

AN ANALYSIS ON THE IMPACT OF THE POPULATION CONTROL  
ON CHINESE ECONOMIC DEVELOPMENT

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ABSTRACT

China has the greatest population in the world. The impact of the population on Chinese economic development is great. Based on Chinese National Economic Model NATN3, the relationship between the population control policy in China and Chinese economic development are obtained by simulation of the policy analysis.

I. A BRIEF INTRODUCTION TO CHINESE NATIONAL ECONOMIC MODEL NATN3

It is well known that, Chinese strategic target for economic development is to quadruple the annual gross value of industry and agriculture output of 1980 and achieve a fairly well off life for Chinese people by the year 2000. So "China in the year 2000" is a very meaningful study (Wang Weiqun & Li Beiqi 1984).

For the reasons stated above, a study group is set up in the Management School of Shanghai Jiao Tong University to develop Chinese National Economic Models and to conduct studies on the future of China. After its set up in the beginning of 1984, the group has developed Chinese National Economic Models NATN, NATN1, NATN2, NATN3.

The practice in the past one year has given the group a deep feeling that, in the light of the specific conditions in China, system dynamics techniques are pretty applicable to develop Chinese National Economic Models.

By 1979, Chinese economy is a planned economy which was almost exclusively controlled by the state. The government policies gave a decisive effect on the economic development. This is a good explanation for the fluctuations of Chinese economy in the first thirty and few years after the foundation of the People's Republic of China. The situations are easy to be expressed by policy variables in system dynamics model.

Now, Chinese government is making a series of decisions to reform the economic structure, such as

- (1) Invigorating the domestic economy;
- (2) Opening to the outside world;
- (3) Accelerating the restructure of national economy.

All these will lead to tremendous changes in people's socio-economic life. These situations are more conveniently reflected by system dynamics model.

Chinese National Economic Models are developed under the very background stated above. In the model NATN3 include such eleven sectors as the population, the public finance, the agriculture, the light industry, the heavy

industry, the commerce, the communications and transportation, the construction industry, the energy resource, science and technology and education, and the environment protection. The model has 663 equations, among which there are 33 Levels and 65 Rates. The model has shown its logical rationality in the identification, estimation, and validation. Its structure tallies with the actual situation in China.

## II. AN ANALYSIS ON THE IMPACT OF THE POPULATION ON CHINESE ECONOMIC DEVELOPMENT

China has the greatest population in the world. Especially, after the foundation of the PRC, the well-being of the people has been bettering and the average life expectancy of the people has been increasing greatly. On the other hand, in the first dozens of years after the foundation of the PRC, the population control had not been conducted effectively, and the population had been growing rapidly. The overrapid population growth would undoubtedly impair Chinese economic development and would slow down improving the life standard of the people. At last the people has understood that the population has to be controlled. And the government has resolutely taken a variety of measures to control the population growth. Specially in the last few years the measures have effectively controlled the population growth.

Since the foundation of the PRC, census has been conducted twice (first in 1964, second in 1982). The census in 1982 showed that there is a population of 1,031,882,511 (with a population of 1,008,175,288 when Taiwan being not counted). It had grown 45.1% in the 18 years since 1964. The average growth rate is 2.1% per year. Attention should be paid to the fact that, in the first 9 years the average growth rate is 2.68%, in the second 9 years is 1.51%. In contrast, during the 18 years since 1964, the gross output value of industry and agriculture in China grew 9.3% per year averagely, national income grew 7.4% per year. Since China has a big population base, and her economic basis is still weak, and the productivity is not high, a study on the relationship between the population and the economy is of great importance for the realization of the strategy for economic development and for increasing the national income per capita.

The population and the economy are closely interrelated and interdependent. The development of the economy will improve the conditions of production and life, and will quicken the population growth. The population growth will in turn influence the economic development. First the part of right age in the population can provide labours for the agriculture, the industry, the commerce, and so on. This is the aspect that the population puts an active effect on the economic development. Next, considering the fund, people need food, clothes, houses, education, recreational activities, and other consumption to live. Too large a population would increase the non-productive expenditure, and would decrease the economic growth rate. Especially, it would slow down the growth of the national income per capita and would impair the improvement of the people's life standard. In addition, too large a population would impair the youngsters' education and training. It would be detrimental to enhancing the population quality. These are the negative consequences causing by too large a population.

According to the actual situation in China, the labour resource which is

indispensable for the economic development is more than sufficient, and in the next dozens of years the labour resource won't be lacking yet. Therefore, the active effect of the population growth on the economic development has lost its significance. Besides, in order to realize the strategic target set for the end of 20th century, China is in urgent need of bringing up a variety of specialists in social science, in economics, in management, in natural science and technology, and needs skilled workers of better education in her all trades and professions, so as to ameliorate today's inefficiency in some sectors. For this reason, the government of the PRC not only advocates family planning, but also encourages healthy birth and better educating youngsters, so as to enhance the quality of the new generations.

### III. THE SIMULATION RESULTS ON MODEL NATN3

The relationship between the population and the economy as mentioned above might well be exposed in MODEL NATN3. The causal backfeeding sketch of the population submodel of the model is shown in Fig. 1. It could be made out from the figure that, according to the actual situation in China, the population is divided into two parts: the rural population and the urban population. The birth rate is related with the number of women in birth age, and could be controlled by the population-control policy and the allocation of funds for family planning. The death rate is reflected by the average life expectancy. The higher the life expectancy is, the lower the death rate and the faster the population growth. The factors which influence in the life expectancy might be

- (1) the total quantity of the foodstuff provided by the agriculture (per capita);
- (2) the investment in medical and health, in the public welfare and in the like (per capita);
- (3) the investment in the culture recreation and athletic accommodation (per capita);
- (4) the extent of the environment pollution;
- (5) the total housing area in urban provided by the construction industry (per capita).

The influence of the economic development on the population has been shown in Fig. 1. The influence of the population on the economy could be shown in the light of the effect of the population submodel's output--such as the educated rural population, the productive rural population, the educated urban population, the productive urban population--on the other submodels. In addition, the consumption, the allocation of the funds, the enhancing of the educational level, and the influence of the scientific and technological development on the production, could all embody the influence of the population on the economy.

In this model, the population control policies are expressed by a kind of TABLE function supported by DYNAMO. A natural idea is that, the larger the population is, the higher the urgency of the population control, and the fewer births must be obliged for each woman during her birth age. Therefore, in this TABLE function the population growth rate serves as the independent variable, and the average number of births for each woman during her birth age, under the control of the policies, is the dependent variable.

In order to analyze the relationship between the population control poli-

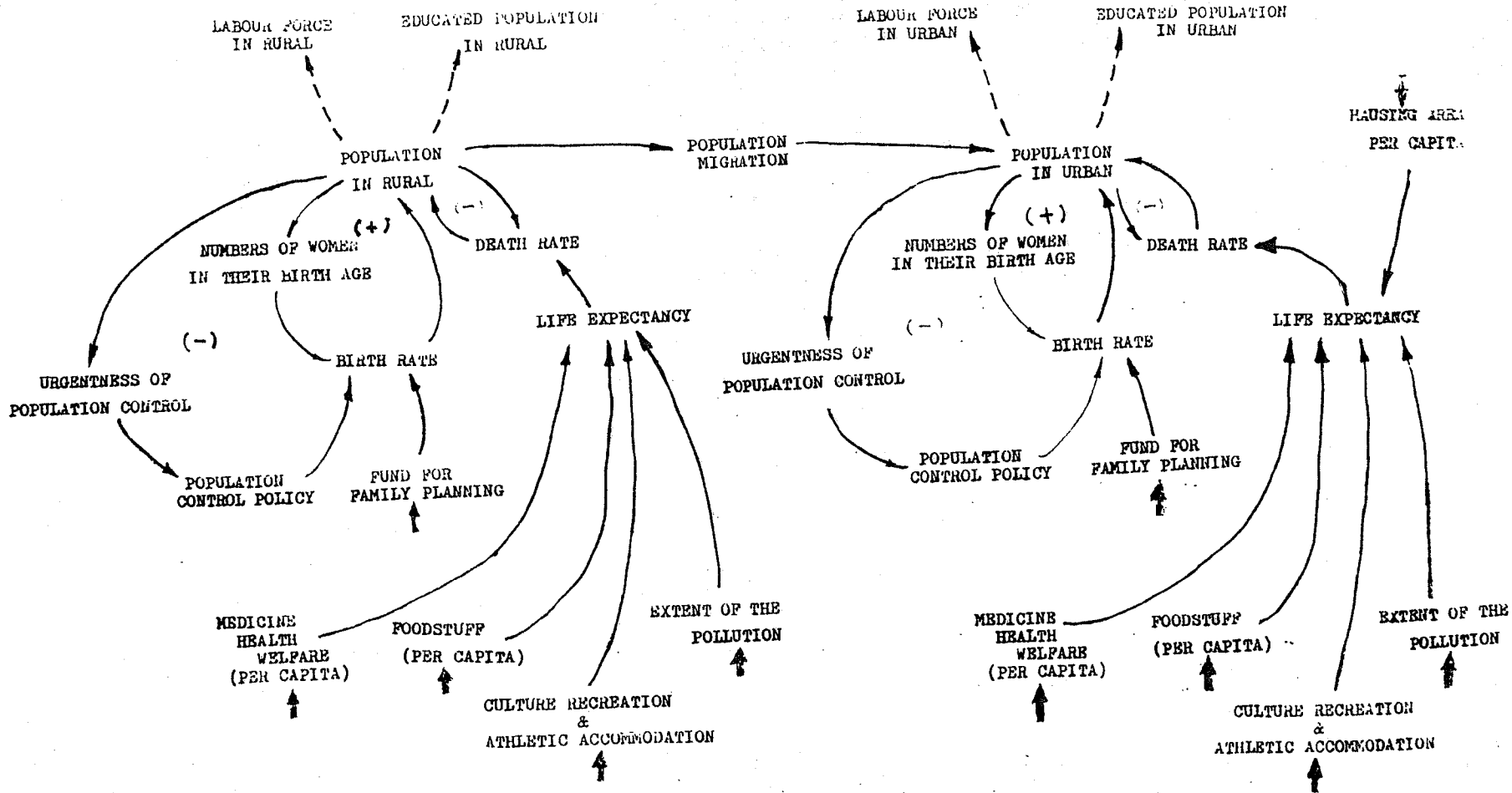


FIG. 1 THE CAUSAL BACKFEEDING SKETCH OF THE POPULATION SUBMODEL

cies and the economy, five schemes for the population control are worked out. The population, the national income, the income per capita, and the gross output value of the industry and agriculture are obtained by simulation of the policy analysis, all presented in Tab.1.

Tab.1 The Results of Simulation on MODEL NATN3

SCHEME	POPULATION CONTRL POLICY						SOCIAL-ECONOMIC INDEX IN YEAR 2000			
	average number of births for each woman during her birth age						total popu- lation	national income	national income per capita	gross output value of indus. & agr.
No.1	3.0	2.5	2.0	2.0	2.0	2.0	1357.4	14839.9	1093.2	35042
No.2	3.0	2.5	2.0	2.0	1.5	1.5	1328.3	14825.8	1116.2	35615
No.3	3.0	2.5	2.0	1.5	1.5	1.5	1299.6	14755.7	1135.4	35483
No.4	3.0	2.5	2.0	1.5	1.4	1.3	1295.8	14843.3	1145.5	35648
No.5	2.0	1.8	1.5	1.0	1.0	1.0	1248.3	14847.5	1189.4	35656
	Given the population growth rate:						Social-Economic Index in 1980:			
	-.006	0.006	0.000	0.012	0.018	0.024	987.0	3600.0	364.7	8520

The analysis gives the following results:

- (1) each of the above population control policies might well reach Chinese economic target, that is, to quadruple the gross value of the industry and agriculture output of 1980 by the year 2000;
- (2) the current years are in the peak congested with women in their birth age. Therefore, the policy which advocates each married couple having only one child in their lives is rational. And when the peak declines, the population control could be relaxed somewhat;
- (3) with the implimentation of the population control policy, the proportion of the aged in the population will grow every year, the very percentage will almost double by year 2000, taking that of 1980 as the base. However, the labour resource would not be lacking yet.

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