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Nexus of Privatization, Marketization, and Institutionalization during Transition Process---An Experimental Analysis Based on China's Provincial Panel Data

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Abstract

This paper aims at exploring development process and its characteristics of China's privatization focusing on a nexus of marketization, institutionalization and various types of privatization, to obtain an insightful implication about effective privatization/marketization policies particularly in institutionally underdeveloped countries like China. Our hypothesis is that, given a certain level of institutional development, there must be a kind of causal and dynamic relationships between marketization and privatization. If market triggers private ownership more easily and effectively than privatization works on marketization, market should be developed first even for the sake of privatizing the entire economy more easily and rapidly. We make a statistical test of this hypothesis with panel data at Chinese provincial level, to draw implications about a dynamic nexus between privatization and marketization vis-à-vis institutional background.

JEL codes: O53, P36, P48

Key words: privatization, marketization, institutionalization, economic transition, China

Introduction

It is a quarter century ago when a radical system transformation started in the former Easter Europe and the Soviet Union. Meanwhile heated debate has been repeated surrounding effective transition approaches and strategies. China's

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gradualism versus CEE and FSU's shock therapy is one of the central issues focused on in such a debate. Fundamental differences between these two approaches may be ultimately concerned with the two following questions, i.e., 1) whether economic transition should be associated with political democratization or not, and 2) whether ownership transformation, or more specifically development of private property rights (hereafter, privatization) should be performed concomitantly with market development (hereafter, marketization) including price liberalization or not.

As far as the first question is concerned, China has experienced relatively successful economic transition, at least so far, as indicated by its long-run high growth, though without any kind of substantial political reforms. Yet it may be still uncertain whether or not it can perform fundamental reforms of state owned enterprises (SOEs) without political change in the future[2]. As for the second question, China has definitely employed a gradualist approach of extending markets without formal as well as large-scale privatization, particularly in key industries, although it has implemented de facto privatization[3]. This Chinese style of privatization seems to have been relatively successful, at least for the moment、if only for the sake of stimulating market activities, thereby accelerating economic growth. Without formal institutions to carry out privatization, it has certainly allowed a tremendous number and many different kinds of private enterprises to be mushrooming in every corner of the Chinese terrain[4].

Our paper aims at exploring the development process and its characteristics of China's privatization focusing on a nexus of privatization, marketization and various types of institutionalization, to obtain an insightful implication about effective privatization/marketization policies particularly in institutionally underdeveloped countries like China.

Our hypothesis is that there must be a certain causal relationship between privatization and marketization. If market can trigger private ownership more easily and effectively than privatization works on marketization, market should be developed first even for the sake of privatizing the entire economy more easily and rapidly. How

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[2] SOEs in China have become one of the "nests" of aggravating corruptions, in which vested interests are deeply involved.

[3] By "de-facto privatization", we mean a type of privatization by which, first, the government allowed a tremendous number and a huge variety of private enterprises to be mushrooming without formal institutions, and second, it overlooked many formally state owned enterprises to be run by private hands, though informally and at first in secret.

[4] Most of township and village enterprises (TVEs) were originally publicly (or collectively) owned, at least nominally, but they have actually been privatized by the end of the 20th century as an aftermath of the systemic transition (*gaizhi*) campaigns. Some of the SOEs were actually found to be privately owned (see Dollar and Wei 2007).

institutions matter during the process of such a causal relationship is an issue that deserves to be considered seriously.

The paper is organized as follows. In section 1 we make a brief literature review to present our hypotheses about relationships among privatization, marketization and institutionalization during transition process. In section 2 we set up a framework to examine the hypotheses, focusing on causal relationships between marketization and privatization. In section 3, we define the above three key variables, i.e. privatization, marketization and institutionalization, and formulate such indices to be used for our statistical tests based on China's panel date at provincial level, to induce several testable hypotheses. In section 4, we present the results of the statistical analysis and discuss whether or not those hypotheses can be proved by the real data. In section 5, we derive some implications about a nexus of or inter-linkage among privatization, marketization and institutionalization from our findings. In the final section we conclude and discuss several limitations inherent in these analyses that should be overcome in our further studies.

1. Literature Review and Hypotheses

As far as we know, there is no work in the economics literature of discussing directly a nexus of privatization, marketization and institutionalization, but there are many authors who take up individual relationships between two of these forces, as well as relationships between one of these forces and certain aspects of economic performances, particularly growth and efficiency. Let us look at major trend of economics literature on effects of privatization, marketization and institutionalization on such performances, first from the general perspectives, then focusing on Chinese studies.

1) Effects of privatization

There are many authors who have taken up an issue of how privatization promotes economic/ managerial performance comparing private and public ownership. The related literature is various and numerous, but as a typical paper surveying a long list of empirical studies on this nissue, we have, for example, Shirley and Walsh (2000) who collect as many as 52 case studies on the effects of ownership in managerial efficiency of the world over. They conclude that 37 cases demonstrate the superiority of private firms over their counterparts with public ownership, while only 4 cases show the contrary and remaining 11 cases provide neither positive nor negative answer to this question.

The other type of literature is one discussing effects of privatization of public enterprises as a result of economic transition from planned to market economies. Megginson and Netter (2001), for example, survey the effects of privatization in the

1980's and 1990's in the world with the result that privatized firms are more efficient and more profitable than their former SOEs, although non-privatizing measures such as market liberalization can improve the efficiency of SOEs, but such reforms would be more effective when coupled with privatization. Focusing on the effects of privatization in transition economies, Estrin et al. (2009) find that such effects differ between CEE and CIS countries, pointing out that privatization in the former is more effective than in the latter. Their finding seems to imply that institutional development is one of the keys determining effects of privatization, as CEE is more institutionally well-organized than CIS in terms of privatization measures. Djankov and Murrell (2002) reached almost the same conclusion as theirs.

Studies on the effects of privatization in the case of China are also many, and most of them discover basically positive effects of privatization in managerial efficiency as well as profitability. Based on their sample survey of 12,400 firms, Dollar and Wei (2007), for example, found that SOEs had significantly lower returns to capital, on average, than private firms, whether domestic or foreign-owned. Constructing a panel data set of 25,970 SOEs, Bai et al. (2009) made it clear that privatization of China's SOEs was effective for increasing sales and improving labor productivity with significant gains in profitability. Moreover, calculating the profit rate of manufacturing firms, Lu and Liu (2005) discovered that privatized firms were able to increase ROA compared to SOEs. Jefferson and Su (2006), too, supported these findings on the basis of their surveyed data of large and medium scaled manufacturing enterprises in China.

2) Effects of institutionalization

Institutionalization in the sense of institutional development is generally thought to gear economic growth, as many authors have argued that "institutions matter" (e.g. Acemoglu, Johnson and Robinson (2004)), indicating that "institutionalization matters". The problem is what and how institutions matter for economic growth. It is undeniable that legal institutions are essential for modern economic growth as Beck (2010) emphasized. By the same token, Beck and Levine (2004) point out that legal tradition is important in shaping financial development in each country.

Another problem is how to prove the importance of institutions as a whole, since they are a complex system comprised by many subsystems. There seems to be no definite way of directly proving the institutional totality in economic development, besides arguing about contributions by some specific institutions e.g. property rights, legal system, and corporate governance, but it can be proved indirectly in the following way. If we can assume that corruptions occur basically due to the entire institutional backwardness in a society, the degree of corruption can be a (negative) proxy of overall

institutional development. Then, if corruptions can be demonstrated as being anti-growth, or anti-efficiency, as against well-known Leff-Huntington's hypothesis (i.e. corruption as grease for growth), institutional development can be shown to be pro-growth, or pro-efficiency. As a lot of statistical studies have demonstrated so far, their hypothesis has been almost denied (see, e.g. Mauro (1995), Vinod et al. (2000), etc.). They have reached a single conclusion that corruptions can neither enhance the total amount of investment, nor increase output of corrupt firms.

However, such a conclusion may be revised at least to a certain extent if institutional factors are taken into account. Mendez and Sepulveda (2006), for example, discover that a linear relationship between corruption and growth cannot be substantiated if political institution is considered. Based on international comparison and regression analysis, they find that Leff=Hungtinton hypothesis can be valid in non-free countries.

In the case of China, almost all the studies have been negative to this hypothesis. In other words, corruptions are generally harmful for economic development. However, some studies find an inverse U-shaped relation between corruption and growth or other economic performance (see, e.g. Wu and Rui (2010), Yang (2011)). This implies that the above finding by Mendez and Sepulveda (2006) may be applied to the Chinese scene.

China may have something strange as to the roles that institutions play in the course of economic growth. Institutionalization may not necessarily guarantee economic development in the Chinese history of economic growth. Weitzman and Xu (1994), for instance, insist that human relationships and trust (in place of formalized proprietorship) worked quite effectively behind the development of TVEs (town and village enterprises) in China. Allen et al.(2005), too, point out that "(in place of legal and financial systems) the system of alternative mechanisms and institutions plays (in China) an important role in supporting the growth in the private sector-----relationship and reputation". It is Kato (2013) who stresses the importance of institutional vagueness in China in the process of economic development. Thus it may be safe to say that the rapid growth in China might have been realized to a certain extent not by institutionalized mechanisms, but rather by informal, human relational factors as well as opaque institutions.

3) Effects of marketization

On the other hand, it goes without saying that marketization stimulates economic growth, since markets themselves have an inherent dynamic force to boost the growth. As economic history tells us, markets have been expanding in association with economic growth, which in turn has promoted marketization (Hicks (1969)). This has already become a popular common sense without any need to testify. Even though we have

found no definite causality between these two factors, it must be natural, at least, to say that marketization proceeds concomitantly with economic growth.

To sum up. To the best of our knowledge, there has been no work which deals with a nexus of or inter-linkages among privatization, marketization, and institutionalization either in economic development or in transition, although there are studies on relationships between privatization and market, or between privatization and institutions, much less ones discussing causal and dynamic relationships among this triad. But since markets, private ownership and institutions are all tightly correlated with economic performance like growth, these three key variables must be closely interrelated[5]. As institutions must be the basis for the interrelationships between private ownership and markets, institutionalization must be acting as a background for privatization/marketization nexus (see Figure 1). Then, it seems logically natural to assume that

a) privatization is closely associated with marketization, whether the former promotes the latter or the former is promoted by the latter, which is an issue to be tested by empirical work;

b) institutionalization must be also associated with both privatization and marketization in the process of economic growth;

c) if, however, institutions act positively the other variables, they can be interpreted as playing a role of something like glue or catalyst connecting markets (marketization) with private ownership (privatization) as shown in Figure 1. Moreover, given China's experiences of rapid economic growth, high speed of marketization, reluctance to formal and large-scale privatization, and relatively underdeveloped institutions, we can derive some testable hypotheses for our analysis as follows, namely,

H(1): the more privatized a transition economy is, the more easily and rapidly it can be marketized.

H(2):the more marketized a transition economy is, the more easily and rapidly it can be privatized.

H(3):then, the relationship between marketization and privatization is reciprocal in nature, but their effects are asymmetrical in that marketization affects privatization more strongly than the contrary.

H(4):the more institutionalized a transition economy is, the more easily it should be privatized and marketized in theory, but the institutionalization's effect must be

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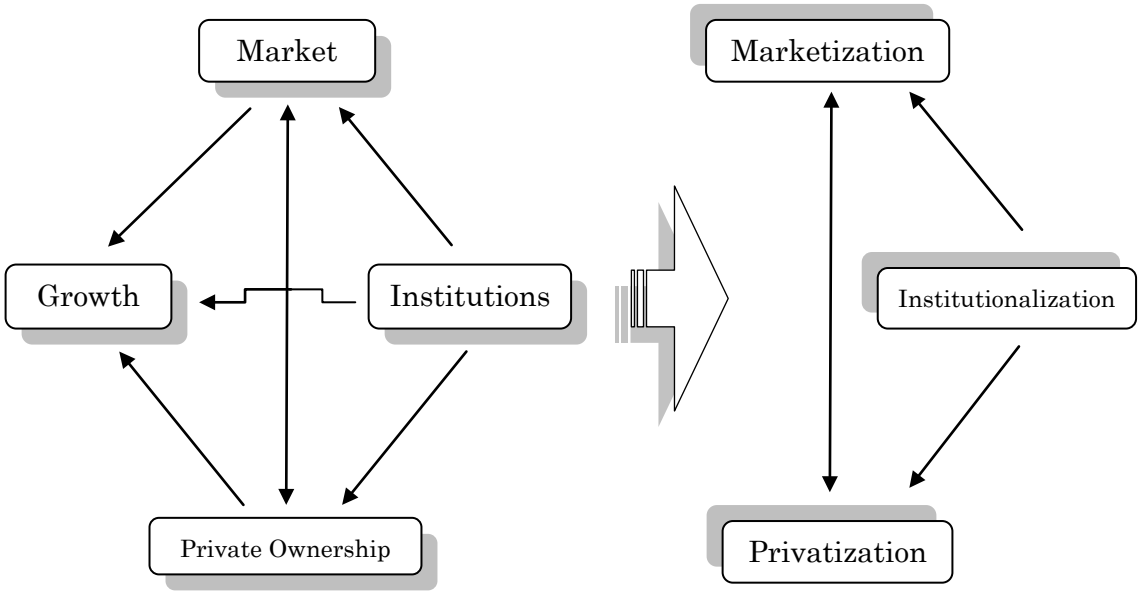
[5] Theoretically, they could be independent from each other, but such an assumption seems extremely unnatural or lacking in reality.

asymmetrical in reality in the sense that the effect on privatization is comparatively stronger than on marketization, because privatization as spread of private capital ownership is more complicated than extensive transfer of ordinary commodities in markets.

Figure 1. Nexus of or inter-linkage among privatization, marketization and institutionalization.



2. Analytical framework and methodology

What methodology should be employed to test these hypotheses, then? Popular causality tests such as Granger's focus only on an aspect of causal relations between each pair of those key variables, rather than on a relative strength of the effects that they have on each other. Our hypotheses above are not only related to causal relations among the triad, but also point to relative influential powers of each variable. In this sense, the methodology employed by Chinn and Ito (2006) could be more useful for our objectives. More specifically, they examined financial development (five-years lag) in association with capital openness as well as institutional characteristics based on panel data of 108 countries in the world, while they tested also the reverse causality of change in capital openness explained by financial development.

Before specifying our estimation models to clarify the nexus of privatization, marketization, and institutionalization, let us assume, first, that institutions do not alter easily, therefore the state of institutionalization does not change at least as rapidly as marketization and privatization do during the middle range of time, say 5 or 6 years.

Then we can focus on the effects of average level of institutionalization, rather than on the change in institutions. Second, we assume that institutions have not only a direct effect on the other variables, but also an indirect effect on them through acting on one of them.

We try to examine marketization's development (with three-years lag) in association with privatization's trend as well as institutional characteristics based on China's panel data encompassing 30 regions at provincial level, while we test also the reverse causality of change in privatization explained by marketization's development. The model is specified as:

$$M_{it}-M_{it-3}=\alpha_m+\beta_{m1}M_{it-3}+\beta_{m2}P_{it-3}+\beta_{m3}I^*+\beta_{m4}I^*P_{it-3}+\beta_{m5}\text{GDPper capita}_{it-3}+\beta_{m6}\text{GDPGrowth}_{it-1/t-3}+\beta_{m7}\text{Openness}_{it-3}+u_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1),$$

and

$$P_{it}-P_{it-3}=\alpha_p+\beta_{p1}P_{it-3}+\beta_{p2}M_{it-3}+\beta_{p3}I^*+\beta_{p4}I^*M_{it-3}+\beta_{p5}\text{GDPper capita}_{it-3}+\beta_{p6}\text{GDPGrowth}_{it-1/t-3}+\beta_{p7}\text{Openness}_{it-3}+u_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2),$$

where M denotes marketization index, P represents privatization index, and I* refers to institutionalization level, respectively, while i shows administrative unit of provincial level, t is time, and u is an error term. GDP per capita, GDP Growth, and Openness in region i are all included as control variables in the above equations. Openness is measured as the ratio of the region's total exports and imports to regional GDP.

Equation (1) investigates a change in marketization levels during three years which can be explained by initial levels of M and P, average level of I and an intersection of I and P, controlling for regional per capita GDP, growth rate and openness in the region. Equation (2) investigates a change in privatization levels during three years which can be explained by initial levels of M and P, average level of I and an intersection of I and M, controlling for regional per capita GDP, growth rate, and Openness.

If the above hypotheses are all valid, and if the three key indexes could be all measured in a comparable way, we could expect as testable hypotheses that:

H(1): β_{m2} is significantly positive.

H(2): β_{p2} is also significantly positive.

H(3): β_{p2} is larger than β_{m2}.

H(4): β_{p3} is significantly positive and larger than β_{m3}, and β_{p4} is significantly positive and larger than β_{m4}.

3. Definition and formulation of the three key variables: privatization,

marketization, and institutionalization

Let us, first of all, define a concept of "privatization" in this paper. Generally, this notion means the transfer of capital ownership from public to private hands at a micro level such as privatization of state owned enterprises (SOEs). However, we use this concept here more broadly as a process of expanding private capital in a macro economy, such as increasing appearance and rising share of private firms as compared to public enterprises. Let us call the former case of privatization as "micro-privatization", the latter one as "macro-privatization" for brevity. Therefore, such situation of privatization could take place in theory as well as in reality that SOEs are not privatized at all while their share of national income or industrial production is declining over years[6]. In other words, micro-privatization is not necessarily linked with macro-privatization. However, the macro-privatization could involve, needless to say, the micro-privatization as long as the share of private ownership is rising within an economy. Usually, these two types of privatization proceeds side by side[7].

The definition of "marketization" is simple. Here we refer to any tendency of market development as marketization. Markets are called "developed" at least in the following two senses, that is, a) the more and more items of goods and services as well as production factors enter the markets; b) the more and more freely they are priced and transacted without non-market, particularly governmental interventions than before. Thus if the government abolishes or loosens price controls, markets can be called "more developed", namely marketization develops in the economy.

Finally, the term of "institutionalization" is more complicated and difficult to define than the above two concepts, since institutions are extremely broad in scope, characterized by diversity, from rules to organizations, from formal to informal, and from coercive to voluntary. Institutionalization is a process/tendency in which such institutions are generated, developing, and intensifying themselves. We use this term in this paper as a process in which various institutions regularizing economic activities are increasingly created, for example enactment of new laws and establishment of new regulations, and/or as a tendency where these institutions are certainly implemented in the real affairs. Institutions are divided into two kinds, formal and informal, but naturally formal institutions are higher than informal ones in terms of the level of institutionalization. Informal institutions, such as customs and human relationships,

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[6] When we look at privatization in China, it seems important to separate these two types of privatization. The Chinese leadership has been reluctant to privatizing the core of SOEs particularly in strategically important industries.

[7] Even in China, these two types of privatization have been concomitants, since the majority of state SMEs have left the state ownership by the end of the 1990's.

are often characterized by vagueness in nature.

The data from which we derive indexes of those variables are all from the Chinese sources. We constructed and formulated indexes to describe the three key variables in the ways as below.

The data for our statistical analysis in this paper are in the major part drawn from the following three sources, *i.e.* (a) Fan, Wang, and Zhu, *Zhozngguo Shichanghua Zhishu* (NERI Index of Marketization of China's Provinces Report, hereafter NIM), National Economic Research Institute, various years, (b) Wang, Fan, and Li (2012), *Zhongguo Fensheng Qiye Jingying Huanjing Zhishu* (Business Environment Index for China's Provinces 2011 Report, hereafter BEI), National Economic Research Institute, and (c) *Zhongguo Tongji Nianjian* (China Statistical Yearbook, hereafter CSY), National Bureau of Statistics of China. Both NIM and BEI provide us with detailed and useful panel data for every province, special city, and autonomous region except for Tibet. Both privatization index and marketization index can be calculated from NIM data. As institutions are complex, we tried to formulate four types of institutionalization index; one is calculated utilizing NIM data alone, the other three are constructed from NIM data as well as BEI data and social cleanness (or negative corruption) index. Control variables used in our estimates are basically derived from the CSY (see Appendix for details of how to formulate these indexes). The period covered by NIM is from 2001 to 2009, while BEI data are only for three years, 2006, 2008, and 20010.

What is to be stressed is the difference of data characteristics between NIM and BEI. The NIM data are composed by various quantitative and objective data, while the BEI data are composed by several subjective indicators. But all of the basic data included in these sources are measured by comparable counts, e.g. point one to point ten.

Table 1. Descriptive statistics

	Average	Std.Dev.	Minimum	Maximum
M(t)-M(t-3)	0.64	0.70	-1.36	2.70
P(t)-P(t-3)	1.81	1.12	-1.31	5.22
M(t-3)	6.16	1.49	2.73	9.46
P(t-3)	6.01	2.76	0.68	12.77
Institutionalization Index : I(1)	5.12	2.74	1.34	15.98
I(2)	9.10	2.85	4.54	20.20
I(3)	10.58	3.00	6.32	22.00
I(4)	14.56	3.08	9.64	26.22
Per Capita GDP(t-3)	12475.04	8914.29	2983.07	51463.43
GDP Growth(t-1～t-3)	25.96	5.66	13.34	49.27
Openness(t-3)	0.33	0.39	0.05	1.67

Note: I(1)—index calculated only based on NIM related data; I(2)---index calculated from I(1) plus social cleanness index; I(3)---index calculated from I(1) plus BEI related index; I(4)---index I(2) plus BEI related index. See Appendix below more in details.

We conducted a panel data analysis based on fixed effect model in the most part to exclude time-invariant effects like regional characteristics, but adopted a random effect model, too, if necessary, after examining the statistical results by Hausmann test and F test as well as Breush and Pagan test (specifically, Model 3 in both Table 2 and 3). As equations (1) and (2) indicate, our models include three-year time lags[8], the number of observations is only 180, i.e. 30 provinces for 6 years, since the coverage of years in our panel is limited to 2001~2009[9].

Table 2. Estimation results of equation (1)

	Dependent Variable : M(t)-M(t-3)			
	Model 1	Model 2	Model 3	Model 4
M(t-3)	-1.01*** [-18.53]	-1.00*** [-18.76]	-0.78*** [-11.32]	-1.00*** [-18.75]
P(t-3)	0.11*** [3.03]	0.19*** [3.86]	0.29*** [4.14]	0.29*** [4.18]
Average I	0.20*** [3.02]	0.21*** [3.16]	0.38*** [4.54]	0.20*** [3.05]
Average I * P(t-3)	-0.02*** [-4.24]	-0.02*** [-4.42]	-0.02*** [-4.25]	-0.02*** [-4.40]
Per Capita GDP(t-3)	0.00** [2.59]	0.00** [2.21]	0.00** [-2.30]	0.00** [2.30]
GDP Growth(t-1～t-3)	0.01 [0.75]	0.01 [0.83]	-0.01 [-1.21	0.01 [0.86]
Openness(t-3)	-0.78* [-1.88]	-0.66 [-1.57]	0.67** [2.04]	-0.70* [-1.68]
Constant	5.42*** [22.38]	4.52*** [11.02]	1.98*** [3.35]	3.52*** [4.89]
Co. of Determination (within)	0.83	0.83	0.24	0.83

Note: ***shows significance level at 1 %, **at 5%, * at 10% respectively.; Model 1 to Model 4 correspond to Institutionalization index I(1) to I(4); Model 3 alone is estimated

[8] Chinn and Ito (2006) adopt five-year lag in their model formulation as noted above, but there seems to be no definite standard for suitable time-lag when we talk about growth period.

[9] No doubt, the number of observations should be increased much more for the sake of enhancing model's reliability , but it seems to us that the limited observations cannot be a major obstacle for our analysis, because our main objective here is to reduce some useful implications about the nexus from this experimental analysis

by random effect model. Figures in parenthesis are t-values except for Model 3, those of which indicate z-values.

4. Results and discussion

A summary of the results of our regression analysis is recorded in Table 2 and 3. Corresponding to the four different sets of institutionalization index, we estimated four models, from model 1 to model 4. Those results lead us to several important findings.

(1) Both of our first hypothesis H(1) and second one H(2) are supported. The coefficients of P(t-3) in equation (1) and of M(t-3) in equation (2) are positive and significant. In other words, other things being equal, privatization expands markets, while marketization in turn stimulates privatization.

(2) β_{p2} (0.93 in the case of model 1) is definitely larger than β_{m2} (0.11), no matter which model is selected, therefore H(3) holds certainly. In other words, marketization affects privatization much more strongly than privatization works on marketization.

Table 3. Estimation results of equation (2)

	Dependent Variable : P(t)-P(t-3)			
	Model 1	Model 2	Model 3	Model 4
P(t-3)	-0.80*** [-11.01]	-0.80*** [-11.00]	-0.80*** [-11.03]	-0.80*** [-11.01]
M(t-3)	0.93*** [4.96]	1.07*** [3.64]	1.16*** [3.57]	1.28*** [2.91]
Average I	0.47* [1.72]	0.44 [1.59]	0.45* [1.74]	0.43 [1.63]
Average I * M(t-3)	-0.05 [-1.39]	-0.04 [-1.25]	-0.04 [-1.40]	-0.04 [-1.28]
Per Capita GDP(t-3)	0.00 [-0.34]	0.00 [-0.52]	0.00 [-0.32]	0.00 [-0.50]
GDP Growth(t-1～t-3)	0.05*** [2.83]	0.05*** [2.95]	0.05*** [2.84]	0.05*** [2.95]
Openness(t-3)	1.65 [1.36]	1.59 [1.30]	1.64 [1.36]	1.60 [1.31]
Constant	-1.47 [-1.38]	-3.12 [-1.53]	-3.85* [-1.71]	-5.39 [-1.62]
Co. of Determination (within)	0.53	0.53	0.53	0.53

Note: *** means significance level at 1 %, ** at 5%, * at 10% respectively. As for Model 1~Model 4, see the Note of Table 2. Figures in parenthesis are t-values except for Model 3, those of which indicate z-values.

(3) Institutionalization positively affects both marketizaiton and privatization, but its effect is not necessarily significant. It is strongly significant for all models of marketization, but only weakly significant in the case of Models 1 and 3 of privatization. Therefore, H(4) cannot be said to hold well in the case of institutionalization effects on marketization, although it is valid for the effects on privatization.

(4) Moreover, institutionalization tends to affect marketization indirectly through privatization (see Table 2) and privatization through marketization (see Table 3), but negatively for all models against our expectation. In particular, this indirect negative effect is strongly significant for marketization. How this fact should be interpreted deserves our consideration, and we will return to this issue below.

(5) When an economy has the higher marketization or privatization level at its initial stage, the less rapidly it increases (see significantly negative signs of the coefficients of M(t-3) or P(t-3)), but the effect on marketization or privatization level of three years later is positive. This suggests that these two variables have their own self-generating power in themselves.

(6) GDP per capita has a significant effect on the trend of marketization, but is effect is almost negligible. On the other hand, the effect of GDP growth on marketization is also negligible, but insignificant. In contrast to the case of marketization, the effect of economic growth on privatization is positive but small, while per capita GDP's effect is almost nothing and insignificant. The region's openness has positive, but only limited impact on privatization though insignificantly, while its effect on marketization is either positive or negative, depending on which type of institutionalization index is employed for analysis.

As far as these results from panel data analysis are concerned, we may not be able to be free from "endogeneity" problems, which can be involved in the model specified as in equation (1) and (2). In order to avoid possible problems of such endogeneity as serial correlation between explanatory variables and error term, and at the same time for the sake of making robustness checks of the above results, we tried to test different methodologies in our analysis, i.e. first difference and feasible GLS approaches. More specifically, in order to remove fixed effects from the model we applied first difference approach to the above equation (1) because we found no correlation of such a kind in the equations.

We added year dummies to equation (1) in ordet to control for time effects common to all regions, to obtain equation (3) below.

$$\Delta M_{it}=M_{it}-M_{it-3}=\alpha_m+\beta_{m1}M_{it-3}+\beta_{m2}P_{it-3}+\beta_{m3}I^*+\beta_{m4}I^*P_{it-3}+\beta_{m5}\text{GDPper capita}_{it-3}+\beta_{m6}\text{GDPGrowth}_{it-1/t-3}+\beta_{m7}\text{Openness}_{it-3}+\gamma_{m8}d2005+\gamma_{m9}d2006+\gamma_{m10}d2007+\gamma_{m11}d2008+\gamma_{m12}d2009+u_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Therefore,

$$\Delta M_{it}-\Delta M_{it-1}=\beta_{m1}\Delta M_{it-3}+\beta_{m2}\Delta P_{it-3}+\beta_{m3}\Delta I^*+\beta_{m4}\Delta I^*P_{it-3}+\beta_{m5}\Delta \text{GDPper capita}_{it-3}+\beta_{m6}\Delta \text{GDPGrowth}_{it-1/t-3}+\beta_{m7}\Delta \text{Openness}_{it-3}+\beta_{m8}\Delta d2006+\beta_{m9}\Delta d2007+\beta_{m10}\Delta d2008+\beta_{m11}\Delta d2009+\Delta u_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

where d2004, d2005 etc. are year dummies, and Δ denotes difference between t and t-1.

We first applied the first difference approach to equation (4) by OLS to obtain the results recorded in Table 4.

Then, we applied the same approach to equation (2), to get equation (5).

Table 4. Results of first difference estimation

	Dependent Variable : M(t)-M(t-3)			
	Model 1	Model 2	Model 3	Model 4
M(t-3)	-1.12***	-1.11***	-1.12***	-1.11***
	[-16.36]	[-16.30]	[-16.36]	[-16.31]
P(t-3)	0.09*	0.12**	0.14**	0.16**
	[1.95]	[1.99]	[2.13]	[2.03]
Average I	0.07	0.07	0.07	0.07
	[0.79]	[0.73]	[0.76]	[0.71]
Average I * P(t-3)	-0.01*	-0.01	-0.01*	-0.01*
	[-1.76]	[-1.64]	[-1.79]	[-1.69]
Per Capita GDP(t-3)	0.00	0.00	0.00	0.00
	[0.90]	[0.82]	[0.92]	[0.85]
GDP Growth(t-1～t-3)	0.01	0.01	0.01	0.01
	[1.20]	[1.29]	[1.20]	[1.29]
Openness(t-3)	-0.13	-0.10	-0.15	-0.11
	[-0.23]	[-0.17]	[-0.25]	[-0.19]
△d2006	0.10**	0.11**	0.10*	0.10**
	[1.98]	[2.00]	[1.96]	[1.98]
△d2007	0.07	0.07	0.07	0.07
	[1.01]	[1.04]	[0.99]	[1.02]
△d2008	-0.01	-0.01	-0.01	-0.01
	[-0.14]	[-0.08]	[-0.16]	[-0.10]
△d2009	-0.12*	-0.12**	-0.12*	-0.12*
	[-1.76]	[-1.71]	[-1.79]	[-1.74]
F Value	39.71***	39.56***	39.76***	39.62***

Note:Figures in parenthesis indicate t-values. *** means significance level at 1 %, ** at 5%, * at 10%, respectively.

$$\Delta P_{it}-\Delta P_{it-1}=\beta_{p1}\Delta P_{it-3}+\beta_{p2}\Delta M_{it-3}+\beta_{p3}\Delta I^*+\beta_{p4}\Delta I^*M_{it-3}+\beta_{p5}\Delta \text{GDPper capita}_{it-3}+\beta_{p6}\Delta \text{GDPGrowth}_{it-1/t-3}+\beta_{p7}\Delta \text{Openness}_{it-3}+\beta_{p8}\Delta d2006+\beta_{p9}\Delta d2007$$

$+\beta_{p10}\Delta d2008+\beta_{p11}\Delta d2009+\Delta u_i$ . . . . . (5).

However, since we found significant serial correlations in the first difference model of the equation, we tried feasible GLS approach to the above equation in order to control for the effects from these correlations. The results thus we obtained are recorded in Tables 5.

Let us compare the resutls of Table 4 with those of Table 2, and the results of Table 5 with those of Table 3. Obviously, the results by the new estimators basically confirm our previous findings and conclusions based on equations (1) and (2). However, as the model specification is different between these two approaches, we cannot compare β_{m2} in Table 2 with that in Table 4, and β_{m2} in Table 2 with β_{p2} in Table 5 in a strictly exact manner. Yet, such results firmly suggests that our hypotheses listed above are almost supported, or at least are not denied, by the different approaches of estimation.

Table 5. Results of feasible GLS estimation

	Dependent Variable : P(t)-P(t-3)			
	Model 1	Model 2	Model 3	Model 4
P(t-3)	-0.70***	-0.70***	-0.70***	-0.70***
	[-10.94]	[-10.81]	[-10.92]	[-10.80]
M(t-3)	0.52***	0.54*	0.78**	0.70*
	[3.00]	[1.96]	[2.48]	[1.70]
Average I	0.41*	0.27	0.37*	0.26
	[1.71]	[1.09]	[1.66]	[1.11]
Average I * M(t-3)	-0.06*	-0.03	-0.05*	-0.03
	[-1.70]	[-1.02]	[-1.67]	[-1.05]
Per Capita GDP(t-3)	0.00	0.00	0.00	0.00
	[0.44]	[0.17]	[0.43]	[0.18]
GDP Growth(t-1～t-3)	0.03**	0.03**	0.03**	0.03**
	[2.40]	[2.56]	[2.41]	[2.55]
Openness(t-3)	2.05*	1.65	2.01*	1.66
	[1.85]	[1.46]	[1.83]	[1.48]
△d2006	0.93***	0.93***	0.93***	0.93***
	[12.10]	[11.92]	[12.06]	[11.89]
△d2007	-0.21*	-0.21*	-0.21**	-0.21*
	[-1.96]	[-1.94]	[-1.99]	[-1.96]
△d2008	-0.23**	-0.23**	-0.24**	-0.24**
	[-2.09]	[-2.04]	[-2.12]	[-2.05]
△d2009	-0.53***	-0.54***	-0.53***	-0.54***
	[-5.07]	[-5.10]	[-5.11]	[-5.13]
Wald chi2	1031.36***	1009.70***	1028.44***	1007.92***

Note: Figures in parenthesis indicate z-values. *** means significance level at 1 %, ** 5%, * 10% respectively

The above findings seem to tell us about the importance of institutions in relation to the privatization/marketization nexus. What does the negative sign of intersection

terms in our model imply, whether in equation (1) or (2), or irrespective of which model regarding institutionalization index is employed? Does this demonstrate anything characteristic of China's privatization/marketization nexus during its transition process? Let us take the intersection of I*×P(t-3) in equation (1) as an example. The coefficient of that intersection in the case of model 1 is significantly negative (-0.02) as Table 2 records. This indicates that the higher the institutional level is, the less rapidly marketization proceeds in China, given the initial level of privatization. This fact seems to imply that in the Chinese context institutionalization does not necessarily stimulate marketization. Vague institutions, as we refer to later, may be one of the keys in determining China's rapid marketization, as a result leading to its high growth rate at least until around 2010.

The similar situation takes place as for privatization, but in a less positive way. Namely, the higher the institutional level is, the less rapidly privatization proceeds in China, given the initial level of marketization, as the coefficient of I*×M(t-3) is negative for all institutionalization models (-0.05 or –0.04), but these estimated coefficients are all statistically insignificant (see Table 3).

Institutions associated with privatization and marketization are really multiple in kinds, say, from legal institutions to accounting rules, but certain kinds of institutions probably may influence certain specific aspects of privatization and marketization process in an asymmetrical way, although we do not still have any solid evidence to prove this implication.

5. Some implications

This finding does not testify uselessness of institutions as well as institutionalization for the sake of expanding markets and accelerating privatization in transition economies. It only suggests that China's relative backwardness in institutionalization has never been a serious obstacle for marketization, privatization as well as economic growth. Rather it implies that institutional backwardness may have been quite effective in China, as Weitzman and Xu (1994) stressed. A typical example is a dramatic rise of TVEs in rural China in the 1980's and 1990's, which was made possible by de-facto privatization and unrestrained economic activities in which ordinary peasants and local cadres were involved spontaneously[10].

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[10] TVEs were originally public enterprises called collectively owned but a substantial portion of them were "red hat enterprises (*hongmao qiye*)". They were nominally "red" or socialist, but actually private. "Red hat" was effective for them to run their enterprises, since banks were all state owned, even rural financial cooperatives were publicly owned, giving favor to public enterprises.

However, we could get a new insight into transition process from China's path of gradualism. Let us rearrange mutual relationships between privatization and marketization on the basis of our analysis summarized in Table 2 and 3. Now we take the results of model 1 again to illustrate such a nexus (see Figure 2 below).

On one hand, P (privatization) stimulates M (marketization), which in turn activates P. On the other hand, P and M themselves have their own self-generating and/or self-stimulating power. Thus there exists an inter-linkage or nexus between P and M. If we could neglect for simplicity constant terms, intersections of I*, and control variables in equations (1) and (2), then we have the following equations as to the nexus of privatization, marketization and institutionalization.

$$P(t) = (1+\beta_{p1})\,P(t-3) + \beta_{p2}\,M(t-3) + \beta_{p3} I^*$$
$$M(t) = \beta_{m2}\,P(t-3) + (1+\beta_{m1})\,M(t-3) + \beta_{m3}\,I^*$$

This can be rearranged in a vector and matrix form as-----

$$X(t) = AX(t-3) + bI^* \cdots\cdots\cdots\cdots\cdots (6),$$

where X is a column vector of P and M, A is a matrix (hereafter, nexus matrix) containing estimated coefficients relating to the two variables, and b is a column vector (β_{p2}, β_{m2}), namely

$$A=\begin{pmatrix} 1+\beta_{p1} & \beta_{p2} \\ \beta_{m2} & 1+\beta_{m1} \end{pmatrix} \quad , \quad b=\begin{pmatrix} \beta_{p3} \\ \beta_{m3} \end{pmatrix}$$

Equation (6) shows that the state of P(t) and M(t) is determined by the initial state before one period (three years), given the level of institutionalization bI*.

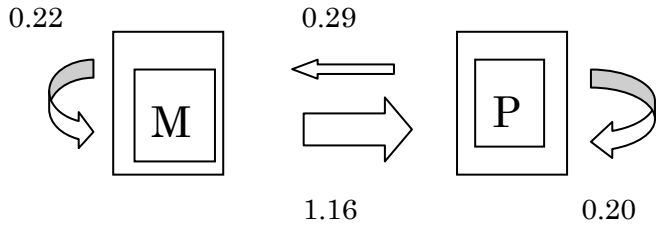
Matrix A describes dynamic and sequential relationships between P and M, as implied in Figure 1 above. P (t-3) creates not only P (t) but also M (t), while M (t-3) creates not only M (t) but also P (t). It may be effective to exemplify specific cases illustrating P and M inter-linkages in order to understand the meaning of such relationships. An example that P creates P is a case in which a private (privatized) firm generates its subsidiaries, while an example that P creates M is a case in which a private (privatized) firm generates new markets of its products as well as its subsidiaries' ones. A case in which M creates M is such a case as a market generates new markets through its input/output relations, while a case in which M creates P is such a case as development of a market ignites burgeoning new private firms.

As the results of our experimental analysis have demonstrated above, the impact of

P on M may be much weaker than that of M on P (see Figure 2 below)[11].

The nexus would naturally be changed in the real economy by institutions and policies implemented by the government. Therefore, institutions would affect the whole process of privatization/marketization nexus directly by factor bI* and indirectly by change in components within the nexus matrix A. The direct effects could be once for all, but the indirect effects would be long-run and continuous as equations (7) and (8) in footnote 8 imply. In this way, the indirect effects might be more substantial than the direct ones when it comes to the overall impacts that institutions may have on the privatization/marketization nexus. However, it is still open to question what and how institutions affect the nexus. Moreover, it remains to be seen how differently institutions act under different cultural legacy. Further studies, particularly based on microscopic surveys on some specific regions, will be required to answer this question.

Figure 2. Dynamic relationships between privatization and marketization



Note) P: privatization, M:marketization

Figures are calculated utilizing the results (column 4, Model 3) recorded in Tables 2 and 3.

On the basis of Figure 2 and the above argument regarding the

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[11] We can extend equation (6) in a hypothetical way. If the nexus matrix is held constant over years, moreover, and if the time lag can be assumed to be shortened to just one year for illustration, then, the above equation (6) can be extended to show annually changing dynamic inter-linkage relationships between the two variables, marketization and privatization, as follows.

$$X(t) = AX(t-1) + bI = A^2 X(t-2) + A\,bI = \cdots = A^t X(0) + A^{t-1} bI \qquad (7)$$

Needless to say, this is just for illustration, and it is unreasonable, more correctly impossible at all for the nexus matrix to be constant in the long run. If we could assume that it may alter every year, the long-run nexus between the two variables would be like the following:

$$X(t) = A_1X(t-1) + bI = A_1A_2\,X(t-2) + A_1\,bI = \cdots = \Pi A_t X(0) + \Pi A_{t-1} bI \qquad (8)$$

privatization/marketization nexus matrix A, we can derive an interesting implication as to the effectiveness as well as limitation of the Chinese way of privatization. Let us assume, first, that the nexus matrix could be described as Figure 2 illustrates, and that the nexus structure could not change at all during the two periods, furthermore assume that both privatization and marketization could be measured by a common standard like "efforts" unit. The Chinese style of privatization begins initially placing more emphasis on marketization (180 units of efforts, for illustration) rather than on privatization (20 units, for example). In contrast to this style, shock-therapy-like style of transition implements privatization and marketization concomitantly with equal efforts (i.e. 100 units of efforts for each activity). After one-period, say 3 years elapses, the initial efforts of each policy will be changed as shown in Table 6, depending on the contrasting two types of transition policy.

This illustration seems to suggest that the Chinese style of privatization policy with less emphasis on formal privatization could produce more private enterprises after one period elapses than the shock-therapy-like approach. Contrary to the actual path of experiences, however, markets would be less rapidly developing under the Chinese way of privatization policy, or although they could be developing more rapidly after two periods of time, thereby making the gap between these two approaches narrow in the longer-run.

The above example tells us about a paradoxical story: if China had accepted the shock-therapy-like privatization policy, it would have been able to develop markets much further and perhaps much more deeply. This story seems to predict a possible change in privatization policy the Chinese present leadership may encounter in the future to promote extensive marketization.

Our experimental analysis of the nexus, thus, implies that privatization must be extended further for the sake of strengthening marketization. China has been reluctant to SOE reforms, while it has been pursuing marketization policies and its leadership launched a new extensive policy to "marketize" the entire economy in 2012, but they seem to be at the crossroad regarding whether or not it should privatize even the core SOEs in the strategically important sectors[12].

It goes without saying that the story would change depending on which model of

Table 6. Two Types of Privatization Compared: A Hypothetical Simulation

	Chinese style	Shock-therapy-like

[12] The Chinese government proclaimed an industrial guideline in 2006 regarding which industries have to be substantially state-owned.

	Allocation of efforts	Allocation of efforts
Privatization(initial)	20	100
Marketization(initial)	180	100
After one period		
Privatization	213.2	138
Marketization	41.8	49
After two periods		
Privatization	308.6	225.2
Marketization	71.5	76.3

Note: Figures are calculated as A×initial efforts for one period after and $(A+A^2)$ × initial efforts for two periods after, under the assumption that A matrix cannot change at all over the whole period.

institutionalization index is applied, but the main conclusion implied from these results would be basically same as long as the nexus matrix drawn from the Chinese data is used. As noted above, the nexus matrix reflects institutional relationships involved in the economy concerned. Thus it may be safe to say that the Chinese way of privatization also reflects more or less its cultural and institutional background.

Concluding remarks

We have focused on an issue of nexus constituted by privatization, marketization and institutionalization during economic transition, utilizing the panel data at the provincial level in China. We found that they were all not only interconnected closely, but also mutually stimulating each other. At the same time we discovered that there existed an asymmetrical causal relationship between privatization and marketization, pointing out a possibility that marketization's effect on privatization was much stronger than privatization's effect on marketization. Finally, we suggested that institutions had important effects, both direct and indirect, on this nexus.

These findings lead us to a new hypothesis concerning a dynamic inter-linkage between privatization and marketization. There must be such a linkage during the transition process, whereby China has succeeded in constructing up to the recent days. In our view, institutional backwardness, or more correctly flexibility, seems to play an important role behind this success.

However, these conclusions are subject to several reservations and/or limitations. First, institutionalization is a notion quite hard to define as we have noted above. We tried to formulate four alternative types of institutionalization index in this paper, but

any of them does not appear to be able to capture the real level of institutional development in China. Indexes reflecting institutional development have been formulated by some scholars (e.g. Kaufman, Kraay and Mastruzzi's worldwide governance indicators), but any of these indexes are not necessarily complete in capturing social institutionalization level, therefore cannot be satisfactory enough for our objective to understand transition process in institutionally underdeveloped economies like China[13].

Second, "privatization" in our analysis does not directly describe micro-privatization in our sense, or transfer of ownership of SOEs and other public firms to the private hands, but depicts the overall development of private sectors (macro-privatization). Consequently, the conclusions derived from this analysis cannot be directly applied to other transition countries which are characterized by different privatization policies as well as different cultural background and historical paths[14]. We do not believe that the Chinese style of transition could be totally applied to other countries. CEE countries, for example, have their own historical and cultural legacy, against which a whole process of transition including SOE privatization was set in motion. The Chinese model or way of privatization cannot be a panacea which can be universally appropriate in any country. Moreover, it seems that the Chinese model has been facing a fundamental turning-point since around 2010, when the political leadership began to stress the importance of "rule of law (*fazhi*)". In other words, China has been undergoing economic transition without rule of law in the strict sense, which must be one of the essential aspects of institutional development[15]. They have realized that "institutions matter" in order to make their economy sustainable, by continuing to reform the economic system as a whole (World Bank and the PRC Development Research Center 2012).

Third, our panel data are limited to provincial level, probably useful enough to imagine the overall structure of the nexus in question. But we believe that this study can be the first step toward exploring a complicated and entangled nexus of the above

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[13] Kaufmann et al. have tried to formulate world-wide governance indicators comprised by a wide range of institution indexes, such as accountability, rule of law, control of corruption etc. See Kaufmann, Kraay and Mastruzzi (2010). These indicators are, no doubt, very comprehensive but cannot tell us about an important aspect of institutionalization, for example, about how people respect their institutions and how they really obey their rules and laws.

[14] Imagine why China has not accepted the mass privatization policy. Such a policy is said to be effective for rapid de-nationalization as well as de-politicization. The socialist system was not their own choice for most of CEE's unlike China and the Soviet Union.

[15] In the Chinese terminology, "fazhi" means "rule by law" rather than "rule of law". Rule of law in the true sense cannot be realized under the communist party system, in which the party is ultimately superior to law.

three forces during transition. The analysis should be complemented by in-depth studies built on microscopic surveys and data, hopefully with the much longer period covered[16]. This paper is nothing but an experimental introduction to such studies in the future.

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[16] As far as we know, there is no detailed study so far focusing on how privatization, whether of macro or of micro nature, has been spreading in China. We have no idea of how de-facto privatization has been transformed into de-jure privatization in China and its regions.

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Appendix The three key variables (indexes of privatization, marketization and institutionalization) and control variables

The three key indexes of privatization, marketization and institutionalization employed in our analysis are calculated and formulated in the following way.

(1) Privatization index: We picked up the index named "development of non-state economies" from NIM. This index consists of three sub-indexes, more specifically indexes of share of non-state economies in the amount of industrial sales, in fixed investment of the entire society, and in urban employment.

(2) Marketization index: We took the following sub-indexes from NIM and averaged them to obtain this index: indexes of "government-market relations", degree of development of commodity markets, and degree of development of factor markets.

(3) Institutionalization index: we tried to construct four sets of institutionalization index, taking into account the comprehensiveness as well as vagueness of institutions and institutionalization in economic development and transition.

Institutionalization (hereafter I) index (1) is derived from totally from NIM data about development of market agencies and environment of legal institutions. More specifically, this indicator consists of following four sub-indexes, i.e. development market agency organizations like lawyers and accountants, protection of legal rights of producers, protection of intellectual properties, and protection of consumers' interests.

I index (2) is calculated by averaging Institutionalization index (1) and (negative) corruption index, which is derived from the data provided by Professor Lian Zhou at Peking University, who estimated the degree of corruptions within Chinese provinces by counting the number of people arrested for corruptions. His estimates do not cover the cases in Peking, so we assumed its corruption level was equivalent with the average between Shanghai and Tianjin.

I index (3) is made from the average of index (1) and BEI-based index, which reflects subjective assessment in each province. Namely, this index is a complex of both objective and subjective indexes.

I index (4) is the most comprehensive indicator which combines the above three institutionalization indexes. That is to say, this index is derived by simply averaging I index (1), I index (2), and I index (3).

(4) Control variables: per capita GDP and GDP growth are drawn from the data of regional GDP in CSY. Openness is calculated as a ratio of each province's external trade (export plus import) to its nominal regional GDP.