
complete college	1.4627	3.46	1.3282	7.53
complete graduate	3.0258	4.09	2.7746	12.59
individualistic			-0.1364	-2.94
government intervention			0.0350	2.72
government intervention, region			0.1080	1.94
constant	0.1053	0.07	-4.3211	-6.19
rho	0.8756	0.0989		
sigma	1.3785	0.2309		
lambda	1.2070	0.3356		
Obs.= 1483				

4.2 Civil Service

As above, we focus on the selection into civil service in China, Germany, and the US. Unfortunately, data limitations prevent us from simultaneously analysing the choice to become civil servants and the creation of start-ups on the same representative set of individuals. For this reason, here we utilize the latest WVS wave from 2005-2006 while for the study of start-ups we used data from the late 1990s and early 2000s.

Table 5 reports the regression results for the income and selection into civil service for China. Our representative sample includes 1483 people interviewed in 2005. The results indicate that more educated people are more likely to select into civil service. Moreover, conditional on entry into the civil service their income grows considerably with each successive degree. Indeed, we find that the effect of graduate studies is between 50 and 100 per cent greater on income than the effect of college or some college education. The results indicate that there are no decreasing returns to

education for the very higher education. This finding implies that young graduates will be attracted to apply for administrative positions in the public sector. We also find a high return to seniority exhibiting a classical concave shape.

The regression results show that there is a very significant, both economically and statistically, selection on unobservable productivity (ability from now on); the correlation between the error term in the selection equation and the error term in the observational equation is 0.88. This result indicates that workers with high inherent ability tend to select into the public sector, rather than the private sector. The overall effect of this positive selection into the government sector translates into an increase in the income, conditional on entry, by about the same effect as a college degree. This result is quite extraordinary because in the presence of little variation in public sector compensation, implying very compressed income distribution, the very high positive selection must come from the extraordinary attraction of administrative jobs. The results also indicate that the variation in income due to the heterogeneity in productivity is relatively small in China compared to the variation caused by observable characteristics, as well as compared to the variation in the other countries.

In terms of individual beliefs and attitudes, we find that less individualistic, possibly altruistic people enter the civil service. Furthermore, people who believe that the government should play an important regulative role and intervene to prevent the excess of the markets tend to become civil servants. Also, the general acceptance of government intervention in the region appears to have a borderline significant positive effect on the decision. Interestingly, China is the only country among the three where any prevailing values or beliefs tend to affect individual choice.

Table 6. Germany: determinants of the decision to join the civil service and of the following income.

	Income		Civil Servant	
Explanatory variables:	Coef.	z	Coef.	z
female	-4.0453	-4.52	0.4074	5.27
age	0.0254	0.15	0.0053	0.34
age sqr	-0.0008	-0.51	0.0000	0.21
single	-3.4304	-2.76	0.2646	1.89
child	-1.4327	-1.27	0.1168	1.03
elementary	0.5467	0.37	0.0566	0.38
some professional	2.6977	0.78	0.1994	0.7
complete professional	1.1203	0.75	0.3769	2.51
some college	2.2988	0.7	0.4953	1.42
complete college	1.9142	1	0.8277	4.57
some graduate	-1.8997	-0.86	0.9400	3.85
complete graduate	1.2658	0.65	1.1578	7.39
government intervention			-0.0304	-2.32
individualistic			-0.0845	-2.84
constant	42.0752	7.16	-2.0110	-4.28
rho	-0.7604	0.1134		
sigma	7.9082	0.9450		
lambda	-6.0135	1.5934		
Obs.= 1642				

Our findings are good news for the quality of the labour force in the low and medium-level ranks in the government administration, but the question remains whether this is the best allocation of the brightest minds of a nation. We contrast these findings to those on selection and income in the civil service in the US and Germany.

Table 6 reports the corresponding results for Germany. We find that higher levels of education tend to increase the probability of becoming a civil servant. However, higher education does not have any effect on individual income, conditional on selection. Also, we find no seniority effect on income. Moreover, we find a very strong negative relation between inherent ability and entry in the public sector: people of high inherent ability are attracted by alternative jobs in the private sector or create

their own firms. Finally, the variation in income due to inherent ability in Germany is huge compared to that in China.

These findings suggest that the compensation schedule in China is very different from the compensation schedule in Germany. These differences imply that civil servants in China are paid on the basis of their degree of education and seniority with little room for variation in income on the basis of ability or performance. In contrast, most of the variation in the compensation of public administrators in Germany is due to inherent ability and education is only used as a screening device for entry.

Interestingly, we find that the people who join the German civil service tend to be those who believe in small and limited government in the context of economic life. Again, this is a major contrast between Germany and China. The only important similarity that we find between the two countries is that in both countries less individualistic people are more likely to join the public administration.

Table 7 reports the results for the US. We do not find evidence for a seniority effect on selection or compensation. Also education also does not appear to play a role in the selection of workers into public service. In this respect, the US is even more extreme than Germany, where higher education played at least a role in entry into the civil service. Again, we find evidence for selection on unobservable ability. In particular, we find that workers of high ability prefer not to become bureaucrats. Similarly to Germany, variation in inherent ability accounts for much of the variation in income.

As in China and Germany, economic culture does appear to be important. In the US, just like in Germany, people who do not believe in big government tend to

join the civil service. Also people who accept social change and the associated uncertainties are more likely to join. The government employees are also more likely to believe that competition sometimes does more harm than good. Thus, Americans tend to have a richer variety of personal beliefs and attitudes that motivate them to enter the civil service.

To summarize, we find positive selection on inherent ability in China and negative selection in the US and Germany. Moreover, the most highly educated people in China join the service, which is definitely not the case in the other countries. To the extent to which anecdotal evidence suggests that a worker of given ability is more productive in the private sector than the government sector, in particular government administration, Germany and the US appear to allocate their talent well. Chinese public administrators are paid according to a rigid pay schedule based on education and seniority while German and American administrators are paid largely on the basis of inherent ability.

Moreover, we also find that individual beliefs and attitudes are very important. The perceived role of the government in economic and social life is a major determinant of individual choice in all three countries, but in China, unlike the other two, people who accept government intervention tend to join the government. This finding seems to suggest an important difference in the perceptions and motivations of the public administrations in China on the one hand and in Germany and the US on the other. In addition, we find that Chinese and Germans who are less individualistic tend to become civil servants, while Americans tend to have much more diverse motivations for their decision.

Table 7. US: determinants of the decision to join the civil service and of the following income.

	Income		Civil Servant	
Explanatory variables:	Coef.	z	Coef.	z
female	-3.0511	-1.52	0.3140	2.52
age	-0.8797	-1.54	0.0313	1.05
age sqr	0.0118	1.8	-0.0003	-0.99
single	-1.5148	-0.56	-0.1459	-0.93
elementary	-11.2457	-1.41	-0.5560	-0.86
some professional	2.6644	0.3	-0.3367	-0.79
complete professional	-8.1776	-1.36	-0.3508	-0.99
some college	-2.7359	-0.44	-0.3203	-0.88
complete college	-2.9180	-0.48	-0.2473	-0.7
some graduate	-3.0887	-0.47	0.4364	1.16
government intervention			-0.0596	-2.73
competition is harmful			0.0529	1.99
acceptance of social uncertainty			0.0999	2.25
constant	70.9180	4.96	-1.8573	-2.32
rho	-0.7993	0.0937		
sigma	12.6023	1.7103		
lambda	-10.0730	2.4634		

Obs.=624

4.3 Discussion

The preceding results suggest the following conclusions. The government in any developed or industrialized country is the largest employer with a share of between 12 to 20 per cent of the labour force. Of these, a large fraction are low or medium-level government officials. While they perform an important role and the attraction of the best and brightest is undoubtedly good for the quality of government services, it still remains an open question whether this constitutes the best allocation of talent from the perspective of returns on educational investment and inherent ability. Indeed, many studies show that low and medium-level officials are more productive in the private sector rather than as bureaucrats.

In our analysis, we tried to provide a positive description of the dimensions by which people select into the civil service or decide to create new firms, as well as their subsequent success conditional on their decisions. The results show that in the US the most gifted individuals do not go into public administration: they either work for private companies or create firms of their own. While the highly educated are more likely to go into public administration, their pay is not dependent on their degree of education but seems instead to be linked to inherent individual ability. Those Americans who are driven to achieve their full potential and want to contribute to the community are likely to create successful firms. Those who believe that excessive competition is harmful and accept social changes as well as believe in limited government interventionism tend to go in the public administrations.

Table 13. Determinants of the decision to create a start-up and of the following income, excluding economic values: with country

effects.

Explanatory variables:	Income Coef.	z	Create Start-Up Coef.	z
female	-0.8318	-1.73	-0.5344	-31.16
age	0.0823	0.79	-0.0009	-1.6
age sqr	-0.0016	-1.34	-0.0021	-1.65
single	-1.8475	-2.27	-0.2179	-7.74
child	1.4884	1.9	0.0805	2.95
elementary	-0.1146	-0.21	-0.0334	-1.1
some professional	-0.7240	-0.91	0.0234	0.62
complete professional	0.8273	1.1	0.0692	2.02
some college	5.5422	4.61	-0.0092	-0.23
complete college	3.2476	4.91	-0.0743	-2.25
some graduate	8.1095	6.45	-0.0623	-1.52
complete graduate	9.1907	9.04	-0.1474	-4.25
constant	38.7217	13.16	-0.7387	-10.95
rho	-0.0092	0.0063		
sigma	12.4652	0.4533		
lambda	-0.1151	0.0772		

Obs. 38208

In contrast, we found that in China the highly educated and able enter the civil service, so the new firms that are created do not tend to be skill or knowledge intensive. Furthermore, we found that of all three peoples, the Chinese are most sensitive to the prevailing values and beliefs in the larger community when they make career choices. Interestingly, their choices seem to be influenced to a lesser degree by individual preferences, beliefs or attitudes. Finally, those Chinese who accept government intervention and share a less individualistic view of their place in society are likely to become civil servants.

Germany appears to be in between China and the US. On one hand, the most talented select into non-bureaucratic jobs as in the US and the compensation schedule in Germany is closer to that in the US than to that in China. On the other hand, the type and profile of the set of Germans who create new firms is actually closer to that in China than to that in the US. The results suggest that the brightest people in Germany opt to join established private companies, leaving the creation of new firms

to people of lower educational attainment. Still, the Germans exhibit the richest mixture of beliefs and attitudes when making career choices.

5. Policy Recommendations

The preceding analysis provides only a limited basis for policy analysis and recommendation. In what follows, we consider mainly policies that could potentially make the creation of start-ups more attractive relative to the alternatives. To the extent that economic innovation, particularly frontier innovation, requires talented and highly educated people, our results suggest that the Chinese economy possibly does not allocate its resources optimally. They also demonstrate that individual beliefs and attitudes are strongly related to career choices and further work on this issue is required. We believe that as the largest employer and the authority responsible for education, the Chinese state is in a position to alleviate any existing problems and create a good environment for economic innovation. Below, we outline some policy suggestions.

Any country would like to have very qualified and talented people in charge of public policy, regulation, and management. There are also benefits of having good people at intermediate positions because they may be able to spot trends and information that remains for various reasons inaccessible to top management but which would be of value in the decision-making process. Yet, there is the danger that the prestige, generous pay, security, and non-pecuniary rewards of public administration jobs may deprive the private sector of highly qualified, managerial and entrepreneurial talent.

The numerous additional requirements that go with the creation and operation of a new firm present a major barrier to entrepreneurship. Entrepreneurs need not only have an idea and excellent knowledge of their market niche. They also need to be good legal experts, accountants, IT specialists, financial planners, and administrators. These additional requirements are coupled with the great risks associated with the introduction of something new from a position of complete obscurity, considerable debt exposure and the possibility of a very costly bankruptcy. Thus, brilliant ideas, high motivation, patience, and fortitude are all required from future entrepreneurs.

At the same time, the set of alternatives grows with education. A position in government administration is only one such alternative, but it is not the only one. Private companies try to attract the candidates with the best credentials in education, too. Thus, we focus on two related questions: What can be done to make entrepreneurship less costly? Would it be possible to encourage more people to become entrepreneurs without hurting the functioning of the government and the quality of the public services? In what follows, we outline two sets of policies trying to address these questions.

5.1. Civil Service

Developments in information technologies and 'big data' analysis offer new opportunities for both the private and public sector. In the 1980s and the 1990s, the emerging information technologies helped streamline the operations of private institutions in the US and other developed countries by eliminating large portions of intermediate-level managerial positions whose role in the past had been the reception, processing, organization, and filtering of information. The public sector in all

countries has been much slower in adopting these labour-saving technologies for a number of reasons, ranging from existing long-term employment contracts, to reluctance to abandon control and status, to absence of incentives to introduce new and better services to the public. We believe that the introduction of electronic government would have a number of advantages, one of which is maintaining the quality and extent of the public service but with fewer civil servants. The organization of such a centralized electronic system would also facilitate the streamlining of required documentation and reduce processing time. Furthermore, the transparency and the credibility of the public administration would grow when the review process becomes public. Last but not least, any reviewing or auditing institution can access the data on any specific case at any given time.

Information technologies can also be used to keep track of the internal operations of various units of the administration. Indeed, the recently developed research or analytics divisions of large companies rely on 'big data', large data sets containing an encoded minute-by-minute record of the operations of their companies, used to optimise in real time the operations of their different units and offered services. The benefits of such an information system would be great also in the public sector, particularly in countries like China where the public administration must operate in a fast-changing environment.

These innovations would have a number of advantages: the reduction in the need of large number of public servants is only one of them. In addition to improving centralized control over the implementation of policy, they also allow for quick feedback on the performance of policies, giving rise to potential suggestions for improvement. In short, "big data" allows, for the first time in history, a large

organization or government to apply statistical and economic analysis on all relevant data when formulating its policies.

5.2. Entrepreneurship

We focus on ways to reduce the barriers to entry and the costs of operations of start-ups. The main issues that we consider are: access to credit and financial planning, access to new technologies, means to reach out to potential clients and partners, provision of specialized services, and the reduction of the risks and negative outcomes associated with creating new firms.

Potential entrepreneurs have ideas and knowledge of local or specific markets, but they usually lack capital and, even more importantly, financial expertise. Their projects are inherently risky which leads traditional financial institutions to lend to them at higher interest rates, if at all. Their high fixed payments, as a result, reveal the crucial importance of financial literacy and planning skills for the eventual success or failure of the new companies. However, many entrepreneurs have not graduated from business school, nor do they have degrees in economics or finance, so they cannot design viable business plans and are too small to hire an expert to do that for them. Thus, in many cases there are two related problems when it comes to financing: extension of credit and business and financial planning.

Microfinancing has shown the way to extending credit to groups that have been excluded from traditional financial markets. Venture capital has also been on the rise in the last decades. These developments have gone a long way toward alleviating the problem of extending credit, and they suggest ways that can be done on a larger scale. Nevertheless, we think that there is still much work to be done in relation to

financial and business planning. Academic work and existing practice in economic development has shown that transferring assets to poor people has no or little effect compared to transferring assets **and** expertise on how to use them. The environments are different, but we suspect that a similar conclusion also applies in the context of entrepreneurship. We believe that a possible solution would be to create institutions that offer financial advice in the creation of viable business plans and help entrepreneurs secure funding for their project in exchange for a claim on future profits or revenue. Such specialized institutions could play the role of an intermediary that matches venture capital investors with potential entrepreneurs. An intermediary of such sort would be sufficiently large to have a global reach and specialized knowledge of the financial markets. In addition, a specialized public institution, similar in nature to the US government-sponsored enterprises in the mortgage markets, can securitise the loans to small and medium-size firms and by doing so create a viable secondary market and free up resources for more lending to such firms.

A related issue is the cost of bankruptcy. New firms fail very often. It is crucial that the entrepreneurs are not punished for trying. Moreover, they should be encouraged to try again; most of the great American inventors and businessmen have failed at least a couple of times before they succeeded. Indeed, some argue that what made the US an economic and technological leader is the fact that it had a financial system that could recognize and write off failures, while not stigmatising the failed entrepreneurs.

Another issue with start-ups is their scale. New firms are often too small to have their own IT specialist or accountant, but nevertheless they require such services. As a result, non-specialists perform them, leading to lower productivity, delays,

problems, and misallocation of resources. That is, small companies suffer from the lack of productivity gains due to specialization. Another related issue is access to the best practices and technologies. Very often producers or distributors offer special discounts for buying large orders or new products. However, a single start-up could not take advantage of these quantity discounts; but if several firms pool their resources together, then they could obtain the lower prices, better services, and ensuing productivity gains enjoyed by a larger company.

The emerging 'sharing economy' in the consumption of durable goods in the US suggests one possible solution to such problems: several firms can share the same resource because none utilizes the durable good fully all of the time. The basic idea is similar to that of the initial cooperative movement in the late 19th century and the early 20th century except that it does not rely on exclusive membership since modern technologies allow reputation to play a disciplining role. We think that the pooling of resources of several small or medium-sized companies with a common purpose to access specialized services is a very important way to address the problems associated with small scale. A variation on the same idea is to have a company that has a long-term contractual relation with the small and medium sized companies to give them access to machines, software, services, or maintenance on demand in exchange for a fee or a claim to future profits. There may be an argument for government intervention in the introduction of such companies: at the moment, few such firm exist, mostly in major economic centers such as New York, where they offer small start-ups, often technology based, access to shared office spaces, technology exchange, etc. There is no viable market of small and medium-sized firms that would support them on a larger scale, but it is possible that such small and medium-sized

firms do not exist because there are no such specialized firms offering access to vital intermediary products and services. Possible applications extend to the use of computer and peripheral hardware, software, specialized services, etc.

We are aware that these ideas are still in the infancy of their practical application and many questions remain to be addressed. To our knowledge, there has also been no academic research on the sharing economy. However, the sharing economy already suggests exciting opportunities for greater utilization of production capacity, increases in productivity in small and medium-sized firms.

Finally, our results also indicated that individual beliefs and attitudes, as well as prevailing economic values affect career choices and outcomes. We do not know how these beliefs and attitudes are formed and we are far from sure that there is a 'correct' set of beliefs and attitudes. For these reasons, we are reluctant to give advice on what 'correct' views people should have, if such views even exist. However, it seems fair to say that the educational system and the media should not create a climate in which individual initiative or desire for commercial achievement and success are perceived as shameful.

There is no known recipe for entrepreneurial success, which suggests that people find out what works in their circumstances through learning by doing. Thus, we think that schools and universities should give the opportunity to young students to experiment and get hands-on experience in business. The coursework should emphasize not learning facts, but methods and allow students to be creative through joined projects, simulation games, and interaction with business professionals, as well as gaining more international experience.

6. Conclusions

In this paper we presented some evidence that public sector in China attracts highly educated and talented people, while those who create firms tend to have low educational attainment. Moreover, we have found that entrepreneurs in China do not stand out with their inherent ability relative to the people who select into alternative careers. These results are very different from those for the US. Americans with high ability tend to go in the private sector or become entrepreneurs. While it increases the attractiveness of alternative career paths, conditional on becoming an entrepreneur, higher education leads to greater business success, suggesting that American start-ups engage in frontier innovation. We then discussed some policy recommendations that may help increase the attractiveness of creating one's own firm in China. Our main recommendations include: (1) the creation of institutions that can disseminate knowledge of business and financial planning, as well as match entrepreneurs with venture capitalists; (2) government sponsored enterprises that securitise loans to small and medium size firms with the objective of reducing the price of credit and increasing its quantity; (3) implementation of practices in the emerging 'sharing economy' to overcome problems associated with the small scale of start-ups.

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