Transition China and efficiency of public management reform: an approach based on entropy

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Abstract

This paper aims to characterize transition China based on two new econometric tools: an indicator of transitory strategy (α) (gradualism *versus* big bang) and a test of efficiency of public management reform (S).

The econometric method is based on model *à la* Antoniou *et alii* (2002). It is a method of statistical physics in which the states of transition economic are described in terms of density functions $\rho(g;\alpha)$ of the variable g parametrized by α. If the choice of country is big bang: $\alpha < 1{,}84$, and if the choice is the gradualism: $\alpha > 1{,}84$. Having the density function$\rho(g;\alpha)$, we can use the corresponding entropy S to evaluate the efficiency of public management reform. The degree of efficiency can be estimated by entropy as a function of time. If the variation of entropy is very stable ($\Delta S \approx 0$), it means that the efficiency of public management of reform is optimal. However, public management of reform is inefficiency if the variation of entropy is important ($\Delta S \neq 0$).

In the case of China, α is superior to 1,84 since the startling transformation and this gradualism is efficiency. We have a result in line with the literature. The New Political Economy of Reforms stipulates that gradualism enables reforms to start more easily by providing the additional option of early at lower cost, after a partial resolution of uncertainty.

Keywords: China, institution, reform, transition, governance, entropy
JEL Classification Codes: P20, P26

I. Introduction

One of the most important events in the modern economic history is the socialist countries transition from the Societ-type planned economy to a market economy starting in the last two decades of the 20th Century. China's reform worked and produced one of the most impressive growths in the largest developing and transition economy in the world. China's experience of transition has produced many interesting contrasts to the experiences of transition in Eastern Europe and Former Societ Union (EEFSU).

That China has managed to grow so rapidly despite the absence of many conventional institutions such as rule of law and secure private property rights is puzzling (Qian 2002). The success of China's approach to transition has produced many challenges to the conventional wisdom in economic theory (Chow 1997 ; and Perkins 2002). Theoretically, it is difficult to imagine how a reform would work without stabilization, liberalization and privatization, following political democratization. This programme is based on the recommendations of big bang approach. Most economists in the West attempted to complete all these reforms simultaneously or in a short sequence (Lipton and Sachs 1990 ; Blanchard et al. 1991). This big bang approach in essence is a version of the Washington Consensus, which is based on the basic principles of the neoclassical economics for a well-functioning market economy and was recommended by the IMF/World Bank for market-oriented reforms in the developing countries. Although China has adopted many of the policies advocated by economists, such as being open to trade and foreign investment and sensitive to macroeconomic stability, violations of the standard prescriptions are striking. For the most part of the past two decades, China's reform succeeded without complete liberalization, without privatization, and without democratization.

Five explanations deserve attention. These interpretations are rank in three classifications: the real, sociological and institutional explanations of economic reform in China.

- The first interpretation: "economic view "

Two types of explanations of China's economic success are common in "economic view". The first is to regard foreign direct investment (FDI) and exports as the driving force for China's success: in this connection the roles of overseas Chinese and of Hong Kong and Taiwan are often emphasized. The second is to attribute it exclusively to the agricultural reform in the early 1980s: the successful agriculture reform provides sources of savings and labor to boost or even drives industrialization.

But, economic view is incomplete. In fact, if focusing on FDI and foreign trade leads to a downplay of the entire reform process and the role of indigenous institutions, then the simple-minded view on trade and foreign investment would create obstacles to the understanding of growth in any country (Qian, 2002). And for understand the successful agriculture reform on other China economy sectors it is necessary to explain how China managed it.

- The second interpretation: “sociologic view”

Weitzman and Xu (1994) address the important question of how to explain the extraordinary economic performance of the “Township and Village Entreprises” (TVEs) started under the Chinese reform program. They explain this conundrum with a mysterious variable λ, which denotes “cooperative culture”. This variable represents “...the ability of a group of people to resolve prisoner’s dilemma type free-riding problems internally, without the imposition of explicit rules of behaviour, other things, including the size of group being equal” (p.138). Thus, Weitzman and Xu assert that “East Asia is a high-λ society relative to Europe which by comparison is more of a low-λ society” (p.139). This second interpretation is not in line with rational choice theory. And how do we explain the high-λ society in East Asia?

- The third interpretation: “institutional view”

The objective of New Institutional Economics (NIE) is to answer these questions not resolved by first and second interpretations. In NIE, the success China’s reform is explain by China’s institutional architecture which has its own specific features and which rest on the local state more than on central authorities and can be characterised by local regulatory autonomy, informal enforcement of property rights, and local feedback mechanisms between state organizations and entrepreneurs (Krug and Hendrischke 2008).

The NIE allows understanding how reforms are individually driven, but this does not explain how the reforms are together implemented. It is well-know that the Chinese authorities chose the gradual approach. But the analysis which explains why China chose this process are rare. The New Comparative Economics (NCE) proposes hypothesis that the China’s choice depended on its political institutions (Lesgourgues, 2010). China is an authoritarian regime which has the monopole of the violence. Contrary to the democratic regimes, China can impose a strategy of economic transition without taking into account the demand of the civil society. The cost of the violence in this country is higher than in the countries which work with a “political market” where the economic reforms are negotiated with lobby and pressure groups. We think that it possible to analyse this cost as the payment of a premium of an insurance against the reversal of authoritarian regime. In other words, China has real options to make economic transition. The real option method enables policy-makers to leverage uncertainty on economic transition and limit downside risk. We think that the real option method represents the new state-of-the-art technique for the valuation and management of transition economic. The gradual approach can be analyzed as real option.

This paper provides the first systematic empirical examination of New Comparative Economics hypothesis. In order to do this analysis, we use two new econometric tools: an indicator of transitory strategy (gradualism versus big bang) and an entropy test of efficiency of public management reform.

II. Entropy model

Antononiou *et alii* (2002) propose a new approach to the problem of efficient resources distribution in different types of economic systems. The authors proceed in two stages: firstly, they determine the density function. Secondly, having this function they use the corresponding entropy to evaluate the efficiency of the resources distribution.

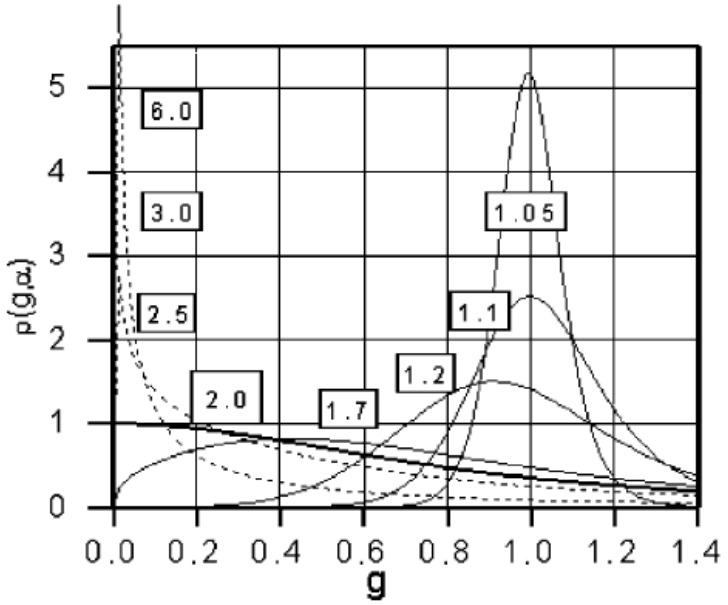
- **The density function**

Antoniou *et alii* (2002) use the Lorenz diagram technique for the determination of the density function $\rho(g,\alpha)$ of the variable g parametrized by α. The parameter α plays a role of the integral characteristic of the state of the economic system. Then, this parameter determines the nonuniformity of the resource distribution. When $\alpha = 1$ we have uniform distribution. When $\alpha \to \infty$ we have distribution of resources concentrated to one component only. The density function $\rho(g,\alpha)$has the form:

$$\rho(g,\alpha) = \frac{1}{\alpha-1}\frac{g^{(2-\alpha)/(\alpha-1)}}{\left(1+g^{\alpha/(\alpha-1)}\right)^{(\alpha+1)/\alpha}},$$

The forms of the density function $\rho(g,\alpha)$for different values of parameter $\alpha > 1$ are presented in figure 1.

Figure 1: Density functions $\rho(g,\alpha)$for different values of the parameter α



Source: Antoniou *et alii* (2002)

We discuss farther the type of density function which we use in transition china.

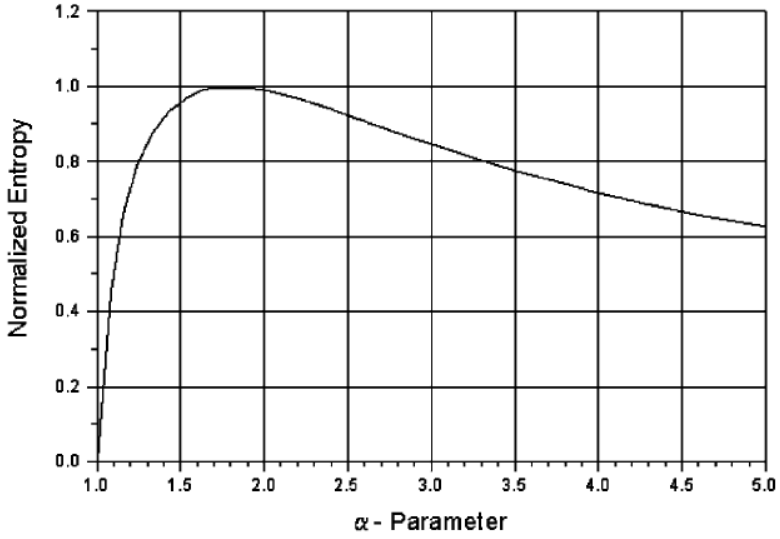
- **Entropy as the efficiency of the resources distribution**

Having the density function $\rho(g, \alpha)$, the authors use the corresponding entropy to evaluate the efficiency of the resources distribution. For the entropy calculation the use the usual formula

$$S = -\int dg\ \rho(g, \alpha) \ln \rho(g, \alpha),$$

Where S is the entropy and ρ is the density function. Figure 2 shows the dependence of the normalized entropy S versus the parameter α. The curve demonstrates the presence of maximum in the region of α-parameter values, close of 1,84.

Figure 2: Dependence of entropy versus α-parameter



Source: Antoniou *et alii* (2002)

How to interpret entropy value in the time? The degree of efficiency in the resources distribution can be estimated by entropy as a function of time. If the variation of entropy in the time is very stable ($\Delta S \approx 0$), it means that the efficiency of system is optimal. However, if the variation of entropy is very instable ($\Delta S \neq 0$) then the system isn't optimal.

III. The New Comparative Economics hypothesis and entropy results on transition China

Before studying entropy results on transition China we present the New Comparative Economics hypothesis.

- **The New Comparative Economics Hypothesis**

The New Comparative Economics stipulates that autocratic regime has more facilitation than democratic regime to implement economic reforms. Indeed, the autocratic regime has real options to make economic transition and to reduce uncertainty in a context of transition. The figures below show this difference between autocratic regime and democratic regime to implement economic reforms.

The democratic regimes and the strategy of economic transition

Figure N°1: The capacity of democratic regimes to implement economic reforms in function of political time

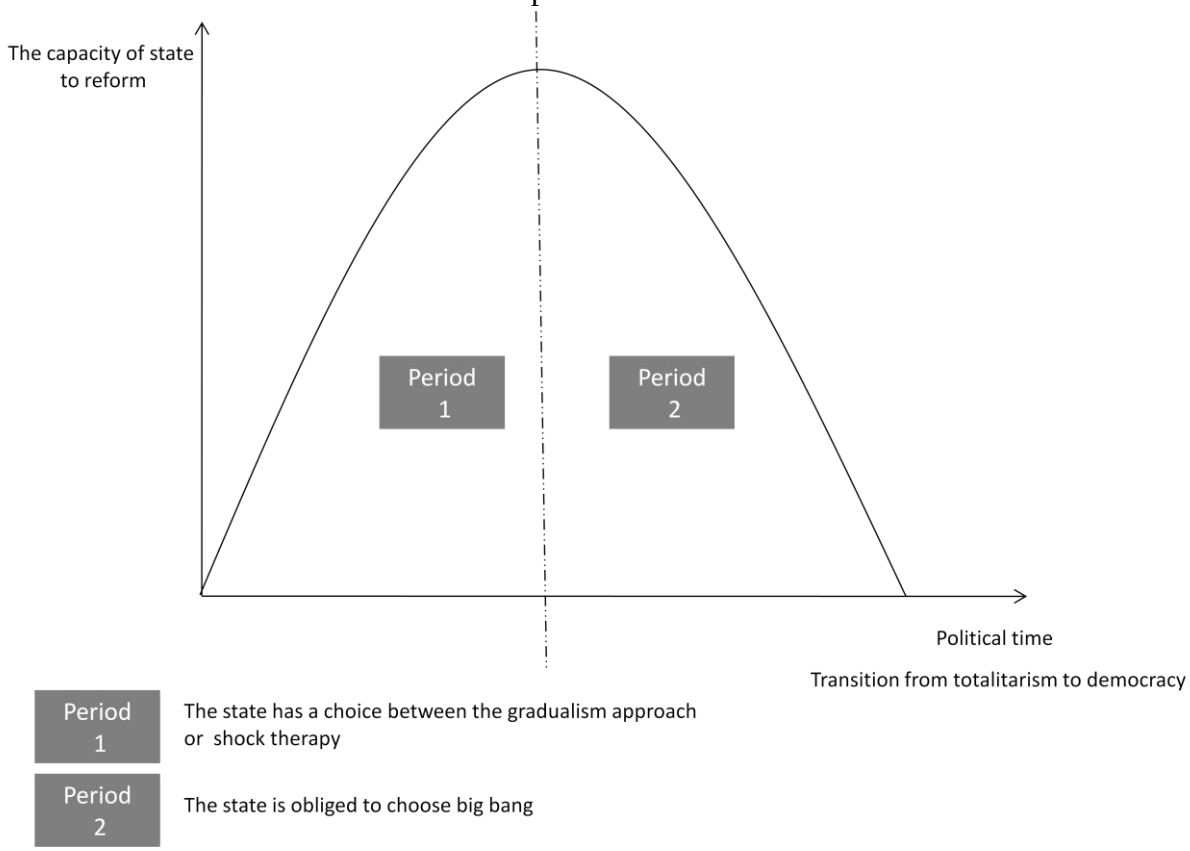
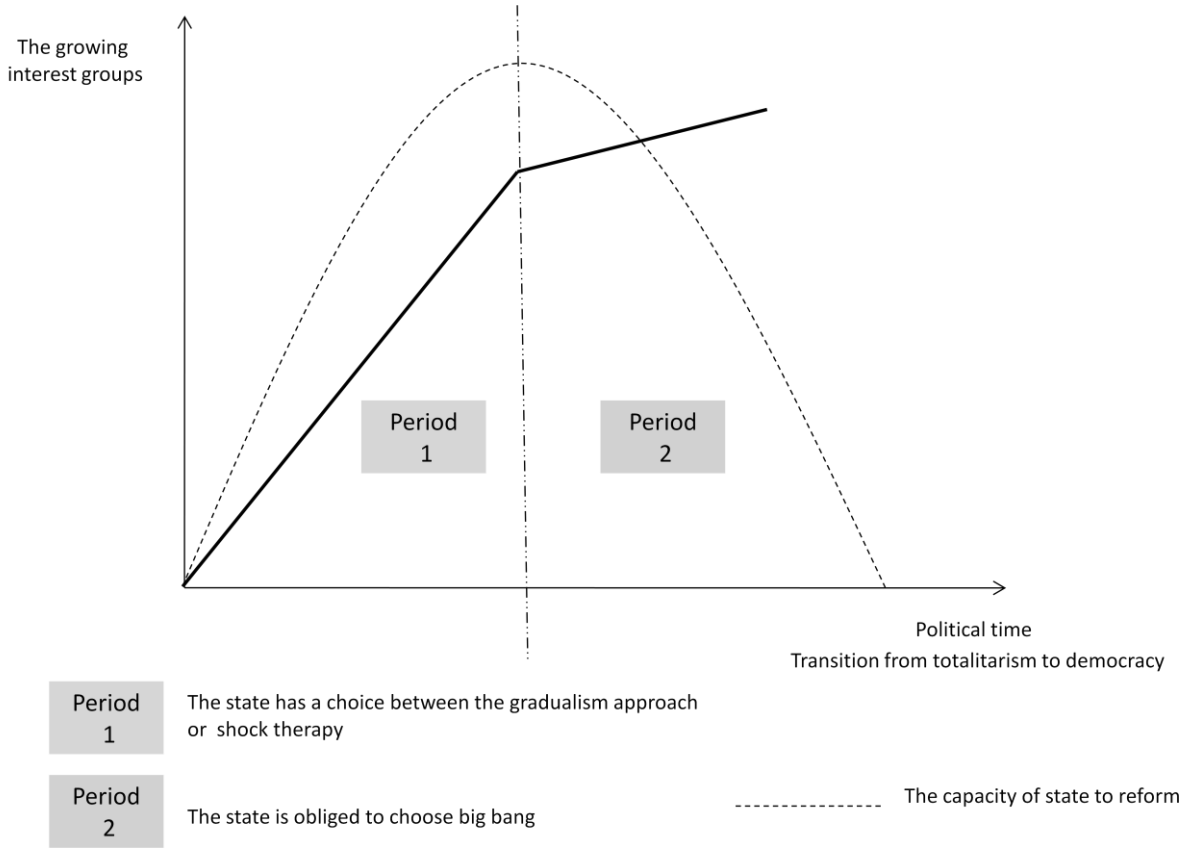


Figure N°1 shows the capacity of democratic regime to implement economic reforms in function of political time. This capacity takes a bell curve. We can see two periods. In period 1, the State has the choice of the strategy of development because interest groups do no exist or because they are not enough the powerful. The State is very successful to reform thanks to a window of opportunity. In period 2, the State has no choice, it has to implement the shock therapy which bases on principle of logrolling (political market). The capacity of the State decreases because he has to negotiate with interest groups. How to explain this evolution? To explain this, it is necessary to look at the power of interest groups which can make ploger the economy in *statu quo*.

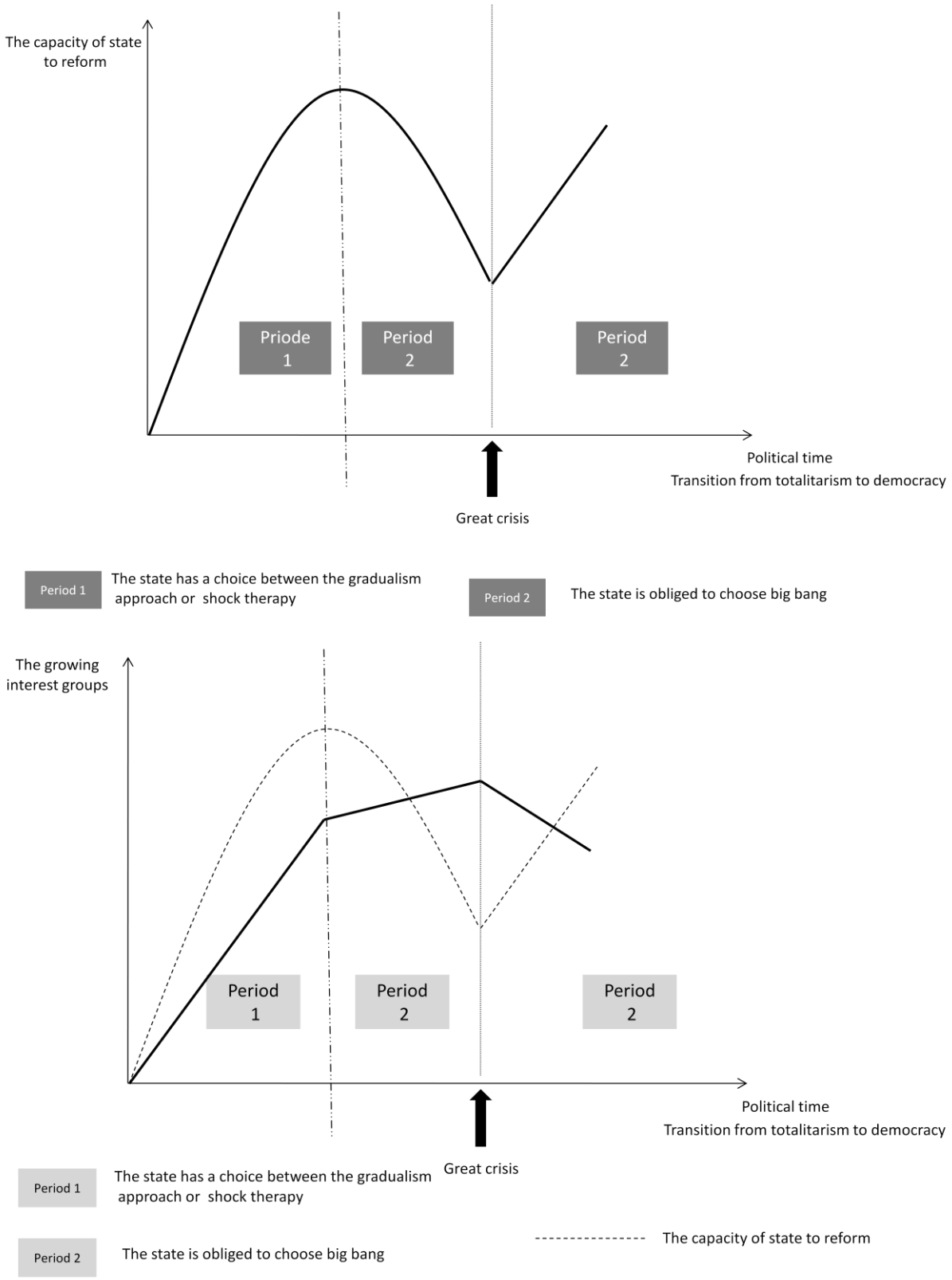
Figure N°2 shows the growth of the groups of interest in function of political time. We suppose that the growth of interest groups is similar to that of the GDP. In period 1, the GDP quickly increases because the capacity of the State to reform is important, what allows interest groups to grow quickly. In period 2, the growth of interest groups is less strong because the State is handicapped by the pressure groups to reform the economy. The New Political Economy stipulates that economic crises are the means for the State to win in capacity to reform the economy because the pressure groups are weakened.

Figure N°2: The growing interest groups in function of political time



The figure N° 3 shows the impact of a big economic crisis on the capacity of the State to reform. We can see on the figure that the big economic crisis improves very strongly the capacity of the State. This is explained by the decline of interest groups.

Figure N°3: The capacity of democratic regimes to reform and great crisis



Indeed, with the economic crisis, interest groups lose of their power and are more inclined to accept the reforms.

We notice a great difficulty for the democratic regimes to lead the economic transition. When the State has the possibility of implement the reforms, it takes advantage of this occasion to implement them quite simultaneously. The Big Bang strategy is privileged by the democratic regimes. The situation is very different for the authoritarian regimes.

The authoritarian regimes and the strategy of economic transition

Figure N°4 shows the capacity of authoritarian regimes to reform in function of political time. For the period 1, the capacity of the autocrat to reform increases in a exponential way because there is a period of learning in the course of which the autocrat accumulates new knowledge. During this period, the political authorities choose the gradual approach either because the pressure groups do not exist or are not rather powerful (as in the case of the democratic regimes) or because the political authorities can oblige interest groups to accept the reforms. The growth of interest groups follows the evolution of the economic growth. When the capacity of the State is maximal, the political authorities choose either to continue to pay a premium against the influence of the pressure groups (in that case the strategy of development stays the same (period 3)), or to accept elections and to undergo the influence of the pressure groups (in that case the State has to haggle and accept the strategy of shock therapy (period 2). If the political authorities are not tempted by the democratization then the capacity of the State to reform remains the same. If the authorities accept more democracy then the capacity of the State to reform declines.

Figures 5 and 6 show the growing interest groups in function of decisions of State. If the political authorities choose the democratization then interest groups will be more powerful than if the political authorities refused the democratization.

We often observe in the authoritarian regimes a very strong support of interest groups in its favour. Some economists stipulate that it is because of the corruption. We want to show that it is not the only reason. In important crisis situation, the political authorities have some means to face the crisis (real options) that the democratic regimes do not have (as the management of the uncertainty). The management of the crises and of economic uncertainties is often better in the authoritarian regimes.

Figure 4 : The capacity of authoritarian regimes
to reform in function of political time

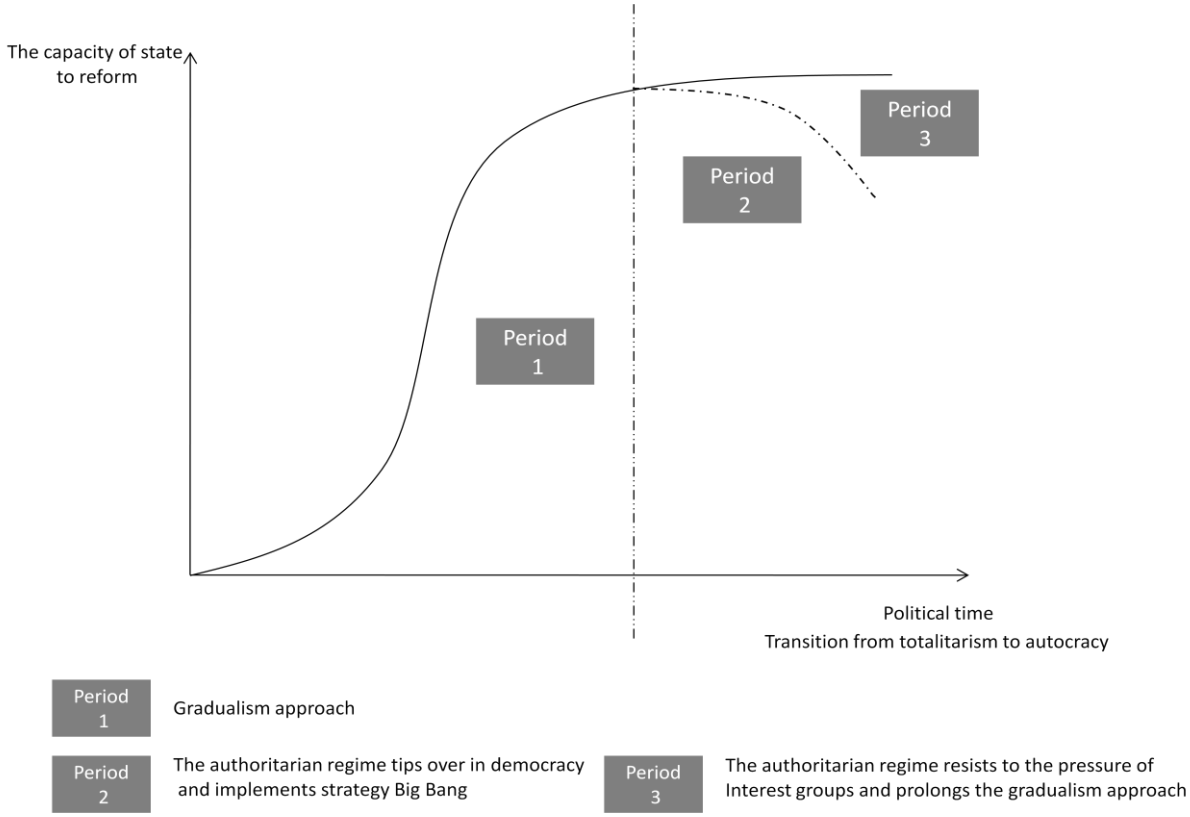
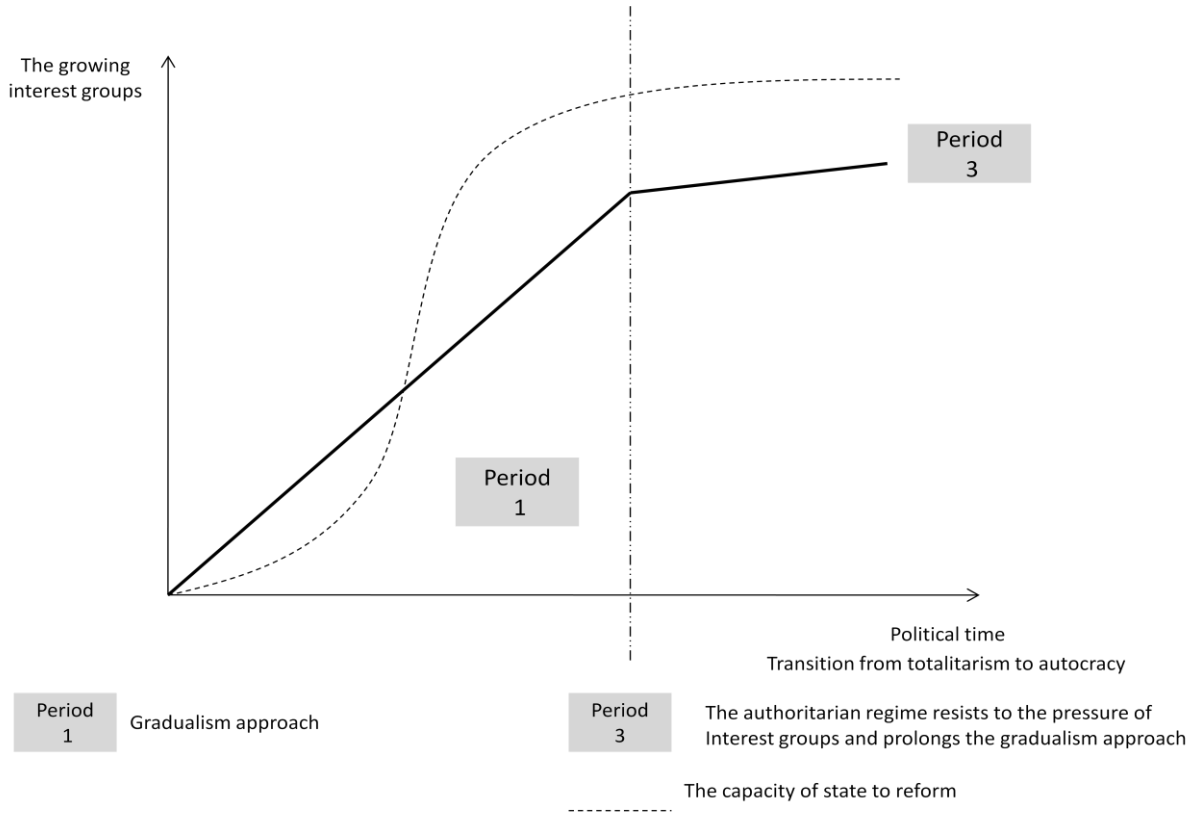
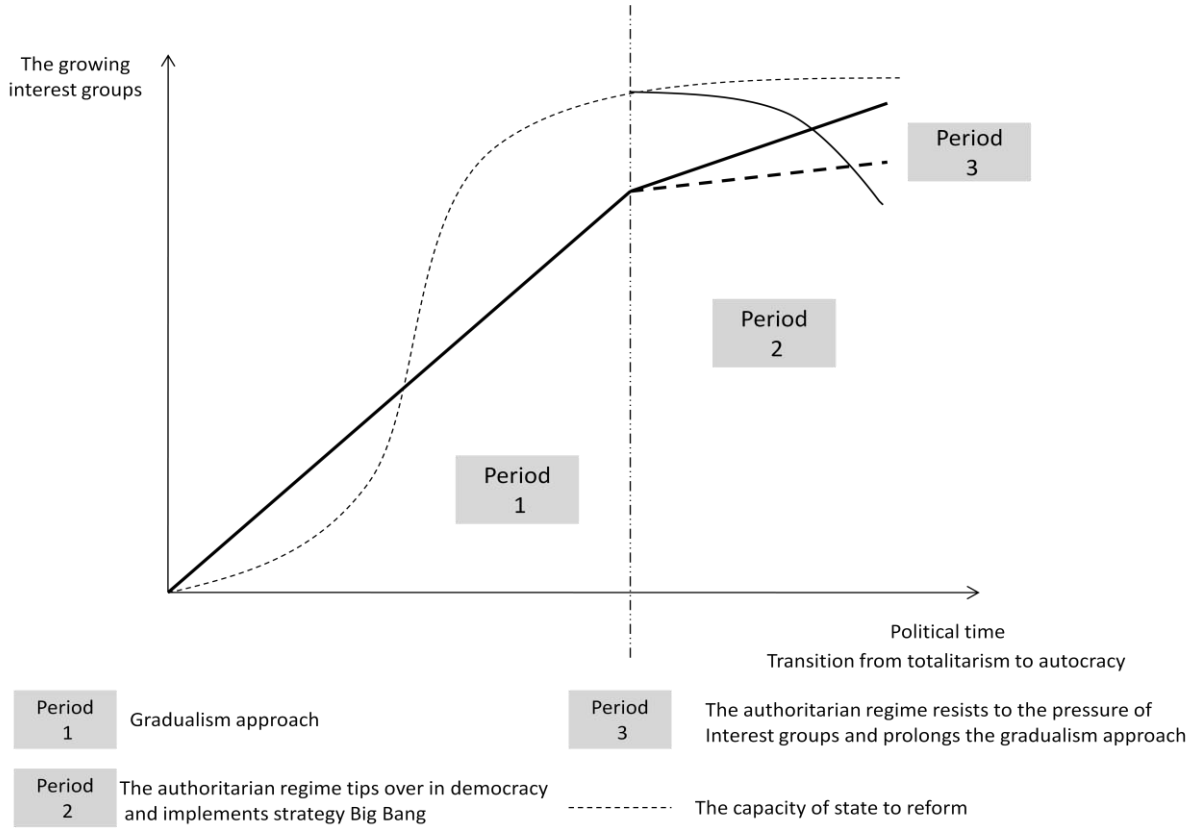


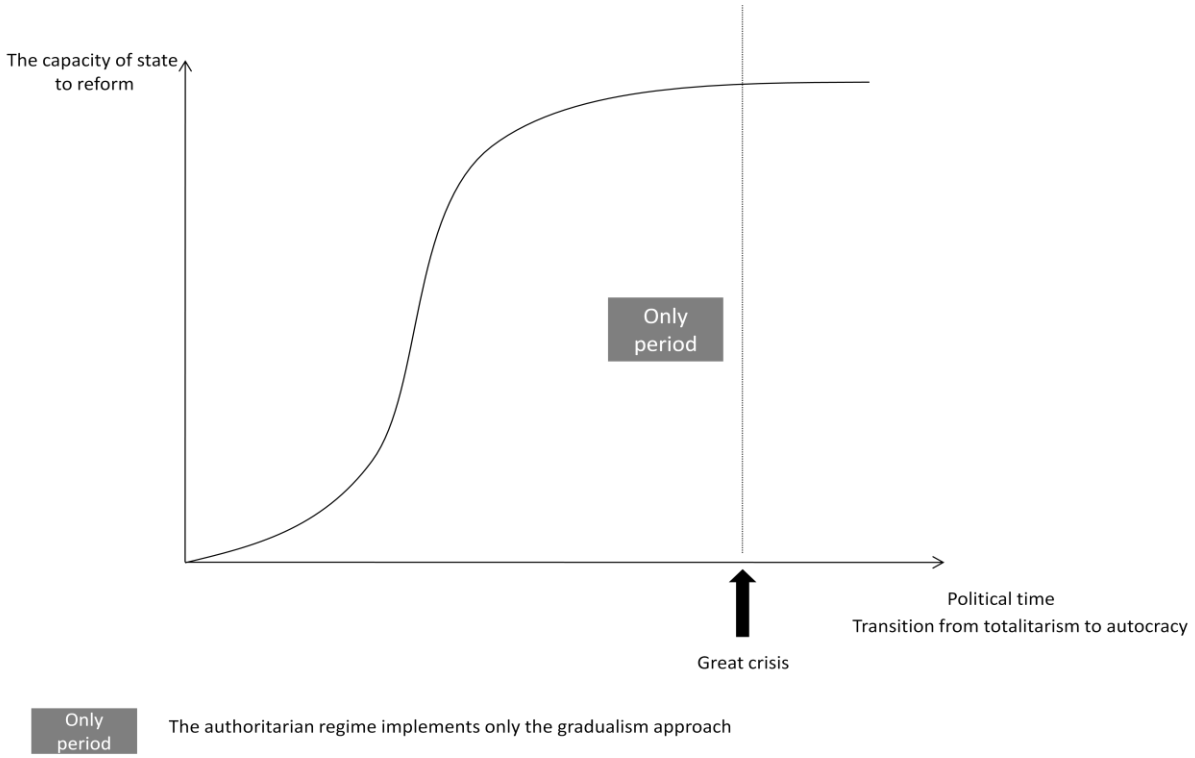
Figure 5 and 6: The growing interest groups in function of decisions of State





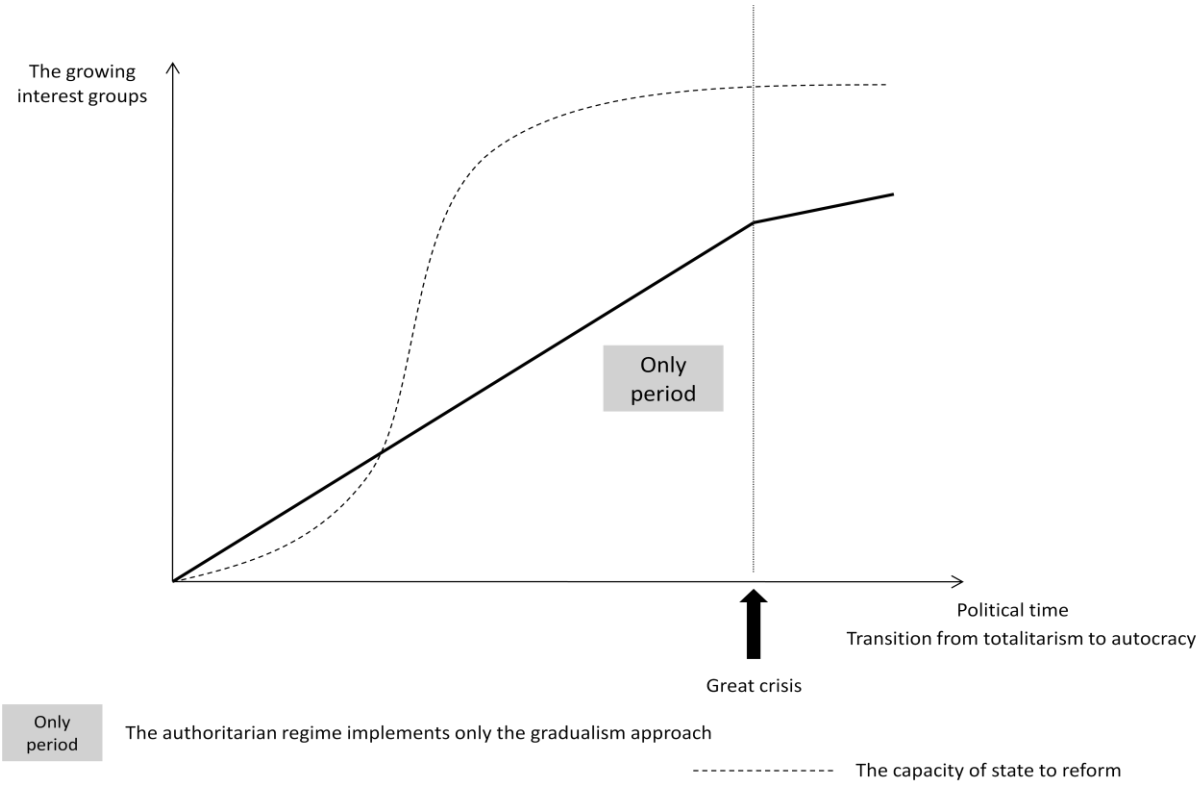
The figure 7 shows that the capacity of the authoritarian regimes to reform the economy remains intact after an important economic shock because of the independence of the State towards interest groups. The State keeps quite its capacities to reform. This allows the State to react better to the shocks and thus to keep a high level of economic growth.

Figure 7: The capacity of authoritarian regime to reform after a big shock



The figure 8 shows that the economic growth of interest groups is more raised in the case of the authoritarian regimes than in the democratic regimes. Even if the independence of the authoritarian regimes towards interest groups represents for them a cost of opportunity, they prefer the gradual approach because it represents a guarantee against the economic recessions.

Figure 8: The growing interest groups after a big shock



We test NCE hypothesis in the case of China with the model of the entropy.

- **Transition China and efficiency of public management reform**

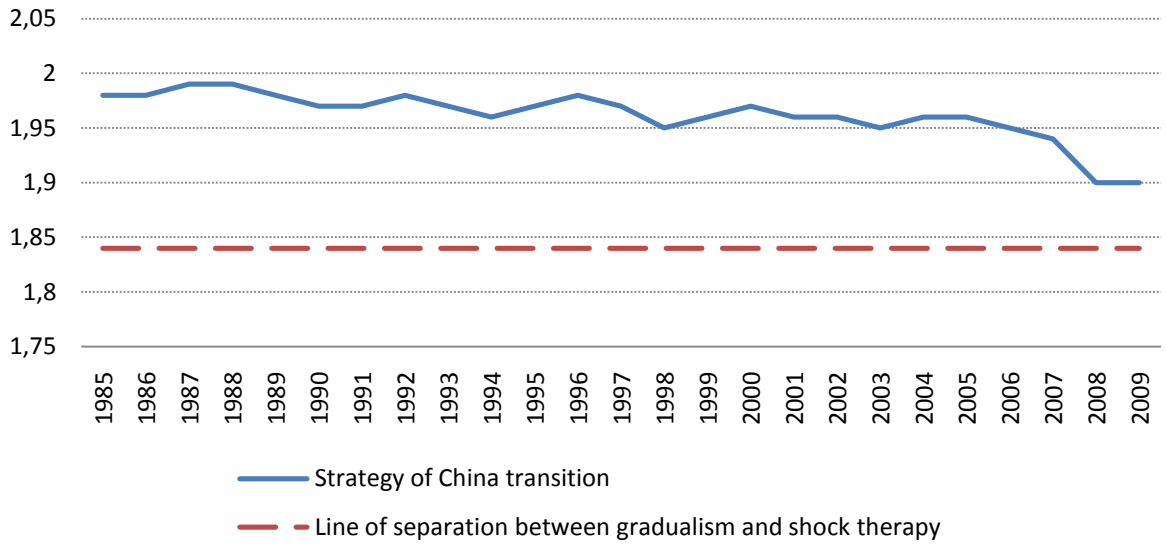
The database

To identify the public spending of the State and the economic reforms we used two statistical sources. The used data cover the period 1985-2008. We use the *Statistical Yearbook of the Republic of China* for period 1985-1988. And we use the *China State Statistical Yearbook* for period 1989-2008.

The evaluation of economic transition

Figure 9 presents the dependence of α-parameter versus of time for China transition. We see that the change of the α-parameter value in time are quite small, which suggests the persistence of gradualism approach. Indeed, the α-parameter value is over 1,84 throughout time. But we see that the α-parameter value decreases since 2006 and gets closer to the threshold of 1,84, what suggests that China is changing strategy. We think that this change of strategy explains by the will of the Chinese authorities to diversify the sources of the economic growth. The Chinese authorities want to develop the internal market since the revaluation of the yuan in 2005. This new strategy was accelerated by the crisis of 2007-2009.

Figure 9: Dependence of α-parameter versus of time for China transition



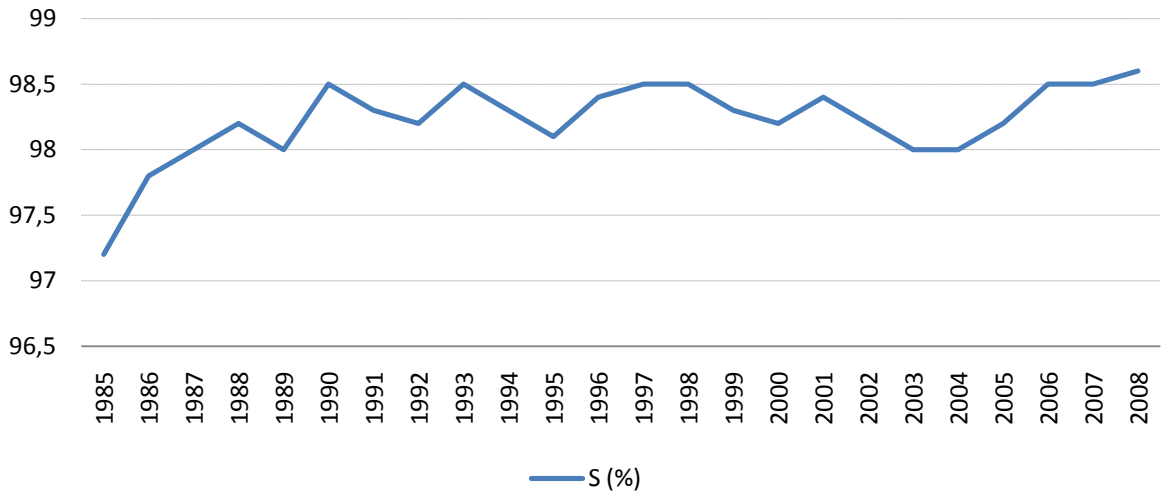
The efficiency of public management reform

In Table 1, S is the normalized entropy of the transition China. We see that China works in region close to the maximum of versus the α-parameter (see figure 2). Relatively small changes of entropy ($\Delta S \approx 0$) (see Table 1) demonstrate the efficient management by China in transition. Even for the current period of crisis, the entropy changes weakly which translates a good management of the Chinese authorities in period of strong uncertainty. The hypothesis of the real options seems to be validated

Table 1: Characteristics of public management reform

Time	α-parameter	S(%)	Time	α-parameter	S(%)
1985	1,98	97,2	1997	1,97	98,5
1986	1,98	97,8	1998	1,95	98,5
1987	1,99	98	1999	1,96	98,3
1988	1,99	98,2	2000	1,97	98,2
1989	1,98	98	2001	1,96	98,4
1990	1,97	98,5	2002	1,96	98,2
1991	1,97	98,3	2003	1,95	98
1992	1,98	98,2	2004	1,96	98
1993	1,97	98,5	2005	1 96	98,2
1994	1, 96	98,3	2006	1,95	98,5
1995	1,97	98,1	2007	1,94	98,5
1996	1,98	98,4	2008	1,90	98,6

Figure 10: The capacity to reform in function of time



IV. Conclusion

The α-parameter value (>1,84) confirms the idea according to which China adopted a strategy of economic transition based on gradualism approach since the startling transformation. But we see that the Chinese strategy is changing and that China turns to a diversification of its activities. The change of strategy took place with the revaluation of the yuan and the financial crisis 2007-2009.

Besides, we estimate a good management of the economic reforms on behalf of the China authorities via the entropy ($\Delta S \approx 0$). This result confirms the New Comparative Economics hypothesis according to which the authoritarian regimes have a good management of the uncertainty and the economic transition because they have at their disposal real options

References

Antoniou I. Ivanov V.V., Korolev Yu.L., Kryanev A.V., Matokhin V.V. and Z. Suchanecki, « Analysis of resources distribution in economics based on entropy », Physica A 304 (2002) 525-34.

Blanchard, O., Dornbusch, R., Krugman, P., Layard, R., and Summers, L. Reform in Eastern Europe. Cambridge, MA: MIT Press, 1991.

Chow, Gregory C. « Challenges of China's Economic System for economic Theory. » American Economic Review 87 (N°. 2 1997): 321-7.

Krug, Barbara and Hans, Hendrischke « China's Institutional Architecture: a New Institutional Economics and Organization. Theory Perspective on the Links between Local Governance and Local Enterprises » Working Paper.

Lesgourgues, Patrice, « L'économie politique des régimes de change : une application au cas de la Chine », PhD Thesis, Bordeaux IV University, 2010.

Lipton, David, and Sachs, Jeffrey « Privatization in Eastern Europe: The case of Poland ». Brookings Papers on Economic Activities (N°. 2 1990): 293-341.

Perkins, Dwight H. « The Challenge China's Economy Poses for Chineses Economists » China Economist Review 13 (N°. 4 2002): 412-8.

Qian, Yingyi « How Reform Worked in China » William Davidson Working Paper Number 473 June 2002.

Weitzman, Martin and Chenggang Xu, « Chinese Township-Village Enterprises as Vaguely Defined Cooperatives », Journal of Comparative Economics 18 (1994), 121-45.