Policy Making, Industrial Structure and Economic Growth in a Dual Economy

Li, Xun

Institute for Advanced Study, WuHan University

18 July 2009

Policy Making, Industrial Structure and Economic Growth in a Dual Economy

Xun, Li

ABSTRACT

This paper discusses a new growth mode, a country with a dual economic structure in which each economic sector will receive different government policies such as financial and fiscal policies. In this paper, we firstly obtain the economic growth rate and the growth rate of per capita output in the balanced growth path. Then we discuss how different policy allocations and current industrial structure influence the economic growth. According to this model, we will also find out several other factors such as technology progress and population flow which have effect on economic growth. More importantly, we point out two types of traps which are often neglected by policymaker and we give each of them a name: "**Policy Trap**" and "**Labor-force Flow Trap**". These deserve the attentions of policymaker.

Key words: economic growth **Policy Trap** **Labor-force Flow Trap** industrial structure

Xun, Li

Institute for Advanced Study of Wuhan University, Wuhan, China (430072)

Economics department of China University of Political Science and Law, Beijing, China (100088)

Research interests: Macroeconomics, Economic Growth, Political Economy

E-mail: attlee86_0@163.com

1. Introduction

When it refers to the issue of economic growth, Solow (1956) and T.W.Swan (1956) firstly established the famous Solow Model, which has been the start of all researches on growth. In the assumptions of this basic model, the most obvious character is the definition of the production function: in any period, capital, labor and technology exist in an economy in which the labor is contained in the production function as a combination with technology. Among the successors of Solow, some introduce the infinite life home and competitive firm to the economy, such as Ramsey (1928), Cass (1965), Koopmans (1965); some scholars such as P. Romer (1990), Grossman (1991) and Helpman (1991) endogen technology and assume all the departments can use the technology at the same time. Besides, there are some models on the assumption that the capital can be divided as stock capital and human capital in the paper of Romer and Weil (1992). All of them haven't analyzed a very common case: economic growth with a dual structure. On the other hand, the Dual Economic Structure Theory of A. Lewis (1954), although have put forward the division of a dual structure and G. Ranis(1961)and J.C.H.Fei (1964) have perfected the model, but they analyzed the problem of development in the view of labor force flow due to the variations of the marginal labor productivity and wage rate, they didn't consider other factors such as government policies and current industrial structure which may influence the growth in a dual economy. There are still a group of scholars who regard government policies as institutional factor. For example, in the book **Institutional Changes and American Economic Growth**, North (1971) has pointed out the relationship between the institutional innovation and economic growth. Jones (2002) gave a general production function $Y = IK^{\partial}\left(hL\right)^{1-\partial}$, in which h is human capital of per capita in the Lucas Production Function. I stands for the influence of basic factors on the productivity. But to our regret, Jones hasn't gone further to illustrate for us clearly that what the I stands for. In all, for these scholars who devote to institution haven't characterize the institutional factors clearly and still debate on the issue that whether the institutional factors can be added into a production function and how to handle with it. In conclusion, these three research directions, in which the first neglect the dual economy in the real world, the second only focus on the factor of labor force narrowly, the last one haven't formed an specific growth model and haven't considered the case of dual economy.

So in this paper, we will avoid these flaws and synthesize all of these three. In fact, in many developing countries such as China and Indian, the development modes in both urban areas and rural areas are distinctive. It is obviously that in unban areas the economy is capital-intensive and technology-intensive. Conversely, because of the lack of investment and technology application, the economy in rural areas is labor-intensive. For these, we can regard that the technologies combining with urban economy and rural economy are in different level, width and depth. Besides technology, there are other important factors-----government policies and industrial structures. In fact, urban area is much easier to get financial and fiscal aid than the rural area, which means more resources flow to urban area and better financial services for urban area. In fact, this is an unfair resources allocation in urban and rural areas. About this, we can refer to financial dual structure theory of R.I.Mekinnon and "Financial Dualism in a Cash--in--Advance Economy" by Daniel, Betty C. and Kim, Hong--Bum(1996), which has a similar opinion on the financial disequilibrium with a dual economic structure as this paper.

There are approximately five sections in this paper. In the first section, we give some reasonable assumptions and establish a new model; in the second section, our duty is the dynamic analysis of the model; in the third section, we will explain the model in the real world by illustrating the different variables; in the forth section, some predictions for the influences of this finance crisis on a dual economy will be made; last part is the conclusion.

2. Some assumptions

Different from Solow Model, we now begin to consider a dual economy in which the urban area is mainly capital-intensive and technology-intensive while the rural area is labor-intensive. We also assume that technologies of different levels attach to different production factors. At the other hand, we supply different government policies to urban and rural areas. So our production function is as below:

$$Y(t) = \left[\left(P(t)K(t)\right)\cdot S(t)\right]^{\alpha}\left[\left(Q(t)L(t)\right)\cdot T(t)\right]^{\beta}$$

where t stands for time.

In this production function, Y is a nation's output, K is capital and L is labor. P is the technology of higher level combined with capital K and Q is technology of lower level combined with labor L. S and T respectively stands for the government policies in urban and rural areas, it can be understood as “resources allocation”. The indexes α and β are respectively represent the contributions of the urban area and the rural area to the output, and we have $\alpha + \beta = 1$.

In this model, we assume time is continuous as Solow model, that is to say every variable is defined on a time point. So we assume the technology of urban area has a growth rate of p and in rural area the growth rate of technology is q. The growth rate of labor force in rural area is n_r, so we have:

$$\dot{P}(t) = pP(t), \quad \dot{Q}(t) = qQ(t), \quad \dot{L}(t) = n_r L(t)$$

As to the output, it is used as consumption and investment. We still assume that the rate of investment to output s is exogenesis and constant, and the discount of the stock is δ .then we get:

$$\dot{K}(t) = sY(t) - \delta K(t) \tag{1}$$

3. Model dynamics

(1) Dynamics of the growth rate of output

Now denote the growth of capital as g_k, and give it a definition as:

$$g_k = \frac{\dot{K}}{K} = \frac{sY - \delta K}{K} = s\frac{Y}{K} - \delta, \tag{2}$$

On the other hand, we define the growth rate of output as $\frac{\dot{Y}}{Y}$, and use the production function we can get:

$$\frac{\dot{Y}}{Y} = a\left[p + g_k + s_u\right] + \beta\left[q + n_r + t_r\right] \tag{3}$$

Now, take derivation of t on both side of equation (2), we get:

$$\dot{g}_k = s\frac{K\dot{Y} - Y\dot{K}}{K^2}$$

$$= s\frac{Y}{K}\left[\alpha\left(p + g_k + s_u\right) + \beta\left(q + n_r + t_r\right) - g_k\right] \tag{4}$$

Use the equations (2), (3)in (4)， we have

$$\dot{g}_k = (g_k + \delta)\left[\alpha(p + s_u) + \beta(q + n_r + t_r) + (\alpha - 1)g_k\right] \tag{5}$$

This is the dynamic equation of g_k, it is the key of this model. On the balanced growth path,

$\dot{g}_k = 0$, this means that $g_k = -\delta$ or $g_k = \dfrac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha}$. Now we will discuss this problem on different cases below.

Case 1: when $\dfrac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha} > -\delta$; Let us see a diagram below,

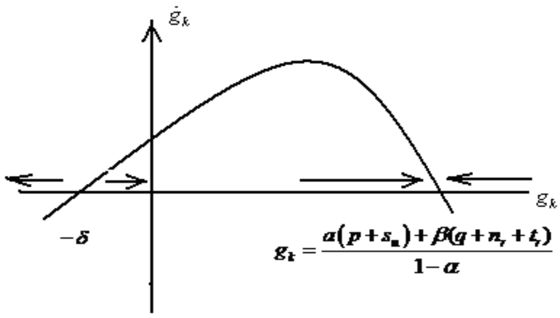

Diagram 1: balanced growth path of case 1

In this case, when $g_k \in \left(-\infty, -\delta\right)$, $\dot{g}_k < 0$, so g_k will decrease in this interval, while when $g_k \in \left(-\delta, \dfrac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha}\right)$, the $\dot{g}_k > 0$, so g_k will increase in this interval. But when $g_k \in \left(\dfrac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha}, +\infty\right)$, $\dot{g}_k < 0$, g_k decrease. So we can conclude that when $g_k = \dfrac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha}$, the economy will approach on a balanced growth path; when $g_k = -\delta$, it is unstable. So we substitute the stable point into (5), we can easily get the growth rate of output on the balanced growth path:

$$\frac{\dot{Y}}{Y} = a\left[p + \frac{\alpha(p+s_u)+\beta(q+n_r+t_r)}{1-\alpha} + s_u\right] + \beta\left[q+n_r+t_r\right]$$

$$= \frac{\alpha}{\beta}p + q + \frac{\alpha}{\beta}s_u + t_r + n_r \tag{6}$$

Case 2: when $\dfrac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha} < -\delta$, as the same analysis as **Case 1,** we can get that the economy approaches on a balanced growth path at $g_k = -\delta$. We can clearly see this in the diagram below:

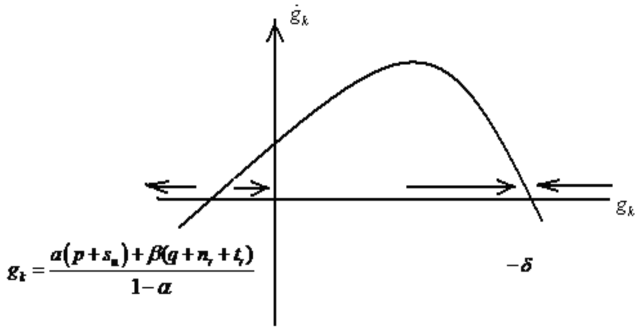

Diagram 2: balanced growth path of case 2

So we get:

$$\frac{\dot{Y}}{Y} = a\left[p + s_u - \delta\right] + \beta\left[q + n_r + t_r\right] \tag{7}$$

At this moment, from the equations $g_k = \frac{\dot{K}}{K} = \frac{sY - \delta K}{K} = s\frac{Y}{K} - \delta$ and $g_k = -\delta$, we can deduce that $s\frac{Y}{K} = 0$. This means s must equal to zero because $\frac{Y}{K}$ shouldn't be zero. However, most developing countries have a high saving rate, this case contradicts the fact in the real word, so we deny $g_k = -\delta$ in the Case 2.

Case 3: when $\frac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha} = -\delta$, we can analyze it from the diagram below:

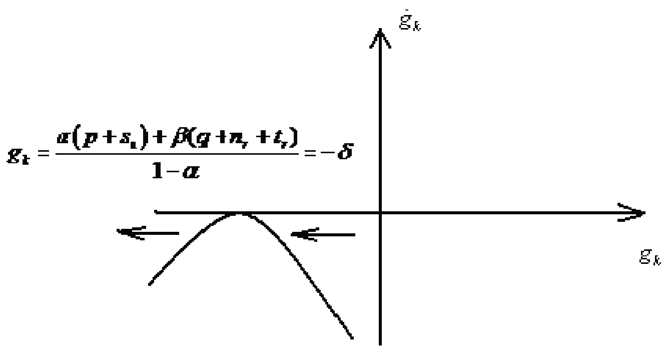

Diagram 3: balanced growth path of case 3

In this case, the point $g_k = \frac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha} = -\delta$ is a special point. This case is worthy of our attention. In the interval $\left(\frac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha},+\infty\right)$, then $\dot{g}_k<0$, g_k decrease and converge to the stable point .When the g_k at the left of the stable point, that is in the interval $\left(-\infty,\frac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha}\right)$, $\dot{g}_k<0$ and g_k diverges. So in this case g_k is one-side convergent. So we get the balanced path:

$$\frac{\dot{Y}}{Y}==\frac{\alpha}{\beta}p+q+\frac{\alpha}{\beta}s_u+t_r+n_r \text{ and } \frac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha}=-\delta; \quad (8)$$

In this case, the constraint condition is very strict and the economy may be unstable with a little disturbance. So we neglect it in the following discussion.

(2) Dynamics of the growth rate of per capita output

Ⅰ The analysis on the growth rate of government policies in the urban and rural areas

Now we assume the sum of $S(t)$ and $T(t)$ is $R(t)$, they three are the preventatives of government policies, so from $S(t)+T(t)=R(t)$ we have,

$$\frac{d\left(S(t)+T(t)\right)}{dt}\Big/\left(S(t)+T(t)\right)=\frac{\dot{R}(t)}{R(t)} \quad (9)$$

Denote $\frac{\dot{R}(t)}{R(t)}=r$, we have a basic equation:

$$\frac{\dot{S}(t)+\dot{T}(t)}{S(t)+T(t)}=r \quad (10)$$

Let us make a transformation on (10) as below,

$$\frac{\dot{S}(t)}{S(t)}\frac{S(t)}{S(t)+T(t)}+\frac{\dot{T}(t)}{T(t)}\frac{T(t)}{S(t)+T(t)}=r \quad (11)$$

Denote $\frac{S(t)}{S(t)+T(t)}=v$, $\frac{T(t)}{S(t)+T(t)}=1-v$ v is proportion of government policies. it is the proportion of resources allocations in different areas. So we have $s_u\cdot v+t_r\cdot\left(1-v\right)=r$, that is:

$$t_r = \frac{r - s_u \cdot v}{1 - v}$$

(12)

Ⅱ The analysis on the growth rate of labor force in the urban and rural areas

At the same time, we denote the population in urban area is $H(t)$, its growth rate is n_u, and assume the weight of the labor force in urban area is η, which in the rural area is μ. We also assume the gross labor is $N(t)$, $\dot{N}(t) = n_0 N(t)$, n_0 is the growth rate $N(t)$. So from the equation: $H(t) + L(t) = N(t)$ we have:

$$\frac{\dot{H}(t)}{H(t)+L(t)} + \frac{\dot{L}(t)}{H(t)+L(t)} = \frac{\dot{N}(t)}{N(t)} \quad (13)$$

Use the same method above, we can get,

$$\frac{H(t)}{H(t)+L(t)}\frac{\dot{H}(t)}{H(t)} + \frac{L(t)}{H(t)+L(t)}\frac{\dot{L}(t)}{L(t)} = \frac{\dot{N}(t)}{N(t)} \quad (14)$$

That is $\eta n_u + \mu n_r = n_0$. Because $\eta + \mu = 1$, we can get an equation:

$$\eta n_u + (1-\eta) n_r = n_0 \quad (15)$$

From a simple transformation we get:

$$n_r - n_0 = \eta (n_r - n_u) \quad (16)$$

Ⅲ Dynamics of the growth rate of per capita output in different cases

Now the growth rate of per capita output is $\frac{\left(\dot{Y}/N\right)}{Y/N}$. Now we continue to analyzing the growth rate of per capita output in the three cases above.

ⅰ In the **case 1,** we get $\frac{\left(\dot{Y}/N\right)}{Y/N} = \frac{\alpha}{\beta} p + q + \frac{\alpha}{\beta} s_u + t_r + n_r - n_0$, so substitute the equation (12) and (16) into it and get:

$$\frac{\left(\dot{Y}/N\right)}{Y/N} = \frac{\alpha}{\beta} p + q + \frac{\alpha}{\beta} s_u + \frac{r}{1-v} - \frac{v}{1-v} s_u + \eta (n_r - n_u) \quad (17)$$

Denote $1 - v = \gamma$, we can get a much simpler form:

$$\frac{\left(\dot{Y}/N\right)}{Y/N}=\frac{\alpha}{\beta}p+q+\frac{r}{\gamma}+\left(\frac{\alpha}{\beta}-\frac{v}{\gamma}\right)s_u+\eta\left(n_r-n_u\right) \tag{18}$$

ii In the **case 2,** because it contradicts the fact in the real word, we abandon it.

iii In the **case 3,** as in the **case 1**, we can get:

$$\frac{\left(\dot{Y}/N\right)}{Y/N}=\frac{\alpha}{\beta}p+q+\frac{r}{\gamma}+\left(\frac{\alpha}{\beta}-\frac{v}{\gamma}\right)s_u+\eta\left(n_r-n_u\right), \text{ and } \frac{a\left(p+s_u\right)+\beta(q+n_r+t_r)}{1-\alpha}=-\delta;$$

but because it is an abnormal stable point, we avoid discussing it.

4. Interpretations of the model in the real world

Now, we will interpret the model in the real world. From the model, we can see the factors that influence both the growth rate of output and the growth rate of per capita output.

(1) The factors that influence the growth rate of output

From the equation $\frac{\dot{Y}}{Y}=\frac{\alpha}{\beta}p+q+\frac{\alpha}{\beta}s_u+t_r+n_r$ we can see the factors that influence the growth rate of $\frac{\dot{Y}}{Y}$;

Ⅰ p **and** q The growth rate of technology in both urban and rural areas. Especially q, influences $\frac{\dot{Y}}{Y}$ directly.

Ⅱ s_u **and** t_r The growth rate of government policies. They were usually neglected but influence the $\frac{\dot{Y}}{Y}$ obviously because they stands for the flow and allocation of resources.

Ⅲ $\frac{\alpha}{\beta}$ Ratio of the output in urban and rural areas. Pay attention to this factor, it is the coefficient of p and s_u. It means even if p and s_u are constant and small, a large gap between the output of urban and rural areas can keep the economy growing. It is seemly a "propulsion" in some degree. This may be a good illustration for "**mystery of high growth**".

In some countries such as China, during the past several decades, the economy keeps a high growth which can not be interpreted by basic factors such as capital, labor and policies. Maybe the mystery lies in the $\frac{\alpha}{\beta}$**,** which stands for industrial structure. In fact, during these years, China gave the priorities to the urban development, especially the heavy industries in cities. This development mode results in the lag of rural area. However, according to the statistics, $\frac{\alpha}{\beta}$ is so high that the economy can still gain a surprising growth. This gap means there is a "blood transfusion" from rural area to urban area.

Ⅳ n_r The growth of the labor force in rural area. Because the rural labor force is a major factor in agriculture, it directly influence the $\frac{\dot{Y}}{Y}$.

(2) The factors that influence the growth rate of per capita output.

From the equation $\frac{\left(\dot{Y}/N\right)}{Y/N}=\frac{\alpha}{\beta}p+q+\frac{r}{\gamma}+\left(\frac{\alpha}{\beta}-\frac{v}{\gamma}\right)s_u+\eta\left(n_r-n_u\right)$, besides items such as $\frac{\alpha}{\beta}$, p, q, s_u mentioned above, we should also notice several factors below:

Ⅰ $\frac{\alpha}{\beta}-\frac{v}{\gamma}$. $\frac{\alpha}{\beta}$ is the ratio of the output in urban and rural areas, $\frac{v}{\gamma}$ is the ratio of the "policy resources" allocated in urban and rural areas. $\frac{\alpha}{\beta}-\frac{v}{\gamma}$ is the coefficient of s_u, it has a significant meaning. Now we will make a simple transformation below:

$$\frac{\alpha}{\beta}-\frac{v}{\gamma}=\frac{\alpha\gamma-\beta v}{\beta\gamma}=\frac{1}{\beta\gamma}\left[\gamma v\frac{\alpha\gamma-\beta v}{\gamma v}\right]=\frac{1}{\beta\gamma}\left(\frac{\alpha}{v}-\frac{\beta}{\gamma}\right) \qquad (19)$$

α, β, v, γ are all positive.

When $s_u\geq 0$, if we want the increase of "resources" in urban area have a positive effect on $\frac{\left(\dot{Y}/N\right)}{Y/N}$, the $\frac{\alpha}{\beta}-\frac{v}{\gamma}$ must be positive, so $\frac{\alpha}{v}>\frac{\beta}{\gamma}$. This means the average output on per "resources" in urban area should exceed that in rural area. In addition; when $\frac{\alpha}{v}<\frac{\beta}{\gamma}$,

s_u must be negative, otherwise the policies will exert a negative effect on $\frac{(\dot{Y}/N)}{Y/N}$.

When $\frac{\alpha}{\nu}=\frac{\beta}{\gamma}$, the policies contribute nothing to $\frac{(\dot{Y}/N)}{Y/N}$. These conclusions are very interesting and important. Is the constant growth of policies for urban area necessary and effective? From these conclusions, we say no. In fact, when $\frac{\alpha}{\nu}\le\frac{\beta}{\gamma}$, the constant flow of "resources" to urban area is a deadweight loss. We call it **"Policy Trap"**. So government should pay attention to this condition when it makes policies. And we will analyze it in details later.

Ⅱ $n_r - n_u$. This is the growth rate gap of labor force in rural and urban areas. Because $\eta \ge 0$, the value of $n_r - n_u$ will effect the $\frac{(\dot{Y}/N)}{Y/N}$ positively. In the developing countries with dual economic structure, according to the theory of A. Lewis, the flow of redundant labor force in the rural area to urban area will be benefit to the development of the country, but result of this model tells us that the quantity and speed should be in control! If not, the n_r will decrease and even be negative while n_u will increase resulting in a negative value of $n_r - n_u$. This implies that the labor flow have a negative effect on $\frac{(\dot{Y}/N)}{Y/N}$ in this case. So we call it **"Labor Force Flow Trap"**, that is to say, labor force flow is not always good to economic growth. This conclusion is in analogical to the viewpoints of V.R. Bencivenga and B.D. Smith (1997).

(3) **"Policy Trap" and "Labor Force Flow Trap": Challenges for government**

In this part, we will discuss the **"Policy Trap"** and **"Labor Force flow Trap"** in details.

Ⅰ As we have said, government regulates the economy by policy design. But how to manipulate their policy tool is a kind of art and challenge. Now, we will discuss firstly the **"Policy Trap"** in two cases------- period of "policy expansion" and period of "policy recession".

First we make some useful definitions and assumptions. To begin with, during the period of "policy expansion", the policies on the two sections are increasing, s_u is always positive. In "policy regression", the policies on the two sections are decreasing, s_u is always negative.

In addition, the policies firstly obey the law of increasing marginal product, but after some point, they keep the law of diminishing marginal product. We can understand it with the diagrams below.

We see the $\alpha(\nu)$ is a function of ν, as the diagram 4 shown, we first have $\frac{\partial \alpha}{\partial \nu} > 0$, $\frac{\partial^2 \alpha}{\partial \nu^2} > 0$, but after the inflexion, we have $\frac{\partial \alpha}{\partial \nu} > 0$, $\frac{\partial^2 \alpha}{\partial \nu^2} < 0$ So dose $\beta(\gamma)$. Look at the diagram below, when ν and γ are zero, $\alpha(\nu) > 0$ and $\beta(\gamma) > 0$. The slope of $\alpha(\nu)$ increase first, and then decrease as well as $\beta(\gamma)$. Because the urban area is more flexible to the policies than the rural area, so the $\alpha(\nu) > \beta(\gamma)$ until the cross point D. After D, $\beta(\gamma)$ surpasses $\alpha(\nu)$, and $\frac{\partial \beta}{\partial \gamma}$ slow down.

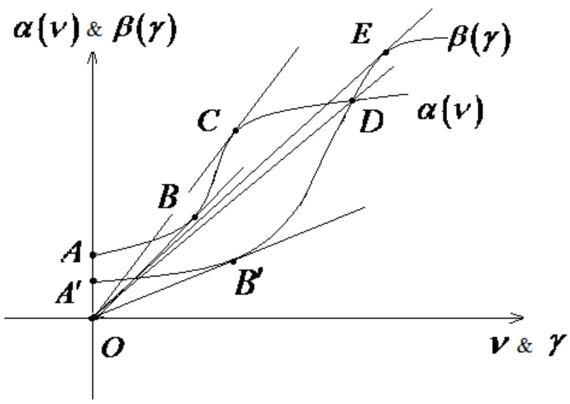

Diagram 4: $\alpha(\nu)$ and $\beta(\gamma)$

According to diagram 5 below, we can get the curves of $\frac{\alpha(\nu)}{\nu}, \frac{\beta(\gamma)}{\gamma}$. If fact, $\frac{\alpha(\nu)}{\nu}$ and $\frac{\beta(\gamma)}{\gamma}$ are the slopes of the ray OX, in which the X represents any point on the curves. So before the point D, the curve $\frac{\alpha(\nu)}{\nu}$ is above $\frac{\beta(\gamma)}{\gamma}$, and after point,

$\frac{\beta(\gamma)}{\gamma}$ surpasses $\frac{\alpha(\nu)}{\nu}$. So the value of $\frac{\alpha(\nu)}{\nu}-\frac{\beta(\gamma)}{\gamma}$ will achieve the top and then decrease gradually to zero. After point D, $\frac{\alpha(\nu)}{\nu}-\frac{\beta(\gamma)}{\gamma}$ is negative.

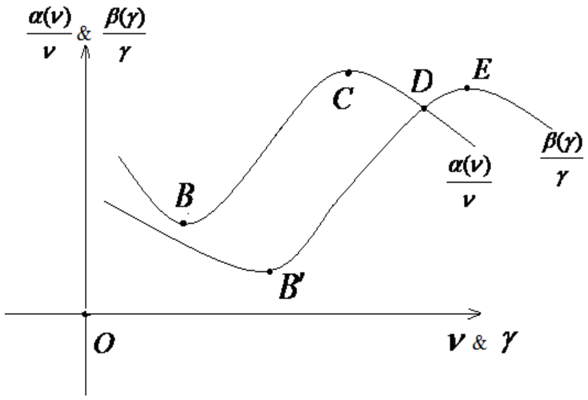

Diagram 5: $\frac{\alpha(\nu)}{\nu}$ and $\frac{\beta(\gamma)}{\gamma}$

Now, we begin to analyzing the **"Policy Trap"** shown in the diagram 6 below. Look at the diagram, X-axis stands for s_u, Y-axis stands for $\left(\frac{\alpha}{\beta}-\frac{\nu}{\gamma}\right)s_u$, at the same time, the two axis respectively stand for $\frac{\alpha}{\nu}$ and $\frac{\beta}{\gamma}$, and both of two are always positive.

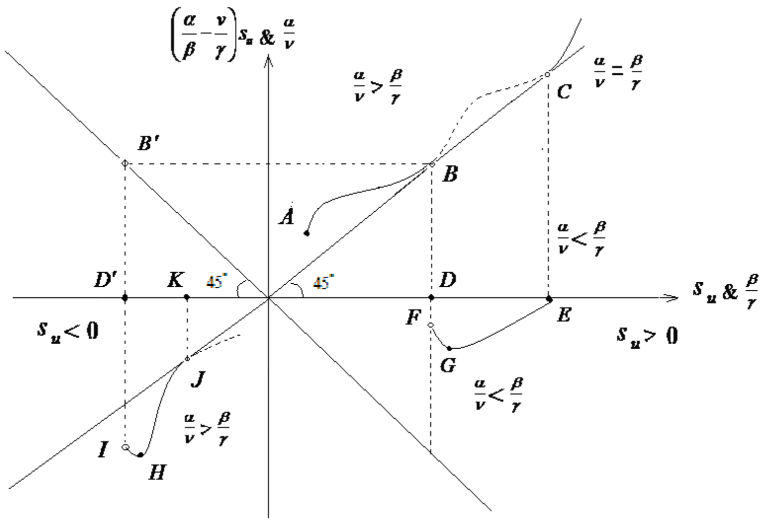

Diagram 6: Policy Trap

We adopt point A as the initial point, where $s_u > 0$, $\frac{\alpha}{v} > \frac{\beta}{\gamma}$. According to the equation (19), we have $\frac{\alpha}{\beta} - \frac{v}{\gamma} = \frac{1}{\beta\gamma}\left(\frac{\alpha}{v} - \frac{\beta}{\gamma}\right)$, so from diagram4 and diagram5, we can see $\frac{\alpha}{\beta} - \frac{v}{\gamma}$ will increase rapidly at the beginning because $\frac{\alpha}{v} - \frac{\beta}{\gamma}$ increase while $\beta\gamma$ change more slowly, so $\left(\frac{\alpha}{\beta} - \frac{v}{\gamma}\right)s_u$ increases sharply. However, later $\frac{\alpha}{v} - \frac{\beta}{\gamma}$ decrease and $\beta\gamma$ increase because β increase quickly, so the increase of $\left(\frac{\alpha}{\beta} - \frac{v}{\gamma}\right)s_u$ slows down and $\frac{\alpha}{v} - \frac{\beta}{\gamma}$ decreases to zero resulting $\left(\frac{\alpha}{\beta} - \frac{v}{\gamma}\right)s_u$ is zero at point B. Near the point B, the government meets a dilemma, it can make a reasonable adjustment so as to $\left(\frac{\alpha}{\beta} - \frac{v}{\gamma}\right)s_u$ continues to going up, of course, if the government can not or do not make a good adjustment and goes on push out policies, the $\left(\frac{\alpha}{\beta} - \frac{v}{\gamma}\right)s_u$ will turn to negative at point F because a negative value of $\frac{\alpha}{v} - \frac{\beta}{\gamma}$, this tendency will keep on to point G until the government realizes it and takes actions. Then it will adjust their policies so as to pull up the value of $\left(\frac{\alpha}{\beta} - \frac{v}{\gamma}\right)s_u$. During this period, $\left(\frac{\alpha}{\beta} - \frac{v}{\gamma}\right)s_u$ goes up from G to E to C.

In the period of "policy recession", $s_u < 0$. We begin the discussion at the point D', where the value of $\left(\frac{\alpha}{\beta} - \frac{v}{\gamma}\right)s_u$ at point B' is zero. At this point, when government continues to cutting down their policies on the two sectors, the value of $\frac{\alpha}{v} - \frac{\beta}{\gamma}$ becomes positive and increase, so $\left(\frac{\alpha}{\beta} - \frac{v}{\gamma}\right)s_u$ decrease rapidly to I then to H until the government change their policies.

In conclusion, from F to G and from I to H are the **"policy traps"**. It is worthy of government' attention.

Ⅱ Now we will focus on **"Labor Force flow Trap"**. The diagram 7 below reveals the change of

$\eta(n_r - n_u)$ with time varies. From the equation (16), we can analyze $\eta(n_r - n_u)$ by $n_r - n_0$ because they are equal. As we know, at the beginning, n_r exceeds n_0 greatly, and n_r keep on sharply growing, so $\eta(n_r - n_u)$ will grow. In the process of industrialization, n_r slows down. Thus in the process of industrialization, $n_r - n_0$ decreased, so the increase of $\eta(n_r - n_u)$ slowed down. Point B is critical, where $n_r = n_u$,so the value of $\eta(n_r - n_u)$ is zero. If the government control the labor force flow immediately, the $\eta(n_r - n_u)$ will continue to increasing. However, government usually neglect it and keep on encouraging the flow. Then $\eta(n_r - n_u)$ turn negative and drop down from F to G until the government put control on it. So from F to G is the **"Labor Force flow Trap".**

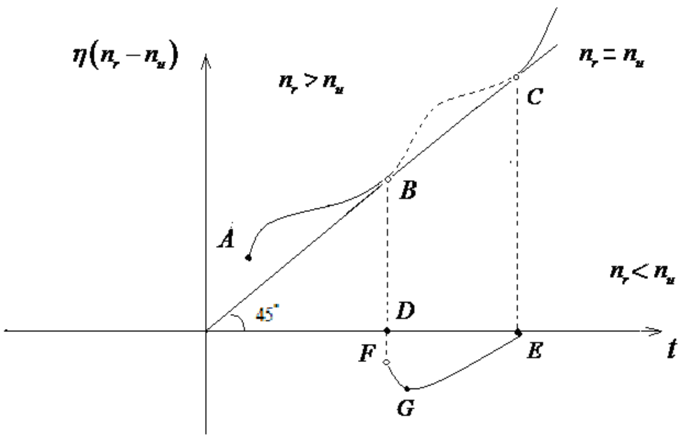

Diagram 7: Labor Force flow Trap

5. Predictions for the dual economy in the global economic crisis

In this economic crisis, nearly all the counties in the world suffer from the shock, although different degrees. For the developing countries, in my opinion, the damages of the economic crisis to city are much more serious in the urban area than that in rural because there are more virtual economy in the city and they are more vulnerable to this crisis which is trigged by subprime mortgage crisis. In fact, countries such as China and India, the natural economy is dominant in rural area, so it has a good ability to resist the crisis. Now take China for an example to predict the economy fluctuations in this crisis.

(1) **growth rate of gross output** At the beginning of the shock, the output in the urban

area will decrease, so the term of $\frac{\alpha}{\beta}$ will go down. While the policies in period T could only react and change in period $T+1$ because the policy makers should react to the changes and as a result the policies usually lags behind the crisis , so we say the s_u keep constant in the short run. On the other hand, t_r, n_r, p, q are also considered to be constant and unchangeable, so $\frac{\dot{Y}}{Y}$ will go down sharply. In a longer time, at one side, because the exposure of great risk, the aid from the financial institution will sharply decrease and the policies will change resulting in a negative S_u; at the other side, the government will try to find new economic growth point and stimulate the economy, as in china, the government have paid more attention to the rural area and put forward many polices about the increasing investment plan on the rural infrastructure construction. This means t_r will increase; meanwhile, many workers in the cities lose their jobs and reflow to rural area, then n_r increase. So in this period, it is hard to predict further tendency of the economy. It is a test to a government, because the tendency depends on the integrative effect of the policies. If the effect of n_r and t_r exceed the effect of s_u, the slippage of growth rate will be harnessed and the economy may touch the bottom and rebound, otherwise, the economy will continue slipping. In a long run, the variables such as t_c and n_r will keep stasis for the reason that the applicable policies may have been used out and the reflow of labor force begins to stop. Only variables technology can change and it can pull the economy up.

(2) **growth rate of per capita output** As what we have discussed above, in the short run, the $\frac{\alpha}{\beta}$ will decrease rapidly resulting in slippage of $\frac{\left(\dot{Y}/N\right)}{Y/N}$; In the longer time, s_u will become negative, but it is hard to judge the change of the term $\frac{\alpha}{\beta}-\frac{v}{\gamma}$. In fact, this term is negative in the short run because $\frac{v}{\gamma}$ keep constant in the short run, but in the longer run, whether it is positive or negative depends on the policies applied by the government. So it is really a challenge, it is also an "art". According to (9) , if the government make an adjustment and $\frac{\alpha}{v} < \frac{\beta}{\gamma}$, which means $\frac{\alpha}{v}-\frac{\beta}{\gamma} < 0$ and $\left(\frac{\alpha}{\beta}-\frac{v}{\gamma}\right)s_u$ is positive, then the policies will

put into effect and make a contribution to $\frac{\left(\dot{Y}/N\right)}{Y/N}$. Otherwise, the $\frac{\alpha}{\nu}-\frac{\beta}{\gamma}>0$ and $\left(\frac{\alpha}{\beta}-\frac{\nu}{\gamma}\right)s_u$ is negative, so the government policies are harmful to the $\frac{\left(\dot{Y}/N\right)}{Y/N}$, in this period, $\frac{\left(\dot{Y}/N\right)}{Y/N}$ may be hard to predict. In the long run, as the same as above, the technology will bring up the term $\frac{\left(\dot{Y}/N\right)}{Y/N}$ and the government has time to adjust their policy then $\frac{\alpha}{\beta}-\frac{\nu}{\gamma}$ has a positive effect on s_u, so in this period, the term $\frac{\left(\dot{Y}/N\right)}{Y/N}$ is predictable to grow up.

6. Conclusions

From the analysis above we can find that the balanced path of an economy with dual structure will be affected by several factors which differ from that in the growth models before such as Solow Model. Apart from labor and technology, the economy structure and policies can not be neglected or underestimated. In fact, the ratio of the output in urban and rural areas has partly affected the output through affecting the technology and policies, meanwhile, in this model, the importance of capital is seemingly cut down greatly. In fact, the policies have contained all the resources flow including capital. So what should we pay attention to? Firstly, we should adjust the industrial structure appropriately in order to optimize the structural effect. Secondly, the use of economy policies should be careful. Sometimes the government will get boggled in the **"Policy Trap"**, they push out more and more policies to stimulate the economy, but the economy run in an opposite direction! It is harmful and wasteful. Thirdly, the labor force flow should be under the control. It doesn't mean to forbid the flow of labor, what the research tells us is that the flow should be moderate avoiding **"Labor Force Flow Trap"**.

References

1. Bencivenga, Valerie R. and Smith, Bruce D.1997, "Unemployment, Migration, and Growth, Journal of Political Economy", Vol.105, No.3.
2. Glomm, Gerhard.1992, "A Model of Growth and Migration, in Canadian Journal of Economics", Vol.25, No.4.
3. Harris, John R., and Todaro, Michael P.1970. "Migration, Unemployment and Development: A Two-Sector Analysis." American Economic Review 60(March): 126-142.
4. Lucas, Robert E.B. & Stark, Oded, 1985, "Motivation to Remit: Evidence from Botswana, Journal of Political Economy." Vol.93, No.5.
5. Rauch,Jame E.1993, "Economic Development, Urban Underemployment and Income Inequality." Canadian Journal of Economics,Vol.26,No.4.
6. Barro, Robert J. "Economic Growth in a Cross section of countries." Quarterly Journal of Economics 106(May): 407-443.
7. Barro, Robert J., and Becker, Gary S. 1989. "Fertility Choice in a Model of Economic Growth." Econometrica 57 (March):481-501
8. Baumol, William. 1986. "Productivity Growth, Convergence, and Welfare". American Economic Review 76 (December): 1072-1085
9. Ficher, Stanley. 1993. "The Role of Macroeconomic Factors in Growth." Journal of Monetary Economics 32(December): 485-512.
10. Baxter, Marianne, and King, Robert G.1993. "Fiscal Policy in General Equilibrium" American Economic Review 83 (June): 315-334
11. Kremer, Michael. 1993. "Population Growth and Technological Change: One Million B.C. to 1990." Quarterly Journal of Economics 108(August): 681-716.
12. Romer, Paul. 1990. "Endogenous Technological Change." Journal of Political Economy

98(October, Part 2): S71-S102.