

## QUANTITATIVE ANALYSIS OF INFLATION ISSUE IN CHINA

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### ABSTRACT

It is no doubt that China now is facing a challenge of inflation; quick prices rising, over issued monetary, rapid growing total social demand and insufficient production supply...

The present paper studies the inflation issue in China in terms of the macroeconomic theory by system dynamics, in order to find the fundamental causes and the self-promoting mechanism of inflation in China. In this paper, factors of total social demand, monetary issue, etc. have been qualitatively and quantitatively discussed, some policy tests have been made, and finally the new viewpoints and suggestions which will help to cut down inflation are put forward. It is a new test to study inflation by system dynamics instead of by regression or curve fitting.

### I. INTRODUCTION

From the results of our earlier studies of monetary issue in China by system dynamics, we find:

First, the price level ( price index ) shows a strong exponential growing trend, especially in recent years this trend appears more obviously.

Second, in recent years ( expect 1982 ), monetary supply was obviously great than monetary demand.

In view of the above-mentioned facts, we predicted; a stronger inflation would take place in China. As we expected, in August of the same year ( 1988 ) the violent wind of rush purchase and rush bank-cashing seeped all sides. Chinese economy was puzzled by inflation.

The inflation was studied before mostly by regression, curve fitting and qualitative methods. Of course the above methods could do something in some way. But there still are some shortcomings. We know inflation is an extreme complex problem in real macroeconomy. It is influenced by many interconnected and interacted factors. To this end, the study of inflation only by regression or by qualitative method is felt quite helpless.

System dynamics is good at dealing with high-order, multiloops, nonlinear and dynamics systems. On the base of our research work of monetary issue, we try to explore the causes and the mechanism of inflation in China, and then put forward some new viewpoints and

suggestions by which the inflation would be cut down.

## II. THEORY ANALYSIS

### 1. Inflation

Economists have many different viewpoints to inflation so far. We consider inflation is a kind of monetary phenomenon. It means over-issued monetary results in quick prices rising. The former is cause and the latter is effect.

### 2. Monetary Supply and Monetary Demand

#### 1) Monetary Demand

Keynesian economical theory divided monetary demand into three parts: transactive demand, precautionary demand and speculative demand.

#### a. Transactive demand $M_dj$

$$M_{dj}/P = f_1(NI, P) \quad (2-1)$$

$$\text{with } df_1/dNI > 0, df_1/dP < 0$$

where NI stands for national income, P stands for price level.

#### b. Precautionary Demand $M_{dy}$

$$M_{dy}/P = f_2(NI, P) \quad (2-2)$$

$$\text{with } df_2/dNI > 0, df_2/dP < 0$$

#### c. Speculative Demand $M_{dt}$

$$M_{dt}/p = f_3(NI, R) \quad (2-3)$$

$$\text{with } df_3/dNI > 0, df_3/dR < 0$$

where R stands for interest rate.

Then the total annual monetary demand  $M_d$  becomes:

$$M_d = M_{dj} + M_{dy} + M_{dt} \quad (2-4)$$

In fact,  $M_{dj}$  and  $M_{dy}$  have something to do with consumption and  $M_{dt}$  is concerned with investment. By the consideration of this, monetary demand can be expressed as the sum of the two parts, consumption demand and investment demand.

$$M_d/P = f_1(NI, P) + f_2(NI, P) + f_3(NI, R)$$

$$= F_1(NI, P) + F_2(NI, R) \quad (2-5)$$

$$\text{with } dF_1(NI, P)/dNI > 0, dF_1(NI, P)/dP < 0$$

$$dF_2(NI, R)/dNI > 0, dF_2(NI, R)/dR < 0$$

where  $F_1(NI, P) = f_1(NI, P) + f_2(NI, P)$  stands for consumption demand, and  $F_2(NI, R) = f_3(NI, R)$  for investment demand.

## 2) Monetary Supply

Monetary supply is governed by the central national bank, symbolized by Ms. The annual monetary issue can be regarded as its increment. Similarly, monetary supply can also be divided into two parts, consumption supply and investment supply corresponding to consumption demand and investment demand.

## 3) Difference between Monetary Supply and Monetary Demand

Obviously, there almost surely is an imbalance difference between monetary supply and monetary demand because of various reasons. This difference is symbolized by DISCM.

In maroscopic range, the two factors of price level and interest rate are concerned with DISCM. Price level is directly affected by DISCM, and interest rate is a leverage adjusting DISCM.

## III. MODELING

According to the previous analysis, we created a system dynamics model to our interest problems. The causal loops of the model is exhibited in figure 3.1.

In terms of the macroeconomic theory and the actual situation of China, we adjusted and tested our model repeatedly. Finally we find a more suitable model structure. The main equations are listed as follows:

$$\begin{aligned} dNI/dt &= K1 * NI && ( 3 - 1 ) \\ dPD/dt &= A1 * NI - B1 EXP ( B11 P ) && ( 3 - 2 ) \\ DISCP &= PD - PS && ( 3 - 3 ) \\ dP/dt &= F1 * DISCM + E1 * DISCP + C1 * P && ( 3 - 4 ) \\ dID/dt &= A2 * NI - B2 EXP ( B22 R ) && ( 3 - 5 ) \\ DISCI &= ID - IS && ( 3 - 6 ) \\ dR/dt &= F2 * DISCM + E1 * DISCI && ( 3 - 7 ) \\ MD &= K2 PD * P + K3 ID * P && ( 3 - 8 ) \\ DISCM &= MS - MD && ( 3 - 9 ) \end{aligned}$$

Where PD stands for production demand, PS for production supply, DISCP for difference between PD and PS, IS for investment supply, ID for investment demand, DISCI for difference between ID and IS, MD for monetary demand, MS for monetary supply, DISCM for difference between MS and MD, the others are constant. The symbols have same meanings in figure 3-1.

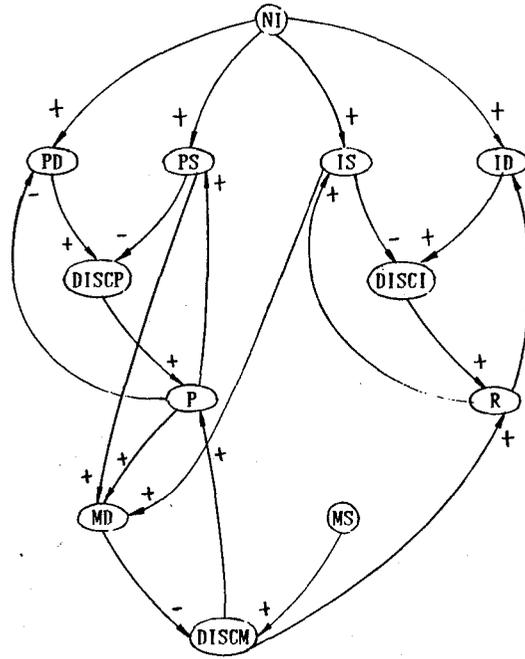


Figure 3.1 Causal Loop Diagram

## VI. CONCLUSIONS AND DISCUSSIONS

### 1. Contrary to Effective Demand Rule

Keynesian economical theory indicates: there surely exists a difference between the demand of various factors including work force and social potential capability. The demand of production factors are always less than the supply. The effective demand is insufficient.

However, we found an interesting problem in our model simulation. Since the start of the reform in China, the effective demand, either consumption demand or investment demand, has exhibited strongly growing trend. Demand is inflative instead of insufficient. (See Figure 4.1)

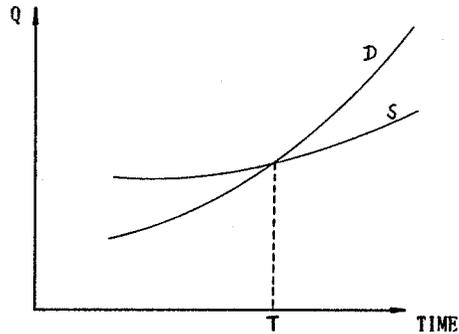


Figure 4.1

During the first period of Chinese reform, in order to break the rigid way of planning economy system, a series of new policies were formulated. The critical points were:

- 1) To raise the workers' and staffs' working enthusiasm by money awards and allowances.
- 2) To give full play to the producing enthusiasm of localities and enterprises by increase their functions and powers.

It was expected that by taking above steps, the productivity could be raised, the production output could be increased, the people's living standard could be improved, these reform policies in some way achieved good results in stimulating economical development. But because of the disadvantages in old economic system of China, these reform policies at the same time hid inflation danger in the process of transforming product economic mode into commodity one.

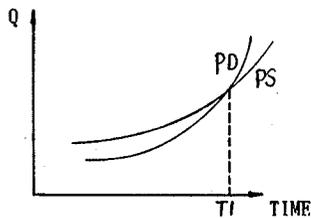


Figure 4.2

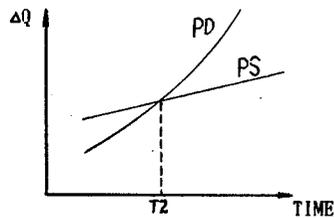


Figure 4.3

One factor of inflation is consumption expanding. We can see from Figure 4.2 and Figure 4.3, that after  $T_1$  the total consumption demand exceeds the supply, and after  $T_2$  so does the increase rate of consumption. What do these result from? We consider that the original goal of the reform is to raise effectation by giving awards to the advanced. However in the

case of no actual work force market and no strong market adjust of income level, remarkable difference income level can only result in the competition of income and money reward instead of effect. Meanwhile, because of the unreasonable price system, management state may not factually inflate management level for enterprises so as to lead to the competition of income. Finally the increase rates of income and consumption level exceed that of labour productivity.

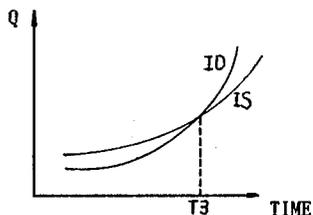


Figure 4.4

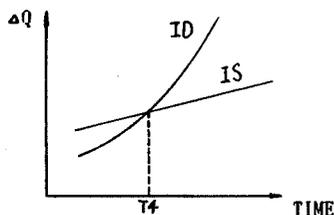


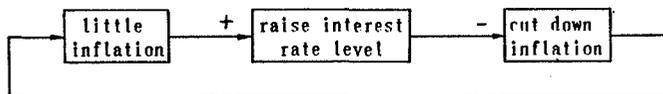
Figure 4.5

Another factor of inflation is investment expanding. We can see from Figure 4.4 and Figure 4.5, that after  $T_3$  the total investment demand exceeds the supply, and after  $T_4$  so does the increase rate of investment. What do these result from? We consider that with the function and power increasing localities and enterprises possess more authorities of investment and more financial resources in addition to the interest rate is lower than normal. The most interesting thing for them is how to obtain financial allocation and bank credit instead of investment gain. Because of the departmental selfishness of localities and enterprises and unreasonable credit system, excessive investment demand intensifies inflation.

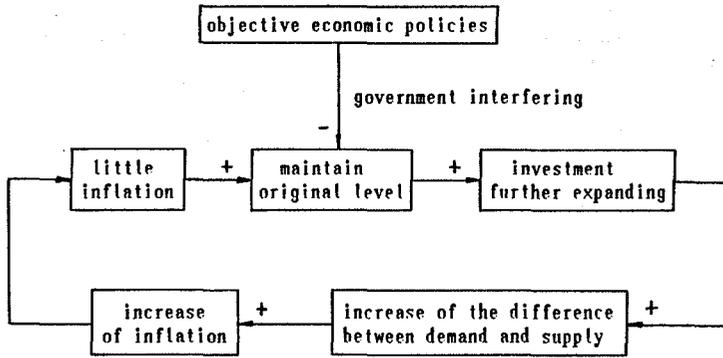
## 2. Factor of Bank System

There are many reasons for inflation in China. Consumption expanding and investment expanding are inherent force. From the results of our model simulation, the investment expanding is more dominant. Bank should be responsible for the external tendency of investment resources. Sustainedly excessive monetary issue makes price level quick rising. In this process bank has added fuel to the flames.

Here we must point out, that in terms of the actual case of China the creation of such a situation is attributed to the disadvantages of system. As the central bank, the People's Bank of China is subordinate to the State Council. It is an administrative organization of the government. No doubt, its action would surely obey the macroeconomic policies of the government instead of protecting monetary. So bank system can not play the role of adjusting and controlling the macroeconomics. Facing inflation, bank feels powerless. Oppositely, bank may promote inflation. This can be illustrated by Figure 4.6.



a. Normal Case



b. Now The Actual Case In China

Figure 4.6

To this end we suggest the bank system reform be speeded up, and bank system be separated from state finance and state administration. Bank system should take the important task of adjusting macroeconomics and controlling inflation.

#### V. REFERENCES

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