

An Explanation of China Economic Growth

-----From the Viewpoint of Post-Keynesian Model

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Abstract: This paper considers, (1) High investment, high savings, high growth, low consumption, low efficiency and instability are the characteristics of Chinese economic growth, so post-Keynesian framework, not neo-classical model, more fit to be used to analyze Chinese growth. (2) Based on the framework of post-Keynesian model, two models with saving propensity out of wages and enterprises bargaining with government are put forward, and the stable conditions are discussed through analyzing the adjustment process of capacity utilization and income distribution. (3) Through studying saving behavior of China, we derive that $s_r < s_w$, which is quite the contrary to the traditional assumption of post-Keynesian theory about saving behavior. It is just this condition that induces Chinese economic growth to be unstable. And the existence of bargaining, through changing investment incentives, increases the stability. (4) Existence of market barrier, lack of mechanism of income equalization adjustment and lagged reform of pension system are the real reasons, which have triggered the unstable growth in China.

1. Introduction

Since 1978, when market-oriented economic reform has been started in China, China's economy has had great success. The economy grew at a rate of 9 percent on average every year. From 1978 to 2003 income per capita increased in nominal terms from 489 Yuan to 9101 Yuan, which amounts to more than twenty times its former size.

What we are interested is what drove GDP growth in China? Economists give a few explanations to China's economy growth. Usually, economists break down economic growth into changes in capital, labor, and total factor productivity (TFP). Domestic and foreign studies such as those by Angus Maddison (1978), Hu Angang (2005) show that a surge in TFP was responsible for higher China's economic growth from 1978 to 1995. These studies suggest that growth between 1978 and 1995 was largely driven by the rise in annual TFP growth. Growth in overall productivity during this period contributed somewhere between one-third to one-half of economic growth. However, fast economic and TFP growth did not last. Between 1995 and 2001, China's economic growth changed substantially. Annual employment growth dropped significantly, to 1.2 percent, despite high overall economic growth, indicating that the economy's ability to absorb labor weakened. As a whole, the fast speed of economic growth of China, together with its driving forces, are confusing.

Though so many achievements were made in studying China's economy growth, there are still some difficulties in giving a good explanation of China's economy growth. First, which growth model could be applied in? Neo-classical growth model was adopted in many

research papers. However neoclassical models suppose market is completely competitive, under which circumstance wage rate equals marginal product of labor and profit rate equals marginal product of capital. Obviously this does not apply to China's economy, which has experienced a transition from a planning economy to a market economy in the past two decades. Prices of factors were not only determined by the power of market but also by forces of government planning. Additionally, in China, the institutional environment changes very quickly. The power of institution change, which includes state-owned property reform, market-oriented reform of price determination and openness to foreign trade, etc, triggers the potentiality of factors and gives rise to their productivity. So analyzing China's growth, institution is an indispensable factor. But how to deal with institution in production function is still a difficult problem.

2. Data of China

2.1 The rate of growth and capital growth

It is well known that high economic growth driven by high investment is the typical characteristic of the Chinese economic growth path. One fact to be taken into account is that since the adoption of the reform and opening-up policy, the investment share has continuously risen and been maintained at a rather high level. It stood at about 35% in the early 1980s and rose to 43% by 2003. Another reflection of this trend is that investment has been a major driving force behind the economic growth of China. According to the traditional method of growth measurement, we almost find the trend of economic growth is coincide with the trend of capital growth, even the years when growth fluctuates severely also is the same with the years when investment fluctuates. However, there is a strange phenomenon that in some years the contribution of capital on growth exceeds the rate of growth of economy, which resulted in the negative contribution of other input on the growth of economy. Maybe the measurement method is not suitable to Chinese economic environment, but it still reflects some basic facts about Chinese economic growth, which involves this reality that Chinese growth over-depends on investment, if maintaining the high economic growth, we must ensure high growth in investment; maintaining economic stability, we must ensure stability in investment more than anything else.

2.2 Economic growth and unbalance of investment and consumption

However, in the process of high growth of Chinese economy, there is another worthwhile noting fact that from mid-1990s China has incurred the continuous deflation, while the investment growth still keeps the trend of going up. Many researchers considered this is resulted by the lower consumption. It is just lower consumption which decreased the growth

of economy since mid-1990s. Although researchers have been continuously discussing ways to remedy it, and macroeconomic control authorities are making great efforts to control the investment rate and increase the consumption rate, the country's investment rate keeps moving up. In 2000, the ratio of investment-consumption was 36:64, in 2001, the ratio was 38:62, and in 2004, the ratio was 44:56, that means investment rises continuously while consumption falls continuously, and the unbalance between consumption and investment expands continuously. It is puzzled why investment could keep the rising trend when consumption demand at some degree hampered the realization of economic potentiality.

2.3 Economic growth and unbalance of investment and saving

Corresponding the lower consumption, Chinese national saving rate is relative high to international experience. Between 1978 and 1995, Chinese high national saving rate on average 37 percent, compared to an international average of almost 21 percent. However, some research considered that China's national saving rate was 10 percentage points higher than what would be expected based on China's characteristics. There are many reasons resulting to the high savings, which mainly involve increased income led by high growth and lagged pension reform, for which, people have to save a high portion for their future.

Most macroeconomic theory assumes that in one country, its national savings should be equal to its investment in a closed economy. However, in China, although saving rate is high, the investment rate is higher than it. We can see in most years, China's investment rate is higher than savings, even in recent years, there is the increasing tendency on the gap between investment and saving. How to explain the unbalance of saving and investment, and which role the unbalance play in the growth of China's economy, these question is worthy of being investigated.

2.4 The Characteristics of economic growth path

Chinese economic growth has taken a path of high saving, high investment, high growth, however, in which, out of equilibrium between saving and investment, consumption and investment, high investment and lower efficiency is its characterized feature.

We must give a good explanation to Chinese growth, that is, why Chinese growth rate is so high, and whether there is some latent dangerous in the process of rapid growth, and why the rate of growth of capital is even higher than rate of growth of economic?

Economists try to explain these question adopting alternative economic growth models, which involved in neoclassical, new growth models, etc. However, we must notice that alternative models have different assumption and premise, we should know under what circumstances, these models could be used to explain Chinese economic growth. So we must

come to analyze the alternative growth models first, and then find a good economic theory to explain.

3. Which model can be used to explain Chinese Economic Growth?

In the history of growth theory developed, there are many alternative theoretic framework used to interpret the mechanism of economic growth from different viewpoints. In here, we investigate in more details two types of growth theory, including neo-classical theory and Keynesian theory, which not only have the important impact on theory development, but also frequently are used to explain the growth practice of the countries in the world.

3.1 Brief comment on neoclassical and Keynesian growth theory

3.1.1 Long run analysis, free competition and full employment

Long run analysis, developed by classical economists, also is adopted by Neo-classical growth theory. This kind of method emphasizes in long run there is tendency toward a uniform rate of profit prevailing in the presence of free competition, that is, in the absence of significant and lasting barriers to entry or exit. The method has two analysis premises, one is free competition, whether produce market or factor market, firms can entry or exit freely, the other is full enjoyment of all of resources, and all productive factors are employed into production fully, whenever the disequilibrium occurs, price would adjust it automatically, and there is no unemployment.

Although neo-classical theory has obvious difference from classical theory in many viewpoints, the two analysis premises are the same. Neo-classical try to search for the driving force of growth in long run by neglecting the influence of all kinds of transient forces. They get their main results also through assuming free competition and full employment. In their analysis, profit and wage are determined by the forces of supply and demand simultaneously, and the rates of profit and wage are equal to their marginal product respectively. If there are no assumption of free competition and full employment, profit rates and wage rates would be changed, then all of neoclassical analysis would be changed.

However, Keynesian theory gives up these assumptions about free competition and full employment and considers there always are spare capacity and unemployed workers in the economy. The growth is realized through the adjustment of capacity utilization level and income distribution between wages and profits. In fact, Keynesian theory conforms to the realities of economy, compared with classical and neoclassical theories.

Post-Keynesian opposed neo-classical theory that the regular recurrence of unemployment on a significantly large scale is an uncomfortable fact that stares awkwardly in the face of neoclassical economics. A defense from neoclassical theory postulates the distinction between

the short and the long run, and claims that unemployment is a short run, transient problem, which arise because the price mechanism operates imperfectly in the short run, and full employment is the natural assumption for the long run because price mechanism is expected to have completed the appropriate adjustments in the long run to ensure the full employment of all resources. Post-Keynesian contends that the research could not isolate the long run from short run artificially, and the short term events would leave their marks in various ways in shaping the long run trend. In fact, the history of an economy growth is tend to path dependence, that is, some accidents would exert influence on long run growth path, otherwise, the growth path in indifferent nations would be same, which is not the fact obviously.

3.1.2 Viewpoints of supply and demand side

Growth theory has two contrasting paradigms, one perspective assumes that output is limited by aggregated demand; the other view claims that output is limited by rising marginal cost.

Adam smith identified that the labor division is the main force contributing to the wealth of nations, and increasing division of labor is limited by the size of market. That means although the growth of output is driven by labor division from supply side, at the same time, size of market, i.e. demand would limit the expansion of output. Therefore, demand plays pivotal roles in growth. However, in Ricardo, he looked this issue from an opposite angle focusing on increasing costs due to diminishing returns. And in aspects of demand, he assumes that all of the saving of economy would be automatically transformed in to investment. This assumption ignores altogether the problem of demand.

Neoclassical theory, based on the assumption of Ricardo that all savings is automatically invested, construct long term growth models in which rising marginal is the only limiting factor. In this case, economic growth would ultimately be constrained from supply side by the relative scarcity of some primary resources. Because labor is the only primary resource in the model, the steady state growth in Solowian economy is determined by constant growth rate of labor exogenously.

The role of effective demand is emphasized by Keynes, which hinges on the distinction between the decisions to save and to invest. The adjustment of savings to investment is seen to be the central message of Keynes's *General Theory*. Later, based on this idea, Kaldor first proposed the post-Keynesian growth theory, the main idea under which is saving adjusting to investment via capacity utilization and distribution of income. Kaldor's original presentation is characterized by a distinction of groups of income-earners, whose saving habits are homogenous within each group and are differentiated among groups. In contradistinction to

Kaldor, Pasinetti assumes workers obtain wages and portions of profits, and the propensity to save out of profits earned by capitalist differs from the propensity to save out of the profits earned by workers. And Robinson put forward that the propensity to save out of incomes earned by worker is zero. According to the different assumption for saving behavior, post-Keynesian try to search for the conditions of stable growth.

3.2 Post-Keynesian model and Chinese economic growth

In fact, there are much criticism to neo-classical growth model, which involved the adoption of aggregate production function, substitution of capital and labor, and the dispute of capital, etc, however, neo-classical theory still have been used to explain the growth of nations widely. The purpose of this paper is not in criticizing the neo-classical model but in putting forward that institution background and assumptions under the model is quite different from Chinese economic environment. Irrespective of these institution background and assumptions, adopting the model would mislead the explanation to Chinese economic growth.

However, compared to neo-classical model, post-Keynesian model is more fit to China's realities according to the following facts. (1) China is in the process of transforming from planning system to marketing system. Although price mechanism has started to play roles in many aspects, non-price forces, especially government interfering still determine the allocation of resources at some degree. (2) Unemployment has been the troubled issue from 1990s, especially in recent years, it has become more and more severe. (3) Growth rate fluctuates very severely, and it is very difficult to find the steady-state growth path. (4) The economy lies unbalance, which include the unbalance between investment and consumption, investment and saving. These facts constitute the characteristics of China's economic growth, which is hard to explain using the framework of neo-classical model. Contrariwise, in many aspects, it could match with the framework of post-Keynesian, which has no assumption of free competition, full employment and automatic equilibrium between saving and investment.

Therefore, this paper would like to adopt the basic framework of post-Keynesian model to analyze the Chinese growth.

4. Model 1: a case with saving propensity out of wage

In the framework of post-Keynesian theory, excess demand in a closed economy represented by an excess investment over saving would normally lead to quantity adjustment through higher capacity utilization. At the same time, in response to that excess demand some adjustment in the price level in relation to the money wage rate might also result, leading to a change in the real wage rate, and the income distribution between wages and profits. Thus,

Keynesian multiplier mechanism would operate in a more general framework to influence simultaneously both the level of output and its distribution.

However, the redistribution of income between profits and wages through an adjustment in the real wage would affect aggregate demand through two different channels. So along as the propensity to consume out of wages higher than that out of profits, a lowering of the real wage rate would tend to depress total consumption expenditure by redistribution income against the wage earners with a higher propensity to consume. However an opposite effect might work through the investment channel. Investment expenditure might get stimulated through lower real wage, raising the profit margin. Depending on which of these effects dominates in a economy, two alternative regimes demanded-led expansion are possible. The former would be led by greater consumption expenditure due to higher real wage, and the latter by greater investment expenditure stimulated by higher profitability

For traditional post-Keynesian models, when analyzing the influence of quantity adjustment led by capacity utilization and price adjustment led by distribution of income, it always assumes that one variable of both is given, then talks the changes in another variable. And Amit Bhaduri (2005) thinks that price adjustment and quantity adjustment occur at the same time, so it could not be feasible to isolate two process of adjustment from each other. He investigates four comparative dynamics of two adjustment considering both simultaneously. This paper also adopts this type of research angle.

In addition, post-Keynesian has the different assumption about saving behavior. Because this model is used to interpret China's economic growth, with regard to saving assumption, we adopt the Kaldor's saving function, which means workers save a constant fraction out of wages, and capitalist save a constant fraction out of profits. However, we abandon the assumption that the propensity out of profit is larger than the propensity out of wage. Thus, the growth of capital in savings of the economy is written as

$$g^s = s_r r + s_w \frac{w}{k} \quad (1)$$

where, s_r , s_w are constant parameters, which represent the propensity to saving out of profit and wage, respectively ($0 < s_r < 1$, $0 < s_w < 1$). And r is the profit rate, w is the wage rate, k is the capital intensity, and g^s is the growth rate of capital in savings.

We assume the accumulation rate depends positively on the rate of profit. The investment function is written as

$$g^i = F(r) \quad (2)$$

Where

$$r = \rho\pi u \quad (3)$$

$$\frac{w}{k} = \rho u(1 - \pi) \quad (4)$$

where g^i is the growth rate of capital in investment, ρ is the ratio of output-capital, u is the rate of capacity utilization, and π is the profit share in total outcome. By substituting (3) and (4) into (1) and (2), we can find that g^i and g^s depend on π and u , given ρ , s_r , s_w . And then total differentiation of (1) and (2), we can get the slope of the locus of saving-investment growth equality in the $\pi - u$ space as

$$\frac{du}{d\pi} = \frac{[F'(r) - s_r + s_w]u}{[s_r\pi + s_w(1 - \pi)] - F'(r)\pi} \quad (5)$$

A positive slope in (5) means that a higher profit is associated with a higher capacity utilization, characterizing a regime of investment or profit-led expansion. In the contrary, a negative slope of (5), associating a higher wage share with higher capacity utilization correspond to the consumption of wage-led path of expansion.

Considering the equations (3) and (4), then the actual growth rate and the accumulation rate can be seen the function of two variables that are capacity utilization and distribution of income. Therefore, once accumulation rate is higher than actual growth rate, which creates the excess demand in the product market, two adjustment process would occur, in which, one is the adjustment of capacity utilization, and the other is the adjustment of distribution of income. The quantity adjustment in the product market through capacity utilization adjusting to excess demand is given,

$$\frac{du}{dt} = \alpha(g^i - g^s), \alpha > 0 \quad (6)$$

where α is the arbitrary positive speed of adjustment.

Because the real wage rate which is the outcome of the interaction between the price level influenced by product market and money wage rate influenced by labor market. If setting side labor market, the interaction between price level and money wage rate would be determined exclusively through product market. Thus income distribution also could be influenced by the excess demand in the product market. The adjustment process of income distribution could be written as,

$$\frac{d\pi}{dt} = \beta(g^i - g^s), \beta > 0 \text{ or } \beta < 0 \quad (7)$$

where the speed of adjustment $\beta > 0$, corresponds to the case of forced saving by the workers, that means the rise in saving propensity out of wages, resulting in a lower wage rate and

higher profit share. In turn, it raises saving to help in closing the excess demand gap. For $\beta < 0$, the real wage increases, as the money wage rate rises faster than the price level in response to excess demand in the product market, and results in the squeeze of profit.

Dividing (6) by (7), at non-zero values with the time variable suppressed, yields,

$$\frac{du}{d\pi} = \frac{\alpha}{\beta} \quad (8)$$

Therefore, the direction of out of equilibrium slope, $\frac{du}{d\pi}$ is determined by the sign of β , whether forced saving ($\beta > 0$) or profit squeeze ($\beta < 0$) takes place.

By introducing a positive and unbounded function to examine the stability of equations (4) and (5), which is given by

$$V = \frac{1}{2}(g^i - g^s)^2 \quad (9)$$

Differentiating (1) and (2) with respect to time, and substituting from (6) and (7), we get,

$$\frac{dV}{dt} = \rho(g^i - g^s)^2 \left\{ [F'(r) - s_r + s_w - \frac{s_w}{\pi}] \alpha \pi + [F'(r) - s_r + s_w] \beta u \right\}$$

Then, if and only if

$$[F'(r) - s_r + s_w - \frac{s_w}{\pi}] \alpha \pi + [F'(r) - s_r + s_w] \beta u < 0 \quad (10)$$

Dynamical equations (6) and (7) are stable. The economical interpretation with regard to (10) is that when accumulation rate is over warrant growth rate, that is $g^i > g^s$, the stability requires the speed of capital growth in saving is higher than that of investment growth, that is

$$\frac{dg^i}{dt} < \frac{dg^s}{dt}; \text{ and when the accumulation rate is lower than warrant growth rate, that is}$$

$g^i < g^s$, that requires the speed of investment growth is higher than that of savings, that is

$$\frac{dg^i}{dt} > \frac{dg^s}{dt}.$$

Therefore, if inequality (10) is to be satisfied, we can find there are four cases to lead to the steady growth path which means $g^i = g^s$.

Case 1: If $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w > 0$, in other words, growth rate of capital in saving is more responsive to changes in capacity utilization than that in investment, and capital growth in investment is more responsive to changes in profit shares than savings, which imply the positive slope of the steady growth curve of investment-savings

expressed by (5) and the positive value of β , the economic growth is profit-led, that means increases in profit share raises capacity utilization. So satisfying stability condition of (10) requires $\alpha\pi > \beta u$, i.e. $\pi/u > \beta/\alpha$, and because $du/d\pi = \alpha/\beta$, then

$$\frac{du}{d\pi} * \frac{\pi}{u} > 1$$

In this system, the excess demand gap can be covered through increases in capacity utilization and profit share simultaneously. However, the relative speed of adjustment of capacity utilization is faster than that of distribution of income.

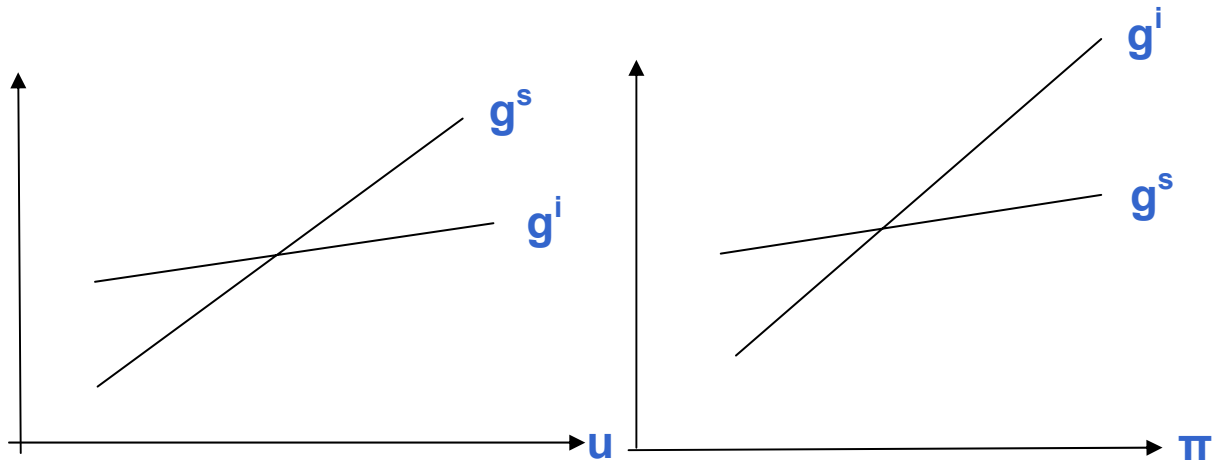


Figure 1a

Figure 1b

Case 2: If $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w < 0$, that mean growth rate of capital in investment is more responsive to changes in capacity utilization than that in savings, and capital growth in savings is more responsive to changes in profit shares than investment, which also imply the positive slope of the steady growth curve of investment-savings and the positive value of β , then the economic growth is profit-led. So stability condition of (10) requires $\alpha\pi < \beta u$, i.e. $\pi/u < \beta/\alpha$, and because $du/d\pi = \alpha/\beta$, then

$$\frac{du}{d\pi} * \frac{\pi}{u} < 1$$

That means in this system, the direction of adjustment of capacity utilization and profit share is the same. However, the relative speed of adjustment of capacity utilization is slower than that of distribution of income.

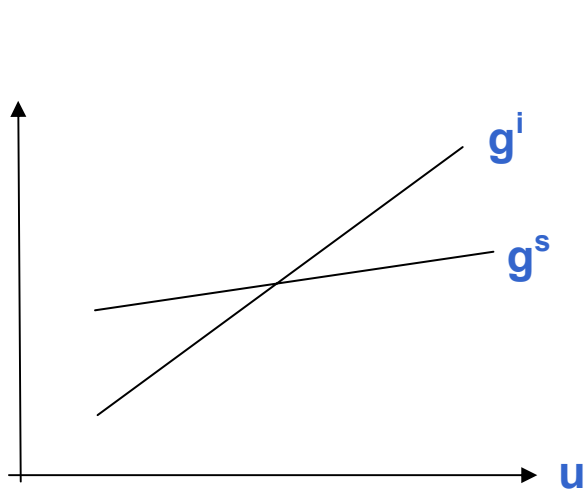


Figure 2a

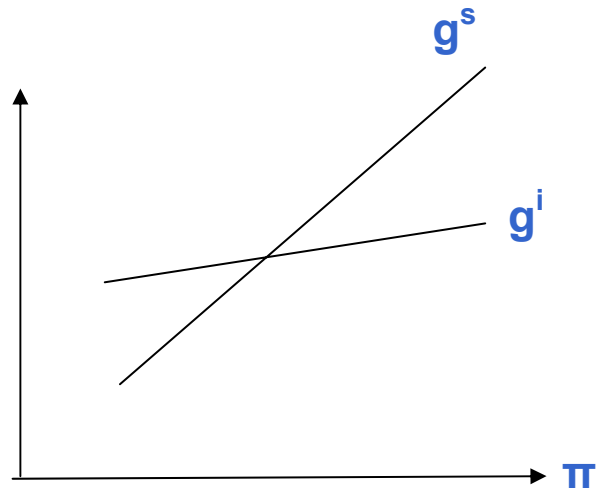


Figure 2b

Case 3: If $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w < 0$, which imply that capital growth in saving is more responsive to changes in capacity utilization and profit shares than that in investment, and imply the negative slope of the steady growth curve of investment-savings expressed by (5) and the negative value of β , the economic growth is wage-led, that means increases in profit share decreases capacity utilization. So stability condition of (10) requires $\alpha\pi > |\beta|u$, i.e. $\pi/u > -\beta/\alpha$, and because $du/d\pi = \alpha/\beta$, then

$$\frac{du}{d\pi} * \frac{\pi}{u} < -1$$

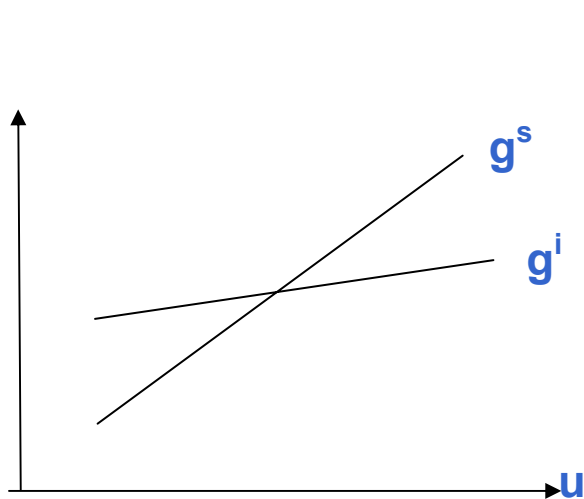


Figure 3a

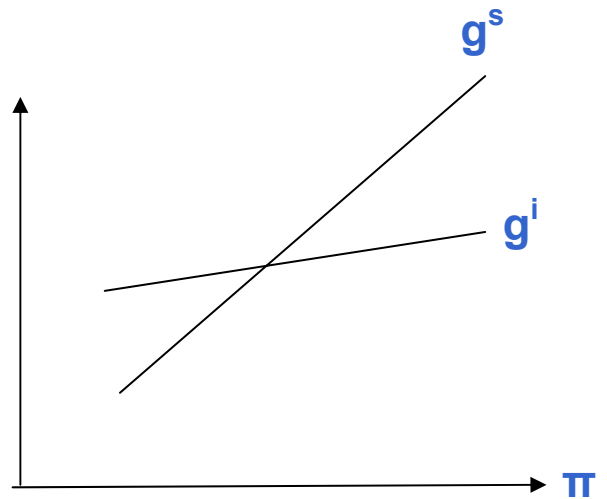


Figure 3b

In this system, the relative speed of adjustment of capacity utilization is faster than that of distribution of income.

Case 4: If $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w > 0$, which imply that capital growth in investment is more responsive to changes in capacity utilization and profit shares than that in savings, and imply the negative slope of the steady growth curve of investment-savings expressed by (5) and the negative value of β , the economic growth is wage-led, that means increases in profit share decreases capacity utilization. So stability condition of (10) requires $\alpha\pi < |\beta|u$, i.e. $\pi/u < -\beta/\alpha$, and because $du/d\pi = \alpha/\beta$, then

$$\frac{du}{d\pi} * \frac{\pi}{u} > -1$$

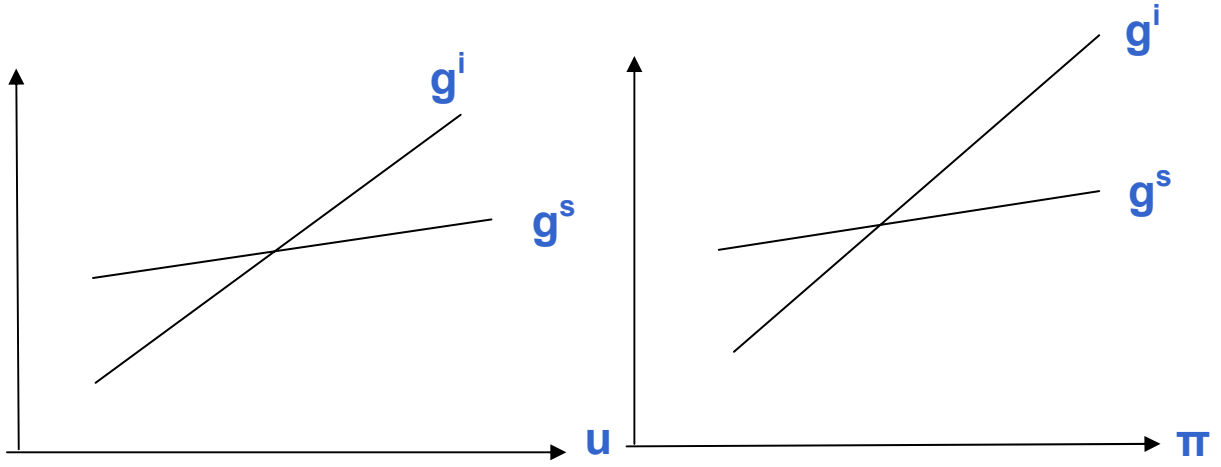


Figure 4a

Figure 4b

In this system, the relative speed of adjustment of capacity utilization is slower than that of distribution of income.

Additionally, considering the role of s_w in the model, we find the change in growth rate of capital in saving with respect to capacity utilization is $s_r\pi\rho + s_w(1-\pi)\rho$, which means the contribution of saving out of wage on growth is positive when capacity utilization changes. With investment exceeding saving, saving out of wages would increase at the rate of $s_w(1-\pi)$ so as to increase the total savings to cover the gap between investment and savings. The change in growth rate of capital in saving with respect to profit share is $s_ru\rho - s_wu\rho$, and the contribution is negative when profit share changes. Therefore, with investment exceeding savings, positive β means two aspects. In one aspect, only under the condition of $s_r > s_w$, total saving could rise to cover the gap between both. In another aspect, if rise in profit share would lead to force saving, i.e. the rise in s_w , that also would induce the rise in total savings so as to cover the gap. This means though wage savings would decrease because of its negative contribution on total savings, the rise in propensity of saving out of wages would

compensates the decrease in total savings. If investment exceeds savings, with the magnitude of β negative, then profit squeeze would decrease savings out of profits and increase saving out of wages. Given other conditions, $s_r > s_w$ would induce total saving reduced so as to expand the gap, so there are some possibilities to lead to steady only under the consideration of the changes in other conditions; and $s_r < s_w$ would induce total saving rising to cover the gap.

In conclusion, first, we find like other Keynesian model the adjustment speed of capacity utilization and income distribution play pivotal roles in whether growth tends to steady or fluctuation. Second, saving propensity out of wages is an very important parameter, which would exert influence on the stable growth through the adjustment of capacity utilization and income distribution.

5. Model 2: A case with bargaining of enterprises

In an economy, the system of which is transforming from planning to marketing, the relationship between enterprises and government play critical role in ordinary operation of enterprises. Under the condition of imperfect investment system, under which enterprises could obtain the government transfer finance and the soft loan from bank, the investment expectation of enterprises which is determined by expected profit would change. Then how to maintain a good relationship with government so as to obtain more transfer or soft loan would be considered by enterprises. And the maintenance of this relationship is mainly influenced by the bargaining ability of enterprises with government, thus, which would be entered into the investment function of enterprises.

Let B denote the bargaining ability of enterprises, then the investment function becomes,

$$g^i = F(r, B), \partial g^i / \partial B > 0 \quad (11)$$

Substituted (2) with (11), and given other assumptions, we can get a new dynamical system.

In the steady state of growth, the dynamics of capacity utilization u is given by,

$$du = \frac{(F_r - s_r + s_w)u}{[s_r\pi + s_w(1-\pi)] - F_r\pi} d\pi + \frac{F_B dB}{\rho\{s_r\pi + s_w(1-\pi)\} - F_r\pi} \quad (12)$$

From (12), it can be find the dynamics of capacity is composed by two parts, the changes in income distribution and changes in bargaining ability of enterprises. Thus,

$$\frac{\partial u}{\partial \pi} = \frac{(F_r - s_r + s_w)u}{[s_r\pi + s_w(1-\pi)] - F_r\pi} \quad (13)$$

$$\frac{\partial u}{\partial B} = \frac{F_B}{\rho\{s_r\pi + s_w(1-\pi)\} - F_r\pi} \quad (14)$$

$$\frac{\partial \pi}{\partial B} = -\frac{F_B}{\rho(F_r - s_r + s_w)u} \quad (15)$$

The comparative statics of three variables can be described as the following figures,

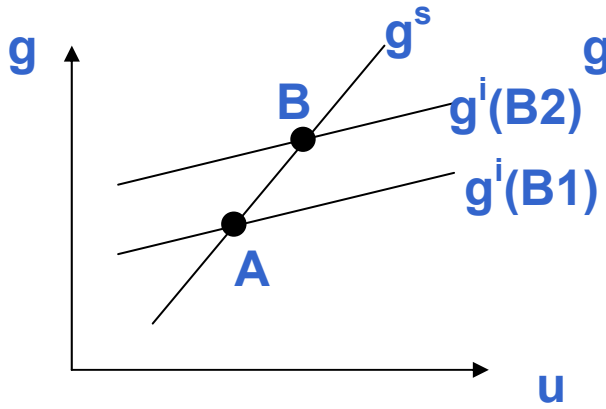


Figure 5a

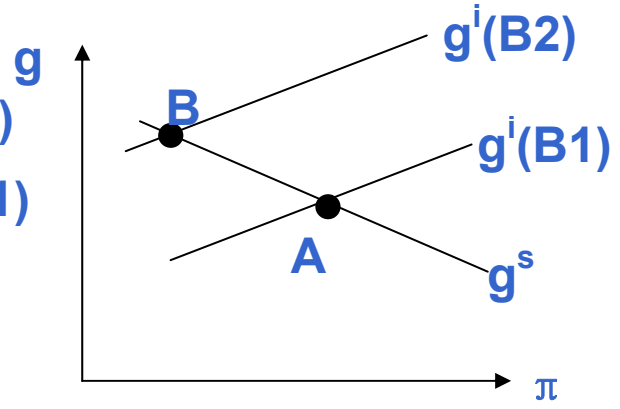


Figure 5b

The implication of (13) is the same with (5), which means the magnitude is positive or negative determines the growth path is profit-led or wage-led. However, the existence of (14) and (15) illustrates that the changes in income distribution or capacity utilization impact on bargaining level. The existence of variable of bargaining would change the equilibrium level of capacity utilization and income distribution. As regards to capacity utilization, when saving is more responsive to changes in capacity than investment, the possibility of bargaining would motivate enterprises to obtain more funds from government so as to result in a parallel upward shift of the investment curve, then the equilibrium level of capacity utilization will be increased. There is the similar justification as regards to income distribution, which means the equilibrium level of profit share will be decreased.

However, this is only a process of changes in single variable, which explains that bargaining has important impact on the dynamics of income distribution and capacity utilization, thus, it can not be neglected. Subsequently, we must further investigate how bargaining and capacity utilization and income distribution simultaneously influence on each other, further exert the impact on growth.

Considering bargaining, then we can obtain the new stability conditions, that is given by

$$\frac{dV}{dt} = \rho(g^i - g^s)^2[(F_r - s_r + s_w - \frac{s_w}{\pi})\alpha\pi + (F_r - s_r + s_w)\beta u] + (g^i - g^s)F_B \frac{dB}{dt} < 0 \quad (16)$$

That means,

$$[F'(r) - s_r + s_w - \frac{s_w}{\pi}] \alpha \pi + [F'(r) - s_r + s_w] \beta u < 0 \quad (17)$$

$$(g^i - g^s) \frac{dB}{dt} < 0 \quad (18)$$

Equations (17) and (18) must be satisfied simultaneously. The implication of (17) is the same with (10), which means the relative speed of adjustment of income distribution and capacity utilization determines whether the system tends to stability. And as regards (18), it means when $g^i > g^s$, if government could reduce the finance support to enterprises, in other words, the bargaining of enterprises would become more difficult, i.e. $\frac{dB}{dt} < 0$, so that the adjustment through bargaining to change the equilibrium could help the system lead to stability, which is described as the figure 6.

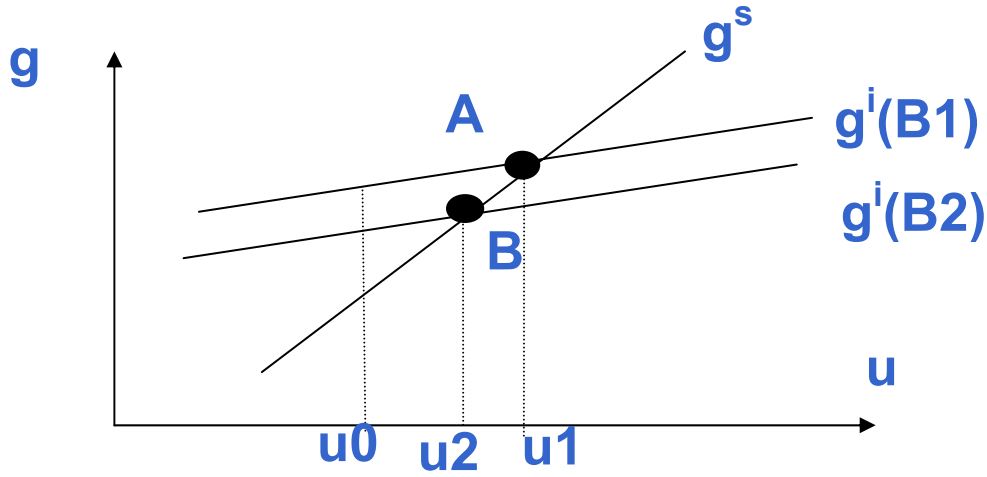


Figure 6

Figure 6 describes the comparative statics of capacity utilization under the condition of existence of bargaining and saving more responsive to change in capacity utilization than investment. When $g^i > g^s$, u_0 is the initial level of utilization when $g^i > g^s$. And u_1 is the equilibrium level of utilization when initial bargaining level lies in B_1 , u_2 is the equilibrium level of utilization when bargaining level goes down to B_2 . In other words, in one respect, when $g^i > g^s$, u_0 will increase to u_2 as to cover the gap between saving and investment, in other respect, because of the decrease in bargaining level from B_1 to B_2 , the equilibrium level of utilization will change to u_2 so as to cover the gap partly.

Considering (17) and (18) at the same time, there are eight case which need to be discussed about the model stability.

Case 1. If $g^i < g^s$, $\frac{dB}{dt} > 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w > 0$. Firstly, because $\frac{dB}{dt} > 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w > 0$, from (14) and (15), then capacity utilization and profit shares would go up continuously. Secondly, from the condition of $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w > 0$, we know with the increase in capacity of utilization, growth in saving is faster than investment; and with the increase in profit shares, growth in investment is faster than savings. At the same time, because this condition implies the positive slope of $\frac{\partial u}{\partial \pi}$, expressed by (13) and the positive magnitude of β , the economic growth is profit-led, that means increases in profit share raises capacity utilization. Then stability condition of (17) requires $\alpha\pi > \beta u$, i.e. $\pi/u > \beta/\alpha$, and because $du/d\pi = \alpha/\beta$, then

$$\frac{du}{d\pi} * \frac{\pi}{u} > 1$$

That means the relative speed of adjustment of capacity utilization is faster than that of distribution of income, thus the growth in saving would be faster than growth in investment so as to expand the gap between investment and savings, so the system is unstable.

Case 2. If $g^i > g^s$, $\frac{dB}{dt} < 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w > 0$. Firstly, because $\frac{dB}{dt} < 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w > 0$, from (14) and (15), then capacity utilization u and profit shares π would go down continuously with the decrease in bargaining. Secondly, from the condition of $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w > 0$, we know with the decrease in capacity of utilization, the rate of growth in saving goes down faster than investment; and with the decrease in profit shares, the rate of growth in investment goes down faster than savings. At the same time, this condition means

$$\frac{du}{d\pi} * \frac{\pi}{u} > 1$$

That is the relative speed of adjustment of capacity utilization is faster than that of distribution of income, thus the rate of growth in saving goes down faster than growth in investment, so the system is also unstable.

Case 3. If $g^i < g^s$, $\frac{dB}{dt} > 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w < 0$. Firstly, because $\frac{dB}{dt} > 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w < 0$, from (14) and (15), then capacity utilization and profit shares would go down continuously. Secondly, from the condition of $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w < 0$, we know with the decrease in capacity of utilization, the rate of growth in investment goes down faster than savings; and with the decrease in profit shares, the rate of growth in savings goes down faster than investment. At the same time, because this condition also imply the positive slope of $\frac{\partial u}{\partial \pi}$, expressed by (13) and the positive magnitude of β , the economic growth is profit-led, that means increases in profit share raises capacity utilization. And stability condition of (17) requires $\alpha\pi < \beta u$, i.e. $\pi/u < \beta/\alpha$, and because $du/d\pi = \alpha/\beta$, then

$$\frac{du}{d\pi} * \frac{\pi}{u} < 1$$

That means the relative speed of adjustment of distribution income is faster than that of capacity utilization, thus the rate of growth in saving would go down faster than the rate of growth in investment as to cover the gap of both, so the system is stable.

Case 4. If $g^i > g^s$, $\frac{dB}{dt} < 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w < 0$. Firstly, because $\frac{dB}{dt} < 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w < 0$, from (14) and (15), then capacity utilization and profit shares would go up continuously. Secondly, from the condition of $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w < 0$, we know with the decrease in capacity of utilization, the rate of growth in investment goes up faster than savings; and with the decrease in profit shares, the rate of growth in savings goes down faster than investment. At the same time, this condition also imply,

$$\frac{du}{d\pi} * \frac{\pi}{u} < 1$$

That means the relative speed of adjustment of distribution income is faster than that of capacity utilization, thus the rate of growth in saving would go up faster than the rate of growth in investment as to cover the gap of both, so the system is stable.

Case 5. If $g^i < g^s$, $\frac{dB}{dt} > 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w < 0$. Firstly, because $\frac{dB}{dt} > 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w < 0$, from (14) and (15), then capacity utilization would go up and profit shares would go down. Secondly, from the condition of $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w < 0$, we know with the increase in capacity of utilization, growth in saving goes up faster than investment; and with the increase in profit shares, growth in savings goes down faster than investment. At the same time, because this condition imply the negative slope of $\frac{\partial u}{\partial \pi}$, expressed by (13), and the negative magnitude of β , the economic growth is wage-led, that means increases in profit share decreases capacity utilization. Then stability condition of (17) requires $\alpha\pi > |\beta|u$, i.e. $\pi/u > -\beta/\alpha$, and because $du/d\pi = \alpha/\beta$, then

$$\frac{du}{d\pi} * \frac{\pi}{u} < -1$$

That means the relative speed of adjustment of capacity utilization is faster than that of distribution of income, thus, the going up of the rate of growth in saving led by increase in capacity utilization would be faster than falling of the rate of growth in saving led by increase in profit share. In short, savings increase faster than investment, so as to expand the gap between investment and savings, so the system is unstable.

Case 6. If $g^i > g^s$, $\frac{dB}{dt} < 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w < 0$. Firstly, because $\frac{dB}{dt} < 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w < 0$, from (14) and (15), then capacity utilization would go down and profit shares would go up. Secondly, from the condition of $F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$, and $F'(r) - s_r + s_w < 0$, we know with the decrease in capacity of utilization, growth in saving goes down faster than investment; and with the increase in profit shares, growth in savings goes up faster than investment. At the same time, because of the negative slope of $\frac{\partial u}{\partial \pi}$ and the negative magnitude of β , the economic growth is wage-led, that means increases in profit share decreases capacity utilization. Then stability condition also implies

$$\frac{du}{d\pi} * \frac{\pi}{u} < -1$$

That means the relative speed of adjustment of capacity utilization is faster than that of distribution of income, thus, the falling of the rate of growth in saving led by decrease in capacity utilization would be faster than going up of the rate of growth in saving led by increase in profit share. In short, savings decrease faster than investment, so as to expand the gap between investment and savings, so the system is unstable.

Case 7. If $g^i < g^s$, $\frac{dB}{dt} > 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w > 0$. Firstly, because $\frac{dB}{dt} > 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w > 0$, from (14) and (15), then capacity utilization would go down and profit shares would go up. Secondly, from the condition of $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w > 0$, we know with the decrease in capacity of utilization, growth in investment goes down faster than savings; and with the increase in profit shares, growth in investment goes up faster than savings. At the same time, because this condition also imply the negative slope of $\frac{\partial u}{\partial \pi}$, expressed by (13), and the negative magnitude of β , the economic growth is wage-led, that means increases in profit share decreases capacity utilization. Then stability condition of (17) requires $\alpha\pi < |\beta|u$, i.e. $\pi/u < -\beta/\alpha$, and because $du/d\pi = \alpha/\beta$, then

$$\frac{du}{d\pi} * \frac{\pi}{u} > -1$$

That means the relative speed of adjustment of capacity utilization is slower than that of distribution of income, thus, the falling of the rate of growth in investment led by decrease in capacity utilization would be slower than going up of the rate of growth in investment led by increase in profit share. In short, investment increases faster than savings, so as to cover the gap between investment and savings, so the system is stable.

Case 8. If $g^i > g^s$, $\frac{dB}{dt} < 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w > 0$. Firstly, because $\frac{dB}{dt} < 0$, $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w > 0$, from (14) and (15), then capacity utilization would go up and profit shares would go down. Secondly, from the condition of $F'(r) - s_r + s_w - \frac{s_w}{\pi} > 0$, and $F'(r) - s_r + s_w > 0$, we know with the increase in

capacity of utilization, growth in investment goes up faster than savings; and with the decrease in profit shares, growth in investment goes down faster than savings. At the same time, because this condition and stability condition of (17) imply

$$\frac{du}{d\pi} * \frac{\pi}{u} > -1$$

That means the relative speed of adjustment of capacity utilization is slower than that of distribution of income, thus, the increase of the rate of growth in investment led by increase in capacity utilization would be slower than falling of the rate of growth in investment led by decrease in profit share. In short, investment decreases faster than savings, so as to cover the gap between investment and savings, so the system is stable.

According to the analysis above, we can get (1) the relative speed of adjustment of income distribution and capacity utilization is the important variable to the stability of model; (2) bargaining behavior of enterprises would exert influence on stability.

6. An explanation of Chinese economic growth

6.1 Chinese saving behavior

With regard to Chinese national savings, there are four points which have to deserve notice. Firstly, there are still higher percentages of State-owned firms in economic system, and most people are not the owner of firm. Although privatisation reform has taken for many years, the main source of income of most people is still the wage. Household seldom obtain shares or dividends from holding some companies shares. Secondly, in China, though profit is not the household main income form, the saving percentage in total national saving is still high. In fact, the household has the higher saving propensity because of the imperfect pension and insurance system. Thirdly, enterprise saving is also an important composition. Disregard of private enterprises or state owned enterprises, profits are the main sources of their saving. Thus, we consider enterprise saving and household saving are the dominant forces to influence the national saving in China. And household save some portion of wages, and enterprises save some portion of profit. Fourthly, the percentage of household saving has been higher than the percentage of enterprise saving. From 1990 to 2000, the percentage of household saving was higher than the percentage of enterprise saving, even in some years, household saving was twice of enterprises saving. Since 2000, both of them have been equal in principle.

At first, we assume the profit shares are larger than wage shares in China,

$$S = s_r \pi + s_w (1 - \pi) \tag{19}$$

$$s_r \pi < s_w (1 - \pi) \tag{20}$$

We can derive that $s_r < s_w$. This result is in contradistinction with the traditional assumption of post-Keynesian about the saving propensity, i.e. $s_r > s_w$.

Because

$$\partial g^s / \partial u = \rho s_r \pi + \rho s_w (1 - \pi) > 0 \quad (21)$$

$$\partial g^s / \partial \pi = \rho s_r - \rho s_w < 0 \quad (22)$$

So we can get

$$F'(r) - s_r + s_w > 0$$

That means the growth in investment is more responsive to changes in profit shares than the growth in savings.

And because

$$\partial g^s / \partial \pi < 0, \text{ and } \partial g^i / \partial \pi > 0$$

Then only higher profit shares would lead to investment exceeding savings. That also means the decrease in the real wage rate of workers and the reduction of consumption of workers, which would make the capacity utilization lying in the lower level. If $g^i > g^s$, and capacity utilization lies in the lower level, that means

$$F'(r) - s_r + s_w - \frac{s_w}{\pi} < 0$$

That means the growth in saving is more responsive to changes in utilization than the growth in investment. The case can be described as the figure 7.

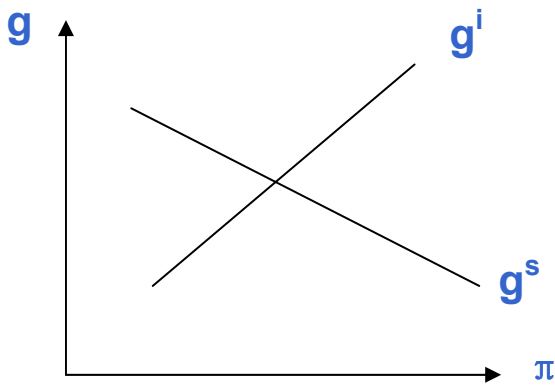


Figure 7a

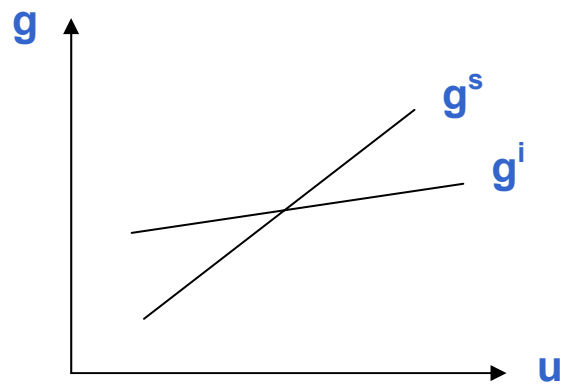


Figure 7b

Under this case,

$$\frac{du}{d\pi} = \frac{[F'(r) - s_r + s_w]u}{[s_r \pi + s_w (1 - \pi)] - F'(r)\pi} > 0 \quad (23)$$

$$\frac{du}{d\pi} * \frac{\pi}{u} > 1 \quad (24)$$

That means China possibly displays the path of steady growth led by profit, and the condition is adjustment of utilization should be faster the adjustment of income.

However, in China, there are series of factors, which involve with the lagged of pension system reform and the lack of the mechanism of income equalization adjustment, which fasten the speed of adjustment of profit shares, that means consumption and savings go down rapidly; In another aspect, the existence of market barrier makes adjustment of utilization is not an easy issue so that the speed of utilization adjustment is lower. Therefore, it is very difficult for China growth to go to steady state, but tend to unstable.

6.2 Chinese investment behavior

Since the mid of 1980, Chinese investment have been very high. As a share of GDP, it have peaked at 43.3 percent in 1993 during the height of previous economic cycle. The cyclical slowdown of investment share in GDP thereafter is moderate, with the investment to GDP ratio reaching a low of 36.3 percent in 2000. Since then, the ratio increased 43.8 percent of GDP in 2003. Since early 1990s, investment by government has been around 3-4 percent of GDP, and investment by household has been 5-6 percent of GDP, in recent years, it has been increasing, to 6.7 percent in 2003. However, enterprise investment, ranging between 27 and 35 percent of GDP, makes China's investment high. So enterprises investment could reflect the Chinese economic investment, thus it constitute the focus of analysis here.

Although there still lies administrative interference of government to enterprise operation, profitability gradually has become the main force driving enterprise investment. First, the importance of private companies has increased. The share of SOEs and collectively-owned companies in total investment has declined from around 80 percent in the early 1990s to 53 percent in 2003. Second, as part of restructuring, many SOEs have improved their profitability: the proportion of SOEs making losses has fallen from 25 percent in 1999 to an estimated 8 percent in 2004. So we can assume that the desire of pursuing higher profit can explain part of investment behavior of enterprises.

However, there is one point, which can not be negligible, that refers to there is still proportion of investment by some of enterprises which finance through the government transfer and soft loan from bank. Indeed, the government financed investment via capital transfers to state-owned enterprises in the power, electricity, water, transport, and other sectors. The transfers were 6.2 percent of GDP in 2001 and are assumed to have remained at roughly that level in 2002-03. In addition, soft lone also constitutes the main source of enterprises, especially, SOEs of investment funds. So we must recognize the existence of government transfer and soft loan stimulate the increase of investment at some extent.

In a bargaining economy compared to the competitive economy, there always a trend of investment exceeding savings if without adjustment of capacity and income. Considering the saving behavior of China, we can get the following figure,

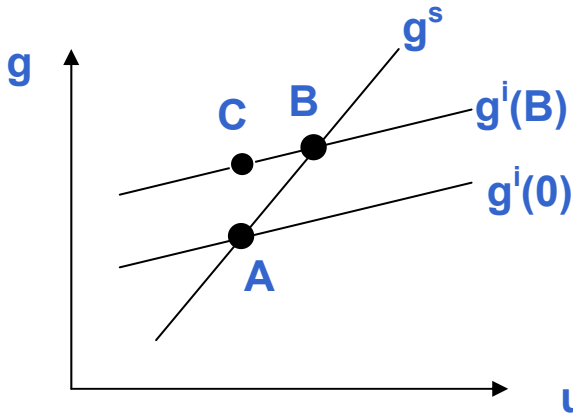


Figure 8a

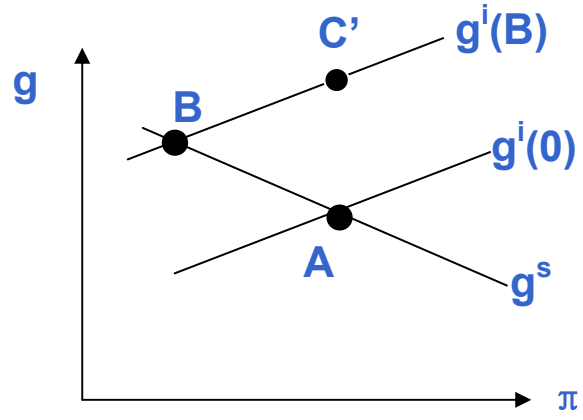


Figure 8b

From figure 8, we can see that existence of bargaining makes the equilibrium point changed from point A to B and makes the economy lead to equilibrium in the higher level of growth rate. If the adjustment of u and π could satisfy the condition

$$\frac{du}{d\pi} * \frac{\pi}{u} > 1$$

Then the economy would keep the steady growth in higher growth. However, just as what has been discussed above, these two processes is difficult to realize under the conditions of existence of market barrier, lack of mechanism of income equalization adjustment and lagged reform of pension system.

In fact, this kind of growth path is dangerous. Once utilization adjustment is slower, that means in product market there would be the surplus, the government would take measures to reduce the support to enterprises, so the decrease of bargaining level would make the growth level lower, that means economy would lead to equilibrium in lower level of growth. Thus, Chinese economic growth tends to unstable necessarily.

7. Conclusion

This paper considers, (1) High investment, high savings, high growth, low consumption, low efficiency and unstable are the characteristics of Chinese economic growth, so post-Keynesian framework, not neo-classical model, more fit to be used to analyze Chinese growth. (2) Based on the framework of post-Keynesian model, two models with saving propensity out of wages and enterprises bargaining with government are put forward, and the stable conditions are discussed through analyzing the adjustment process of capacity utilization and income distribution. (3) Through studying saving behavior of China, we derive that $s_r < s_w$,

which is quite the contrary to the traditional assumption of post-Keynesian theory about saving behavior. It is just this condition that induces Chinese economic growth tend to unstable. And the existence of bargaining, through changing investment incentives, expands the stability. (4) Existence of market barrier, lack of mechanism of income equalization adjustment and lagged reform of pension system are the real reasons, which have triggered the unstable growth in China.

Reference:

1. Toichiro Asada, Pu Chen, Carl Chiarella, Peter Flaschel (2006), Keynesian Dynamics and The Wage-Price Spiral: A Baseline Disequilibrium Model, *Journal of Macroeconomics* (28), 90-131
2. Peter Skott (2006), Comments on “Integrated Keynesian Disequilibrium Dynamics”, *Journal of Macroeconomics* (28), 131-135
3. Hu Angang (2005), “The sources of China’s economic growth”, *The China Business Review*, September-October, 2005
4. Augus Maddison, (1998), *Chinese Economic Performance In the Long Run*, 1998
5. Barro, R.J., Sala-i-Martin X. (1995), *Economic Growth*, McGraw Hill, Now York.
6. Jesus Felipe, J.S.L. Mccombie, (2005), “Why are some countries richer than others? A skeptical view of Mankwin-Romer-Weil”’s test of the Neoclassical growth model”, *Metroeconomica*, Vol. 56, No. 3, July 2005
7. Jesus Felipe, Fisher, F.M, (2003), “Aggregation in production functions: what applied economists should know”, *Metroeconomica*, Vol. 54, 2003
8. Kurz, H.D., Salvadori, N. (1995), *Theory of Production: A Long-Period Analysis*, Cambridge University Press
9. Lucas, R.E. (1988), “On the mechanism of economic development”, *Journal of Monetary Economics*, Vol.22
10. King, R.G., Rebelo, S. (1990), “Public policy and economic growth: Developing Neoclassical implications”, *Journal of Political Economy*, Vol. 98, No. 5
11. Joanlio Rodolpho Teixeira and Jorge Thompson Araujo (1996), A Post-Keynesian model of growth with distributional improvements, *Socio-Economic Planning Science*, Vol.30, No.1, 67-76
12. Kurz. H. D. (1994), Growth and Distribution, *Review of Political Economics*, Vol.6, No.4, 393-420

13. L. Randall Wray (1989), A Keynesian presentation of the relations among government deficit, investment, saving and growth, *Journal of Economic Issues*, Vol.23, No.4, 977-1002
14. Pasquale Commendatore (2003), On the Post-Keynesian theory of growth and institutional distribution, *Review of Political Economics*, Vol.15, No.2, 193-211
15. Thomas Palley (1996), Growth theory in Keynesian mode: Some Keynesian foundations for new endogenous growth theory, *Journal of Post Keynesian Economics*, Vol.15, No.2, 113-135
16. Thomas Palley (2002), Financial institution and theory of distribution, *Cambridge Journal of Economics*, Vol.26, 275-277
17. Mark Setterfield (2001), Neo-Kaleckian growth dynamics and the state of long-run expectations, *Old and New Growth Theory: An Assessment*, 181-199
18. Bhaduri, A. and S.A. Marglin (1990), Unemployment and the real wage: the economic basis for contesting political ideologies, *Cambridge Journal of Economics*, Vol.14, 375-393
19. Bhaduri, A.(2005), Growth, distribution and innovations: Understanding their interrelations, *The Schumpter Lectures*; Graz university, Austria
20. Louis Kuijs (2005), Investment and saving in China, *World Bank Working Paper 3633*