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# ECONOMIC GROWTH, BALANCE OF PAYMENTS AND INFLATION IN POSTWAR JAPAN

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## PREFACE

This paper aims to find the interdependency of the economic growth, the balance of payments and inflation in Japan. The Japanese economy has experienced rapid inflation since the autumn of 1972. This recent inflation has not been treated since it depends on a cause quite different from the one which characterizes the Japanese price movements before 1972. We will emphasize the differences between Japanese price movements and price movements of other advanced countries, especially Britain and the USA, before 1971.

In Section 1, we will show features of modern inflation such as creeping inflation, stagflation in advanced countries. The general relation between equations of the macro economic model, price level, labor supply, and the balance of payments will be shown.

In Section 2, we will outline the movements of postwar Japanese prices and the balance of payments. Especially, we will show the cause and process of three types of inflation in postwar Japan, namely, postwar vicious inflation, the inflation based on the differences in productivity, and imported inflation.

In Section 3, we will survey and comment on the arguments regarding the relationship between economic growth and the balance of payments.

Finally, we will examine the relationship between variables which affect economic growth, balance of payments, and price level. We will also clarify the cause of imported inflation since 1968.

## 1. MODERN INFLATION IN ADVANCED ECONOMY

The following are features of modern inflation in an advanced economy. They are continuous rises and downward inflexibility of prices. The causes of these features are administered price controls by monopolistic firms, *wage-push* through bargaining power by labor union, and a full employment policy by government. Both market power by monopolistic firms and bargaining power by labor union are *cost-push* factors for a rise in prices. The operation of *cost-push* factors may bring on unemployment, unless there is an increment of effective demand. To dispense the emergence of unem-

ployment, a full employment policy by government is required. It is the so called Keynesian policy.

The main policy of the modern economic society which has commonly prevailed in advanced countries is for full employment. It is influenced by Keynes' General Theory.<sup>1)</sup> The Keynesian system has an assumption that the money wage rate is inflexible even if unemployment has prevailed. On the other hand, it is regarded by classical theory that money wages and prices are flexible. The most important institutional framework which regulates such a price adjustment mechanism is the gold standard and monetary system based on it. The gold standard is a mechanism which brings the balance of payments equilibrium under the proposition of the international mobility of gold to hold fixed exchange rates. In the case of the gold standard, wage, price, and money supply are adjusted for the balance of payments. Therefore money wage rates must be flexible under the gold standard. Once it becomes inflexible, a decrease of money supply can not help but result in unemployment. If the money wage rate is inflexible, the monetary system must be adjusted for supporting full employment. Quantities of money must be supplied to yield effective demand needed for full employment. This is the Keynesian full employment policy. This was named as the labor standard by J. R. Hicks.<sup>2)</sup> The labor standard refers to that monetary policy which is operated discretionally to yield full employment according to the Keynesian theory under inflexible money wage rates.

In addition to the inflexibility of money wage rates, downward rigidity of price appears in the advanced economy. This is caused by market power of monopolistic firms. Bargaining power by labor union, administered price by large firms, and full employment policy by government are the institutional foundation in modern capitalism.<sup>3)</sup> Monopolistic firms and labor unions have market power, that is to say, firms govern prices, and labor unions govern wages, but labor unions can not govern quantity of employment, and monopolistic firms can not govern quantities of output as a whole. The increase or decrease of governmental expenditures is expected to adjust quantities of output and employment to help reach the full employment level.

Government faces a difficult choice. If it expands effective demand, the economy will increase output and employment, but will have to justify

<sup>1)</sup> J. M. Keynes, *The General Theory of Employment, Interest and Money*, 1936.

<sup>2)</sup> J. R. Hicks, "Economic Foundations of Wage Policy", *Economic Journal*, Sept. 1955.

<sup>3)</sup> This view was presented by Yuich Shionoya; *Gendai no Bukka*, 1973. He says modern inflation is related to modern economic system which is characterized by the interdependence of big business, a labor union and the government.

higher prices and wages. In contrast with this, if government reduces effective demand in order to stop increases in prices and wages, outputs and employment will be reduce.

We can formulate the following gold standard, Keynesian system, and labor standard.

$N$  : demand of labor  
 $w$  : money wage rate  
 $R$  : exchange rate  
 $Y$  : real output  
 $M$  : quantity of money supply  
 $p$  : domestic commodity price  
 $\bar{p}_f$  : foreign price  
 $\bar{k}$  : Marsharian  $k$

$$(1-1) \quad Y = F(N)$$

(1-1) is a production function. As we treat short-run equilibrium, we neglect capital stock  $K$  and assume labor supply is constant.

$$(1-2) \quad N = f\left(\frac{w}{p}\right)$$

(1-2) is a labor demand function. We assume quantity theory is appropriate.

$$(1-3) \quad M = \bar{k}pY$$

$$(1-4) \quad N = \bar{L}$$

(1-4) is a condition of full employment.

$$(1-5) \quad B(\bar{p}_f/p, R, Y) = 0$$

(1-5) is an equilibrium condition of the balance of payments.  $\bar{k}$ ,  $\bar{L}$ ,  $\bar{p}_f$  are exogenous variables. We have five equations and six endogenous variables. Gold standard:  $R$  is given at the par of gold, in other words, the fixed exchange rate is held and other variables are determined by (1)~(5).

Keynesian system:  $w$  and  $R$  are exogenously given and full employment condition (1-4) is ruled out from the system.

The labor standard of the advanced Keynesian system is divided into two cases :

(a)  $w$  and  $R$  are exogenously given and the balance of payments equilibrium condition (1-5) is excluded.

(b)  $w$  is exogenously given and other variables are determined by (1)~(5). (a) is a case of the fixed exchange rate. This means that if  $w$  is given, and monetary policy for full employment is operated, the balance of payments

may deteriorate. This fact also means that if a full employment condition is introduced to the Keynesian system, the balance of payments may deteriorate. On the other hand, (b) means that if the floating exchange rate system is adopted, full employment and the balance of payments equilibrium is performed at the same time through the variation of exchange rates. However, in a country with relatively a high price level, exchange rates may decrease continuously.

Modern inflation in an advanced country<sup>4)</sup> can be shown as follows.  $p$  is treated as a target variable which is a function of  $w$ . Therefore, the wage-cost mark-up equation is added.

$$(1-1) \quad Y = F(N)$$

$$(1-2) \quad N = f\left(\frac{w}{p}\right)$$

$$(1-3) \quad M = \bar{k}pY$$

$$(1-4) \quad N = \bar{L}$$

$$(1-5) \quad B(\bar{p}/p, R, Y) = 0$$

$$(1-6) \quad p = q \frac{w}{y} \quad \left(y = \frac{Y}{N}\right)$$

$q$  is a wage-cost mark-up rate which is proposed by Sidney Weintraub,<sup>5)</sup> and is assumed to be constant. The constant  $q$  means that business firms have market power. If exchange rate  $R$  is fixed, either balance of payments equilibrium condition (5) or full employment condition (4) must be excluded. If  $p$  rises as a result of increase of  $w$  over  $y$ , full employment can not be realized unless  $M$  increases so that the rise of  $p$  may be realized. The inflation in an advanced country before 1971 can be illustrated by (1-1), (1-2), (1-3), (1-4) and (1-6), since a fixed exchange rate has prevailed and a full employment policy was adopted. Therefore (1-5) is excluded and (1-4) remains. In an advanced economy, money wage rate  $w$  has risen more than labor productivity  $y$ , so that  $p$  has risen. In this situation, government has made money supply increase. The main routes of money supply are the increase of governmental expenditure with budget deficit, purchases of bonds hoarded in the private sector and credit creation by the central bank. In extreme Keynesian policy, which is characterized by the increase of money supply through either purchase of bonds by the central bank or increase of governmental expenditure with budget deficit, is apt to bring inflation as well as deterioration of the balance of payments. We

<sup>4)</sup> It does not always cover all advanced countries. It means rather matured countries like Britain.

<sup>5)</sup> S. Weintraub; A General Theory of the Price Level, Output, Income Distribution and Economic Growth, 1959.

can find such a case in Britain, and sometimes in the USA. But, in West Germany or in Japan, the situation different. The increase of effective demand, namely, economic growth does not always cause deterioration of the balance of payments in these countries.

## 2. AN OUTLINE OF PRICE MOVEMENTS IN POSTWAR JAPAN

At first, we will show the movements of price level briefly in each period by five years. There was a postwar vicious inflation from 1946 to 1950. This was caused by the deficiency of a productive capacity and extremely easy money supply.<sup>6)</sup> We can regard the period from 1951 to 1955 as the period of recovery from the postwar situation. The wholesale price level was stabilized in this period. In the period from 1955 to 1961, the consumer price level was also stabilized as well as the wholesale price level. Since 1961, CPI has rapidly risen in spite of the long-run stabilization of wholesale prices. In this period, from 1961 to 1965, the most distinguished feature of Japanese price movements, namely the deviation of CPI from WPI, has emerged. In the period from 1965 to 1970, the consumer price level has risen as usual and the wholesale price level has shown the tendency to rise. We may be able to say that the Japanese price movement has approached that of modern inflation in advanced countries since 1965 in the sense that a *cost-push* factor has operated. Nevertheless, it is different from the Keynesian system, since the balance of trade surplus has accumulated in this period. It was inflation accompanied by a favorable balance of trade. After 1970, various events have occurred, for example, the dollar crisis in 1971 and the oil crisis in 1973. Since 1972, the Japanese economy has experienced hyper-inflation caused by these events.

In the background of such price movements in the Japanese economy, as mentioned above, there were two basic structural changes, which influenced the movements of prices. First, the Japanese economy has changed from a labor surplus to a labor shortage by 1960 or 1961.<sup>7)</sup> Second, it has changed from a dollar shortage economy to an excess dollar economy by 1968. Besides postwar vicious inflation and recent hyper-inflation, there were only two inflational periods. One was a continuous rise of the consumer price level after 1960. The other was a new type of inflation, which appeared for the first time after 1968. The former was caused by a labor

<sup>6)</sup> This inflation has been ceased by the disinflation policy under the advise of Ambassador Dodge in 1949. He suggested the abolition of various financial institutions for recovery from postwar confusion.

<sup>7)</sup> Japanese economy has been characterized by labor surplus and low wages before 1960.

shortage. The latter was caused by a favorable balance of payments which is called imported inflation. The labor shortage which occurred after 1960 was brought about by rapid economic growth, the rate of which was higher than the growth rate of the labor force. On the other hand, the movements of the balance of payments have shown such a course as follows. There was a balance of payment ceiling against economic growth in the Japanese economy before 1965. This was also a limit of prosperity for business cycles. Balance of trade used to fluctuate cyclically according to business cycles, holding the long-run tendency of the balance of payments deficit. But since 1966, a balance of trade surplus has occurred. However, the movements of over-all balance of payments and balance of trade are not always parallel, but some gaps exist. What has covered these gaps in the past follows. There was the aid by the USA, namely, favorable transfer payments from 1945 to 1949. From 1959 to 1963, there was an increase of extraordinary demand by the Korea War. It improved the balance of trade. Since 1960, there has been an entrance of capital. It improved the capital account. After 1965, a balance of trade surplus has occurred, but an exit of capital arisen. Since 1968, the balance of trade surplus has been larger than the exit of capital, so that the gap between the balance of trade and the over-all balance of payments has not been covered, and an excess dollar economy has occurred. The reason why the balance of payments has changed from an unfavorable base to favorable base are as follows.

- (1) The Japanese industrial structure has been altered to a bias for heavy industry which has adapted to the growth of international effective demand.
- (2) The competitive capability of exports has risen through the increase of productivity.
- (3) As inflation of other countries which are main partners of Japanese trade has been strengthened after 1968, relative price has become favorable for Japanese exports.

Let us rearrange postwar Japanese inflation. The Japanese economy has experienced three types of inflation since the end of the Second World War. First, there was a postwar vicious inflation from 1945 to 1949. It is characterized by the co-existence of unemployment and inflation. It has been frequently called a dilemma of the unemployment and inflation. Second, in the period after 1960, a consumer price level has risen continuously, apart from the wholesale price level. It is explained by the difference in productivity between large enterprises or the producer goods sector and small enterprises or the consumer goods sector. Thirdly, since 1965, a wholesale price level has begun to rise up in accordance with the consumer price level. Indeed, it begins to appear that the aspects of Japanese infla-

tion resemble the inflation of an advanced economy, but it is not always the same as that of the Keynesian model. Economic growth with full employment in this period has brought on not the deterioration but the improvement of the balance of payments.

(1) *The Inflation in the Period from 1945 to 1949*

The inflation in this period, characterized by the co-existence with unemployment, can be called monetary inflation. It is different from Keynes' true inflation since it occurred before the level of production has reached a full employment ceiling. On the supply side, it has been under insufficient productive capacity and an excess labor force, and on the demand side, extremely easy money for the recovery from postwar confusion was supplied. If we express the situation in this period by the Harrodian term, we can show as follows. In the long-run, from 1945 to 1955,  $G_n > G_w$ , while in the short-run, from 1945 to 1949,  $G > G_w$ . A force which brought on  $G > G_w$  was an increase of governmental expenditure. It was an extraordinary increase in money supply. The balance of payments deteriorated. Therefore, this period is characterized by unemployment, inflation and deficit in the balance of payments.

(2) *Inflation Based on Difference of Productivity*

Since 1966, the wholesale price level, which had risen gradually from 1963, began increasing at a more rapid rate. In this process, a special inflation, which has not been experienced in other advanced countries, has arisen. The wholesale price level was stabilized in the long-run, from 1955 to 1965, showing fluctuations according to business cycles in the short-run. On the other hand, the consumer price level has continuously risen. The mechanism of the inflation based on the difference of productivity is as follows. As the result of rapid growth, the Japanese economy performed full employment. Economic growth increases quantities of labor demand. Under full employment, it causes a rise in the wage rate. On the other hand, in the period of rapid growth, heavy industry especially was developed. The productivity of this sector was higher than other sectors; light industry, the agricultural sector, the service sector and so on. Commodities included in the wholesale price index are produced mainly by heavy industry. Consumer goods and services which constitute a consumer price index are produced primarily by light industry and other sectors.

Productivity in these sectors is lower than heavy industry. Nevertheless, increases in wages occur not only in heavy industry, but also in light industry. A rise in wages in light industry is also influenced by a rise in wages in heavy industry. It is frequently called *the spill over effect*. In light industry, a rising rate of wages is higher than that of productivity,



so cost-push effect takes place. The inflation based on the difference on productivity only means a change of relative price among sectors and does not always mean a rise in the general price level.<sup>8)</sup> Therefore, we should say it is a partial cost-push inflation because it is not a true inflation.

(3) *Imported Inflation*

Since 1963, the wholesale price level has risen. The main causes of the rising of the wholesale price level are the increase of effective demand and a rise in prices of imported raw materials. This is called imported inflation. Imported inflation, which imported from foreign countries, arises from three routes. At first, prices of goods and materials from foreign countries rise in accordance with the rate of inflation of those countries, and these push up the cost of production. The second is, the rate of inflation in foreign countries which is higher than in Japan, Japanese exports increase, and the balance of trade improves. It also increases the effective demand and causes a rise in the price level. The third, as a result of the balance of trade surplus, an increase in the money supply may take place. In fact, it has occurred in 1971.

In the background of the fact that the imported inflation had emerged in the Japanese economy during that period is that there was a structural change. Since the Japanese economy experienced normal business cycles again, the ceiling of boom has been a bottleneck for the balance of payments. This is usually called the balance of payments ceiling. At least,

<sup>8)</sup> The inflation based on difference of productivity is shown by the following formulation. Suffix 1, 2 show heavy industry or the producer goods sector and light industry or the consumer goods sector, respectively.

$$P_1 = q_1 \frac{w_1}{y_1}$$

$$P_2 = q_2 \frac{w_2}{y_2}$$

$$\dot{P}_1 = \dot{q}_1 + \dot{w}_1 - \dot{y}_1$$

$$\dot{P}_2 = \dot{q}_2 + \dot{w}_2 - \dot{y}_2$$

$\dot{P}$ ,  $\dot{w}$  and  $\dot{y}$  show the rising rate in price, wage and productivity, respectively. And  $\dot{q}$  is a changing rate of wage-cost mark-up ratio. If the rate of capital share or labor share is unchanged,  $\dot{q}$  is constant. Therefore,  $\dot{q} = 0$

$$\dot{P}_1 = \dot{w}_1 - \dot{y}_1$$

$$\dot{P}_2 = \dot{w}_2 - \dot{y}_2$$

$$\dot{y}_1 > \dot{y}_2 \quad \text{difference of rising rate in productivity}$$

On the other hand  $w_1$  has been larger than  $w_2$ . But, the catching up process of  $w_2$  to  $w_1$  has begun in this period.  $w_2$  has been forced to approach  $w_1$ . Therefore,  $\dot{w}_2 > \dot{w}_1$  has occurred.

$$\dot{w}_1 \leq \dot{y}_1, \quad \dot{w}_2 > \dot{y}_2$$

Thus

$$\dot{P}_1 \leq 0, \quad \dot{P}_2 > 0$$

before 1961, a labor supply ceiling had been above the balance of payments ceiling. However, the Japanese economy had changed from a labor surplus type to labor shortage type by that time. Therefore, after 1965, the balance of payments ceiling has been replaced by the labor supply ceiling.<sup>9)</sup>

In Fig. 1, time  $t$  is measured at the horizontal axis, and income or product is expressed by logarithm  $Y$  which is measured at the vertical axis.  $G_N$  is the labor supply ceiling and  $G_B$  is the balance of payments ceiling.

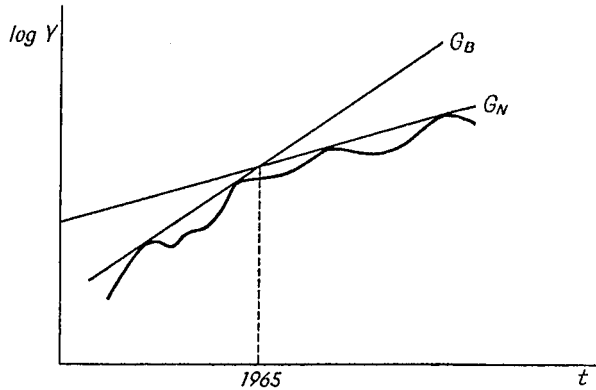


Fig. 1

The two ceiling intersected in 1964 or 1965.  $G_N$  is Harroddian  $G_N$ .  $G_B$  is a growth rate which holds the balance of payments equilibrium  $B=0$ , allowing a little deficit.

$B$ : balance of payments

We can express this in a simplified form,

$$X = X(Y_f, p_f/p)$$

Export depends on the scale of foreign income or expenditure and the relative price between foreign countries and Japan.

$Y_f$ : income or expenditure in foreign countries

$p_f$ : foreign price level

$p$ : domestic price level

$X$ : export

$M$ : import

We can assume  $\frac{dX}{dY_f} > 0$ ,  $\frac{dX}{d(p_f/p)} > 0$

<sup>9)</sup> Such an argument was presented in the president's address of 1973's meeting in the Association of Theoretical Economics by Miyohai Shinohara.

If we adopt traditional Keynesian analysis, import depends on domestic income or product.

$$M = M(Y)$$

according to Keynesian macro system,

$$(2-1) \quad B = X - M$$

$$(2-2) \quad M = a + mY$$

$$m > 0$$

$m$  is marginal propensity to import.

$$B = X - mY - a$$

if we assume the export is the linear function of  $Y_f$  and  $p_f/p$ , we can write

$$X = b + \alpha Y_f + \beta p_f/p$$

$\alpha$ ,  $\beta$  correspond to a sensitivity or elasticity of export to foreign demand and relative price respectively.

$$B = \alpha Y_f + \beta p_f/p - mY - (a - b)$$

Balance of payments equilibrium

$$\alpha Y_f + \beta p_f/p - mY - c = 0$$

$$(a - b = c)$$

An increase in market of Japanese trade partner is reflected in increase of  $Y_f$ . The lowering of a tax barrier can have the effect as an increase in  $\alpha$ . It is usually explained that in a period of rapid growth,  $Y$  has increased more rapidly than  $Y_f$ , so that the balance of payments tends to deteriorate. However, a growth rate in the Japanese economy has also been very high since 1966, when the recovery from the 1965's depression began. Nevertheless, the balance of payments has not deteriorated, but has improved. The balance of payments surplus has been accumulated, and it has caused an excess in liquidity. In 1971, the dollar crisis occurred, and dollars were exchanged to yen. On the other hand, as it was the depression period, the rate of interest was lowered and easy money was supplied. The increased liquidities in the hands of the private sector, banks, and other business firms, were directed to purchase lands, equities and other stocks. This was the cause of the so-called stock inflation, which occurred after the autumn of 1972. In contrast with postwar vicious inflation, it was the co-existence of inflation with favorable balance of payments. An explanation of this phenomenon is in the fact that the yen is under-estimated relative to the dollar. I suggest that the increase of exports has been brought about by the effect of the change in relative prices. In other words,  $p_f/p$

has risen. The stabilization or decrease of  $p$  has been brought by the increase of productivity. And it is the result of economic growth, which is generally thought to be the force that increases imports.

### 3. ECONOMIC GROWTH AND BALANCE OF PAYMENTS

Modern inflation in advanced countries was brought about by the downward inflexibility of the money wage rate, the price administration of big business, who are generally going to stabilize capital shares, and the Keynesian full employment policy by government. These also bring on deterioration of the balance of payments. Keynesian policy, in the sense as I mentioned, plays a role which transfers *cost-push* to rise in price without unemployment, and it is also likely to bring a deterioration of the balance of payments. Indeed, the Japanese economic growth has been limited by the balance of payments ceiling in the period from 1950 to 1964, but after 1965, rapid growth has not brought about the deterioration of the balance of payments. To examine this reason, we must consider the general relationship between economic growth and the balance of payments.

The traditional Keynesian model of the balance of trade can be shown as mentioned in the last section.

$$(3-1) \quad B = X - M$$

$$(3-2) \quad M = a + mY \quad m > 0$$

$$(3-3) \quad B = X - mY - a$$

$B$ : balance of trade,  $M$ : import,  $X$ : export,  
 $m$ : marginal propensity to import,  $a$ : a constant

From (3-3), if  $Y$  increases by economic growth under given  $X$ , the balance of trade becomes unfavorable. The defects of this model consist of the following points. (1)  $X$  is treated exogenously as given. (2) Only the balance of trade is considered, but asset demand is not considered.

Mundell criticized the traditional theory which lets  $M$  depend on only  $Y$ , so it loses the relationship between  $M$  and the demand for liquidity. Mundell's arguments<sup>10)</sup> are formulated as follows.

$$X - M = R$$

$R$  shows the balance of trade surplus.  $E$  denotes domestic expenditure.

$$Y - E = \dot{L}$$

$\dot{L}$  is change in demand for liquidity per unit time.

<sup>10)</sup> See Mundell, Robert A., "Growth and the Balance of Payments", in *International Economics*, 1968, Chap. 9.

$$L = kY$$

It is assumed that there is a given relationship between demand for liquidity and income  $Y$ .  $k$  is the desired money to income ratio at the fixed world interest rate.

$$\dot{L} = k\dot{Y} = k\lambda Y$$

$\lambda$  is growth rate of income (=output).

Thus

$$Y - E = k\lambda Y$$

or

$$E = (1 - k\lambda) Y$$

Mundell treated  $M$  as a function of  $E$  in contrast with traditional theory which treats  $M$  as a function of  $Y$ . In general,  $X$  as well as  $M$  is a function of  $E$  but we treat  $X$  as an exogenous variable here.

$$M = a + mE$$

therefore

$$M = a + m(1 - k\lambda) Y$$

thus

$$B = X - m(1 - k\lambda) Y - a$$

A rise in growth rate, namely increases of  $\lambda$ , increases  $B$ . In other words, growth of income improves the balance of payments.<sup>11)</sup>

The main feature of Mundell's argument consists of a point that  $M$  does not depend on  $Y$ , but on  $E$  so that the gap of  $Y$  and  $E$  is regarded as an increment of demand for liquidity. His argument shows that the growth of income brings an excess supply of goods and flow demand for money, and improves the balance of payments. However, in reality, the growth of income may bring deterioration in the balance of payments. If there were credit creation or governmental expenditure with budget deficit for economic growth and full employment, what might happen? To clarify these problems, we need to consider more general cases.<sup>12)</sup> Komiya included

<sup>11)</sup> Mundell's model is summarized followingly. It consists of four equations:

$$\begin{array}{ll} \text{(A-1)} & B = X - M \\ \text{(A-2)} & M = a + mE \\ \text{(A-3)} & \dot{L} = k\lambda Y, \quad k > 0 \\ \text{(A-4)} & \dot{L} = Y - E \end{array}$$

<sup>12)</sup> F. J. Reid attempted an extension of Mundell's model. He demonstrated in his note that: "(i) Mundell's model, as specified, implies that an increase in the growth rate results in only a short-run improvement followed by the long-run worsening of the balance of payments. (Continue)

bonds in the model and found that a change in the level of income, in addition to Mundell's results, creates a capital account deficit.<sup>13)</sup> Laffer, on the other hand, concluded that absolute growth in income affects the balance of payments and the capital account positively and the trade balance negatively.<sup>14)</sup> Here we examine the force of growth to the balance of payments referring Komiya's argument. We must examine two problems. The one is to analyze the two forces exerting on the balance of payments, assuming there are two forces which affect oppositely the balance of payments in the process of growth. We need to clarify in which case growth in income affects the balance of payments positively or negatively. Another problem is related to the effect in the case that there might be an autonomous money supply, for example, credit creation, or an increase of governmental expenditure with budget deficit.

Komiya shows that a growth of income improves trade balance, but deteriorates the capital account by introducing a bonds balance into his model. He says, "There are two basic forces which affect the balance of payments in the process of economic growth. On the one hand, growth in income increases the demand for money, and this is a factor restricting expenditure and improving, rather than deteriorating, the balance of payments; on the other hand, autonomous increases in the money supply work to increase expenditure, and this is a factor worsening the balance of payments."<sup>15)</sup> Komiya considers an open economy consisting of two sectors: the private sector, which includes households and firms, and the banking sector. He also considers three categories of commodities; (i) goods and services, (ii) bonds (securities) and (iii) money (domestic currency), which is supplied by the banking sector in exchange either for bonds or for foreign currencies. The private sector's demand and excess demand for  $i$ th commodity are denoted by  $D_i$  and  $D_{ei}$ , respectively.

(ii) The appropriate reformulation of the model allows Mundell's conclusion to be reestablished and facilitates a comparison with other models of the growth and the balance of payments."

Refer; Reid, Frand J., "Mundell On Growth And The Balance Of Payments: A Note", *Canadian Journal of Economics*, November 1973, pp. 592-595.

<sup>13)</sup> Ryutaro Komiya, "The Economic Growth and the Balance of Payments: A Monetary Approach", *Journal of Political Economy*, February 1969, pp. 35-48.

<sup>14)</sup> Arther Laffer, "Anti-traditional Theory of the Balance of Payments Under Fixed Exchange Rates" (mimeo, University of Chicago, 1971). Dornbusch attempted to reconcile those different results, Komiya's and Laffer's, by noting the neglected relation between the sources of the growth and their financing or capitalization in the form of a flow supply of financial assets or appreciation of the stock of claims on real assets. Rudger Dornbusch, "Noter On Growth And The Balance Of Payments", *Canadian Journal of Economics*, August 1971, pp. 389-395.

<sup>15)</sup> Komiya, op. cit. p. 36.

$D_{e1} = D_1$  (= consumption + investment) - current output

$D_{e2} = D_2$  (= demand for bonds) -  $A_0$  (= initial net bond position)

$D_{e3} = D_3$  (= liquidity preference) -  $M_0$  (= initial money stock held by private sector)

$p_1$ : price level of goods and service

$p_2$ : price of bonds (the reciprocal of the rate of interest)

The price of money is unity by definition.

$$D_i = D_i(p_1, p_2, p_1 Y, A_0, M_0) \quad (3-1)$$

The balance of payments on current accounts, or the balance of trade, is given by

$$B_1 = -p_1 D_{e1} \quad (3-2')$$

and the balance of the capital account by

$$B_2 = -p_2 (D_{e2} + A_d) \quad (3-3')$$

$A_d$  ( $\equiv 0$ ) denotes the net purchases of bonds by the banking sector during that period. The over-all balance of payments is given by:

$$B = B_1 + B_2 = -(p_1 D_{e1} + p_2 D_{e2}) - p_2 A_d = D_{e3} - p_2 A_d \quad (3-4')$$

Equation (3-4)' follows from budget restraint

$$\sum_{i=1}^3 p_i D_{ei} = 0 \quad (3-5')$$

Without the purchases of bonds by the banking sector,  $A_d = 0$ , therefore

$$B = D_{e3}$$

The over-all balance of payments equals excess demand for money by the private sector. This corresponds to Mundell's  $Y - E = \dot{L}$ .

Komiya's argument is an attempt to show that the over-all balance of payments, capital accounts and trade balance are reflections of asset balance adjustment by the private sector, and the banking sector in a country. There are the following basic relationships between holding of assets and the balance of payments. Assume that the balance of payments is in equilibrium. Komiya says: (i) If neither sector wants to change its portfolio asset holdings,  $D_{e2}$ ,  $D_{e3}$ ,  $A_d$  will be zero and the balance of payments will remain in equilibrium. (ii) If  $D_{e3} > p_2 A_d$ , the private sector will obtain the remainder by turning the over-all balance of payments into surplus and selling surplus foreign exchange to the banking sector. On the contrary, if  $D_{e3} < p_2 A_d$ , the private sector will purchase foreign goods and services by turning the over-all balance of payments into deficit. (iii) If the private sector's initial bond holdings exceed the desired level, and if there are no

bond purchases by the banking sector, bonds are sold to foreign countries, turning the balance of payments on capital account into surplus. On the contrary, if the private sector's initial bond holdings are insufficient to the desired level, the private sector purchases bonds from foreign countries, turning the balance of payments on capital account into deficit.<sup>16)</sup>

Next we will examine how the economic growth influences various balances of payments. Komiya uses a productivity parameter  $\alpha$ , and investigates in what manner  $B$ ,  $B_1$ ,  $B_2$  change respectively by an increase of  $\alpha$ . He assumes  $(\partial Y/\partial d)=1$  under constant price.

Thus, a change of productivity  $\alpha$  means economic growth.

$$\frac{dB}{d\alpha} = \frac{dD_{c3}}{d\alpha} = m_3 \quad (3-6)'$$

$$\frac{dB_2}{d\alpha} = -p_2 \frac{\partial D_{c2}}{\partial Y} = -m_2 \quad (3-7)'$$

$m_3 = \partial D_3/\partial Y = \partial D_{c3}/\partial Y$  is marginal propensity to hoard.  $m_2$  is the net marginal propensity to invest in bonds by the private sector. Komiya says, "the household sector's marginal propensity to invest in bonds is larger than the marginal increase in business sector's indebtedness as income rises with price unchanged."<sup>17)</sup> And he concluded from (3-6)' and (3-7)' that the growth of real output improves the over-all balance of payments, as well as the balance of trade ( $B_1 = B - B_2$ ). On the other hand, the balance of payments on the capital account turns into a deficit.

As investigated above, it was clarified that there are two forces of growth which affect the balance of payments. However, we must note Komiya's method is based on general equilibrium theory. It shows an adjustment mechanism of the balance of payments and based on various rigorous presumptions.<sup>18)</sup> There are many different movements of payments in the real world. For example, it is assumed in his arguments that the household sector's marginal propensity to invest in bonds is larger than the marginal increase in the business sector's indebtedness. If we neglect the household sector's liquidity preference, it means that the slope of a saving function is larger than the slope of an investment function in the classical theory.

<sup>16)</sup> *ibid.* p. 38

<sup>17)</sup> *ibid.* p. 39

<sup>18)</sup> D. D. Purvis points out that Komiya's treatment, "claims to deal with short-run or impact effects, but does not allow for stock disequilibrium. .... the usefulness of his paper is diminished by the stock-flow confusions stemming apparently from that author's use of a Hicks-Patinkin period type analysis." Douglas D. Purvis, "More On Growth And The Balance Of Payments: The Adjustment Process," *Canadian Journal of Economics*, November 1972.



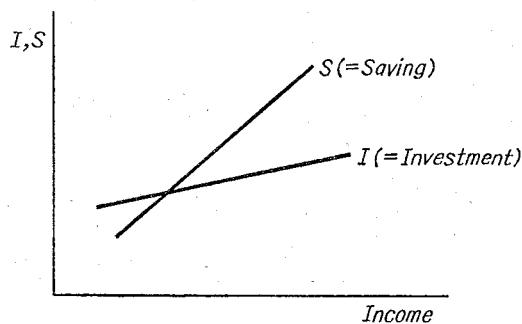


Fig. 2

This is a condition of stabilization. But in the process of actual economic growth, a basic disequilibrium has occurred frequently. In the Japanese economy from 1950 to 1965, the ex ante marginal propensity to invest is larger than the ex ante marginal propensity to save in the Keynesian sense, and the balance of trade was deficit and the balance of payments on capital account was surplus. In those periods, the indebtedness in the private sector, especially in firms, increased and most of earned income was directed to investment expenditure and was not directed to asset holding. Corresponding to increased investment demand, credit creation by the banking sector increased. In Komiya's arguments,  $B_1 = B - B_2$ ,  $\frac{dB}{d\alpha} > \frac{dB_2}{d\alpha}$ , therefore, he concluded that a growth of income improves the balance of trade, but deteriorates the balance of payments on capital account and the over-all balance of payments is improved. However, in Japan, in the periods when rapid growth has continued,  $\frac{dB}{d\alpha}$  was not always larger than  $\frac{dB_2}{d\alpha}$ . This is the reason why there was a balance of payments ceiling as a limit of economic growth.

Next let us investigate a factor which influences the balance of payments other than the growth of income. It is an autonomous increase in the money supply. Generally speaking, there are three channels of the money supply. (i) the balance of payments surplus, (ii) banking sector's purchases of bonds held by the private sector, or credit expansion by the banking sector, (iii) autonomous increase in governmental expenditure which is financed by borrowing from the banking sector. Mundell considered only (i), neglecting (ii) and (iii), and assumed that equilibrium was achieved if the balance of payments surplus corresponded to increment of domestic demand for liquidity. If (ii) and (iii) are introduced, they operate to deteriorate the balance of payments. The Japanese economy from 1950 to 1965 was characterized by the increase of credit expansion. This deteriorated the balance of payments. Since 1965, channel (iii) has been added. This

has been regarded as a factor which has worsened the balance of payments. Nevertheless, the balance of payments has been improved. Why has such a thing occurred? It depends on the effect of change in the relative price.

#### 4. GROWTH, BALANCE OF PAYMENTS AND PRICE LEVEL

Komiya's analysis as investigated in the last section, shows the relationship between growth and the balance of payments in an open economy under an assumption of unchanged price. In the real world, an increment of money income is partly absorbed in a rise in price. Komiya showed the analogy between the balance of payments in an open economy and price changes in a closed economy. "In a closed economy, if all prices are flexible and money illusion are absent, the price level will decline as an economy grows, and output will be increased, with an unchanged money supply. . . . . As real income rises, people try to increase their money holdings by spending less than the increase in income, and this will tend to bring down the price level."<sup>19)</sup> More precisely, it may be interpreted as follows. If the marginal propensity to save is larger than the marginal propensity to invest, real output increases more than real expenditure, as income grows, and as it declines the price level, but it shows the mechanism of the classical school under full employment. In the Keynesian world, this will tend to bring down the level of output until the real output equals real expenditure. We must remember again that Komiya's method is a neoclassical general equilibrium one. His arguments are going to show the mechanism by which equilibrium is achieved in the adjustment process. In the real world, a factor which deteriorates the balance of payments is, at the same time, apt to bring inflation, and a factor to improve the balance of payments is, at the same time, deflation. An absent point of the above-mentioned arguments is the factors which affect exports. In Mundell's model, export is exogenously given. On the other hand, in Komiya's argument, relative price is assumed constant.

The export depends not only on growth in income of a trade partner, but also on relative price between a country and his partner. Assume that a change in price depends on the difference between income and domestic expenditure and productivity, and on the other hand, export depends on the trade partner's income and on a relative ratio between the domestic price level and the trade partner's price level.

$$\dot{p} = p \left\{ (Y - E), \alpha \right\}$$

<sup>19)</sup> Komiya, *op. cit.* p. 40

$$X = X(Y_f, p_f/p)$$

$p$ : domestic price level

$p_f$ : trade partner's price level

$Y$ : domestic income

$E$ : domestic expenditure

$Y_f$ : trade partner's income

$\alpha$ : productivity

As we assume,  $p_f$  and  $Y_f$  are exogenously given, the distinction  $Y_f$  from  $E_f$  (trade partner's expenditure) is not needed. If  $Y - E > 0$ , then  $\dot{p} < 0$  and  $\dot{p} < 0$  if  $\dot{\alpha} > 0$  and competition has prevailed. The former is a demand factor, and the latter is a cost factor for change in price. The import  $M$  depends on domestic expenditure  $E$ .

$$M = a + mE, \quad m > 0$$

$m$  is the marginal propensity to import and  $a$  is a constant.

We can regard an increase in  $\alpha$  as a growth in income. As  $Y$  is real income, it can be allowed  $\frac{\partial Y}{\partial \alpha} = 1$ . If  $\frac{\partial E}{\partial \alpha} < 1$  ( $= \frac{\partial Y}{\partial \alpha}$ ), the balance of trade is improved. If  $\frac{\partial E}{\partial \alpha} > 1$ , it is deteriorated.  $\frac{\partial E}{\partial \alpha} < 1$  depends on the character of the increase in the productivity, or in the technical progress.  $\frac{\partial E}{\partial \alpha} > 1$  means that the increase in productivity required more investment. This has happened in the Japanese economy from 1952 to 1961. The investment-income ratio ( $I/Y$ ) was larger in those periods than after 1966. Since 1962,  $\frac{\partial E}{\partial \alpha}$  has declined, and it corresponds to the decline of  $I/Y$ . On the other hand, in those periods from 1952 to 1961, the effect of the lowering price level,  $\frac{\partial p}{\partial \alpha} < 0$ , was so large that the effect rising price level,  $\frac{\partial E}{\partial \alpha} > 1$ , was cancelled out and the rise in general price level did not occur. Since 1962,  $\frac{\partial E}{\partial \alpha}$  has declined, but the effect of lowering price,  $\frac{\partial p}{\partial \alpha}$ , has weakened. The effect of lowering the price by the increase in productivity depends on competitiveness.<sup>20)</sup> The tendency of wage-push weakens the productivity effect.

<sup>20)</sup> In Japan, the average rate of rise in wage in manufacturing industry has not been higher than that of productivity before 1968 as a whole, but the former has become higher than the latter since 1969.

	1952~1964	1965~
$\frac{\partial E}{\partial \alpha}$	$\frac{\partial E}{\partial \alpha} > 1$ , large	$\frac{\partial E}{\partial \alpha} < 1$ , not so large
$\frac{\partial p}{\partial \alpha}$	$\frac{\partial p}{\partial \alpha} < 0$ , large	$\frac{\partial p}{\partial \alpha} < 0$ but not so large
increase in $Y_f$	large	not so large
rise in $p_f$	a little rise	fair rise
$p_f/p$	a little rise	fair rise
$X$	increase	fair increase
$M$	fair increase	small increase
balance of trade	deteriorated	improved
price level	stabilized	rise

The most important reason why the balance of payments was improved after 1965, relative to the period before 1964, is the rise of  $p_f$ .  $p_f/p$  has risen in spite of the rise in  $p$ . Thus exports have increased. The balance of payments has been improved, accompanied by the rise of the domestic price level. These were main features of the growth, the balance of payments and the price level.

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