

The Analysis of Interregional Government Financial Behavior in Inflation^{1, 2}

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Keywords

China local government; commercial banks; financial behavior; game; inflation

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¹ We would like to thank Xiaoming Li, Massey University (Albany) , New Zealand, for his help and seminal papers. All remaining errors are ours.

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Abstract

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1. Introduction

Macro economic fluctuation is a tough problem in a country where economic transition is taking place. Since its economic reform and opening up to the outside world, China has witnessed four times of inflation and one time of obvious pressure of inflation. They are the 1979-1980, 1984-1985, 1988-1989 and 1992-1995 periods and the period from 2002 up to the present. During the former four periods, the peak value of retail price index (RPI) was 6%, 8.8%, 18.5% and 21.7% respectively; while in the latter, the RPI reached 5.3% up to the end of the third quarter of 2004. From this, we can conclude that in the process of economic development and transition, the intention of the government in controlling inflation can have some effect only in a short period of time. It will evolve into a new round of inflation quickly after the inflation is controlled each time. Compared with the market-matured countries where the economic development expresses a periodic cycle, we have to consider whether the periodic cycle of inflation in China foretells that China has entered a stage common in market centered countries since the economic transition? If not, then, is there any difference in nature between the economic periodic cycles in China and the other market economy countries? What is the institutional reason of China cyclical inflation? These problems will constitute the nucleus of this paper.

Obviously, for the transition process, because of being affected by traditional planned economic system inertia, the government is still playing a very important role in economical operation. Furthermore, the lag effect of the reform of investment and financing system make the

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locality and central authority, locality and locality play a “dual game” in macro economic policies, and thus influence the execution result of the macro economic policies. The structure of existent property right and financing institution arrangement has a obvious exciting effect to the double game. There is a barrier between vertical management (typical of financial departments) and horizontal management (typical of local governments). Especially take " strip (tiao) " as the core in the finance organization, that is to say finance organization is vertically managed, while the local government relies mainly on " lump (kuai)", that is to say local governments are horizontally compete with one another, the contradiction of " strip and lump partition " leads to the fact that in financial behavior locality and central authority exist non-cooperative game, and locality and locality exist zero-game. In addition, together with the softening of the restraint of investment risk caused by the existent property right system and the guidance of present assessment of governing achievement in one’s official career, these make the local government chase to occupy more financial resources, to promote the development of local economy and society, and regard these as their priorities. The purpose of the local government financial behavior is to force the central bank to change the direction of its policy through the so-called “reverse-threaten-mechanism” (daobi jizhi). Due to the lack of independence, the central bank will inevitably increase the credit scale of the whole society, leading to inflation. Thus, the study of inflation caused by the financial behavior game between the central government and local governments and among the local governments will naturally fall into the vision of our research. In this article, we will try to utilize the game theory as the analytical tool to analyze the cause of inflation from the point of interregional government financial behavior game, thus to establish an interest game type inflation model about the transition economic country.

In the study of such problems, one of the seminal papers in this literature is from Li, and Ma (1996). They have correctly analyzed financial game under credit ration, but the credit ration has been cancelled from 1998. Li (2000) has analyzed the financial behavior game among localities detailed, but his analysis was focused on the monetary policy tool, which failed to explain adequately the repeated occurrence of inflation in our country. Fan Gang (1994) emphasizes that the “decentralization” under the "state-owned property right relation" has given rise to the “soft-restraint competition’ inside the state-owned economy, which is the main institution reason that cause inflation in the last few years in China (Fan Gang, 1994).Fan Gang’s analysis have some resemblance with the theory and logic of this paper, but his viewpoint mainly stresses the “soft-restraint competition” caused by the property right relationship, which fails to embrace government’s behavior. This paper believes that the relationship of property right undoubtedly has great influence over the budget restraint, but this restraint can only show itself through the utility preference function of the government. Thus, this paper will utilize the existent government institution as the background, and try to put the property right relationship and the government utility preference function into the unified analytical framework to explain the inflation problem of China. It should be noted that the property right relationship discussed in this article is confined to the field of finance, partly because there is no essential adjustment of intrinsic relationship between the arrangements of financial property right and the government financial behavior (though there have been great changes in social property right relationships through many years’ reform.), and partly because the direct factor leading to inflation lies in the changes of overall financial supply. In a word, the inflation model established in this article, based on the Chinese government special institution background and extant financial property right relations, is an

interest-game type inflation model. The model will have stronger explanation strength to China's cyclical inflation phenomenon, meanwhile, have a positive significance in both theory and practice to normalize the financial behavior of local government, restrain its investment impulse, and maintain the macro economic stability of our country.

The following structure of this paper arranged thus: The second part carries on the analysis to the local government financial behavior characteristic, drawing out the source of the local governments financial behavior conflict; The third part utilizes the Cournot game model (Li 2000) as a tool to further analyze the local financial behavior, solve and explain three solutions separately; The fourth part utilizes relevant data to empirically examine the model; The fifth part is the conclusion and policy implication.

2. Characteristic Analysis of Local Government Financial Behavior

Owing to the special social and political structure of China, its market-oriented economic institution at the present stage manifests the mode in which “the government still playing the predominate position in economic operation” (Feng Tao, 2000). On one hand, under this kind of mode, the government will exert direct or a series of hidden rules to control the social economic resources input and allotment (Feng Tao, 2000). On the other hand, at the present social economy development level, the aspiration of social development still circumscribes to pursue the increase of the growth rate aspect. Therefore, the central government assesses to the governing achievements of one's official career is economy growth index. Undoubtedly, this target also constitutes the most important variable in the government utility function. At the same time, through a public financial decentralization (caizheng baogan), tax revenue decentralization (fenshuizhi), and investment and financing (tourongzi) institution reform gradually, the local government has begun to enjoy more and more independent economic benefit and a certain decision-making power in economic activities, thus forming a "Competitive market among interregional government" (Feng Tao, 2000). This competition is characterized on one hand, by non-cooperative bargaining "tiaokuai" game between vertical management of financial departments and the horizontal management of the local governments, and on the other hand by the “kuaikuai” zero game among the local governments. However, because of our country's existing financial institution arrangement where takes state-owned institution as the corpus, take “tiaotiao” as the ties in managing ways, namely manages vertically, then, the preference of struggle of the local government for the economic resources is focused on the possession of financial resources that regarded as the strip (tiao). As a result, the purpose of struggle for financial resources can be reached in the existing institution framework,⁷ which in turn speeds up the realization of economic growth target in a comparatively short period of time.

Under the induction of present system of assessing to the governing achievement in one's official career, each local government will certainly have the urgent to speed up the economic development pace, so as to seek the fast growth and per capita income of their native region economy in order to maximize their official career.

However, our country is still in an extensive growth ways, the development speed is directly dependent on the input of productive elements and the possession of the economic resources,

⁷ The financing institution has the soft constraint relation with local government under the state-owned system background.

moreover the most effective input is money, which can in turn mobilize more input of economic resources. The more the currency that an area obtains, the more the region can fight for resources. Hence, the local governments will positively wield the control rights over all kinds of commercial banks, in order to enlarge one's own investment and to scramble for more financial resources. In order to simplify the model, in this article is substituted the input amount of elements and the possession amount of resources with the amount of resources.

Suppose the economic body is composed of region A and region B, which are similar in economic scope and economic strength. Either region wants to possess greater portion than the other in the resources available for investment, which can be expressed mathematically as follows:

$1/2 < I_i^* / \bar{I} \leq 1$, (i=A、B) (Li, 2000) . Where, I_i^* is regional i desired investment resources

which can maximize the welfare W_i in region i, \bar{I} is the overall real resources that can be

utilized and the investment available. In a specific period of time, the overall amount of resource is limited, and too much money used to seek for limited resources excessively will surely lead to

inflation. I_i^r is the investment resources that the region i get physically. W_i is monotonous

increasing function of I_i^r . The result of I_i^r lower than I_i^* is the loss of welfare of region i. φ_i

and Φ_i denote the realized and desired shares in region i in proportion to the overall resources,

respectively. Because $(\Phi_A + \Phi_B) > 1$, however, $I_A^* + I_B^* \equiv \Phi_A \bar{I} + \Phi_B \bar{I} \equiv (\Phi_A + \Phi_B)$

$\bar{I} > \bar{I}$, i.e., as far as the desired investment demands of each region, the total amount of resources

which can be utilized is shortage. In a circumstance where there is a conflict between limited overall amount of resources and the local utility motives, "the investment aspiration" of our country is always bigger than the social optimum level. The economic conflict among regions is characterized as the interest conflicts caused by scrambling for limited resources, for only through the control of the rare and inadequate resources can the local government turn the wishes of displaying governing achievements performance into reality. The prerequisite of possessing resources is possessing money as a kind of purchasing power. Each region wants to take up more currency in order to obtain more resources. In this way, the competition of local governments for resources is shown as the competition for financial resources.

At present, the financing method in China is mainly through the indirect financing, typically through the credit of commercial banks, which occupy 80% of the whole financing. In order to simplify, we suppose that every region get credit financing only through the commercial banks. There are three kinds of commercial bank institutions in every region. First, the branches of four major state-owned commercial banks; Second, the branch of shareholding commercial banks; Third, local commercial banking institutions. Under the present financial organization institution arrangement, the local government will wield different intervention over the business of the above-mentioned three kinds of commercial banks in order to obtain more monetary resources.

As to state-owned commercial banks, for example, it will carry out the "belong to a ground type" intervention. The local government usually requests the branch leaders of the commercial

banks in the region to take part in various economic meetings, requiring the credit policy of the state-owned commercial banks to satisfy local economic development needs. Because of the existence of “belong to a ground” relationship, the local government usually gets the upper hand in the “vertical/horizontal management” (the tiaokuai game) game. As to the shareholding commercial banks, it will carry out the "lure and force type" intervention. For example, it will provide them with creditworthy project to lure credit, or change the hidden rules to force them to submit or give in. As to the local commercial banks, it will carry out the "control type" intervention. Because the local commercial banks are essentially established by the local government, the latter can directly exercise “appointed credit”, a kind of administrative intervention to the business of local commercial banks. Whatever forms of intervention are adopted by the local government, its essence is non-market-oriented behaviors. They are all for to minimize the losses of its welfare or maximize its own utility through intervention the credit amount of the commercial banks.

Since the motive of the local government in considering self-interest is to maximize his partial interest, with little or no responsibility of social overall interest (FengTao,1996). Therefore, the spillover-effect resulting from expanding credit investment policy will be beyond the scope of its obligation. In the following, we will further explain how the financial behavior of the local governments to competitively expand credit investment which leads to inflation.

3. Model Analysis

If the total amount of the resources is given, region A、 B must be manifest a zero-game in the competition for the resources. Clearly, $I_i^r = (I_i / I) \bar{I} = \varphi_i \bar{I}$, (i=A、 B). Here, I_i represents the amount of nominal loans granted to region i; I is the overall nominal loans granted to A and B. In order to obtain desired investment resources $I_i^* = \Phi_i \bar{I}$, the corresponding monetary amount I_i will display an equation as follows (Li, 2000) :

$$I_i = \theta_i (I_j - \bar{I}_j) + I_i^* \quad (i, j=A、 B; i \neq j) \quad (1)$$

Among them , $I_i^* + \bar{I}_j \equiv \bar{I}$; $I_i + I_j \equiv I$; $\theta_i = \Phi_i / (1 - \Phi_i) > 1$. Equation (1) is the loan behavior principle of the region i's commercial banks when it follows the local government intervention instruction.

Then, which role should the central bank play in the financial behavior game by the local governments for the controlling right of more monetary fund? Obviously, the central bank will not be tolerant of the financial behavior game carrying on without limitation for the sake of the stability of the macro economy. Because, as far as central bank is concerned, it is two main variables in its utility function are stability and the promotion economic growth. Therefore, the central bank will take some measures to guide the financial behavior of the commercial banks, in order to realize the following two objectives: one is to minimize of inflation, the other is to optimally distribute to the resources, which is mathematically expressed as follows (Li, 2000) :

$$I^c = (1 + \pi^c) \bar{I} \quad (2)$$

$$I_A^c + I_B^c = I^c \quad (3)$$

Assumption, the inflation target is exogenous, which in turn decides total credit plan. This total credit value will be assigned with the proportion of $I_A^c / I_B^c = \theta^0$ among A, B regions. The final materials resources will also be distributed in region A and B in this proportion $I_A^0 / I_B^0 = \theta^0$, of which $I_A^0 + I_B^0 = \bar{I}$. If the resource allocation comes to reality in such a proportion, the whole social welfare will be maximized:

$$W \equiv W_A(I_A^0) + W_B(I_B^0) > W_A(I_A^r) + W_B(I_B^r), \text{ if } I_A^r \neq I_A^0, I_B^r \neq I_B^0, I_A^r + I_B^r \equiv \bar{I}$$

Because of $I_A^0 < I_A^*$, $I_B^0 < I_B^*$, then $W_A(I_A^0) < W_A(I_A^*)$, $W_B(I_B^0) < W_B(I_B^*)$. Obviously, the welfare goals of the locality and central authority, locality and locality have conflicts. In order to realize the targets set in equations (2) and (3), the central bank might try its best to, directly or indirectly, control the credit amount I_i^c of the region i. If the central bank carries on the strict control according to the Equation(2)、(3), then the commercial banks of this location can only grant the loan according to $\lambda_i = \frac{I_i^c - I_i^*}{I_j^c - I_j^*} < \theta_i$ proportion. Therefore, the Equation (1) is

revised :

$$I_i = \lambda_i (I_j - \bar{I}_j) + I_i^*, \quad \lambda_i = \lambda_i (I_i^c) \quad (4)$$

Limited to the restriction on local financial behavior by central bank, the financial behavior that local government i welfare maximized will be subordinated to the Equation (4) restraint condition. Namely: Subject to the restraint of $I_i^r = \frac{I_i}{I} \bar{I} = \frac{\lambda_i (I_j - \bar{I}_j) + I_i^*}{I} \bar{I}$. Under this

restriction, the solution to the local government i to maximize the welfare is no longer I_i^* , but I_i^{r*} .

And $I_i^{r*} = \frac{\lambda_i (I_j - \bar{I}_j) + I_i^*}{I} \bar{I} = \frac{\lambda_i (I_j - \bar{I}_j) + I_i^*}{P} < I_i^*$, among them ($P = I / \bar{I}$). In this case,

local government i, in order to make welfare losses maximized, will make the I_i^r close to I_i^{r*} , instead of I_i^* .

Suppose that the welfare lose function of each local governments respectively is (Li, 2000) :

$$J_A = \tau^2 (I_A + I_B - \bar{I})^2 + \Omega_A (I_A - \varphi_A \bar{I})^2 \quad (5)$$

$$J_B = \tau^2 (I_A + I_B - \bar{I})^2 + \Omega_B (I_B - \varphi_B \bar{I})^2 \quad (6)$$

Among them, Ω_i is that local government i give the weight of investment relative to

inflation. If local government A give the extremely high weight to one's own investment, and ignore one's own financial behavior impact on inflation, then $\Omega_A \rightarrow \infty$; and τ is the distorted parameter of price caused by inflation,. Here, we regard it as the constant. Under our country current financial organization institution arrangement, through the above-mentioned "Belong-to-a ground type ", " Lure-and-force type "and" Control type " intervention, the local government in fact often has the control power of the commercial banks. Then, the local government usually will require the commercial bank to make its welfare loss minimized through choosing the credit amount. During the process of choosing, according to the theories of Cournot game , one often assumes that the other side's credit amount keeps intact all the time, the change of oneself credit quantity will not cause the change of the other side's credit quantity. Namely, $\frac{\delta I_A}{\delta I_B} = 0$, $\frac{\delta I_B}{\delta I_A} =$

0. By solving the equations, we can get the following financial behavior reaction function of the region A、 B (Li & Ma, 1996):

$$I_A = \frac{-\tau^2 I_B + (\Omega_A \varphi_A + \tau^2) \bar{I}}{\Omega_A + \tau^2} \quad (7)$$

$$I_B = \frac{-\tau^2 I_A + (\Omega_B \varphi_B + \tau^2) \bar{I}}{\Omega_B + \tau^2} \quad (8)$$

We can do the following graphic analysis to the pair of financial behavior reaction functions:

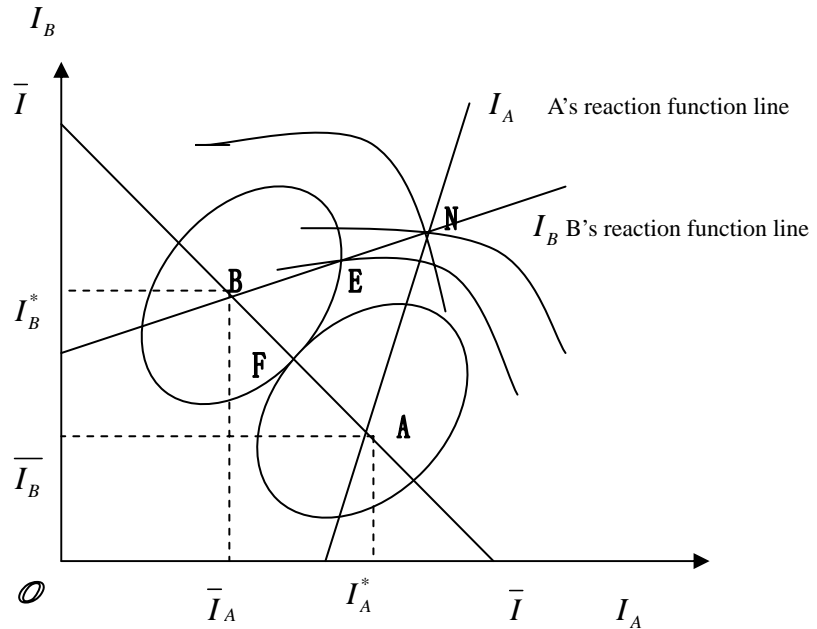


Fig. 1: Three solutions of interregional government financial behavior game

In the Fig.1., I_A and I_B pass two points of A、B respectively. \bar{I} is the social resource restraint line. The welfare of region A regards A as centre to spread and decrease progressively

step by step along difference contours⁸. At the same time, farther far apart from the resources restraint line $\bar{I} \bar{I}$ from exterior, show the more resource shortage, namely the inflation rate is also higher; farther far apart from the resources restraint line from the inner, show the more resources idles, namely the deflation rate is higher. According to the Equation (7)、(8), the slope of the reaction function mainly is dependent upon the Ω_i and φ_i . For example: when Ω_A increases, the local government A gives larger weight to investment. Then the local government A will put more emphasis on investing but taking no cognizance the inflation. Therefore reduce the slope of A's reaction function, its reaction line will change even slower. If B's reaction function does not change, the increase of Ω_A will push the Nash balance point (N) farther outside, its economy explanation is a stronger investment expansion and higher inflation rate. Now, we discuss further the game solutions.

As the above Fig., we can get three possible solutions: N、E、F. Among them, N is the point of intersect of A、B reaction function lines, also is the Nash equilibrium; F is the point of cooperate equilibrium, in both sides difference contour is tangent in this point .E presents the case when regional B acts as the Stackelberg leader and region A as the follower. Compare these three solutions with one another, obviously, when both parties cooperation (F), realized the Euler theorem to allocate resource completely. At this moment, either party can obtain more benefits , F is closer to each desired investment A (I_A^*, \bar{I}_B) and B (\bar{I}_A, I_B^*) compared with point N、E . The more important thing is that it does not have inflation or deflation at this moment. However, cooperative strategy is not sustainability. In F, both sides of A、B have a motive to cheat the other. For example, if A moves from F to one's own reaction function, then he can obtain extra interests ; If B moves from F to one's own response function, he also can obtain more extra interests; So, the both parties are difficult to have sincere cooperation. Only the central can restrain the financial behavior of the local governments. So, unless central bank implements the severe control measures, and can succeed in overcoming the local opportunism behavior, the cooperative equilibrium can be reached.

If F is not the economic stable state, then between N, E which one is the stable state? In fact, from the above analysis we can also see, two regions when they are moving from N to E, by solving the Stackelberg leader-follower model, as long as the two parties are together reduce the investment expenditure, both sides can obtain extra interests . But because of reaction function that slope upwards, one who follows can seize heavy interests. This is "follower advantage" (Coop,1985). The follower can obtain the greater benefits. This will lure the both parties to participate in this "chicken game". Finally, both sides will be locked in the economic state of inflation. When facing the tightening macro adjustment and control from the central authority, every party will try to force the other side to accept the role of forerunner, and he himself as follower in order to obtain heavy interests; Or, lobby the central bank authority, and declare that the investment of the other side expands excessively, the intention is to draw support from central

⁸ The indifference contours is one group of seal curves. The closer to the central point, the more greatly it's worth; the farther from the central point, the smaller the value is.

authority and to restrain the expansion of the other side, to reduce the investment expenditure of the other side, made he himself become in fact follower to obtain more benefit. Meanwhile, tightening "follower advantage" can be made into the following economic explanation. As to forerunner, follower mostly briefly imitates the behavior of leader at this moment, the cost and risk of its imitation are relatively small, so its rational choice is to benefit by waiting. At the same time, the competition among the regions will also lure the backward regions into imitating the developed regions and coping with the central bank countermeasure; this will accelerate the inflation or elongate the outside time lag of austerity policy.

When the economy is in depression, all regions will enlarge investment in order to stimulate economy actively. And with the economic recovery, they will expect further economic growth, leading to speed investment. When all faced with the restraint of resource shortage, the motive of investment all over the country will be further encouraged. Just as above-mentioned model, the investment result of ignoring the actual economic need must be overheated and inflation. If both parties refuse to cooperate and no side wishes to reduce investment expenditure first, or the central also can not succeed in controlling the investment expansion, high inflation X- inefficiency Nash equilibrium solution will exist over a long period. If the central authority under various kinds of pressures, appeal to directly control Ω_i and φ_i , thus succeed in tightening, then the economy finally can get back to cooperation game solution F. However, the economy that has reached is not permanent and can not long-last. In the economy of a market-based orientation, these measures will exert an adverse effect on the market-based process. Especially, the market-based index has already been up to 86% at this round of inflation in China. Therefore, the measures to cope with inflation should be adapted to the changes of the market environment. The central "cut-it-even-at-one-stroke" (yidaoqie) no-marketization direct control measures which will not have a sustainable policy effect as the permanent policy, may often be opposed strongly by some regions sometimes. Depending on the administrative means and "check credit, check land", not carrying on the structural fine adjustment with the market-based means, the macro control will not only be more difficult, but its effectiveness will not be consolidated and sustained as well (BaShusong, 2000). In this way, it will form an inflation rebound expectancy. The expectancy can be self-fulfilment, cause round and round cyclic inflation. So, the conclusion of this article is, under the present assess to one's political achievements in official career, the local governments will positively wield the control rights over all kinds of commercial banks, in order to enlarge one's own investment and to scramble financial resource. When the financial behavior of the commercial bank is limited by the intervention of the local government, Nash non-cooperation equilibrium N will be the steady solution. Though this is no Pareto-optimal, even make both sides worse off, because the inflation rate is the highest at this moment. The following part of this article will combine the recent year's data of Chinese each province and municipality to make the further empirical examination to this model.

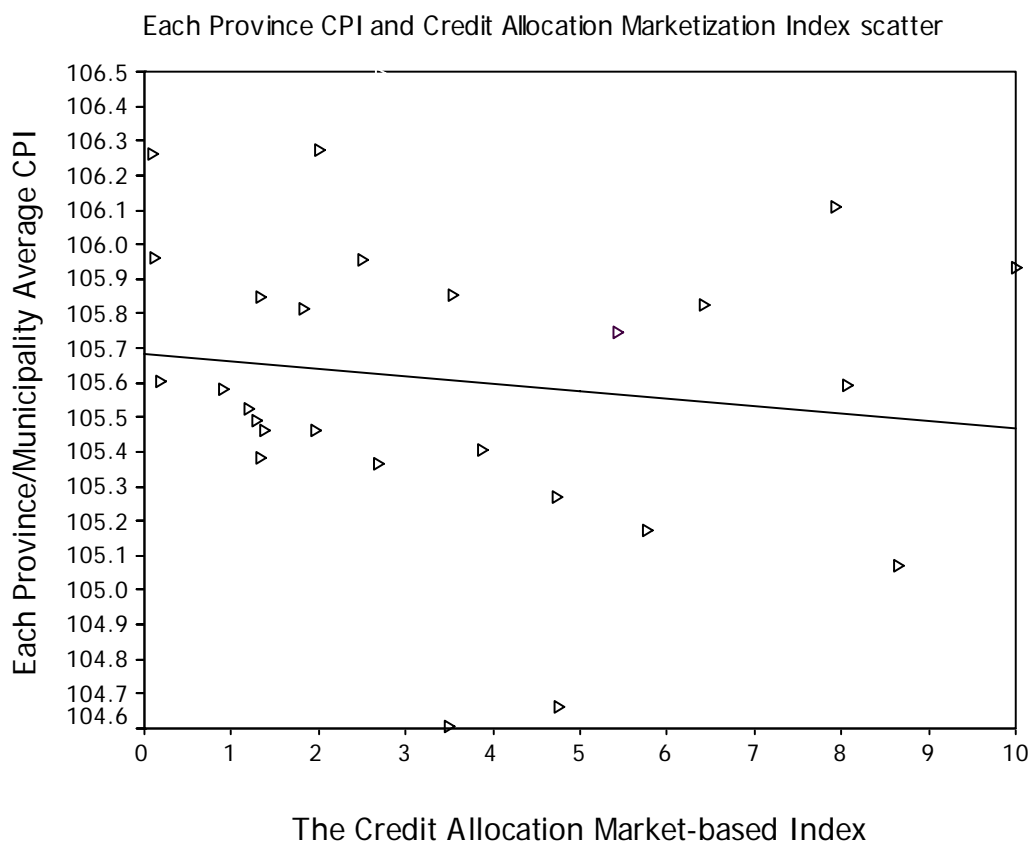
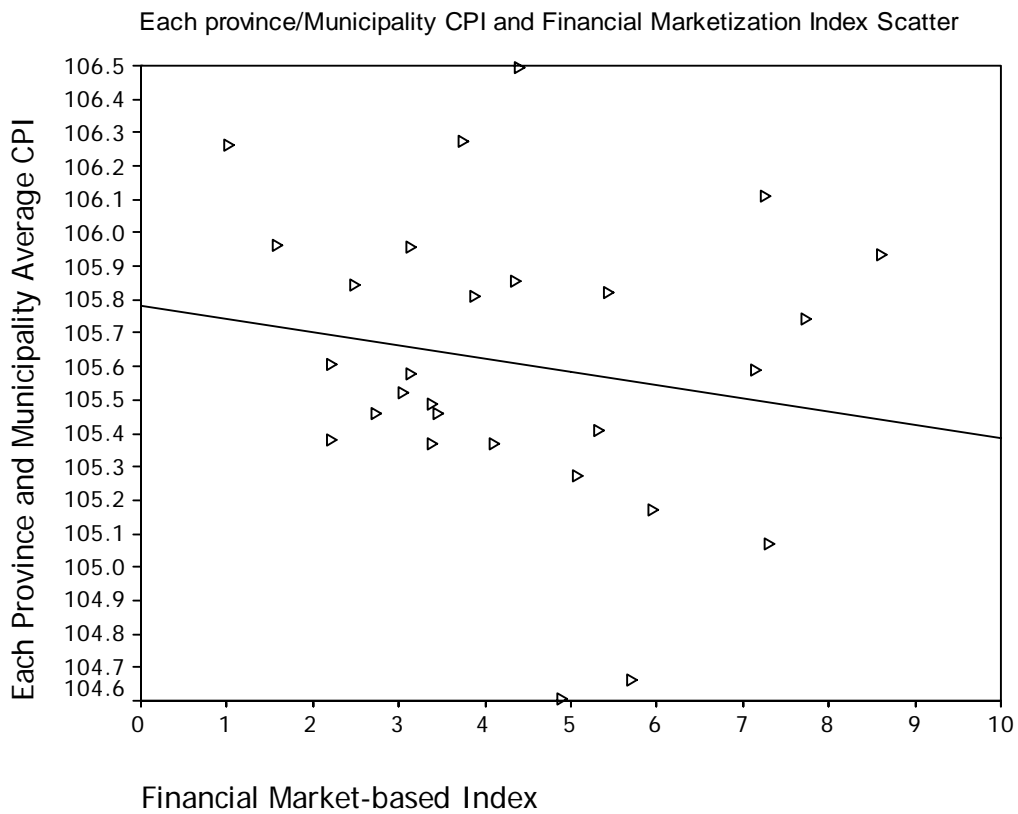
4. Empirical analysis

This article uses the annual data, the time interval span was 1978- 2003. The data are drawn from *Comprehensive Statistical Data and Materials on 50 years of New China*, *China Statistical Yearbook 2004* and *China Market-based Index Report 2004*. The variables in the model include: the Consumer Price Index (CPI) of 1978-2003 year, the financial market-based index of 2003 year,

the credit allocation market-based index of year 2003, the bank credit (GCR), the fixed assets investment (FI), and the gross domestic product (GDP).

The logic of the third part of this article can be simplified: The local governments wield the control rights over all kinds of commercial banks, make regional credit and investment excessive, cause inflation. We examine this argument from two aspects. Firstly, we will describe the relation between the local government financial intervention behavior and inflation. Secondly, we will do some Granger Causality test between the time series variables CPI, CR, FI, and GDP, especially between CPI and the bank credit.

According to *China's market-based index report (2004)* of Fan Gang, et al., we have each province and municipality the financial market-based index, the credit allocation market-based index of year 2003. Because of the difficulty of data collecting, this article would substitute the financial market-based index and the credit allocation market-based index for the local government intervention index to the local commercial banks. The smaller these two indexes are, indicating the financial market-based in this region is relatively low, the larger intervention influence power to the local commercial banks by the local government. According to the financial market-based index, the credit allocation market-based index and average CPI of each province and municipality of China, we have drawn some scattered maps. Obviously, by observation, we can see the scattered points slope from the upper left hand side to the lower right hand side. Using SPSS11.5 software to fit those scattered points, we can see that there are negative relations between the financial market-based index, the credit allocation market-based index and average CPI of each province and municipality of China. Further analysis shows that in regions where the financial marketization index and credit fund distribution marketization index are comparatively low, the government interfering act is generally strong and the inflation will be high; in regions where the financial marketization index and credit fund distribution marketization index are comparatively high, i.e., the financial market and the distribution of credit fund follow the market principle and have less interference from the local government, the level of inflation will be comparatively low. Thus, we can arrive at a preliminary conclusion: the financial interfering act of the local government is one of the causes leading to inflation.



Granger (1996) thinks, one of the conditions that Granger Causality test is the stationarity

of the variables, otherwise it will produce the spurious regression. Therefore, before carrying on Granger Causality test, we must investigate the stationarity of the variables firstly, namely examine their unit root. Only when cointegration exist, we can test Granger Causality relations between the variables. This article used eviews4.1 software. We use augmented Dickey-Fuller (1981) procedure, namely ADF test. Table 1 reports the results of the ADF test.

Table 1. ADF Unit Root Test

variables	Test type	lag	ADF values	Critical values			conclusion	confidence degree
				1%	5%	10%		
CPI	n	0	-1.569781	-2.6603	-1.9552	-1.6228	no- stationarity	
DCPI	n	0	-4.026070	-2.6649	-1.9559	-1.6231	stationarity	99%
GFI	n	1	-1.486178	-2.6756	-1.9574	-1.6238	no- stationarity	
DFI	n	1	-3.539800	-2.6819	-1.9583	-1.6242	stationarity	99%
GDP	n	1	-0.803437	-2.6603	-1.9552	-1.6228	no- stationarity	
DGDP	n	1	-4.273049	-2.6700	-1.9566	-1.6235	stationarity	99%
GCR	c	1	-2.407918	-3.7497	-2.9969	-2.6381	no- stationarity	
DGCR	c	1	-5.120192	-3.7667	-3.0038	-2.6417	stationarity	99%

^a The lags are chosen according to the Schwarz's information Criterion. ^b All series are in growth rate form. ^c The Critical values come from Mackinnon's.

We can notice that the level values of all variables seem to have a unit root (no- stationarity), and will be stationarity after one order difference. That is to say the variables are that all I(1) processes. The finding that all variables are I(1) processes allows us to test for possible cointegrations between variables CPI, CR, FI, and GDP. Table 2 displays the Johansen (1991) test.

Table 2 . Johansen cointegration test

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.820442	59.14893	47.21	54.46	None **
0.461416	23.08648	29.68	35.65	At most 1
0.306947	10.09144	15.41	20.04	At most 2
0.107649	2.391820	3.76	6.65	At most 3

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

The null hypothesis of no cointegration between CPI, CR, FI, and GDP is rejected. Further, the hypothesis that there are no more than one cointegration relationship between CPI, CR, FI, and GDP is not rejected. That is to say, there does exist a cointegration relationship between CPI, CR, FI, and GDP. The cointegration relationship indicates that there is a long-term equilibrium among the variables, but we can not draw the conclusion that this kind of relationship is the Granger Causality relation. We must do Granger Causality test on the foundation of cointegration. We can draw the following table 3:

Table 3. A part of Granger Causality test result

Null Hypothesis:	Obs	F-Statistic	Probability
GCR does not Granger Cause CPI	23	3.04366	0.07267
CPI does not Granger Cause GCR		3.99256	0.03672
GDP does not Granger Cause CPI	24	4.13060	0.03240
CPI does not Granger Cause GDP		2.94439	0.07694
GFI does not Granger Cause CPI	21	6.38570	0.00915
CPI does not Granger Cause GFI		1.75348	0.20485
GDP does not Granger Cause GCR	23	2.86306	0.08326
GCR does not Granger Cause GDP		0.53463	0.59491

Now, we will try to explain the above-mentioned Granger Causality test results.

1、Credit expansion and inflation exist two-way Granger Causality relationship. We can summarize by 93% of the confidence degree that credit expansion is the Granger reason to inflation; meanwhile, summarize by 97% of the confidence degree that inflation is Granger reason to credit expansion too. The expansion of credit has promoted the inflation; the inflation has also promoted credit expansion conversely. This has strongly proven the logical reasoning of section three of this article that the credit interference of the local government to the located commercial banks leads to credit expansion which further leads to inflation That is to say :Financial intervention of the local government →Credit expansion →Inflation→further interference to keep the upper hand of the game →further expansion of credit →Inflation higher. This will form a vicious circle. It is high inflation X—inefficiency solution will be the ultimately equilibrium of the financial behavior game between regions. Just as the foregoing paragraphs analysis, the economy at this moment will be locked in this inefficient point of solution.

2、GDP is the Granger reason of inflation. It is the governments at all levels that worship the figure of GDP, causing inflation repeatedly to emerge in our country, this applies unanimity with the theory of the third part too.

3、The fixed assets investment is Granger reason of inflation. Government's preference to fixed assets investment is one of the main reasons which may cause the inflation in our country.

4、On one hand, GDP is the Granger reason of credit expansion. It is the governments at all levels that are passionately interested about GDP, and demand for displaying his political achievements, thus cause the scale of credit to expand , and be difficult to reduce. On the other hand, we are unable to refuse the null hypothesis that GCR does not Granger Cause GDP. That is to say, the regional government financial behavior that intervenes, can not improve the true GDP output from the national point of view, just as the conclusion of the model in the third part, because for a long time it will only result in higher inflation and greater welfare and lose.

It should be noted that our assumption of region A and region B are homogeneous in building up the game model. De facto, the discrepancy of economic development of every region, causes the position in fighting for the financial resources will also have obvious discrepancy , which will be the next subject of our research .

5. Conclusion and Policy Implications

Through the above-mentioned game model analysis and empirical examination, we can come to the conclusion as follows: Our country's cyclical inflation, does not indicate that our country

has already stepped into the market economy inherent economic cycle. The main reason of cyclical inflation of our country is caused by the local investment expansion resulting from inter-regional interest game. In the present property relation structure, government institution, and financial institution arrangement, each region all attempts to have larger economic resource share. So, the local governments will positively wield the control rights over all kinds of commercial banks, increase the credit amount in the location, to raise one's own investment expenditure, in order to increase the economic growth rate. The result of the financial behavior game among the local governments, is that the investment expenditure will maintain at high inflation level for a long time. The behaviors of each local government build on the following wrong faith foundation: He who unilateral investment increment will make himself acquire more actual resources with the smaller inflation cost. Both sides have not been conscious of the spillover effect of their policies to the other party and the whole economy. Actually, the increasing of investment of one local government will simply lure the increasing of investment of the other government. Apart from causing higher inflation, the first increased credit cannot obtain more real resources. Even so, both sides do not have the voluntarily motive to reduce himself investment. All wants to offer more loan but is unwilling to shrink. Finally, economy is a stable state of high inflation.

In summary, the solution to the inflation problem of our country depends not only on the macro economic policy, but also on the radical solution of fundamentally financial institution. To make it more clearly:

- 1、 Not only the central bank should keep the independent characteristic, but to some extent the commercial bank should also keep a certain degree of independent characteristic. Through reorganization , change the institutions to set up according to the economic zone but not according to the administrative area; and build up an organizational system based on the legal attribute of property and linked by property right and stock ownership instead of “vertical/horizontal management”.
- 2、 We should actively and effectively promote the government's property right reform, and restraint of the regional government financial intervention behavior by law. The government should observe laws in doing everything.
- 3、 Quicken the development of regional financial market, especially bond market. The investment demands of the local government should more be solved by the issue local government bond, but not by squeezing all kinds of commercial banks loan.
- 4、 The central government should pay more attention to the market-based macro adjustment and control means, instead of "cut it even at one stroke" no-marketization policy. Macro policy tool should contribute to avoiding the iteration of the inflation, and avoid the uneven distribution of bitterness and happiness of the anti-inflation achievement.
- 5、 Change the present governing achievements examining system, to correct local government financial behavior .Above-mentioned conclusions are all for the fundamental measures to avoid the cyclical inflation in China.

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