

THE PITFALLS OF A CENTRALIZED BUREAUCRACY*

Chenggang XU

(Received: 18 October 2018; accepted: 31 January 2019)

The incentive problem inherited in bureaucracy is a vital issue in all transition economies and China is not an exception. This paper summarises how China partially solved this problem at early stages of post-Mao reforms and why the Chinese solution is only transitory, which explains severe problems that China is facing now. The paper also discusses the incentive mechanisms in the judicial system; and the effect of the soft budget-constraint (SBC) syndrome on incentives, including the relationship between institutions and innovation.

Keywords: Incentives, bureaucracy, Chinese economy, soft-budget constraints, R&D, law enforcement, incomplete law

JEL classification indices: D02, D73, G20, G30, H70, K20, K29, O30, P30

* Based on the speech for receiving 2016 China's Economics Prize.

Chenggang Xu, Professor of Economics at Cheung Kong Graduate School of Business (CKGSB), Director, Center for AI and Institutions at CKGSB, Beijing, China. He is one of the first recipients of China Economics Prize for contributions in understanding government and enterprise incentive mechanisms for the transition economy of China. E-mail: cgxu@ckgsb.edu.cn

Allow me to first sincerely thank the National Economics Foundation for establishing China's Economics Prize, which promotes the advancement of economic and social sciences in the country. I also want to express my gratitude to the Prize Committee of the Foundation for recognising the works by Yingyi Qian and me on incentive problems.

I consider myself to be enormously fortunate in many ways. First, I could personally experience the Cultural Revolution and China's post-Mao economic reforms and directly observe the socio-economic developments in other countries; this experience is an extremely rare opportunity for a social scientist. Second, starting from my self-study period, I have had the opportunity to get acquainted with some of the most outstanding Chinese scholars in the natural sciences, social sciences, and engineering, become influenced by them deeply in many ways, and received generous direct assistance from respected older-generation economists, such as Yu Guang-yuan, Zhang Xuan-san, Liu Yuan-zhang, and Wu Jia-pei, among others. Particularly, during my study and teaching abroad, I was fortunate to immerse myself in the world's best academic environments, become acquainted with some of the best economists in the world, and become a student of the great economists János Kornai and Eric Maskin, who are my supervisors; Oliver Hart, Martin Weitzman and Andreu Mas-Colell among many others. Meanwhile, I had the opportunity to learn from the best scholars in China, especially Wu Jing-lian and Mao Yu-shi, as well as numerous excellent entrepreneurs. Moreover, I would like to thank the journal *Bijiao* and its predecessor, both of which have been edited by Wu Jing-lian and Xiao Meng, who established a bridge for communications and exchanges between academic economic literature and policy issues in China in a timely and systematic manner over the past two decades.

Finally, I am truly grateful for having the opportunity to work with many outstanding scholars and have them as my dear friends, especially Yingyi Qian, Eric Maskin, Gerard Roland, Katharina Pistor, Haizhou Huang, Martin Weitzman, and Patrick Bolton. Without them, I would not have been able to achieve what I have accomplished. Their support goes far beyond concrete research projects that we have conducted together but are boundless inspirations from them. The bond we have developed through cooperation is strong, and it includes not only academic exchanges but also human and intellectual friendship. Originating from common interests and passion, our friendship drives us to persistently explore the path of human society, digging into deeper dimensions, and lighting up with delight when we immersed ourselves in our studies of China and the world. However, I must clarify that I did not discuss this acceptance speech with any collaborator. If there is any fallacy or inappropriate word or expression arousing controversy, then I shall bear the responsibility for it.

In the following, I will briefly summarise my work in three aspects. The first is the analysis of the incentive mechanism in China's bureaucratic institutions. The second is related to the incentive mechanisms in the judicial system. The last is the effect of the soft budget-constraint (SBC) syndrome on incentives, including the relationship between institutions and innovation. The last two dimensions are general studies where I view the China issue as a manifestation of the general problem in the world. The three aspects to be summarized share a common character, and I will highlight this common point in the concluding remarks.

1. ANALYSIS OF CHINESE INSTITUTIONS

Since the establishment of the Chinese Empire around 220 B.C. by the Qin Empire, China has been governed by a top-down bureaucratic institution. The influence of this long-lived and complex bureaucratic institution has long reached beyond the scope of China. Theoretical analysis of this bureaucratic institution is important not only for China's reform but also provides general academic value in the social sciences, similar to those on democracy and the market institutions since ancient times. Before modernization, bureaucracy in Europe was arguably introduced from China or was heavily influenced by Chinese traditional bureaucracy, which had been recognised by some great European social scientists since the 18th and 19th centuries. Indeed, Adam Smith, Karl Marx, and Max Weber conducted serious studies on the Chinese imperial bureaucracy and land systems. The debates on the meritocratic nature of Chinese imperial bureaucracy have had significant influences in the social science literature for centuries. These debates are reviving strong interest in the meritocratic nature of contemporary Chinese bureaucracy in today's research in political science, economics, and sociology. A thorough understanding of these issues is related to an understanding of the bureaucracy's incentive mechanism, its personnel system and basic properties. The following brief survey will show how China dealt with its bureaucrats' incentive problems during the reform period. This survey will shed light on our understanding of the nature of the Chinese bureaucracy from the perspective of incentive theory.

China's institution officially established in the 1950s originated from the imperial bureaucracy, which had evolved over the past two millennia, and the full-scale transplantation of a Soviet type of totalitarian bureaucracy during that time. Based on this institution, after the catastrophic Great Leap Forward movement, the Cultural Revolution, and other major institutional changes, the institution based on which China started its post-Mao reform took shape. Its basic features are the following: 1) Predominant state ownership of the means of production;

2) No separation between the Party and the government; 3) The Party, which is organised and controlled strictly in a top-down hierarchical manner, is the core organ that dominates national politics, economy, ideology and armed forces; 4) In the administrative and economic aspects, is a high degree of devolution to the local governments; and 5) The national economy consists of thousands of self-contained local economies. The last point is the institutional feature, which distinguishes China from the Soviet type of classic totalitarian institution. I characterise this institution as regionally decentralized totalitarianism (RDT).

Since the post-Mao reform that started from this RDT institution, private enterprises not only have been legalized but also have become the driving force of China's growth. China's per capita GDP increased 26-fold over 30 years. Compared with its status during the pre-reform era, China's economic institution has changed significantly, and so do the corresponding political, social, and legal institutions. After three decades of reform, the largest sector of the national economy is the private sector, which includes non-profit organisations. Private property rights are recognised by the Constitution, and the mainstreams of social sciences, such as economics, political science, law, and so on were officially recognised and have made significant progress in teaching and research. These new institutional elements together with the inherited old institutional elements have constituted China's institutions today, which are a unique institution in the world (but it does not mean this institution will not follow universal regularities of human society, such as incentive compatible principle and others). As a step forward to understand this institution, I characterize it as regionally decentralized authoritarianism (RDA) (Xu 2011). It is characterized by being highly centralised in political powers while being highly decentralised in administrative and economic powers, and the private sector is the largest sector in the economy.

The transition from RDT to RDA took more than two decades since the late 1970s. Several major changes occurred during this period, although most of them were gradual. Among the major changes, the 2002 Chinese Communist Party (CCP) constitutional amendment (recognising the status of entrepreneurs in society) and the 2004 state constitutional amendment (recognising private property rights) are landmark events that marked the nature of the changed institution in the Basic Laws.

How could China successfully transform from an extremely repressive RDT and very poor economy inherited from the Cultural Revolution to today's RDA institution where the private sector dominates the economy and the nation reaches middle-income development level? How did China solve its incentive problems within the government bureaucracy during the past reforms? The answers to these questions are directly related to the following challenges: How can the incentive problems being solved within the government bureaucracy in future

reforms? How far can China's reform go? And, how can China deal with great challenges today and in the future?

As mentioned, in the onset of the reform, resources were completely controlled by all levels of the government. Resolving the incentive problems of bureaucrats and whether millions of bureaucrats participated in the reform are the necessary conditions for the success of the reform. The problem is that reforming the bureaucracy must be implemented by the bureaucrats themselves. Areas to be reformed, ways to reform, and people to employ for the reforms are all linked to the interests of these bureaucrats. Many of the bureaucrats will slacken at work or even resist the proposed reform if it conflicts with their own interests. Under this situation, regardless of how perfect the design of a reform program looks like, it will not be implemented. One of the major reasons for the failures of the reforms in the former Soviet Union and Eastern Bloc states is their failure to resolve the incentive problem in their party-state bureaucracies.

A highly centralised party-state bureaucracy is organised like an army. The question is, could we solve the incentive problem within this gigantic bureaucracy by imitating an army, where orders are issued, implemented, and monitored in a top-down manner associated with a strict performance-based reward-and-punishment scheme? The answer to this question from Hayek is no. The reason is that the objective of an army is always simple: to win a war. This explicit and simple objective provides subordinates in the military with minimal opportunity to deceive and with fewer conflicts of interest with their superiors. However, the government faces challenges in socioeconomic issues; the objectives, and the methods to achieve the objectives are significantly more complex, diverse, and dynamic. Furthermore, the subordinates, who thoroughly understand the local situation, usually have conflicts of interest with their superiors.

Therefore, designing incentive mechanisms for officials is one of the basic problems of the reform. However, the implementable incentive mechanisms can neither be divorced from the existing institution nor be designed with pure reasoning. Any incentive mechanism that can be implemented must be constrained by existing institutions.

In the early stages of reform, by effectively solving the incentive problem that other centrally-planned economies, such as the Soviet Union and the Eastern European countries could not solve, China seemed to create a miracle, the so-called "China miracle"¹. Why? Will the incentive mechanism, which was effective in the early stages of reform, last forever?

¹ Weitzman – Xu (1994) argued that the fast growing Chinese township-village enterprises (TVEs) pose challenges to our understandings on incentives in general property rights in particular.

China's accomplishment during the early stage of reforms is that the central government of this authoritarian regime (or even more centralised totalitarian regime at the onset of the reforms) induced local governments, each of which is endowed with substantial administrative and economic powers, to participate in tournament-like competitions over the GDP growth rate (or other indicators that are highly correlated to it). Under the high-powered incentives generated by this cross-regional competition, local governments take initiatives, some even high risks, to invent innovative ways of reform to promote economic development. (Qian – Xu 1993; Maskin et al. 2000; Qian et al. 2006). Further, I want to emphasise that the regional tournament competition may or may not provide effective incentives depending on a series of conditions. The four most important basic conditions are the following: 1) There must be a top-down hierarchical bureaucracy that effectively controls the appointment, supervision, evaluation, and execution of all subordinate level bureaucrats (authoritarian nature of government). 2) All, or the majority of, lower-level bureaucracies consist of self-contained structures, a feature of the so-called M-form (Qian – Xu 1993; Maskin et al. 2000; Qian et al. 2006). 3) The government focuses only on one well-defined and measurable objective. 4) The government's disregard for all other objectives does not cause serious consequences. Considering the implicit assumptions 1), 3) and 4), Maskin et al. provide a theory and preliminary evidence showing that the Chinese M-form, i.e. condition 2), is better than the Soviet U-form in providing incentives (Maskin et al. 2000). A sizeable and growing empirical literature provides evidence to show that regional competition is significantly (economically and statistically) associated with regional economic growth. Accompanied by this literature, rapid growth is observed in political economics and political science literature on the incentives of the Chinese government bureaucracy and in a revival debate on the meritocratic nature of this bureaucracy.

I want to emphasise that some generalizations of the used-to-be successful regional competition could become mistaken because only within a relatively narrow context the aforementioned four basic conditions can be satisfied. Thus, regional competition does not always solve the incentive problem within the bureaucracy. In the Chinese RDA regime, conditions 1) and 2) are automatically satisfied as long as the institution is not corrupt to a serious malfunction. In the following, I will analyze the last two conditions.

Condition 3) guarantees that regional competition under the RDA regime, that is, satisfying the premise of the first two conditions is able to provide high-powered incentives to fulfil the objective. Condition 4) ensures that the regional competition does not generate serious adverse effects. As GDP is the comprehensive indicator of the total market activities, which is well-defined, well measured, and can be verified independently, setting the GDP growth rate as the competition ob-

jective for local governments not only satisfies condition 3) but also alleviates the constraints of condition 4) because this indicator covers all areas of the economy. Regional governments competing on GDP growth rate make the post-Mao reform different from the regional competitions on grain yields per-unit land during the Great Leap Forward. However, GDP does not cover non-economic dimensions, such as education, environment, inequality, social stability, corruption, and others, which are supposed to be the basic responsibilities of any government. Therefore, setting the GDP growth rate as the sole objective for local governments must violate condition 4) up to some degrees. Only when the consequences of violating condition 4) is tolerable the regional competition can solve the incentive problem, but this solution is only transitional.

Years ago in China, the regional competition on GDP growth rate had caused serious negative consequences to the society and had called for changes. However, without reforming the RDA regime, that is, keeping conditions 1) and 2), the solutions found to replace regional competition on economic growth may lead to worse outcomes, as Holmstrom – Milgrom had discussed (1991).

Further, allow me to briefly summarize the ideas that I have discussed so far. Any large hierarchically organised bureaucracy always faces fundamental incentive problems. In general, this kind of incentive problem can be resolved well only in special cases, such as special missions (e.g., military action or disaster relief mission) or special periods (e.g., early stages of reform). As bureaucrats are appointed, assessed, and promoted by their superiors, bureaucratic subordinates must be accountable to their bosses. However, subordinates usually know local information better, and their bosses rely on them for information and executing commands. When their self-interests are threatened, subordinates not only have intentions but also have abilities to deceive. The saying, “Where there are policies from above, there are counter-policies from below (*shang-you zhengce, xia-you duice*),” manifests the nature of incentive problems in a bureaucracy. Inappropriately designed incentive schemes in a bureaucracy, such as incentive-incompatible high rewards and severe punishments, lead bureaucrats to be “idle or irresponsible in their jobs (*bu zuowei, luan zuowei*)”². In attempting to solve the fundamental incentive problems of bureaucracy without reforming the RDA institution, the solutions are bound to repeat the cycles of centralisation and decentralisation, and these cycles end up with the well-observed and well-reported

² In the 12th National People’s Congress in 2016, Prime Minister Li Keqiang blamed those bureaucrats, who are “idle or irresponsible in their jobs (*bu zuowei, luan zuowei*)”, being responsible for underperformance of the economy and threatened to dismiss them (<http://news.qq.com/a/20160305/021848.htm>).

vicious circles of “things stop working once centralised, things run into disorder once decentralised (*yi-shou jiu-si, yi-fang jiu-luan*).”

The regional competition on GDP growth rate has solved important parts of the incentive problem under certain conditions during a particular period of time. However, this opportunity appears only when many conditions are satisfied, thus it is only a small window of opportunity. This should be taken as a transitional approach. When this solution is not completely failing, the reform should use the time gained to focus on replacing the bureaucracy with better institutions, which will allow replacing regional competition with better schemes. The basic principle of the suggested reform based on the aforementioned analysis is shown in the following: 1) The functions and powers of the government should be strictly restricted to maintaining market and social order and providing public services. The dominant entities of the economy and society, those who would make decisions and allocate resources should be private enterprises, non-governmental organisations, and the market. 2) The incentives of local bureaucracy heads should be more linked to their constituencies, that is, the citizens within their jurisdictions, and be less linked to the bureaucratic bosses. A large proportion of the bureaucratic appointments should be replaced by elections in bottom-up and step-by-step manners. For these two transitions to proceed smoothly, establishing the rule of law is the necessary condition. In the following, I will discuss this issue based on my previous research collaboration with Katharina Pistor (2003).

2. RESEARCH ON THE JUDICIAL SYSTEM/INSTITUTION

Maintaining order and protecting property rights by the judicial system is the foundation of a market economy. In particular, it is a consensus in economics and law about the importance of protecting private property rights and enforcing contracts by independent courts. In all developed countries, for generations, the dominant law enforcement entity has been the independent courts, which must hold a neutral position in all legal cases. As the independence of courts prevails, it is taken for granted, and thus, rarely mentioned in today’s scholarly literature in the West. However, since the 20th century, in many domains of developed market economies, such as in finance, medicine, aviation, and in other areas with significant safety consequences, regulatory agencies have been introduced to assist law enforcement by courts. Regulation means that some administrative agencies also take the role of law enforcer, but they hardly remain neutral. Serious debates on regulation have been conducted by economic and legal scholars. The first question is: why do we need regulation in the first place? Introducing regulation into the economy causes new problems, such as bureaucracy, corruption, political cap-

ture, and others. Thus, if the law enforcement by the court can solve all the problems and effectively maintain market order, then why do not we let the court alone enforce the law? The second question is: who should be the regulator and the law enforcer? This question is particularly important because when some non-neutral administrators become law enforcers, government failure emerges. Yet, without regulation, market failures occur. Therefore, the question is, which is a more serious matter: government failure or market failure? To address this question, we must understand the nature of the judicial system and the design of judicial institutions. An answer to this question will also guide us in designing reforms.

The aforementioned discussions highlight important issues for all developed economies. However, compared with these economies, China has law enforcement problems that are significantly more fundamental and serious. In the absence of independent courts and effective law enforcement, government regulation has replaced a large portion of the tasks of the courts in law enforcement. To a large extent, the over-reliance on regulation is partly an intentional policy design, partly wishful thinking, and partly chosen as a last resort. The deficiencies caused by the over-reliance on regulation are widespread and serious. In addition to the extensive judicial injustice, the absence of law enforcement prevails in many areas because regulating every aspect of an economy is impossible. Thus, reforming China's judicial system is one of the most fundamental problems that China faces.

Inspired by the incomplete contract theory and property rights theory of Hart (1995), Pistor – Xu (2003) proposed an incomplete law theory to explain the allocation of control rights in law enforcement or the basic alternative law enforcement mechanisms. This theory explains the conditions under which the court alone is the optimal law enforcement mechanism, and also the conditions under which introducing regulation to complement the court's law enforcement is optimal to social welfare.

Similar to the fact that incomplete contract theory is developed based on the benchmark of complete contract theory, our incomplete law theory is developed based on the benchmark of classical legal theory. Thus, this theory complements classical legal theory and does not conflict against it. The existing classical legal theory or law-economics theory has made two underlying implicit assumptions (while some classical legal theory founders may not even be aware of it). The first assumption is complete law (or at least laws that can be designed to be complete). The second assumption is the neutrality of the court, which is consistent with the realities of all developed economies. Our theory drops the first assumption, the completeness of law. We believe that the incompleteness of law is the key point of understanding different law enforcement institutions. Moreover, a theory based on the assumption that the law is incomplete is closer to the reality.

The assumption of complete law implies no loophole or ambiguity in the law. Moreover, to ensure judicial justice, an independent court should only enforce the law when a case is brought to it, that is, the law should be enforced *ex-post* and reactively, and the court must maintain a neutral position between plaintiff and defendant. Through *ex-post* enforcement, optimally designed complete law would stipulate that any law-breaking action would incur a cost (punishment) that overrides the benefit from such action. Thus, in a society where the law is fairly implemented, at equilibrium, no rational person would choose to break the law. This scenario is the overview of the optimal deterrent equilibrium of law enforcement in the classic Bentham – Becker theory³. Taking this theory literally, government regulation is not only redundant but may also be harmful because of government failures. Indeed, before 1930, without state regulation and relying entirely on court enforcement of the law in maintaining market order, financial markets had proliferated in the United Kingdom and the United States, providing essential financial support for industrial revolutions. This important historical fact strongly supported the Bentham – Baker theory. However, since the Great Depression of 1929, starting from the US, almost all modern societies with rule of law have introduced regulations to complement the court in law enforcement.

Our theoretical explanation on the introduction of state regulation is that if the law is incomplete, then rational people, including judges, lawyers, and ordinary people, will have different understandings of the law, especially concerning its scope and the degree of punishment. This situation leads to different results for different people. Thus, even with a neutral court, *ex-post* law enforcement alone will fail to deter optimally, and we call this situation “deterrence failure”. Under this situation, designing alternative institutions to assist the law enforcement by the court becomes necessary. This scenario is the overview of incomplete law theory in explaining alternative law enforcement systems.

According to incomplete law theory, regulatory law enforcement is created in response to the deterrence failure of the court system. Therefore, regulatory law enforcement must do and only do the things that the court is not able to do, that is, proactive prevention, to complement the court’s reactive law enforcement. This scenario is indeed the actual operation mechanism of regulators. However, the problem is that regardless of whether a regulatory agency is part of the executive branch of the government or an NGO (such as chambers of commerce, guilds, and others), regardless of whether a regulator is independent of the government, or regardless of the moral standard of a regulator, they lose the neutrality between

³ Jeremy Bentham (1748–1832) was an English jurist and utilitarian philosopher; Gary Becker (1930–2014) was an American economist and Nobel laureate partly for his contributions to law enforcement.

the plaintiff and the defendant as long as they are involved in proactive law enforcement. Such a non-neutral law enforcement agency may not only bring judicial injustice but also breed corruption. We call these aforementioned problems “regulatory failure”, which is a particular type of government failure.

To reduce regulatory failure and mitigate its consequences, regulatory regimes should be designed with the following principles: 1) regulators must be kept neutral, and 2) the scope of each regulator’s power must be narrowly defined. Regulatory agencies are more likely to be unjust and breed corruption than courts because the nature of proactive law enforcement implies non-neutrality in their operations. A neutral regulatory regime is characterised by independence from political powers, which prevents political interference in law enforcement and being independent of commercial interests to prevent the erosion of law enforcement justice by commercial interests. Regulatory agencies must be kept neutral from other administrative powers as well. The powers of regulatory agencies must be strictly limited to preventive civil law enforcement, and a narrowly-defined specific area. Even within their jurisdiction, regulators must have no power whatsoever in enforcements exceeding prevention in criminal law enforcement. Facing *ex-post* law enforcement and criminal cases, the law enforcement powers should be placed in the hands of the court, and regulatory agencies must transform their roles into being the prosecutor.

The degree of the incompleteness of the law is closely related to the dynamics and complexities of technology and society. As technology and society change rapidly, the law becomes incomplete. Schumpeter’s “creative destruction” is usually used to discuss the growth of technology, business, and market in the technological revolution. The theory of incomplete law reinterprets “creative destruction” from a new perspective of the institution. More importantly, when there is no reform or when reforms are resisted, the legal institutions’ destruction brought about by the technological revolution could become absolute destruction to law and social order, that is, we cannot take “creative destruction” for granted. Historically, in economies with well-established rule of law, rapid revolutionary changes in technologies and society break down the completeness of the law, consequently causing deterrence failure of law enforcement and undermined market order. Only when the judicial system of the economy is able to deal with such challenges creatively absolute destruction can transform into “creative destruction”. In addition, only in this case, the rule of law and market order can be maintained or re-maintained and technological changes can be beneficial to peace and economic growth.

The regulatory type of law enforcement imposes high costs on society because of the nature of preventive proactive law enforcement and the cost incurred from regulatory failure. In a society with well-established rule of law, the introduction of regulation in certain areas depends on the trade-offs between the costs and

benefits from the regulation. Regulation should only be introduced in the areas where the following conditions are satisfied: 1) the law is highly incomplete, and 2) effects of harmful activities are large, for example, life-threatening situations or creating tremendously negative externalities.

However, China faces drastically different problems. As mentioned, an independent court is the core of the judiciary. In the absence of an independent court and lack of awareness of the importance of judicial independence, emphasising government regulation would mislead the direction of reform and hamper the long-term efforts to establish the rule of law. Judicial independence and the rule of law cannot be established overnight. They require long-term efforts. Yet, judicial independence is the prerequisite of many reforms. In reality, many reforms may have to be carried out before the rule of law can be established. To deal with the urgent needs, administrative regulation is put into place as a temporary substitute of the court. This “regulation” is fundamentally different from the regulation in economies with the rule of law, where the court plays the central role in law enforcement. In China, the greatest difficulties in law enforcement are not due to the incompleteness of the law but are due to the lack of independence of the court. Regulation in China is not designed to focus on prevention functions. Instead of assisting and obeying the court, regulation is designed for subordinates to obey their superiors in the executive branch of the government hierarchy. Moreover, some regulatory agencies, which are established for temporary purposes, create their own interest groups in the system, thereby hampering the long-term reforms in the judicial system.

Incomplete law theory and classic legal theory take judicial independence as the foundation of the rule of law. Incomplete law theory argues that in certain areas where the reactive enforcement suffers from deterrence failure caused by the incompleteness of law, supplement by proactive law enforcement, namely, regulation, is the optimum law enforcement mechanism. This supplement should be the goal of judicial reforms to establish the rule of law in all developing countries including China. Therefore, in the reform process, we must consider the establishment of an independent judiciary as a top priority.

3. SOFT BUDGET CONSTRAINT THEORY: INTERPRETATION OF INSTITUTION, INNOVATION, AND ECONOMIC PROBLEMS FACED BY CHINA

Research and development (R&D) play a decisive role in long-term economic growth. However, R&D faces serious incentive problems. Institutions profoundly influence R&D activities by determining their incentive mechanisms. For example, R&D expenditures measured by the ratios of R&D to GDP in predominant

state-ownership economies, such as the Soviet Union and Eastern Europe, are significantly higher than those in the market economies. However, because of the incentive problems, their R&Ds generally fall behind those in the market economies, especially in the computer industry, biological sciences, and other frontier fields except the aerospace and nuclear industries. Today, as innovation becomes China's top national policy, a clear and thorough understanding of the relationship between institution and innovation, especially the relationship between institutional reform and the concepts of innovation and entrepreneurship, is too important to overlook.

Inspired by Hayek and Schumpeter and based on Kornai – Dewatripont – Maskin soft budget constraint (SBC) model (Kornai 1992; Dewatripont – Maskin 1995; Qian – Xu 1998), proposed a theoretical model to explore the manner by which different institutions determine alternative incentive mechanisms in R&D. The general points are the following: 1) The hard budget constraint in the market system determines the “survival of the fittest” principle in the R&D process through the prevailing ex-post selection mechanism. 2) The “survival of the fittest” principle in the market ensures high efficiency of R&D activities, which make many parallel R&D projects in the market affordable and thus enhance the overall success rate. 3) The SBC makes economies with predominant state ownership impossible to select projects ex-post, which not only violates the “survival of the fittest” principle but also leads to difficulties in eliminating poorly performing projects and therefore increasing the R&D costs. 4) Facing the high costs of R&D and failing to select ex-post, these economies would have to rely on top-down bureaucracy to make ex-ante evaluations of R&D projects to control cost by reducing R&D projects. 5) This situation not only distorts the incentives mechanism for R&D but also significantly reduces parallel competition in the forefront innovation projects, thereby resulting in numerous decision “mistakes.” In other words, the decision errors that occurred in the bureaucracy are essentially created by the institution. Within bureaucratic institutions, regardless of the design of rewards and punishments, the decision errors in the ex-ante selection processes will always be repeated, and these repeated “errors” weaken their competitiveness in the forefront innovation areas.

Even in the developed market economies, the natures of R&D activities are also deeply influenced by different institutions of firms, markets, and judicial systems in the economies. For example, over the past half-century, most of the revolutionary, ground-breaking, and original inventions and innovations came from small innovative companies financed by venture capital (VC). In contrast, the R&Ds in large companies with sufficient capital usually focus on incremental innovations, later-stage developments, or taking over inventors through mergers and acquisitions.

However, the thriving of VC finance depends on institutions and concretely on a developed financial market, whereas the precondition of financial market development is the rule of law. Most VC financing activities involve syndication among many independent VCs, and this syndication hardens the budget constraints of the VCs. By contrast, although large companies in the market economies are generally subject to hard budget constraints, the internally financed R&D activities within these companies may not be so. As there is no means to design internal capital markets of large companies in such a way that they imitate the operations of numerous independent VCs, internally financed R&D activities within large firms suffer from SBCs. This explains that why large companies' R&D focuses on lower-risk innovative activities (Huang – Xu 1998a, 1998b, 2003; Maskin – Xu 2001). To a certain extent, this study readdresses the well-known Coase problem, “what is the boundary of the firm,” from the perspective of finance. The ownership structure of the firm is closely related with, yet different from, the boundary of the firm. Only in the market economies where private property rights dominate, the boundary of the firm can be determined by asset owners, and they could co-exist with small, innovation-oriented firms that enjoy high efficiencies in invention and innovation, and large firms that enjoy high efficiencies in large-scale development, manufacturing, sales, and services.

For similar reasons, government-run VCs are hardly able to imitate independent VCs operating in markets. The governments of the European Union, Japan, and several other countries, and recently China, hope to promote innovation by establishing VCs to simulate the independent private VCs in the US. However, these efforts overlooked the institutional conditions of VCs. Therefore, after two decades, these attempts failed to fulfil the expectation. And there are important implications for long-run growth to these economies (Huang – Xu 1999). China should seriously learn from this lesson and realize the rationale behind it.

In the next parts of this section, I apply the SBC theory to explain some of the most serious economic problems in China: excess capacity and soaring leverage ratio. These two problems are actually driven by the same root: the SBC. The heart of the SBC problem is that when state-owned enterprises (SOEs) and local governments are insolvent, they do not go bankrupt. Instead, they are bailed out by the government. The SBC problem creates wrong incentives for the managers of SOEs and bureaucrats of local governments such that they borrow and expand unresponsively.

The SBC is an old problem that reformers were already familiar with in the early days of reforms. In the 1990s, after effective reforms through which budget constraints were hardened, the SBC problem was substantially mitigated, which laid a foundation for fast economic growth in the subsequent decade. Unfortunately, not only the reforms of hardening budget constraints have been discontin-

ued, but the SBC problem was also forgotten in the name of the so-called “China Model”. Consequently, in recent years, the SBC problem has returned in the form of new syndromes and caused serious consequences. The new SBC syndromes include the extraordinarily large amount of borrowing of local governments from banks backed by a land mortgage, rapidly expanding bank loans to SOEs, which leads to viciously excess capacity. An arguably more important point is that the SBC syndrome appears in the security market. When performing extremely poorly or even become insolvent, the listed former SOEs are not delisted and do not go bankrupt. Instead, they obtain various kinds of capital injections from the government. This new SBC syndrome distorts the entire financial market and undermines the market order. In addition, this syndrome causes more difficulty for this market to be the place to support independent VCs to finance innovations.

The reason why successful VCs are concentrated in nations with developed security markets is that hard budget constraints prevail in such security market. Moreover, the hard budget constraints, in turn, are necessary conditions for the development of the security market. Without guaranteed hard budget constraints, the order of the entire stock market is destroyed.

4. CONCLUSION: COMMON CHARACTERISTIC OF THE THREE ASPECTS

The common subject shared by the aforementioned sections is the solving of incentive problems in different institutions, including bureaucrats’ inventive problems in a bureaucratic hierarchy for the sake of reform and economic development; solving the incentive problems of everyone, including bureaucrats, corporations, and individuals, in different judicial systems to establish the rule of law; and solving incentive problems for bureaucrats, top managers, and entrepreneurs in different financial systems for R&D. The common point of the discoveries of these analyses is that controlling resources and human beings through a top-down bureaucratic hierarchy faces unsolvable incentive problems. This scenario applies to any political, economic, and judicial institution, except for organisations, such as the military and fire brigade, which have simple and emergency tasks. Top-Down government bureaucracy cannot resolve the incentive problems for bureaucrats at all levels as long as they face important multiple tasks. If the judicial system is organised or governed by a top-down bureaucratic hierarchy system alone, then this kind of judicial system will not be able to enforce the law effectively because of all types of incentive problems. Finally, a top-down fiscal-financial institution creates the SBC problem, which hampers R&D activities in the institution. These results not only explain the superiority of a market economy over a bureaucratically planned economy but more important-

ly argue that to maintain market order and promote economic development, the spheres controlled by top-down hierarchies in the administrative, fiscal, finance, and judicial systems should be reduced as much as possible. In the areas where a top-down hierarchy is necessary, the scope of powers of these hierarchies should be restricted as much as possible.

REFERENCES

- Becker, G. S. (1968): Crime and Punishment: An Economic Approach. *Journal of Political Economy*, 76:169–176.
- Dewatripont, M. – Maskin, E. (1995): Credit and Efficiency in Centralized and Decentralized Economies. *The Review of Economic Studies*, 62(4): 541–55.
- Hart, O. (1995): *Firms, Contracts, and Financial Structure: Clarendon Lectures in Economics*. Oxford: Oxford University Press.
- Holmstrom, B. – Milgrom, P. (1991): Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design. *Journal of Law, Economics and Organization*, 7: 24–52.
- Huang, H. – Xu, C. (1998a): Soft Budget Constraint and the Optimal Choices of Research and Development Projects Financing. *Journal of Comparative Economics*, 26 (1): 62–79.
- Huang, H. – Xu, C. (1998b): Boundary of the Firm, Commitment and R&D Financing. *Mimeo*, London School of Economics.
- Huang, H. – Xu, C. (1999): Institutions, Innovations, and Growth. *The American Economic Review*, 89(2): 438–444.
- Huang, H. – Xu, C. (2003): Financial Syndication and R&D. *Economics Letters*, 80 (2): 141–146.
- Kornai, J. (1992): *The Socialist System: The Political Economy of Communism*. Princeton: Princeton University Press.
- Maskin, E. – Xu, C. (2001): Soft Budget Constraint Theories: From Centralization to the Market. *Economics of Transition*, 9(1): 1–27.
- Maskin, E. – Qian, Y. – Xu, C. (2000): Incentives, Information, and Organizational Form. *Review of Economic Studies*, 67(2): 359–378.
- Pistor, K. – Xu, C. (2003): Incomplete Law. *Journal of International Law and Politics* (New York University), 35(4): 931–1013.
- Qian, Y. – Xu, C. (1993): Why China's Economic Reform Differ: The M-form Hierarchy and Entry/Expansion of the Non-State Sector. *Economics of Transition*, 1(2): 135–170.
- Qian, Y. – Xu, C. (1998): Innovation and Bureaucracy under Soft and Hard Budget Constraints. *Review of Economic Studies*, 65(1): 151–164.
- Qian, Y. – Roland, G. – Xu, C. (2006): Coordination and Experimentation in M-Form and U-Form Organizations. *Journal of Political Economy*, 114(2): 366–402.
- Weitzman, M. L. – Xu, C. (1994): Chinese Township-Village Enterprises as Vaguely Defined Cooperatives. *Journal of Comparative Economics*, 18(2): 121–145.
- Xu, C. (2011): The Fundamental Institutions of China's Reform and Development. *Journal of Economic Literature*, 49(4): 1076–1151.