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# Market transition in Rural China – A New Institutional Approach<sup>1</sup>

Yong He

CERDI-CNRS, University Clermont-Auvergne, yong.he@uca.fr

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**Abstract:** With the guidance of a framework of new institutional economics, the theoretical modelling establishes the necessary and sufficient conditions for institutional change to occur in authoritarian regimes: first, external shocks must be strong, much stronger than in a democratic regime; second, the shocks must be of such a kind that gives rise to factional competition within the ruling group. It predicts that involvement by the ruled group brings about more extensive institutional change than that merely driven by the ruling group. The theory is then applied to explain rural China's market transition. As institutional change defines pay-off structure, the extent of this change is approximated by the income advantage of cadre households relative to non-cadre households. Econometric tests based on a Chinese rural household panel data of 21 years confirm the theoretical prediction.

**Keywords:** Institutional change, authoritarian regime, political returns, market transition, new institutional economics, Chinese rural cadre.

**JEL Classification:** B52, P2,R2.

## I. Introduction

Authoritarian regimes refer to political systems in which countries are ruled by a minor group of persons not chosen through voting process by the people. They correspond to all non-democratic regimes, and cover about one third of countries and one-half of the population in the world.

This study adopts an approach of new-institutional economics of which three Nobel prize owners: Ronald Coase, Douglass North and Oliver Eaton Williamson are the main contributors. Our theoretical framework is inspired by North's analysis on institutional change in economic history. North (1992) has ever noticed the deficit of a new-institutional understanding of non-democratic world: "research in the new political economy (the new institutional economics applied to politics) has been largely focused on the United States and other developed countries. While we know a lot about the characteristics of the politics of third world countries we have very little theory about such politics".

In North (1990)'s theory of institutional change, exogenous changes in the environment (hereafter they are called external shocks) alter relative prices, and organizations as player use their bargaining strength to reinforce or change the ongoing rules. Therefore, political competition between organizations is

the key condition for institutional change to occur. Applying this framework to authoritarian regimes, the crucial question to answer is how could exist political competition? If the ruling group monopolizes the decision-making about institutional change and their interests are more likely linked with the existing system, the status quo could last very long.

Our model is grounded on following ideas. The players are divided into ruling and ruled groups in which only the first has decision right for institutional change. The ruling group is assumed to be endogenously divisible into, using conventional terms, conservative and reformist factions. External shocks must be much stronger than in a democratic regime, because the ruled group is small in size, the common interest within the group is strong, and the costs for reaching an agreement are low. The strength of the shocks, nonetheless, is not the unique requirement. They must be of such a kind that differentiates their interests, leading the reformists to perceive their advantages for engaging in institutional change, and making their bargaining strength to exceed that of the conservatives. Whenever the reformist faction is weaker than another one, institutional change is blocked.

Furthermore, institutional change just coming from political competition within the ruling group is limited in taking into account the interests of the ruled group. Involvement in institutional change by the ruled group itself is a major factor. This, again, depends on the strength and nature of external shocks. Some types of shocks could affect relative prices to the advantage of the ruled group. The best example is the Black Death in Europe during 14th century that caused sudden wage increase. As the results of these shocks, individual choices and actions in consumption, production, and other activities could make on-going institutional setting obsolete. This involvement firstly contributes to the decision making on institutional change by the ruling group through reinforcing the bargaining strength of the reformists within the ruling group. It also gives rise to more extensive institutional change than the one merely driven by intra-ruling group competition.

Therefore, the necessary condition for institutional change in authoritarian regimes is strong external shocks. The differentiation between the interests of the conservative and reformist factions within the ruling group and their competition are the sufficient condition for this change. Furthermore, the degree of popular involvement determines the extent of this change.

This theory is testable, first through empirical validation with case studies, and second with econometrical tests. We explain China's rural market transition with this theory through dividing this transition into three phases. External shocks have prompted all of them. Whereas the first two phases were driven by the political competition within the ruling group, the third proceeded with strong involvement by the ruled group through their voting by feet.

Then we set an econometric test for verifying the prediction that with popular involvement, institutional change is more extensive than that merely

driven by the ruling group. Given, following North, an institutional change defines changes in pay-off structure, and this structure has two dimensions: overall growth of the pay-off and its distribution among individuals, we are able to use global income growth and political returns reflecting income distribution among ruling and ruled groups as indicators to measure the extent of institutional change. Political returns are specific to authoritarian regimes, because in the absence of democracy, these returns correspond to the rents resulting from the monopoly of the ruling group. These returns must be changing along with institutional change that affects the power to control of the group. A sample of household panel data from 1989 to 2009 is constituted, and political returns are defined as the ratio of the net income advantage of cadre households to the incomes of non-cadre households. Applying fixed-effects and matching method to minimize estimation bias, we find that, as expected, the third phase brought about much higher income growth as well as a sharp decrease in political returns.

To summarize, this study has contributed to: 1) constructing a theoretical framework to explain the blockage and occurrence of institutional change in authoritarian regimes; 2) empirically illustrating the theory with Chinese rural market transition and providing econometric tests to the key theoretical prediction. The study, therefore, has filled the gap of the new institutional theory in the deficiency of theoretical setting and empirical tests on institutional change in authoritarian regimes.

The remainder of this study is organized as follows. Section II constructs the theoretical framework. Section III applies the theory to analyze Chinese rural market transition. Section IV provides arguments for the measurement of the extent of institutional change, introduces data and econometric methods, and analyzes the results. Finally, section V concludes.

## **II. The theory**

Bad institutional change happens more frequently in authoritarian regimes. In this study, however, institutional change, like in most previous works, implicitly refers to “good” institutional change that, in broad sense, leads to Pareto efficiency.

North (1990, 1991) provides a general economic approach to institutional change. Institutions define the rule of the game and the pay-off structures. External shocks are the driving force of institutional change through altering relative prices, and creating opportunities for the players in the society to change the rules of the game; Organizations are players. They consist of groups of individuals bound together by some common objectives, and compete in function of the perceived advantages and costs of altering the institutional framework. Institutional change comes as the result of their competition.

Applying this approach to authoritarian regimes, as a large majority of people are excluded from the decision-making process, political competition

appears absent. North (1996) puts major importance on political competition, and affirmed that the best political solution is democratization in which, political market reaches to a solution at the lowest transaction costs.

In following model, we show that, together with some other mechanisms, political competition similar to democratic competition exists in authoritarian regimes in a special form.

### ***II.1. Political competition within the ruling group***

In authoritarian regimes, the competition between different factions within the ruling group becomes possible because the composition of the group is not homogenous (for an analysis on communist regime, cf. He, 1992). Adopting the most conventional way, its members can be distinguished into reformist and conservative factions: the former is more likely to accept and the latter refuse institutional change. Note  $J$  as the decision rule for an institutional change:

$$J = R - C \quad (1)$$

$J$  is a function of bargaining strengths of the reformist faction  $R$  and the conservative faction  $C$ . Institutional change is blocked if  $J \leq 0$ . Otherwise the change passes.

Bargaining strengths of the two factions are function of the extent and kind of external shocks, or, the formation of two factions is endogenously determined. We firstly specify three effects of external shocks:

$$P_R = f(E)$$

where  $E$  refers to the extent and kind of external shocks, and  $P_R$  the relative prices effect in the favor of the reformist faction to the detriment of the conservative faction, with  $\partial P_R / \partial E$  being either  $> 0$  or  $\leq 0$ . In the latter case, the conservative faction is more favored.

In the context of developing countries in which authoritarian regimes are more likely to subsist, people potentially belonging to reformist faction are those with higher education level and entrepreneurial ability. One example of this relative prices effect is that the appearance of new technologies could valorize the ability of the technocrats.

A tax revenue effect is also assumed, which refers to a potential change in tax revenue for the government with the new institutional settings as the consequence of external shocks relating to this revenue under the old one:

$$T = f(E)$$

where  $T$  is the estimated tax revenue change, with  $\partial T / \partial E$  being either  $> 0$  or  $\leq 0$ .

The political stability, defined as the propensity for the change of political regime, is also a concern:

$$S = f(E) \quad (4)$$

where  $S$  reflects the change in political stability level with the new institutional settings as the consequence of external shocks relative to this level under the

old one, with  $\partial S/\partial E$  being either  $> 0$  or  $\leq 0$ . New institutional setting often threatens political stability, thus increases the bargaining force of the conservative faction.

Combining these equations, and assuming that the reformists care changes in tax revenue, and the conservatives in political stability, we get:

$$J = R[P_R(E), T(E)] - C[P_R(E), S(E)] \quad (1.1)$$

where  $R' > 0$  and  $C' < 0$ .

$R' > 0$  means that relative price and tax revenue effects favor the reformist faction. When relative prices change provides the opportunity for some members of the ruling group to gain under a new institutional setting, and the gain is enough large to reach a Pareto efficiency (that is, the gain is always positive after recompensing the potential losers), the reformists benefit from a rise in bargaining strength. Likewise, tax revenue effect also reinforces the bargaining power of the reformists, because they bring improved governmental financial conditions.  $C' < 0$  can be interpreted in a similar way: a threat to political stability reinforces conservatives' bargaining strength.

Equation (1.1) implies that the existence of strong external shocks is a necessary condition for institutional change. Just like in a competitive product market in which prices are highly sensitive to slight adjustment between supply and demand, in a democratic regime, the political market insures that even a weak shock altering relative prices could spontaneously yield a demand for institutional change. In authoritarian regimes, however, as the costs of an agreement reached within a small-sized group are small, and as the maintenance of their rule is a strong common interest, in the presence of weak shocks, the ruling group is more likely to keep unified, and blocks institutional change.

Equation (1.1) also implies that the existence of strong external shocks is only a necessary condition.  $J > 0$  not only requires  $E$  being enough strong, but also,  $\partial P_R/\partial E > 0$ ,  $\partial T/\partial E > 0$  and external shocks having weak political stability effect (the absolute value of  $\partial S/\partial E$  is low). In other words, the occurrence of institutional change also depends on the kinds of external shocks. Some kind of shocks, albeit strong, may fail to differentiate the interests of the two fractions through  $P_R$ ,  $T$  and  $S$ . In this case, institutional change could be blocked. Therefore, the occurrence of factional competition is the sufficient condition for institutional change to take place.

## ***II.2. Involvement by the ruled group***

By definition, the members of the ruled group are excluded from decisionmaking. By which mechanism they are able to be involved in institutional change? Again, external shocks play a crucial role.

Note  $A$  the degree of involvement by the ruled group, which is affected by the shocks via changes in relative prices in the favor of the ruled group ( $P_A$ ):

$$A = f(P_A(E)) \quad (5)$$

with  $\partial A/\partial P_A > 0$ , and  $\partial P_A/\partial E$  either  $> 0$  or  $\leq 0$ .

While some kinds of shocks differentiate the interests of the ruling group, the others create changes in relative prices in the favor of the ruled group. In subsequent Chinese case, globalization stimulating a rise in wage of rural workers is an example.

When external shocks make actual pay-off structure defined by ongoing institutional setting unacceptable for most population, given political voting is unavailable, various processes emerge to fulfil similar function. By involvement from the ruled group, we refer to all kinds of actions, going from changes in individuals' choices in consumption and production to political manifestations that express their discontent and weaken existing institutional setting. In rural China's case, the best example is the "voting with feet", or leaving rural regions for cities where the treatment is better, which meaningfully reduced the realm of control of the ruling group. Another example is the prevalent absenteeism and nonchalance during work that caused huge inefficiency in Ex-Soviet economy. The actions of trade unions or of other organizations authorized in some autocratic regimes also give rise to these effects.

Another role of popular involvement is its influence over the ruling group via changes in tax revenue: The demand for institutional change by ruled group, if satisfied, could increase tax revenue, and enhance the bargaining strength of the reformist faction. Or:

$$T = f(A) \text{ with } \partial T / \partial A \geq 0 \quad (6)$$

On the other hand, popular participation in institutional change may also cause ruling group's concern about political stability:

$$S = f(A) \text{ with } \partial S / \partial A \leq 0 \quad (7)$$

To simplify, the effect of popular involvement on tax revenue and on political stability can be included in  $T(E)$  and  $S(E)$  of Equation (1.1) respectively, so that in the presence of popular involvement, the decision rule is always defined by Equation (1.1), but with the awareness that the terms  $T(E)$  and  $S(E)$  are different between the cases with or without popular involvement.

The key role of popular involvement is that institutional change, whenever decided by the ruling group, will become more extensive than that merely driven by the ruling group. In authoritarian regimes, institutional change mostly consists in giving up some control power by the ruling group in the favor of individual freedom of choice. This concession made merely as the result of the compromise within the ruling group must be smaller than that achieved under the pressure of popular involvement.

Note  $V$  as the extent of institutional change. Without popular involvement,

$$V = f(R, C) \text{ with } \partial V / \partial R > 0, \partial V / \partial C < 0; V = 0; \text{ if } R - C \leq 0 \quad (8)$$

With popular involvement,

$$V = f(R, C, A, \Delta R_A, \Delta C_A) \quad (9)$$

where  $\partial V / \partial A > 0, \partial V / \partial \Delta R_A > 0, \partial V / \partial \Delta C_A < 0; V = 0 \text{ if } R + \Delta R_A \leq C + \Delta C_A$ .

$\Delta R_A$  and  $\Delta C_A$  are respectively induced bargaining strengths of reformist and conservative factions derived via Equations (6) and (7). In other words, in the absence of voting right, popular involvement also contributes to the decision making on institutional change.

With popular involvement, institutional change is bigger if:

$$A + \Delta R_A > \Delta C_A \tag{10}$$

In general, this condition holds, because the ruled group is numerically important, leading popular participation to change the balance of bargaining forces. Nevertheless, it is always possible that the concern for political stability leads  $\Delta C_A$  to be so high that  $R + \Delta R_A \leq C + \Delta C_A$ , or institutional change is blocked. This extreme case often happens in political institutional change. In other cases, especially in the case of economic institution reforms,  $\Delta C_A$  due to the concern to political stability should be at a reasonable level. Therefore, the condition defined by Equation (10) is more likely to hold, leading institutional change with popular involvement to be larger than that merely driven by within-ruling group competition.

### II.3. The achievability of institutional change

As the result of foregoing analysis, the conditions under which institutional change is achievable or blocked can be set out.

External shocks could be either neutral or alter relative prices. In the former case, there could be no influence on institutional change. In the second case, the influences depend on 1) if they affect relative prices that differentiate the interests of ruling elites or are in the favor of the ruled group; 2) if they exert tax revenue effects. Fully expressing the extent of institutional change as a function of external shocks, we get:

$$V = f\{R[P_R(E), T(E)], C[P_R(E), S(E)], A[P_A(E)]\} \tag{11}$$

Logically external shocks are also able to cause bad institutional change if all or some of the derivatives:  $\partial P_R / \partial E$ ,  $\partial T / \partial E$ , and  $\partial P_A / \partial E$  are negative, so that  $\partial V / \partial E < 0$ . But we only consider the case where  $V \geq 0$ .

On the basis of Equations (1.1) and (11), we are able to identify five typical cases summarized in Table 1.

**Table 1:** A typology of institutional change

	(1)	(2)	(3)	(4)	(5)
<i>External shock</i>	<i>weak</i>	<i>strong</i>	<i>strong</i>	<i>strong</i>	<i>strong</i>
Relative bargaining strength within ruling group (the reformist over conservative)					
Ruled group	not involved	not involved	not involved	involved	involved
Result	blocked	blocked	small change	big change	blocked

Source: author.



Case 1: When external shocks are weak, so that  $J \leq 0$ , there is not any institutional change.

Case 2: The shocks are strong but their effects on relative prices and on tax revenue are quite weak (some or all of  $\partial P_R / \partial E$ ,  $\partial T / \partial E$ , and  $\partial P_A / \partial E$  are small), or the concern for political stability is too strong (the absolute value of  $\partial S / \partial E$  is high) so that  $J \leq 0$ , there is not any institutional change.

Case 3: Institutional change occurs with  $\partial P_R / \partial E > 0$ ,  $\partial T / \partial E > 0$ , small concern about political stability, and absent popular involvement ( $\partial P_A / \partial E = 0$ ), so that  $\partial V / \partial E > 0$ . The extent of the change is small ( $V$  is small).

Case 4: Other things being equal to Case 3, there is in addition popular involvement ( $\partial P_A / \partial E > 0$ ), so that not only  $\partial V / \partial E > 0$  (institutional change occurs), but also the extent of change is large ( $V$  is large).

Case 5: Other things being equal to Case 4, there is a big concern for political stability ( $S(E)$  is high in absolute value), so that  $J \leq 0$ , institutional change is blocked.

### III. An application to Chinese rural market transition

Market transition is a typical case of institutional change. Chinese rural market transition proceeded in a context of change from collectivist command economy to market economy. Rural cadres, officials working in townships and villages, played a leading role in this transition. They form the base for rural political and economic governance, and constitute the ruling group. Statistic information on rural cadres is scarce. They are estimated to be about 1.5% of rural population.<sup>2</sup>

Three phases of Chinese rural market transition can be distinguished, and their differences can be analyzed with the key factors derived from our theoretical framework: external shock, political competition within the ruling group, and the degree of popular involvement.

First phase (1978-1996) was the establishment of the household-responsibility system (HRS). Collective land ownership kept unchanged, peasants were contracted to explore a certain size of land during 30 years renewable, and the yields beyond the quota was sold in free markets at unregulated prices. Thrusted by this change, there was a large development of the township and village enterprises (TVEs).

The external shock driving this change was the economic crisis caused by the Cultural Revolution (1966-1976), in which uninterrupted political struggles made national economy to reach the brink of collapse. More incentive rural production system was called for going out from the crisis. This was an external shock coming from urban area to rural region.

This was a cadre-driven institutional change. The shock altered relative prices in the favor of one part of cadres with higher education level and entrepreneurial ability. The naissance of TVEs started during the mid-1970s. Since then a large number of cadres were formed to be business managers.

While the conservative faction saw loss of control in land and other resources, the reformists got more advantages from the expansions of TVEs, a natural consequence of the application of HRS, which derived important surplus labor. The reformist cadres also benefited from expanding trading networks owing to the growths of TVEs and of agricultural production.

The involvement by peasants, the ruled group, was limited. Without the permission by cadres, peasants had not any right on how to use lands and organize productions, and only passively adapted to this change and accepted their role assigned by cadres.

It is noteworthy that in China, institutional change often proceeds in a form of “ex post institutionalization”. The reform starts at first in small scope, sometimes clandestinely. If producing positive results, it will be extended to other zones, and at last recognized officially. Otherwise, it will shrink in size and disappears. The emergence of HRS was in Xiaogang village. After having suffered a severe drought, 18 households secretly signed a contract with local cadres to be allocated lands for exploration, a method strictly forbidden under the old system. In 1979, similar experiments were launched and expanded in Sichuan and Anhui provinces, and generated dramatic increase in agricultural productivity. In 1981, the central government openly praised the reform, and new system was adopted nationwide.

With this change, quickly cereal and food shortage disappeared, and rural industrialization started. Between 1982 and 1988, industrial output of TVEs grew at an average annual rate of 38.2% (Putterman 1997). In the end of this phase, TVEs produced over 30% of all China’s industrial added value, profit and output, and all TVEs across non-agricultural sectors created more than 15% of China’s GDP (Sun 2002). Correspondingly, employment in TVEs rapidly increased to reach to 125.37 million in 1998.

The second phase (between 1997 and 2000, extendable to 2003) was marked with the privatization of TVEs. The East Asia economic crisis in 1997 suddenly reduced market size for TVEs adopting labor-extensive technology. Market competition had constrained the ability of TVEs to meet revenue and employment imperatives, while local governments’ sales-oriented growth strategies had exacerbated governance problems (Kung and Lin 2007). In response to this decline, many small TVEs in financial difficulties were asked either to close or privatized. This trend of privatization can be estimated to reach its end by 2003 where most TVEs had been owned by private majority shareholders.

Following the theoretical model, again, the success of privatization was due to an external shock: the East Asia crisis, which placed intensive pressure for the ownership change. More importantly, this shock made the relative prices of entrepreneurial ability appreciated. The Party technocrats had strong incentive for the change in ownership because it could bring enormous benefits to them. According to Li and Rozelle (2003), local governments almost always

sold firms to insiders, especially to their managers or other private owners closely linked with local officers in large-scale TVE ownership restructuring. Therefore, this was also a cadre-led institutional change. The big winner of the privatization was a number of cadres. Peasants had neither opportunities nor capital to be the owners of TVEs, and for them there was little difference between working in collective and private-owned TVEs.

The process of privatization, once more, went in the way of ex post institutionalization. At first privatization started locally and clandestinely, then, at last, it was generalized and formally recognized.

The third phase started from 2000, and was featured by the acceleration of rural-urban migration. According to the Statistical Annual Yearbooks, the share of migrant workers in total rural labor increased from 7.14% in 1990 to 19.47% in 2000. This share reached to 30.91% in 2005 and to 56.17% in 2010.

External shock came from China's integration into globalization. Since 2000, as major providers of a large number of manufacturing goods, Chinese coastal regions had been enjoying the reputation of the "world factory". The increase in demand and in wage incited more peasants to leave their villages and to work in cities. Rural-urban migration was then tightly restrained by a system of household registration (the Hukou system) with discriminating conditions for rural workers on food quota, housing, medical care, child schooling, and employment (Young 2013). *Rural workers were administratively kept in their villages without right of free movement. Before, with less attractive wage and high costs for installing in cities, staying in villages was the privileged choice for most farmers. With this shock, a massive increase of rural migrants can be considered as voting with feet against on-going institutional setting in the disfavor of peasants.*

This phase also marked a profound evolution in the way of institutional change. It was no longer, as in early two phases, driven by cadres, but by peasants themselves. External shocks made peasants individually changed their choices in allocation of labor. These individual actions produced a collective effect, which made a mounting pressure on the ruling group to reconsider their institutional setting. To satisfy the increasing demand for labor in cities, the loosening of restrictions on migration came also in a way of ex post institutionalization. It started in few provinces in need of migrant workers. It was until 2014 that the differentiation between agricultural and non-agricultural Hukou statuses was definitively suppressed at the national level.

Three remarks can be made from the comparison of three phases. First, they constitute a whole process of market formation. The first phase partially formed land and products markets. Since then peasants were allowed to rent their contracted lands to the others, and to sell their products. The second phase marked the nascent form of capital market following the privatization of TVEs. Finally, the third phase formed the labor market in which labor mobility became possible.

Second, while two first phases were cadre-driven institutional changes, the third was thrust with intense involvement by peasants.

Third, not only external shocks were needed to be strong, but also successive for the success of market transition. Moreover, because external shocks exerted different relative prices effects: those favorable to reformist cadres and those to peasants, institutional change was driven only by cadres during the first two phases, whereas peasants were involved in the third phase.

#### **IV. Empirical Tests**

The theory mainly yields two predictions: 1) the occurrence of strong external shocks is a necessary and factional competition within the ruling group a sufficient condition for institutional change to take place; 2) institutional change is bigger with popular involvement than that merely driven by the competition within the ruling group. Case studies with descriptive statistics are able to verify the first prediction. This section shows why and how the second prediction is testable.

##### ***IV.1. The measurement of institutional change***

The test of the second prediction requires quantitatively measuring the extent of an institutional change. Following North, institution defines pay-off structure. Consequently, a more extensive institutional change must induce bigger change in pay-off structure. The change in pay-off structure has two dimensions: the growth of total pay-off and the change in its distribution among individuals, especially between the people belonging to the ruling and ruled groups. In the context of rural China, global income growth rate corresponds to the first dimension, and changes in political returns, as will be shown, can measure the pay-off distribution. With these indicators, it becomes possible to verify the prediction that the third phase with popular involvement brought about institutional change bigger than that during the first two phases.

Political returns can be defined as the ratio of the net gain from one unit of investment in political activity to its opportunistic costs in other activities. These returns can be surrogated by the ratio of the advantage in income of the ruling group to the income of the ruled group. Political returns are higher in authoritarian regimes, because these returns correspond to the rents derived from the monopolistic political position of the ruling group. The more powerful the monopoly, the higher political returns will be.

A handful of work has addressed political returns. Fisman (2001) showed that in every case of the emergence of a string of rumors about the health of former Indonesian President Suharto, the returns on shares of politically dependent firms were considerably lower than the returns of less-dependent firms. Goldstein and Udry (2008) provided evidence that in Ghana, individuals

holding powerful positions in local political hierarchies have more secure tenure rights to cultivated land and enjoy substantially higher output.

Nee (1989) affirmed that during a transition from planning to markets in rural China, there may have been diminishing political returns. This is because in a central planning system, with economic resources concentrated in the hands of political officials, returns to political power and status must be high. Market transition signifies a progressive change to a competitive income determination, leading to decreasing political returns of them.

Following our theory, the trend of political returns may not emerge so unidirectional. First, political returns could be not decreasing because the ruling group has the possibility to block market transition. Second, political returns can be either not decreasing or periodically increasing if the pay-off structure of a cadre-driven transition is excessively to cadres' advantage. Only with popular involvement, institutional change could be expected to produce decreasing political returns. Subsequent section will focus on how to test this prediction empirically.

#### ***IV.2. Data and Estimating methods***

CHNS database is constituted with longitudinal surveys of eight waves (1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009 and 2011).<sup>3</sup> The surveys cover more than 30000 individuals from about 8000 households (about two-thirds from rural and one-third from urban populations) in nine representative Chinese provinces.

Cadre households are defined as the households with at least one member being village or township-level cadres. According to our estimation, the share of cadre households in total rural households is around 5% in rural China.

608 cadre households are identified, in which at least one of household members were reported as a cadre in one of waves 1989, 1991, 1993, 1997 and 2000 in rural areas. As the Chinese government is vigilant on political topics, data on this issue is unusually incomplete. Some cadre households may deliberately not report the existence of cadres. To deal with this, the strategy adopted in this study is to consider all households that reported at least one time the existence of a cadre as cadre households. The year of their reporting is the starting year, and their cadre household status is assumed as lasting to the final wave of their participation in survey.

Since some cadres, after one or several mandates, may quit their posts, could this way to deal with the data incompleteness lead to serious bias? Several arguments suggest overlooking the effect of this measurement error. First, as cadre is a stable and relatively high profit job, cadres in active service have an incentive to keep their posts as long as possible. Second, the absence of elections favors the reigning cadres to keep their posts by themselves or their relatives. Third, as most cadres must first be Party members, and Chinese rural areas and populations are large, the ratio of Party members to population is much

lower than in urban areas.<sup>4</sup> In most villages, a small number of households with Party members constitute a closed choice set for cadre nominations.<sup>5</sup> Fourth and more importantly, becoming a cadre is an investment, or an establishment of a social network. The engagement in political activities forms an accumulative capital. Even after resignation, ex-cadres still exercise influences in village or township activities. Therefore, the absence of formal title could have limited effects on their returns.

As we need to observe the evolution of income effects, among 608 cadre households, a number of them only appeared in a short period due to their interruptions in survey. Arbitrarily the study only keeps those that lasted at least four waves (at least 9 years). As such, 429 cadre households are kept, with 2608 observations.

To ensure comparability, first are removed the non-cadre households, of which survey waves started in 2004, 2006 and 2009 due to their limited lengths. Then are removed all households that did not participate in all surveys from their starting wave to wave 2009. This way, 1911 non-cadre households are kept for comparing with 429 cadre households. Thus, the panel data set is a total of 2340 households and 16062 observations, starting from waves 1989 to 2000 and ending to wave 2009.

As the first task, we define political returns as  $\pi_t = \frac{Y_c^t - Y_{nc}^t}{Y_{nc}^t}$  in wave  $t$ ,

where  $Y_C^t$  and  $Y_{nC}^t$  are respectively incomes of household with and without political cadre.

Previously a number of work have explored the existence of the returns to being cadres and variables explaining these returns in rural China (e.g., Parish et al. 1995; Nee 1996; Parish and Michelson 1996; Cook 1998; Morduch and Sicular 2000; and Walder 2002). These studies were queried due to selection bias they encountered: If rural cadres are richer not because they are cadres, but because of some unobservable superior capabilities, and their becoming cadre and their higher income are both explained by these capabilities, the conclusion that they are rich because of their cadre status would not be fully convincing. In this case, econometrically, both explanatory and dependent variables correlate with error terms, and endogeneity leads to biased estimates.

Before the presentation on how to deal with the selection bias, we list all variables contained in econometric tests.

*State\_job*, *collective\_job* and *private\_job* are three most important income sources of Chinese rural households. *Leaving\_home* is used to identify the effect of household's financial resources coming from members working in cities. It affects income in two ways: labors working outside through remittance could raise income. They may also reduce income if they devote income for residing in cities (e.g., housing purchasing). *Age*, *Age2*, *Gender* and *Education*, used here as control variables, are variables reflecting the household human capital.

**Table 2:** Variable definitions

		Definition
Dependent variable	<i>Income</i>	Household per-capita annual income at constant prices.
Explanatory variable	<i>State_job</i>	The share of household members working in state-owned units (enterprises, services and administrations).
	<i>Collective_job</i>	The share of household members working in TVEs.
	<i>Private_job</i>	The share of household members working in non-farming activities (excluding state and collective jobs).
	<i>Leaving_home</i>	The share of household members that left home and working in cities.
Control variable	<i>Age</i>	The average age of working adults of the household.
	<i>Age2</i>	Squared <i>Age</i> .
	<i>Gender</i>	The share of male in total working adult number of the household.
	<i>Education</i>	The average years in school of working adults of the household.

Notes: 1) Data come from the CHNS database. 2) All explanatory variables are scaled by the number of household working adults, defined as household members over 16 years old.

Estimations are made with following equation:

$$Y_{it} = \sum_{k=1}^4 \alpha_{1k} X_{ik} + \sum_{l=1}^4 \alpha_{2l} Z_{il} + \sum_{t=2}^8 \beta_t (C * Wave_t) + \mu_i + Wave + \sigma_{jt} + \varepsilon_{it} \quad (12)$$

The dependent variable,  $Y_{it}$ , is *Income* for household  $i$  in year  $t$ .  $X_k$  is one of the explanatory variables.  $Z_l$  is one of the control variables. All these variables are defined in Table 2. *Wave* is a time dummy between 1989 and 2009, in a total of 8 time points. Variable  $C$  is *cadre household* dummy. As  $C$  is time-invariant and in fixed-effects models time-invariant variables cannot be estimated, the cross products of *cadre household* dummy and *Wave* are used to capture *cadre households' income advantages over time*.<sup>6</sup> Therefore the coefficient of interest is  $\beta_t$ . Unobservable household characteristics such as ability, family background and other intangibles are captured in  $\mu_i$ . Since in fixed-effects models, time-invariant variables cannot be estimated, province cross wave is used to control for province fixed effects ( $\sigma_{jt}$ ). Lastly,  $\varepsilon_{it}$  is the error term.

To address the selection bias, this study explores two econometric methods. First, the fixed-effects models are employed. Household-level fixed effect models have an advantage to partially overcome endogeneity and selection bias by using fixed effects terms  $\mu_i$  and the province fixed effects  $\sigma_{jt}$ . Also in household panel data, the serial correlation between the within-household error terms is a concern and this autocorrelation over time biases the  $t$ ,  $F$  and  $R^2$  values. To correct this, White Standard errors clustered at the household level are used throughout.

Second, among 1911 non-cadre households, a matching method is applied to identify a group of non-cadre households that were as similar as possible to

the cadre household group at the starting time of evaluation. The procedure is to match the treated and untreated individuals according to their observable characteristics with propensity-score matching methods (See Cameron and Trivedi 2005, chapter 25).

For this purpose, per-capita income, asset, education, mean age of adults, and household size are used to identify the matching group.<sup>7</sup> They are the non-cadre households whose propensity scores fell within the range of scores of the cadre household observations. Finally as matching the households in the regions with similar development level makes sense, matching was separately applied in three regions: Coastal, Central and Western regions.<sup>8</sup> This way, a data set of 429 non-cadre households with 2801 observations is constituted. Coordinately, there are 1482 non-matched non-cadre households with 10653 observations.

Table 3 presents the evolution of mean values of all variables over time by cadre household group, matched non-cadre household group, and non-matched non-cadre household group.

**Table 3:** Mean values of variables by cadre and non-cadre households

		1989	1991	1993	1997	2000	2004	2006	2009
<i>Income</i>	Cadre	2805	3027	3473	4670	5902	7529	8645	12337
	Matched	2824	2785	3006	3989	4668	5894	6868	10608
	Non-matched non-cadre	2243	2269	2581	3395	4092	5286	5813	9042
<i>Age</i>	Cadre	38.13	37.50	38.24	39.71	41.70	44.55	42.21	44.44
	Matched	37.25	37.51	38.92	39.91	40.60	42.17	40.75	43.01
	Non-matched non-cadre	36.90	37.18	37.90	39.12	40.53	42.55	41.52	42.21
<i>Gender</i>	Cadre	0.4927	0.4935	0.4922	0.4839	0.4938	0.5025	0.4796	0.4627
	Matched	0.4856	0.4875	0.4807	0.4827	0.4862	0.4949	0.4721	0.4658
	Non-matched non-cadre	0.4915	0.4881	0.4875	0.4887	0.4948	0.4961	0.4758	0.4692
<i>Educa- tion</i>	Cadre	7.40	7.70	8.02	8.24	8.66	8.69	9.00	8.93
	Matched	7.36	7.36	7.49	7.86	8.35	8.41	8.68	8.58
	Non-matched non-cadre	5.93	6.21	6.41	6.75	7.21	7.38	7.62	7.60
<i>State_job</i>	Cadre	0.2810	0.1894	0.2011	0.1583	0.1592	0.0814	0.0736	0.0628
	Matched	0.1423	0.1270	0.1186	0.1042	0.0889	0.0363	0.0436	0.0534
	Non-matched non-cadre	0.1088	0.0714	0.0837	0.0671	0.0563	0.0233	0.0217	0.0236
<i>Collec- tive_job</i>	Cadre	0.3079	0.2604	0.2809	0.2417	0.2104	0.0123	0.0075	0.0000
	Matched	0.3123	0.3153	0.3093	0.2832	0.2635	0.0091	0.0077	0.0000
	Non-matched non-cadre	0.3082	0.2664	0.2562	0.2055	0.1973	0.0044	0.0032	0.0000
<i>Private _job</i>	Cadre	0.0070	0.0051	0.0202	0.0523	0.0481	0.2172	0.1736	0.1602
	Matched	0.0079	0.0013	0.0128	0.0385	0.0654	0.2648	0.2235	0.1971
	Non-matched non-cadre	0.0096	0.0058	0.0129	0.0419	0.0560	0.2344	0.2063	0.1663
<i>Leaving _home</i>	Cadre	0.0142	0.0791	0.1029	0.0877	0.0958	0.2204	0.3517	0.3604
	Matched	0.0287	0.0448	0.0830	0.0771	0.0739	0.1958	0.3174	0.3134
	Non-matched non-cadre	0.0209	0.0498	0.1038	0.0713	0.0773	0.1969	0.3109	0.3257

*Notes:* 1) Data come from the CHNS database. 2) The method of distinguishing cadre and non-cadre households is introduced in this section. 3) The constitution of matched non-cadre household group is made with propensity-score matching method introduced in this section.



These descriptive statistics provide some interesting information. First, as expected, the cadre group had the highest, and the non-matched non-cadre group had the lowest incomes. The gaps in income between cadre and matched non-cadre households were smaller. Wave 2009 appeared to be a “bound” in terms of income growth. Through checking, it was found that between 2006 and 2009, there were a significant number of households that began to generate profits from businesses, and this meaningfully influenced the mean income of the population.

Second, while differences in age and gender were not significant, cadre group had net superiority in education over non-matched non-cadre group. This gap between cadre and matched non-cadre groups was small.

Third, in most waves, while cadre households’ share of employment in state-owned units was higher, the differences in collective-owned units between cadre and non-cadre households varied in periods. The share of the cadre households in private non-farm businesses, however, became lower than that of non-cadre households since 2000. Over the period, jobs in state-owned and collective-owned units decreased progressively to the benefit of private businesses. This corresponds well to above analysis on market transition process.

Finally, leaving home and working in cities were increasing so that in 2009, in all three groups, about one third of the working force left home.

### VI.3. Results

Table 4 contains two regression results basis on Equation (12). The values of  $R^2$  are all satisfactory.  $F$  statistics are significant. The rho values are over 0.3. As the group variable is the household, high rho value signifies strong individual effects of households, indicating the appropriateness of the fixed-effects models.

**Table 4:** Fixed-effects regression results

<i>Variables</i>	<i>(1) Cadre vs. matched</i>	<i>(2) Cadre vs. all non-cadre</i>
	<i>Income</i>	<i>Income</i>
<i>State_job</i>	2477.623 (643.638)***	1968.870 (362.837)***
<i>Collective_job</i>	2017.668 (612.735)***	982.340 (284.586)***
<i>Private_job</i>	4821.895 (1021.773)***	3626.210 (451.085)***
<i>Leaving_home</i>	-40.547 (518.588)	-249.786 (260.925)
<i>Age</i>	11.705 (84.454)	79.986 (35.914)**
<i>Age2</i>	0.085 (0.853)	-0.943 (0.362)***

*contd. table 4*

<i>Education</i>	287.501 (117.549)**	191.250 (61.097)***
<i>Gender</i>	1667.032 (966.438)*	1886.149 (452.159)***
<i>Cadre_1991</i>	272.303 (433.914)	176.020 (280.428)
<i>Cadre_1993</i>	204.495 (451.686)	177.419 (302.866)
<i>Cadre_1997</i>	711.666 (478.947)	800.800 (328.110)**
<i>Cadre_2000</i>	1367.238 (527.565)***	1178.260 (364.312)***
<i>Cadre_2004</i>	1762.362 (583.378)***	1918.262 (436.855)***
<i>Cadre_2006</i>	1907.372 (780.450)**	2448.593 (510.057)***
<i>Cadre_2009</i>	1579.319 (962.046)*	2776.965 (683.926)***
<i>Wave_dummy</i>	yes	yes
<i>Province wave</i>	yes	yes
Constant	-1802.668 (2396.885)	-2098.986 (985.105)**
Observations	5409	16062
Household number	858	2340
R-squared		
Within	0.2374	0.2180
Between	0.2423	0.2452
Overall	0.2435	0.2306
F (prob>F)	11.68 (0.000)	27.58 (0.000)
Rho	0.3250	0.3120

*Notes:* 1) Data come from the CHNS database. 2) The method of distinguishing cadre and non-cadre households is introduced in section IV.2.3) The constitution of matched non-cadre household group with propensity-score matching method is introduced in section IV.2. 4) The regressions are made based on Equation (12). 5) Robust standard error is in parenthesis. 6) \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

The sample of the first regression contains cadre group and matched non-cadre group. That of the second regression contains cadre group and all non-cadre groups. Based on the previous arguments, the first estimation is deemed having less estimation bias than the second one. We focus on the coefficients of cadre dummy over time from *cadre\_1991* to *cadre\_2009*, with *cadre\_1989* as the base line. The coefficients of cadre dummy generally confirm the existence of income advantage of the cadre group over time.

In table 5, political returns measured as  $\frac{Y_C^t - Y_{nc}^t}{Y_{nc}^t}$  are computed. Recall that

$Y_c^t$  and  $Y_{nc}^t$  are respectively incomes of household with and without political cadre in wave t. In line “mean”, these returns are computed with the mean values of incomes of different groups contained in Table 3. In line “estimated”, the term  $Y_c^t - Y_{nc}^t$  is replaced by the estimated coefficients from *cadre\_1991* to *cadre\_2009* derived from Table 4.

**Table 5:** The evolution of political returns

		1989	1991	1993	1997	2000	2004	2006	2009
Income Mean	Versus matched	-0.007	0.087	0.155	0.171	0.264	0.277	0.259	0.163
	Versus all Non-cadre	0.251	0.334	0.346	0.376	0.442	0.424	0.487	0.364
Estimated	Versus matched		0.0978	0.0680	0.1784	0.2929 (***)	0.2990 (***)	0.2777 (**)	0.1489 (*)
	Versus all Non-cadre		0.0776	0.0687	0.2359 (**)	0.2879 (***)	0.3629 (***)	0.4212 (***)	0.3071 (***)

*Notes:* 1) Data come from the CHNS database. 2) The method of distinguishing cadre and non-cadre households is introduced in section IV.2. 3) The constitution of matched non-cadre household group is introduced in section IV.2. 4) Political returns are

determined as  $\frac{Y_c^t - Y_{nc}^t}{Y_{nc}^t}$  where  $Y_c^t$  and  $Y_{nc}^t$  are respectively the incomes of households

with and without political cadre in wave t. 5) The “mean” values of political returns are calculated on the basis of mean incomes of different groups in Table 3. 6) The “estimated” values of political returns are computed using the coefficients of cross-product terms in Table 4 to substitute  $Y_c^t - Y_{nc}^t$  in the formula determining political returns. 7) For the “estimated” results, \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$  in parenthesis.

The values contained in line “mean” are used merely for comparisons with their corresponding estimated values. It is interesting to note that without using matched method, the estimated values are lower than mean values, whereas with matched method, the estimated values are higher than mean values. This seems to indicate that without matching there is an underestimation of political returns. Therefore, applying prudence principle, we focus on the results based on matching method. In the case where some estimated coefficients are insignificant,<sup>9</sup> we also consider the coefficients obtained without matching and the mean values.

The periods corresponding to three phrases are 1989-1997, 1997-2004, and 2004-2009. Based on Table 3, income growth in the third period was much higher than that of the first two periods. Income growth rates of non-matched non-cadre households of three periods were 5.3%, 6.5% and 11.3% respectively. Those of the matched non-cadre households were 4.4%, 5.7%, and 12.5% respectively. During the first and second periods, as expected, political returns were either stagnated or increasing. During the third period, political returns

saw a sharp fall, from 27.77 to 14.89%. This suggests that in the third phase with popular involvement, peasants got larger improvements relative to cadre group, indicating that institutional change was bigger. Together with the difference in income growth rates, these results confirm the theoretical prediction that the phase with popular involvement brings about much extensive institutional change.

## V. Concluding remarks

Motivated by North's remarks on the deficiency of theoretical approaches to institutional change in less developed countries, this study constructed a theory in which institutional change in authoritarian regimes is explained with the interplay of external shocks, political competition within the ruling group, and the involvement by the ruled group. The main theoretical prediction established is that the occurrence of institutional change in a non-democratic regime depends on the strength of external shocks. This is its necessary condition. The differentiation between the interests of the conservative and reformist factions within the ruling group and their competition, which depend on the kinds of external shocks, are its sufficient condition. Furthermore, the theory predicts that with popular involvement, institutional change is more extensive than that merely driven by the ruling group.

This theoretical framework then was shown to be able to illustrate three phases of Chinese rural market transitions of which the last phase was featured by popular participation. The above theoretical prediction was validated by econometric tests.

## Notes

1. 26 Avenue Léon Blum, 63000 Clermont-Ferrand, France. The author would like to thank the Carolina Population Center, University of North Carolina at Chapel Hill; the National Institutes of Health (NIH; R01-HD30880, DK056350, and R01-HD38700) for the China Household National Survey (CHNS) data collection and analysis files since 1989.
2. China has more than 4 million township cadres, and 5 million cadres working in 600,000 administrative villages ("The reform of village and township administrations", <http://baike.baidu.com/view/1493768.htm>). Assuming a half of township cadres living in urban areas, there are 7 million rural cadres.
3. Our sample ends in 2009 because of a concern about excessive rural exodus. Extending to 2011 may result in disappearance of a number of observations. Meanwhile, a number of surveyed households could more likely report the members outside as full household members, causing estimation bias.
4. With one fourth of 80 million Party members live in rural areas, the ratio of Party members to rural population is 4%, at least two times less than that in urban area.
5. Based on qualitative interviews, Oi (1989) concluded that the importance of becoming Party membership resides in increasing the chances of holding office as a cadre.

6. This method of using a dummy variable to interact with year dummy variables to capture the evolution of its impact over time has been generally employed in econometric studies (Cf. Wooldridge 2016 chapter 14).
7. Asset index is built following Sahn and Stifel (2000), and Filmer and Pritchett (2001). It is composed of 10 items (each of them offers a range of choices): drinking water, toilet facilities, kind of lighting, kind of fuel for cooking, type of ownership of house, surface and room number of household, ownership of electrical appliances and other goods, means of transportation, type of farm machinery, and finally, household commercial equipment. Principal components analysis is employed to derive weights.
8. The distinction of three regions follows the standard classification in *China Statistic Yearbooks*. The distribution of observations in three regions is 32%, 39% and 29%, and that for cadre households is 34%, 45% and 21%.
9. The coefficients of interest of three first waves are insignificant. Based on some observed incoherence, seemingly the quality of data collection during the early period of surveys was a concern.

## References

- Cameron A. Colin and Pravin K. Trivedi, (2005). *Microeconometrics, Methods and Applications*, Cambridge: Cambridge University Press.
- Coase, Ronald H. (1937). "The Nature of the firm", *Economica*, November, 386-405.
- Cook, Sarah, (1998). "Work, wealth, and power in agriculture: do political connections affect the returns to household labor?" in *Zouping in Transition: the Process of Reform in Rural North China*, edited by Andrew Walder, Cambridge, MA: Harvard University Press.
- Filmer, Deon, Pritchett, Scott, (2001). "Assessing asset indices", *Demography*, 49(1), 359-392.
- Fisman, Raymond, (2001). "Estimating the value of political connections", *American Economic Review*, 91(4), 1095-1102.
- Goldstein, P. Markus and Christopher R. Udry, (2008). "The profits of power: land rights and agricultural investment in Ghana", *Journal of Political Economy*, 116(6), 981-1022.
- He, Yong, (1992). "An economic approach to communist regimes", *Kyklos*, 45(3), 393-406.
- Kung, James Kai-Sing, Lin, Yi-Min, (2007). "The decline of township-and-village enterprises in China's economic transition", *World Development*, 35(4), 569-584.
- Li, Hongbin, and Rozelle, Scott, (2003). "Privatizing rural China: insider privatization, innovative contracts and the performance of township enterprises", *The China Quarterly*, 176, 981-1005.
- Morduch, Jonathan and T. Sicular, (2000). "Politics, growth and inequality in rural China: does it pay to join the Party?" *Journal of Public Economics*, 77, 331-356.
- Nee, Victor, (1989). "A theory of market transition: from redistribution to markets in state socialism", *American Sociological Review*, 54(5), 663-681.

- Nee, Victor, (1996). "The Emergence of a market society: changing mechanisms of stratification in China", *American Journal of Sociology*, 101(4), 908-949.
- North, Douglass, (1990). *Institutions, institutional change and economic performance*, Cambridge: The University Press.
- North, Douglass, (1991). "Institutions", *The Journal of Economic Perspectives*, 5 (1), 97-112.
- North, Douglass, (1992). "The New Institutional Economics and Development", Washington University in St. Louis.
- North, Douglas, (1996). 'Privatization, incentives and economic performance', in Anderson Terry and P. Hill (eds) *The Privatization Process: A Worldwide Perspective*. Maryland: Rowman and Littlefield Publishers, Inc.
- Oi, J.C., (1989). *State and Peasant in Contemporary China*, Berkeley: University of California Press.
- Parish, L. William, Xiaoye Zhe and Fang Li, (1995). "Non-farm work and marketization of the Chinese countryside", *China Quarterly*, 143, 697-730.
- Putterman, Louis, (1997). "On the past and future of China's township and village-owned enterprises", *World Development*, 25(10), 1639-1655.
- Rozelle, Scott, Guo, L., Minggao, S., (1999). "Leaving China's farms: survey results of new paths and remaining hurdles to rural migration", *The China Quarterly*, 158, 367-393.
- Sahn D.E, Stifel D.C. (2000). "Poverty comparisons over time and across countries in Africa", *World Development*, 28(12), 2123-2155.
- Sun, Laixiang, (2002). "Fading out of local government ownership: recent ownership reform in China's township and village enterprises", *Economic Systems*, 26, 249-269.
- Walder, Andrew, (2002). "Markets and income inequality in rural China: political advantage in an expanding economy", *American Sociological Review*, 67(2), 231-253.
- Young, Jason, (2013). *China's Hukou System: Markets, Migrants and Institutional Change*, New York: Palgrave Macmillan.
- Wooldridge, Jeffrey M. (2016). *Introductory Econometrics - a modern approach*, 6<sup>th</sup> edition, Boston, MA: Cengage Learning.