ECONOMIC INSTABILITY AND THE MONETARY PROCESS OF ADJUSTMENT IN AN OPEN ECONOMY: THE EXPERIENCE OF GUYANA: 1955-1973.

By

NELSON C. MODESTE

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Nelson C. Modeste

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This study examines, on the basis of the economic experience of Guyana between 1955-1973, the monetary process of adjustment in an open economy. Two monetary models are used for analyzing the process of adjustment. The first serves as the basis for analyzing the effects of an increase in exports and net capital inflow on income, the balance of payments, the money supply, and imports. It also serves to analyze the problem of instability in export earnings. The analysis suggests that the excessive degree of fluctuations in Guyana's export earnings upsets equilibrium in the balance of payments which consequently generates through the process of adjustment instability in domestic economic activity. The second model looks at the process of adjustment from the standpoint of the new monetary approach to balance of payments theory. This model permits us to examine such issues as

the effects of economic growth and credit financing of the government's budget deficit on Guyana's balance of payments. It also permits us to examine the degree of correspondence between the domestic rate of inflation and the rate of inflation in the world.

The findings as far as the operation of the process of adjustment in Guyana is concerned, indicate that the internal process of adjustment to a surplus or deficit in the balance of payments is generally very quick. In particular the results indicate that within the first year there is almost conplete adjustment between changes in imports and changes in the sum of exports and net capital inflow. The results also indicate that the expansion of bank credit is responsible for most of the changes in Guyana's holdings of net foreign assets.

The analysis of the causes and effects of instability in Guyana's export earnings indicate that the instability in the country's export earnings produce a similar degree of instability in the country's level of money income. The data however fail to substantiate the thesis that the instability in export earnings causes instability in domestic investment and that the causes of the wide swings in Guyana's export earnings lie in the high ratio of primary products exported and the high degree of product and geographic concentration.

The results from the second model again substantiate the earlier result that the expansion of bank credit is responsible for most of the changes in the country's holdings of foreign assets. It furthermore indicates that the credit financing of the govenment's budget deficit also generate

economic forces which ultimately result in the outflow of foreign assets. The empirical results, rather disappointingly, failed to produce a statistically significant coefficient for the effects of growth in real income on the flow of reserves.

In general these results indicate that the process of adjustment operates very quickly in Guyana and that there is a need for controlling the rate of expansion of bank credit.

CHAPTER I

INTRODUCTION

In most developing countries international trade controls, via the balance of payments, the process of income and money creation. This relationship between income, money creation and the balance of payments has however created two problems. The first is that of instability in domestic economic activity. This problem arises from the process of adjustment which occurs within the economy in response to the state of disequilibrium in the balance of payments (Levin, 1960, pp. 10-12; Wallich, 1950, p. 302). For example an increase (decrease) in export earnings can generate a surplus (deficit) in the balance of payments and because of the linkage of the money supply to the balance of payments it will cause an expansion (contraction) in the money supply which will thereby generate expansionary (contractionary) effects on domestic economic activity. Consequently, it is concluded that the increases (decreases) in export earnings not only increases (decreases) income and the money supply, but that in addition it causes instability or fluctuations in domestic economic activity.

The second problem concerns the relationship between the balance of payments and economic growth. A very popular view emanating, until quite recently, from the literature and

other standard text-books in economics, was that as economic growth occurs the increase in income will subsequently increase the demand for imports relative to exports and that there would consequently develop balance of payments difficulties which would require the adoption of measures to either restrict trade and/or reduce economic growth (Dernburg and MacDougall,1972, p. 268; Johnson, 1954; Kindleberger, 1973. p. 349; Meier, 1968, pp. 73-75). This proposition has recently been subject to some severe criticisms (Johnson, 1972; Komiya, 1969), particularly since it omits from consideration the effects of the increase in income on the demand for money and the subsequent effects on domestic expenditures.

The purpose of this study will be to examine for Guyana, a small open economy, the following issues:

1. The effects of an increase in exports and net capital inflows on (a) the balance of payments, (b) on the money supply, (c) on imports, and (d) on money income. It will also examine the causes of the excessive changes in export earnings, and determine whether as a result of the adjustment mechanism, the fluctuations in export earnings cause similar fluctuations in money income.

2. The effects of an increase in real income and domestic financial policies on the balance of payments.

In a study on the effectiveness of monetary policy in Netherlands, Holptrop (1972) empirically examines part of the process of adjustment which an open economy experiences when there is disequilibrium in the monetary sector. Specifically Holtrop looks at the effects of changes in domestic assets, and changes in the sum of exports, net capital imports, and

the previous current account balance, on national money income, and imports, with the theoretical linkage between the variables, changes in the money supply and domestic economic activity, being determined by the interrelationship between the money market and the goods market. In an open economy, this interrelationship between the money market and the goods market implies that an increase in domestic assets, exports and net capital imports creates an excess supply of money, in the money market, which is assumed to be instantaneously transmitted to the goods market by the increase in the community's aggregate demand for both foreign and domestically produced goods and services. On this theoretical basis Holtrop estimated four equations with two of the four equations being specified as follows:

$$(1 - 1) \quad \Delta Yn = c + a_1 Lcr + a_2 E$$

$$(1 - 2) \quad \Delta M_o = c + b_1 Lcr + b_2 E$$

where

Lcr = Domestic monetary impulses = The M_2 definition of the money supply minus the net holdings of foreign assets within the banking system = Domestic Credit.

E = External monetary impulses = increases in exports plus net inflow of foreign capital plus the current account surplus of the previous year.

ΔY = changes in nominal national income.

ΔM_o = changes in imports.

The results from the regression analysis indicate that there exists "a high degree of correlation between monetary impulses and the sum of changes in the nominal national income and the import of goods and services" (Holtrop, 1972, p. 273).

Holtrop concludes on this basis that "the potential long-term impact of monetary policy on total volume of spending - and consequently, on growth, on the price level, and on the balance of payments - is considered to be beyond doubt" (Holtrop, 1972, p. 283).

The results from the Holtrop study, while offering on the one hand fairly strong support for the process of adjustment according to the Quantity Theory of Money in an open-economy under a system of fixed exchange rates, are on the other hand subject to the criticism that it suggests domestic monetary policy can exert a significant and powerful effect on income in the long-run. This view conflicts with the more or less general view emanating from the literature that expansionary domestic monetary policy in an open-economy will, if at all, only increase income in the short-run, as the increases in expenditures associated with the increase in domestic assets will eventually all fall on imported goods and thereby leak out of the system. This consequently means that both income and imports will return to their original level following the exhaustion of the additional liquidity on imported goods and services.

Coppock (1962) and MacBean (1966) in their respective studies have examined the hypothesis that fluctuations in economic activity in the less developed countries are caused by fluctuations in the export earnings of these countries, that is

$$(1 - 3) \quad IY = c + b_{cy} IX$$

where

IY = instability in money income.

IX = instability in export earnings.

This hypothesis is based first on the mechanism of adjustment which follows when there is an increase (decrease) in export earnings. Second, on the assumption that the magnitude of the annual changes in export earnings in the LDC's are very large, because their exports consist primarily of primary products that are concenterated upon too few products and too few trading partners, that is:

$$(1 - 4) \quad IX = a + b_1PR + b_2CC + b_3GC$$

where

PR = ratio of primary product exports to total exports.

CC = commodity concentration

GC = geographic concentration

The empirical evidence presented first by Coppock and subsequently by MacBean failed to produce a general rejection of the null hypothesis (i.e., $b_1=0$; $b_2=0$; $b_3=0$), in equations (1-3) and (1-4).

In this study, it is anticipated that further insights into the relationship between fluctuations in economic activity and fluctuations in export earnings can be achieved by looking at the process of adjustment within a single country. Consequently the study will examine on the one hand the degree of interrelationship between the money market and the market for goods that are produced domestically. It will also examine on the other hand whether the monetary impulses resulting from the changes in exports are offset by any countervailing domestic monetary policies.

A further look at the process of adjustment in an open economy in response to changes in money flows will be made in accordance with the new monetary approach to balance of payments theory,(Frenkel, 1971; Johnson, 1972; Komiya, 1969; Mundell, 1968; chap. 9). This theory emphasizes basically the impact on the balance of payments of changes in the factors that determine the demand for money. The empirical studies (Bean, 1976; Genberg, 1976; Guitian, 1976; Magee, 1976; Zecher, 1976) which have examined this new approach to balance of payments adjustment have been case studies on countries in which the capital market is highly developed. The demand for money function in these studies is therefore assumed to depend not only upon income but also upon the interest rate. Consequently the following reserve flow equation was estimated:

(1 - 5)

$$r = (R/R + D)g_r = a_1 g_y + a_2 g_p - a_3 g_i - b_1 g_m - b_2 (D/R + D) g_d$$

where

g_r = growth in foreign assets

g_y = growth in real income

g_p = growth in domestic price level

g_i = growth in interest rate

g_m = growth in money multiplier

g_d = growth in domestic assets

Genberg in a study on the factors that determine changes in the flow of foreign reserves in Sweden also allows for the use of sterilization policies to offset the monetary impulses

emanating from the balance of payments by estimating in conjunction with equation (1-5), the follwoing equation:

$$(1 - 6) \quad d + (D/R + D)g_d = b_3(R/R + D)g_r + b_4 g_{GD}$$

where

g_{GD} + growth in government budget deficit.

In this study a slightly modified reserve flow equation will be estimated because it is assumed that money balances in Guyana are held primarily for transaction purposes. This study will also take a specific look at the effects of the financing of the government's budget deficit by money creation on the balance of payments. It is expected that in the absence of economic growth, the credit financing of the government's budget deficit will only result in the reduction in the country's foreign assets.

In Chapter II a further analysis of the theoretical ideas which underlie the issues raised in this introduction will be discussed. It will be seen that the works of David Hume (1752) provide the initial ideas on the balance of payments and balance of payments adjustment, regardless as to whether it is discussed in terms of the new monetary approach to balance of payments theory, or in terms of the classical notions of the quantity theory of money.

CHAPTER II

THE ROLE OF MONEY IN THE PROCESS OF INTERNATIONAL ADJUSTMENT

This chapter provides the main theoretical ideas which will be used as the basis for the analysis of the issues raised in Chapter I. Basically the two issues are raising a fundamental question, namely, what is the process of adjustment in an open economy which is operative at all times and which consequently ensures that the demand for money is always equal to the money supply? The answer to this question was initially provided by David Hume (1752) who developed the price-specie flow mechanism on the basis that domestic money and international money are identical. Thus according to Hume a surplus in the balance of payments will increase the money supply and this will via the quantity theory of money subsequently increase prices. The increase in the price level, when there is a surplus in the balance of payments will consequently make the exports of the country relatively expensive and its imports relatively inexpensive. This increase in the price of the country's exports and the decrease in the price of its imports will give rise to changes in trade flows[1], namely, an increase in imports and a decrease in exports, which will thereby lead

to an outflow of international reserves and thus a contraction in the domestic money supply and the subsequent correction of the imbalance in the balance of payments.

This adjustment mechanism of David Hume (1752), was on the one hand modified by Polak (1957-58) and Prais (1959-1961) to reflect the shift in emphasis away from the effect of changes in the money supply on the relative national price level, to the effect of changes in the money supply on domestic expenditures, and consequently the changes in domestic expenditures as the means for eliminating the surplus or deficit in the balance of payments. On the other hand, the adjustment mechanism, was further modified by Frenkel (1971), Johnson (1972), Komiya (1969) and Mundell (1968), to reflect the shift in emphasis away from the simple to the modern version of the quantity theory of money. Further modifications were also introduced to reflect the increasing importance of credit issued by the commercial banks and the Central Bank which had developed from the system of holding fractional international reserves. Allowance was also made for the adjustment to occur not only through changes in trade flows but also through changes in flow of short-term capital in response to differentials in the interest rate.

In the following section a very simple model of the adjustment process in an open economy will be presented first in terms of the simple version of the quantity theory of money and then in terms of the new approach to balance of payments theory which emphasizes adjustments according to

changes in the determinants of the demand for money. The final section will then discuss some implications of the adjustment process as far as the possible use of domestic monetary policy and government budgetary policy are concerned.

The Mechanism of Adjustment in an Open Economy According to the Quantity Theory of Money

In an open economy under a system of fixed exchange rates, a surplus in the balance of payments will persist until the increases in the quantity of money and the subsequent increases in domestic expenditures are just sufficient to eliminate the surplus from the balance of payments.

The theory underlying this adjustment process can be expressed in terms of the following equations. The first equation is the Cambridge demand for money function which relates the demand for nominal money balances to the level of nominal income:

(2 - 1) $Md = kY$

where

Md = demand for nominal money balances.

Y = nominal income.

with nominal income by definiton being equal to the price level times output:

(2 - 1a) $Y = Py$

where

P = domestic price level

y = real output

The second equation defines the process of money creation on the basis of the consolidated accounts of the banking system

which requires according to accounting principles that the monetary liabilities of the system correspond to the sum of foreign and domestic assets held by the banking system, that is:

$$(2 - 2) \quad Ms \equiv R + D$$

where

Ms = money supply

R = foreign assets

D = domestic assets

Changes in the money supply therefore occur through changes in foreign and/or domestic assets:

$$(2 - 2a) \quad \frac{dMs}{dt} \equiv \frac{dR}{dt} + \frac{dD}{dt}$$

where

$\frac{dMs}{dt}$ = changes in the money supply

$\frac{dR}{dt}$ = changes in foreign assets

$\frac{dD}{dt}$ = changes in domestic assets

The third equation is a definitional equation of the balance payments:

$$(2 - 3) \quad B \equiv \frac{dR}{dt} \equiv X - I + K$$

where

$\frac{dR}{dt}$ = B = balance of payments

X = exports of goods and services

I = imports of goods and services

K = net autonomous inflows of capital to the non-banking sector.

The fourth equation is the domestic expenditure equation, with domestic expenditures being dependent upon income and liquidity. It is assumed that an increase in income and the money supply will increase domestic expenditures while an increase in the demand for money will reduce domestic expenditures:

(2 - 4) $C = Y + a(Ms - Md)$

where

c = domestic expenditures

and with equilibrium in the monetary sector, income will be equal to domestic expenditures.

The fifth equation is the import function which expresses imports as a fraction of income:

(2 - 5) $I = mY$

The sixth and seventh equations assume that exports and net capital inflows are exogenously determined:

(2 - 6) $X = Xo$

and (2 - 7) $K = Ko$

In the following equation national income is defined as the sum of domestic expenditures and the balance on current account:

(2 - 8) $Y = C + X - I$

Thus starting from a position of initial equilibrium, that is, the demand for money equals to the supply of money, domestic expenditures equal to income, and imports equal to the sum of exports and net capital inflows; (according to equation 2-8) an increase in exports will lead to an increase in income, which will according to equation (2-1) cause the demand for money to increase. The increase in exports will

also according to equations (2-3) and (2-2a) improve the balance of payments and hence increase the money supply. This increase in the money supply does not occur instantaneously. Thus during the initial stages of the expansion in exports the scarcity in liquidity will according to equation (2-4), tend to depress domestic expenditures below income as the public attempts to build up their cash balances. However as the money supply increases there will be even further increases in domestic expenditures which will tend to increase income, imports and the demand for money.

This process of adjustment would continue until the change in the demand for money correspond to the change in the money supply, the change in imports equals the change in exports and net capital inflow, and until the change in domestic expenditures equals the change in income. Thus for every given increase in exports one can envisage a continuous process of adjustment which starts by effecting liquidity, domestic expenditures, income, and imports with the process coming to an end when the surplus (deficit) in the balance of payments is eliminated.

Following Polak and Argy (1971), the effects of an increase in exports and net capital inflow on income, the balance of payments, the money supply, and on imports can be derived by assuming that there is equilibrium in the money market, that is:

$$kY = R + D \qquad (2 - 1a)$$

where

$$k = \frac{1}{v}$$

Following this, equations (2-1a) and (2-3) are expressed in first difference form hence

$$k\Delta Y = \Delta R + \Delta D \tag{2 - 1b}$$

and

$$B = \Delta R = \Delta X - \Delta I + \Delta K + B_{-1} \tag{2 -3a}$$

Furthermore by assuming that the change in reserves and income is constant in equilibrium, the following long-run solutions are obtained when equation (2-3a) is substituted into equation (2-1b):

$$\Delta Y = \frac{1}{m} \Delta(X + K) \tag{2 - 9}$$

$$B = \frac{1}{mv} \Delta(X + K) - \Delta D \tag{2 - 10}$$

$$\Delta Ms = \frac{1}{mv} \Delta(X + K) \tag{2 - 11}$$

and

$$\Delta I = c\Delta(X + K) \tag{2 - 12}$$

One of the consequences of this process of adjustment which must occur in the absence of countercyclical monetary policy is the perpetual disturbance of internal stability (Levin, 1960; Wallich, 1950), because as domestic expenditures increase (decrease) in response to an increase (decrease) in the money supply, money income also increase (decrease) according to the proportion of domestic expenditures which fall on domestic goods and services. This perpetual disturbance of internal stability has led to the thesis that economic fluctuations in open economies are imported, since only a change in exports or net capital inflow is required to affect domestic expenditures.

In the less developed countries, the principal source of the disturbance in domestic economic activity is identified as the LDC's export earnings because these countries have specialized in primary products and because their exported goods are heavily concentrated upon too few products and also because their trade is concenterated to too few countries (MacBean, 1966; United Nations, 1952; Wallich, 1950), that is:

$$(2 - 13) \quad IX = a + b_1PR + b_2CC + b_3GC$$

where

IX = instability in export earnings

PR = primary product ratio

CC = degree of commodity concentration

GC = degree of geographic concentration

Consequnetly, it is argued that it is the extremely volatile nature of the LDC's export earnings which by upsetting internal stability causes in the short-run fluctuations or instability in money income (Holtrop, 1963; Levin, 1960; Wallich, 1950). This relationship between fluctuations in export earnings and money income is expressed as follows:

$$(2 - 14) \quad IY = C + b_{Iy}IX$$

where

IY = instability in money income

Furthermore, it is also argued since part of the adjustment process entails the increase (decrease) in imports for every increase (decrease) in exports (Harrod, 1973; pp. 120-121; Holtrop, 1972; Polak, 1956-58; Polak and Argy, 1971) and since imports of non-essential goods and services are cut to the minimum, in conjunction with the LDC's being dependent

upon international trade as a means of obtaining their capital equipment for domestic investment, that the fluctuations in export earnings would generate similar fluctuations in domestic investment (MacBean, 1966, p. 69), that is:

$$IV = a + b_{IV}IX \qquad (2 - 15)$$

where

IV = instability in domestic investment

IX = instability in export earnings

The discussion so far has examined the process of adjustment and the consequence for internal stability when there is a surplus or deficit in the balance of payments. The next section will discuss the adjustment process in terms of changes in the factors that determine the demand for money rather than the factors that determine the changes in the money supply. Consequently changes in the factors that determine the demand for money which in this case is the domestic price level and real income are considered as being exogenously determined. The changes in the domestic price level are assumed to occur primarily through changes in the world price level, whilst changes in real income is determined by changes in productivity and factors of production.

The Mechanism of Adjustment in an Open Economy According to the New Monetary Approach to Balance of Payments Theory

In this section the emphasis will be focused on the process of adjustement in the balance-of-payments due to changes in the factors that determine the demand for money. This emphasis on the adjustment process in response to changes in the factors that determine the demand for money, represents

the new monetary approach to the balance of payments theory. (Johnson, 1972; Komiya, 1969; Mundell, 1968, chap. 9). This new approach to balance theory and balance of payments adjustment owes its theoretical principles to the price-specie-flow mechanism of David Hume (1752) with the exception being that the mechanism of adjustment has shifted from changes in relative national price levels to the effects of liquidity changes on the balance between income and domestic expenditures and thereby to the subsequent effects of domestic expenditures on the balance of payments.

In this new approach the emphasis is placed on the changes in liquidity and hence the changes in domestic expenditures which occur through changes in the factors that determine the demand for money, which was specified as follows:

(2 - 1b) $Md = kPy$

An autonomous increase in real income will increase the demand for money and thereby create a stock disequilibrium in the money market. This increase in the demand for money will also result in the reduction in domestic expenditures, as people attempt to maintain their existing money balances. In an open economy, this reduction in domestic expenditures will generate a surplus in the balance of payments. This impact of an exogeneous increase in real income on the balance of payments runs counter to the Keynesian view of the relationship between increases in real income and the balance of payments.

In the Keynesian approach, it is suggested that increases in real income will result in the deterioration of the balance

of payments (Dernburg and MacDougall, 1972, p. 268; Johnson, 1954; Kindleberger, 1973, p. 389; Meier, 1968, pp. 73-75). In that analysis it is assumed that the income elasticity of import demand is positive and for small economies that the relative prices of traded commodities remain unchanged. Thus an increase in real income will, by increasing imports cause a deterioration in the balance of payments. Furthermore if it is assumed that the income elasticity of import demand is identical for all countries; then the country that grows relatively faster than its trading partners will experience a deterioration in its balance of payments relative to its trading partners. The Keynesian approach to the relationship between economic growth and the balance of payments, in contrast to the monetary approach, considers only the effects of the increase in real income on the demand for imports and neglects the effects of the changes in real income on the demand for money and the subsequent effects of the changes in the demand for money on domestic expenditures (Johnson, 1972; Komiya, 1969; Magee, 1976; Polak, 1956-58, p. 26).

The demand for money is also affected by changes in the price level. An increase in the domestic price level will improve the balance of payments, since the increase in the price level reduces the existing holding of real money balances. This will then result in an increased demand for money, which will be satisfied by an inflow of international reserves. It is assumed that these changes in prices will according to the small country assumption reflect basically changes in the world price level, rather than changes in the

country's price level relative to the world price level. If the changes reflect changes in the countries price level relative to the world price level, then there would be an inverse relationship between changes in prices and the flow of reserves as increases in the domestic price level will result in the substitution of foreign goods for domestic goods.

Although according to equation (2-1) the demand for money is determined primarily by the public's need to carry out economic transactions. The interest rate in other economies with highly developed capital markets, becomes an important variable in explaining the demand for money. Consequently, an increase in the interest rate will by reducing the demand for money, cause an outflow of reserves. The interest rate, like the price level is also determined exogenously in the world market, so that for individual countries the changes in the interest rate is merely a reflection of changes in the world interest rate. If the changes in the interest rate are interpreted as a change in the respective country's interest rate relative to the rest of the world, then such changes should attract foreign capital and lead to an improvement in the balance of payments.

To recapitulate, the discussion so far has focused on the process of adjustment which ensues when monetary equilibrium in an open economy under a system of fixed exchange rates is disturbed by either a surplus (deficit) in the balance of payments or by a change in the factors that determine the demand for money. This process of adjustment which

occurs in order that equilibrium in the monetary sector may be maintained, however poses severe limitations on the use of domestic financial policies, because the excessive use of domestic financial policies results in the outflow of foreign assets. The discussion in the next section will consequently look into the effects of domestic financial policies on the balance of payments.

Domestic Financial Policy

The harmful effects of domestic financial policies[2] on the balance of payments result from the assumed independence between these policies and income and its direct effect on domestic expenditure (Johnson, 1972; Komiya, 1969; Magee, 1976; Polak, 1956-58, p. 26). Thus the increase in bank credit will increase liquidity in the economy and because it has no effect on output and therefore on the demand for money, domestic expenditures will increase as the community attempts to reduce their excess holdings of money. This increase in domestic expenditures will result in a net outflow of foreign assets and consequently the deterioration in the balance of payments as the increase in domestic expenditures on imports was neither initiated nor supported by any prior inflow of foreign assets.

The inability of domestic financial policy to influence output in the long-run, imposes serious restrictions on the monetary authority's ability to control the domestic money supply. In fact as a result of the process of adjustment, the use of domestic monetary policy will only affect the composition of the Central Bank's total assets, since with no

growth in income and with a constant price level, growth in bank credit will be completely offset by an outflow of foreign assets (Johnson, 1972). This inverse relationship between domestic assets and the balance of payments is expressed as follows:

$$(2 - 16) \quad r = (R/R + D)g_r = -(D/R + D)g_d$$

If the use of domestic financial policies does affect the rate of capital formation and subsequently causes an increase in income and the demand for money, there will be an offsetting tendency for the community to reduce their expenditures as they attempt to hold part of the liquidity injected into the system in the form of additional money balances (Dornbusch, 1971; Mundell, 1971; chap. 4). This would consequently tend to offset the full leakage of bank credit out of the system and thereby dampen the harmful effects of domestic monetary and fiscal policies on the balance of payments.

Notes

[1]As Samuelson (J.I.E., 1971) has pointed out, this process does not correctly treat traded goods, whose prices are equalized through trade and therefore cannot move in opposite directions.

[2]Domestic financial policy is defined as a mix of monetary and fiscal policies, with the assumption that monetary policy occurs in the form of changes in bank credit while fiscal policy occurs in the form of changes in the portion of the government's budget deficit that is financed by bank credit. The latter method of financing the government's budget is tantamount to monetary policy.

CHAPTER III

MONETARY ARRANGEMENTS IN GUYANA

The discussion in the previous chapter has raised several notions concerning the monetary process of adjustment in an open economy. These notions, in keeping with the objectives of the study, will be tested on the basis of the economic experience of Guyana. It is therefore necessary before embarking upon the empirical testing of these notions, to provide some background information on Guyana covering the period between 1955-1973. Consequently, this chapter is designed to present information on the salient economic features of the Guyanese economy. This look at the Guyanese economy in accordance with the overall theme of the study, will emphasize, the past and present system of monetary arrangements in the economy. This will entail looking at the Currency Board System, the functions and regulatory tools of the Central Bank, in conjunction with a look at the objectives of monetary policy since the establishment of the Central Bank.

The Monetary System

The monetary system of Guyana for the period between 1955-1973 has developed in close conformity to what has become known as the Sterling Exchange Standard. This standard

according to Sayers (1967, pp. 134-144) has developed from the use of London as a base for transferring cliams between countries. The Sterling Exchange Standard is moreover characterized by the holding of sterling balances in London and the maintenance of a fixed parity between the various countries domestic currencies and the British pound. For the British Dependencies and Colonies, their involvement in the Sterling Exchange Standard was enhanced by the establishment of the Currency Boards.

Currency Board System in Guyana

In the period between 1955 to 1966 when Guyana was a British Colony (and consequently known as British Guiana), the unit of account was the British West Indian dollar. This currency was issued by the British Caribbean Currency Board (Eastern Group) with the value of one West Indian dollar being equal to four shillings and two pence.

The operation of this system has been described by several writers (Clauson, 1944; Greaves, 1953; Bloomfield, 1961). It involves basically the automatic interchanging of local currency with sterling at a fixed rate. The system is furthermore characterized by the requirement that all of the monetary liabilities, that is, notes and coins of the Currency Board, be supported by 100 percent sterling reserves. These reserves were then invested by the Currency Board in British and other colonial governments' securities. The net proceeds from these investments would then be held by the Currency Board until its holding of sterling reserves had increased to the upper limit of 110 percent. After this

limit was reached, the proceeds from the investment would then be returned to the Colony. In 1954 a change in policy permitted the Currency Board to back part of its monetary liabilities with domestic assets.

This change in policy, as far as Guyana is concerned, did not produce any perceptible change in the Board's operation. In fact according to the data presented in Table I, the policy seems to have been effectively implemented in 1960, since in that year the proportion of domestic assets in total assets increased from about 6 percent in 1959 to about 20 percent in 1960. According to Thomas (1965) this late implementation of the policy resulted from the "lack of initiative by the participating governments" (p. 26).

Despite the modifications which were introduced in 1954, most writers (Bloomfield, 1961; Clauson, 1944; Greaves, 1953) readily concede that the opreations of the Currency Board was automatic and passive. In fact if it is assumed that the changes in domestic credit remains relatively constant then the functioning of the Currency Board under the Sterling Exchange Standard is reminiscent of the simple specie currency mechanism, since a surplus in the balance of payments will give rise to an increase in sterling balances and a corresponding increase in the money supply. This functioning of the Currency Board as a mere money changer has led to the conclusion that the operation of the Currency Board System naturally precludes the use of monetary policy as a stabilization device (Bloomfield, 1961; Clauson, 1944). This rigidity in the operation of the Currency Board System coupled with

TABLE III-1

GUYANA'S MONEY SUPPLY, NET FOREIGN ASSETS AND DOMESTIC ASSETS

(Figures in Millions of Guyana Dollars)

Year	Money Supply	Net Foreign Assets	Domestic Assets
1955	25.6	25.0	.6
1956	26.3	28.2	-1.9
1957	28.5	30.6	-2.1
1958	30.4	29.2	1.0
1959	34.8	32.8	2.1
1960	37.8	26.8	11.0
1961	36.3	26.9	9.3
1962	41.7	37.1	4.6
1963	43.3	54.0	-10.6
1964	47.3	59.6	-12.4
1965	45.2	46.8	-1.6
1966	46.7	34.9	11.2
1967	53.0	48.9	4.0
1968	56.9	47.0	9.8
1969	59.7	37.4	22.2
1970	59.0	35.2	22.8
1971	66.9	46.8	20.1
1972	82.1	67.6	14.5
1973	93.7	23.2	70.5

Source: International Financial Statistics

the movement towards political independence led to the legal establishment of the Bank of Guyana in 1965. However, in order to make the transfer of control from one authority to another as smooth as possible, the British Carribean Currency Board (Eastern Group) was eventually dissovled in 1967.

Central Banking and Monetary Policy in Guyana

The principle objective of the Bank of Guyana as stated in the Bank of Guyana Act, 1965 is that of "fostering monetary stability and promoting credit and exchange conditions conducive to the growth of the economy of Guyana" (Bank of Guyana, Annual Report, 1966). The Act provided to the Bank $6 million as its authorized capital. The Act also provides for the establishment of a Board of Directors, whose primary function is to formulate the Bank's policy. This Board is comprised of four or five members with the Governor of the Bank and the Bank Banager serving as the Chairman and Deputy Chairman, respectively. Both the Governor and the Bank Manager are appointed to the Board for a period not exceeding five years; whilst the two or three other Board members are appointed for a period not exceeding four years.

The Bank in the performance of its duties is solely responsible for issuing notes and coins in Guyana. It is furthermore required by the Act, to maintain at all times assets whose value correspond to the value of the total amount of notes and coins in circulation. According to the Act, the value of the assets are to be distributed in such a manner that at least 50 percent of the value of the total amount of notes and coins are to be backed by foreign assets. The Act

also requires that the Bank of Guyana act as Banker to the commercial banks and the government. It consequently in the performance of these duties buys, sells, and rediscounts bills of exchange, promissory notes and other instruments of credit from commercial banks. It also buys and sells government securities, deals in foreign exchange, services the public debt and in general perform the normal operations of a Central Bank. The Bank is also empowered to make direct advances to the government when there is a shortfall in government revenue. The Act also stipulates that the maximum amount which the Bank can advance at any given moment to the government is to be 15 percent of the average annual government revenues for the last three years. The government is furthermore required to repay this advance within 350 days. The Bank is also prevented from holding government securities in excess of 30 percent of the average annual government revenue for the previous three years.

The Act entrusts the Bank with tools which it can use to regulate the supply of money and bank credit in the economy. The Bank can vary the minimum reserve requirements that the commercial banks are required to maintain on their demand and time deposits. The Bank also determines the percentage of total liabilities which the commercial banks are required to maintain in the form of liquid assets, fix the rate interest which the commercial bank pay on its deposits, or charge on its loan, and fix the discount rate.

The primary objective of monetary policy during the period 1965 to 1973 has been to attempt to shift the allocation of bank credit from those uses which result in an increase in consumption to those uses which would increase production (Bank of Guyana, Annual Report, 1966, 1968, 1970, 1972, 1973). The Bank in attempting to achieve this objective has used moral suasion as its chief weapon. In its endeavour to dampen the drain on the banking system holding of foreign assets, the Bank has urged the government to pursue a policy of fiscal restraint by balancing its budget. The Bank had also imposed the requirement of 100 percent advance deposits on imports, during the period, November 16, 1966 to October 12, 1967.

CHAPTER IV

AN EMPIRICAL INVESTIGATION OF THE PROCESS OF ADJUSTMENT ACCORDING TO THE QUANTITY THEORY OF MONEY

In this chapter an empirical analysis of the process of adjustment according to the quantity theory of money in an open economy will be presented.

The first issue which will be taken up is the integration of the Guyana economy into the world economy. This question will be examined by looking at the changes in money income which are accounted for by changes in exports and net capital inflows. The integration of the Guyana economy into the world economy under a system of fixed exchange rates also implies that there is a close linkage between the balance of payments and the money supply, with the money supply expanding or contracting according to whether there is a surplus or deficit in the balance of payments. This close linkage between the balance of payments and the money supply leads to the thesis that changes in the money supply are induced by changes in exports and net capital inflows. Estimates of this relationship will be provided. It will also be seen that the impact of a change in exports and net capital inflow on the money supply and on the country's foreign assets could be large or small according to whether the marginal propensity to import and the income velocity of money are large or small.

The second issue which will be examined is whether accompanying this integration into the world market, there have been excessive changes or fluctuations in income due to the changes in foreign demand for the country's exports. The degree of excessive changes or instability in export earnings and in income will be estimated by using the Massell (1970) index of instability.[1] This thesis of instability or excessive fluctuations in domestic economic activity has developed from the basic openness of the economy which according to the process of adjustment as outlined in Chapter II, requires domestic expenditures and hence income and imports to change in such a manner that equilibrium in the external sector is always maintained. The contraction and expansion of domestic economic activity in accordance with the deficits and surpluses which the decreases and increases in exports are able to generate in the balance of payments implies that there is no offset to the monetary impulses emanating from the balance of payments. The last section of this chapter will therefore present estimates of the balance of payments equation, under two assumptions: first, that there is no offset to the monetary impulses emanating from the balance of payments, and secondly, that there is some offset to these monetary impulses.

Market Integration

In an open economy the hypothesis that the domestic economy is integrated into the world economy will be

tested by examining the effects of changes in external transactions on domestic money income. Following Polak and Argy (1971) the following equation is estimated:

(4 - 1)

$$\Delta Y = \frac{1}{m} \Delta(X + K) + u$$

where

ΔY = changes in national money income

$\Delta(X + K)$ = changes in the sum of exports and net autonomous capital inflow into the non-monetary sector.

u = error term.

It is anticipated that the foreign trade multiplier, $\frac{1}{m}$, should have a value which is greater than one, since an increase in exports and net capital inflows will by increasing the money supply lead to an excess demand for goods and services as the community attempts to reduce their holdings of money.

Holtrop (1972), in a study on the monetary experience of the Netherlands economy, finds that the changes in both domestic and external monetary impulses expressed as a percentage of the money supply do exert a very significant impact on the changes in spending as indicated by the changes in nominal income. A correlation coefficient of .83 was obtained from the regression.

For Guyana, only the relationship between the external monetary impulses, that is the changes in the sum of exports and net capital inflow, and nominal income is considered, because according to Polak (1956-58) and Polak and Argy (1971), changes in domestic assets have no effect

on money income in the long-run. The estimation of equation (4 - 1) for the period 1956 through 1973 yielded the following results which are shown in the equation below:

$$\Delta Y = \underset{(4.62)}{.81}\ \Delta(X + K), \quad D\text{-}W = 2.45$$

with the figures in parenthesis being the t-statistics.

The equation was first estimated with the raw data for income, exports and net inflow of foreign capital. The Durbin-Watson statistic however indicated that the disturbance terms were not independent of each other and this consequently made the estimated coefficient for the income foreign trade multiplier less efficient, since there is some other linear method of estimation which if applied to the equation would yeild an estimated coefficient with a smaller variance (Johnston, 1972, chap. 8; Kmenta, 1971, pp. 273-278). Therefore, in order to reduce the serial dependence among the successive observations, it was necessary to transform the variables in the equation according to the following scheme: $G - .18G_{t-1} + .25G_{t-2}$. The coefficient for the income foreign trade multiplier was then estimated by applying ordinary least-squares to the transformed data. The results as shown indicate that the multiplier effect on income of a change in export and net capital inflow is below its anticipated value. Further consideration indicates that changes in real income may actually be independent of changes in exports and net capital inflow, since with money income by definition

being equal to the domestic price level and real income:

(2 - 1a) $Y = Py$

and with the domestic price level, P, being pegged to the world price level via the exchange rate:

(4 - 2) $P = eP^*$

where

P^* = world price level

Changes in money income should therefore occur primarily through changes in real income.

The Money Supply Process

In a closed economy, the central bank controls the process of money creation by varying the amount of securities it buys and sells on the open market, by varying the minimum reserve requirements on deposits, by varying the discount rate, and also by varying other non-quantifiable policies which are generally known as moral suasion.

In an open economy the central bank, by committing itself to exchanging foreign currency for domestic money at a fixed parity, lose its ability to control the process of money creation. Instead the process of money creation is controlled by the changes in exports and net capital inflow, and the public's demand for money and imports. In order to see how the process of liquidity creation works in an open economy, and in order to see the importance of the public's demand for money and imports imagine that there is an increase in exports which will affect income in accordance with the proportion of export earnings that is actually expended on domestic goods and services. This

increase in domestic money income will then according to the proportion of income that the community wants to hold in the form of money, lead to an increase in the demand for money and hence when in equilibrium to an increase in the money supply. To test, for Guyana, the hypothesis that in an open economy it is increases in exports and net capital inflow which controls the process of liquidity creation, the following equation is estimated by ordinary least-squares:

$$(4 - 3) \quad \Delta Ms = \frac{1}{mv} \Delta (X + K)$$

The raw data for the variables in the equation were transformed by the following function: $H_t - .29H_{t-1} + .21H_{t-2}$, in order that the serial dependence among the error terms may be reduced. The following results were obtained when ordinary least squares was applied to the transformed data:

$$\Delta Ms = \underset{(4.62)}{.09} \Delta(X + K) \qquad D\text{-}W = 1.43$$

The results indicate that the coefficient for the changes in the sum of exports and net capital inflow is statistically significant.

<u>The Choice Between External Equilibrium and Internal Stability</u>

One of the consequences of having an open economy is that there must be continuous internal adjustment in the level of economic activity, if equilibrium is to be maintained in the balance of payments. Thus whenever there is a change in foreign demand for the country's exports which consequently leads to a surplus or deficit in the balance of payments; the domestic economy, in the absence of countercyclical policy,

must adjust in such a manner that the surplus or deficit in the balance of payments is eliminated. The increase (decrease) in exports will therefore either through the Keynesian income effect and/or the classical cash balance effect increase (decrease) domestic expenditures which in the final analysis will increase (decrease) nominal income according to the proportion of domestic expenditures which is expended on domestic goods and services. This resulting increase (decrease) in nominal income will subsequently lead to an increase (decrease) in imports and an outflow (inflow) of foreign assets, which will thereby correct the disequilibrium in the balance of payments (Polak, 1951-58, pp. 19-24; Prais, 1959-1961). This process of internal adjustment therefore creates a problem for policy makers who are forced to choose between either maintaining external equilibrium or internal stability.

In the developing countries this process of internal adjustment is further accentuated as the export earnings of these countries are subject to greater volatility than the export earnings of the developed countries. J. D. Coppock (1962) in an empirical analysis of the causes and effects of instability in export earnings, finds for the period 1946 to 1958, that the less developed countries had a mean instability in export earnings which was 31 percent higher in comparison to the instability in export earnings of the developed countries. Guy P. Erb and Salvatore Schiavo-Campo (1969) computed on a similar basis as the Coppock study,

instability indices for developed and less developed countries for the period 1954 to 1966. The results indicated that the mean instability in export earnings for the LDC's was 117 percent higher than in the developed countries. Massell (1970) also finds for period 1950 to 1966 that the export earnings from the less developed countries were subject to 50 percent more instability than the export earnings from the developed countries. The calculated degree of instability in export earnings for LDC's and DC's according to the three studies are shown in Table IV-1.

TABLE IV-1

CALCULATED INDICES OF INSTABILITY IN EXPORT EARNINGS FOR THE LESS DEVELOPED AND DEVELOPED COUNTRIES

STUDY	TIME PERIOD	MEAN INSTABILITY INDICES LDC's	DC's
Coppock (1962)	1946-58	23.1	17.6
Erb and Schiavo-Campo (1969)	1954-66	13.4	6.2
Massell (1970)	1950-66	.142	.025

Sources: (a) Coppock, 1962: Table A-2 and Mac Bean, 1966, p. 35.

(b) Erb and Schiavo-Campo, Bulletin Oxford University Institute of Economics and Statistics, 1969.

(c) Massell, American Economic Review, 1970

Causes of Excessive Fluctuations in Export Earnings

Three hypotheses have been formulated to explain the underlying cause for the higher degree of instability in the export earnings of the less developed countries. The

first of these hypotheses is that since most of the less developed countries are specialized in exporting primary products, the cause of the extra degree of instability in their export earnings could be attributed to their specialization in primary products. This hypothesis also implies that the export earnings from primary products are also relatively more unstable than that obtained from exporting manufactured products (MacBean, 1966, p. 36).

The empirical examination of this hypothesis by Coppock (1962) and Massell (1964, 1970) failed to substantiate the a priori reasoning of the effects of specialization in primary products on the fluctuations in export earnings. Coppock in his study found, contrary to expectations, that export earnings of manufactured products were relatively more unstable than the export earnings from primary products. Coppock calculated an instability index of 6.8 for the export proceeds from manufactured products, while the instability index for the export proceeds from primary products was calculated to be 3.8. Massell in his 1964 paper, also finds the relationship between instability in export earnings and the ratio of primary products exports to total exports to be relatively weak. In his 1970 paper, the insignificance of the ratio of raw materials exports to total exports and the significance of the negative coefficient for the ratio of food exports to total exports, when regressed on an instability index for export earnings led Massell to the conclusion, "that there is no tendency for primary products

to be more unstable than manufactures (net of other variables)" (p. 628).

A second factor which has been indentified as a plausible factor in explaining instability in export earnings for the less developed countries is the concentration of their exports to particular regions or countries. This hypothesis goes as follows: the geographic concentration of trade has diminished the ability of the LDC's to offset fluctuations in demand in one region or country by increasing their exports to some other region or country (MacBean, 1966; p.44).

The empirical studies which have looked at this relationship between instability in export earnings and geographic concentration have however failed to substantiate this hypothesis. Coppock (1962), in his analysis correlated the index of instability in export earnings with the index of geographic concentration as determined by Hisrchman (1945) concentration index. The result from this correlation was a correlation coefficient of -.13 which has one can see is low in value and has the wrong sign. MacBean (1966) in his study obtain a correlation coefficient for the relationship between instability in export earnings and geographic concentration which also had a negative sign and which was insignificant at the 5 percent level. Massell in both his 1964 and 1970 papers finds the coefficient for the index of geographic concentration to be insignificantly related to instability in export earnings. In his 1964 and 1970 papers, the coefficient was negative whilst in his 1970 paper he obtained a positive coefficient for the index of geographic concentration. Massell on this basis

concludes in the 1970 paper that geographic concentration "appears to be unimportant as an explanatory variable" (p. 628), for instability in export earnings.

A third factor, namely the concentration of the exports of the LDC's upon too few products has also been identified as a probable explanatory variable for instability in export earnings. This hypothesis is based on the argument that the concentration upon too few products for exports results in the reduction of "a country's chances of having fluctuations in one direction in some of its exports offset or ameliorated by counter fluctuations or stability in others" (MacBean, 1966, p. 41). This argument has subsequently led policy-makers in the developing countries to adopt measures which are designed to increase the number of exported products. Recent studies by Brainard and Cooper (1968) and Massell (1970) however suggest that great care must be given to the type of products which are actually selected as a means of diversifying a country's exports, since "there is some degree of correlation between receipts from different pairs of goods" (Massell, 1970, p. 622). This notion can be illustrated by considering two goods, which yield export earnings corresponding to x and z respectively. The variance in total earnings, E, is given by the following formula:

$$(4 - 4) \qquad V(E) = V(x) + V(z) + 2\,Cov(x,z)$$
$$= V(x) + V(z) + 2\rho_{xz}\sqrt{V(x)\,V(z)}$$

where

$V(E)$ = variance in total export earnings

$V(x)$ = variance in earnings from product x.

$V(z)$ = variance in earnings from product z.

ρ_{xz} = correlation coefficient between x and z

From equation (3-4) one can see that the variance in total export earnings will be larger than the sum of the variance of the two products, if the correlation between the export receipts from these two products is positive. Conversely, the variance in total export earnings will be smaller than the sum of the variance of the two products, if the correlation coefficient between the pair of goods exported is negative. Similarly, if the export receipts from the two goods are not correlated then the variance in total export earnings will correspond to the sum of of the variance of the individual products. Consequently, it is suggested that the overall objective - reducing the variability in export earnings - behind the attempt to diversify will stand a better chance of being successful if the chosen products are such that there is an inverse correlation between them, that is $-1 \leq \rho_{xz} \leq 0$.

The empirical studies (Coppock, 1962; Massell, 1964, 1970; MacBean, 1966; Michaely, 1962) which have examined the proposition that it is the lack of diversification which has caused instability in export earnings have failed - with one exception - to substantiate this proposition. Coppock (1962) in his study computed four different indices of commodity concentration, which were then separately correlated

to the index of instability in export earnings. The correlation coefficients which were obtained from these regressions ranged from +.02 to +.11.

M. Michaely (1962) in his study on the other hand, finds instability in export prices, to be significantly correlated to commodity concentration. His study however probably does not contribute much to the understanding of the problem of commodity concentration since the index of instability used merely looks at the average annual percentage changes in prices without eliminating the trend factor from the series.

MacBean (1966) in his study obtains a very low and insignificant correlation coefficient of -.07 when his index of instability in export earnings is correlated with the commodity concentration index. On the basis of this result MacBean suggests that there is "very little or no effect on the stability of export earnings from commodity concentration." (p. 41).

The results obtained by Massell in both his 1964 and 1970 papers represents, of the major studies on instability in export earnings, the only source that has found commodity concentration to be statistically significant to instability in export earnings. In his 1964 paper he obtains a coefficient for commodity concentration that is statistically significant at the 5 percent level, when the index of instability in export earnings is regressed on the indicies of commodity and geographic concentration. However, when the index of geographic concentration is excluded as one of the explanatory variables, and the instability index of export earnings is regressed on the index of commodity con-

centration, the results yield an R^2 that is very low in value along with an estimated coefficient that is insignificant. In view of the fact that the significance of the relationship between instability in export earnings and commodity concentration depends upon the specification of the model to include both commodity and geographic concentration, Massell (1964) concludes, "that the relationship between instability of export is a tenuous one indeed" (p. 61).

In his 1970 paper, it is found that the index of commodity concentration along with the food ratio is statistically significant at the 5 percent level when the index of instability in export earnings is regressed on a number of explanatory variables: commodity concentration; the domestic consumption ratio, an index of geographic concentration, the food ratio, the raw materials ratio, the share of world trade, per capita income, value of merchandise exports and a dummy variable to differentiate between developed and less developed countries. Massell consequently concludes that it is shifts in foreign demand which casues instability in export earnings (p. 627).

The general inability of the statistically tests to corroborate what are plausible explanations for the excessive degree of fluctuations in export earnings of the LDC's led MacBean (1966, p. 55) to suggest that the causes of instability in export earnings may be due to internal factors such as war and local politics, instead of the various economic factors such as specialization in primary products and the concentration of trade to too few countries and too few products.

For Guyana the hypothesis that in developing countries instability in export earnings is casued by commodity and geographic concentration and by the ratio of primary products to total exports was first tested for the period 1956 to 1973. We later included a dummy variable to reflect the political changes which occured within the period.[2] Table IV-2 presents the results that were obtained when the following two equations were estimated by ordinary least squares.

(4 - 5) $IX = a + b_1PR + b_2CC + b_3GC + u$

and

(4 - 6) $IX = a + b_1PR + b_2CC + b_3GC + b_4PL + u^*$

where

IX = instability in export earnings

PR = ratio of primary product exports to total exports

CC = commodity concentration index

GC = geographic concentration index

PL = 0 for the period 1956 to 1965
1 for the period 1966 to 1973

The results fail to support the hypothesis that for an LDC export instability is caused by commodity and geographic concentration and the ratio of primary products to total exports. The subsequent inclusion of the dummy variable in the model to reflect the political changes over the period considered turns out to be significant at the 5 percent level. The inclusion of the dummy variable also increases the R^2 from .15 to .32.

TABLE IV-2

CAUSES OF INSTABILITY IN EXPORT EARNINGS

DEPENDENT VARIABLE	CONSTANT	PR	CC	GC	PL	R^2	D-W
IX	.03 (.59)	-.04 (-.80)	-.003 (-.07)	.04 (1.26)	_	.15	2.21
IX	.02 (.45)	-.012 (-.20)	+.018 (.42)	-.018 (-.37)	-.010 (-1.75)	.32	2.36

Note: Figures in parenthesis = t-statistics; D-W = Durbin-Watson Statistics.

Additional estimates of the magnitude of instability in volume, unit value and total value for the major products that are exported and for total exports were also computed. These results are presented in Table IV-3, and they indicate for the major products exported that the proceeds from rice are relatively more unstable than the earnings obtained from bauxite and sugar exports. The instability in the proceeds from the exports of rice, bauxite and sugar were calculated to be .065 for rice, and .019 for bauxite and sugar. Meanwhile the degree of instability in the value of Guyana total export earnings was estimated to be .007. This indicates that to some extent the fluctuations in the major exported products were offsetting rather than reinforcing. The results also indicate that the degree of instability in the volume of Guyana's total exports is slightly greater than the

instability in the price (unit value) received for their exports.

TABLE IV-3

INSTABILITY INDICIES FOR QUANTITY, UNIT VALUE AND TOTAL VALUE OF GUYANA'S MAJOR EXPORT COMMODITIES: 1956-73

COMMODITY	AVERAGE ANNUAL DEVIATIONS FROM GROWTH PATH (I -I* INDEX)
Rice:	
Quantity	.051
Unit Value	.010
Total Value	.065
Bauxite:	
Quantity	.014
Unit Value	.015
Total Value	.019
Sugar:	
Quantity	.015
Unit Value	.021
Total Value	.019
Total Exports:	
Quantity	.011
Unit Value	.010
Total Value	.007

Although the empirical results have in general failed to substantiate the various explanations of the higher degree of fluctuations in the export earnings of the less developed countries, the problem associated with the fluctuations in export earnings is nevertheless a real one. In an open economy the adjustment process requires in the absence of countercyclical monetary and/or fiscal policies, that domestic spending as represented by nominal income, expand and contract in accordance with the expansion and contraction of exports.

Consequently, it is reasoned for open economies, operating under a system of fixed exchange rates, that there would be domestic instability, as money income would vary "in the same direction and more than proportional to the initial changes in export proceeds" (MacBean, 1966, p. 26).

The hypothesis that instability in export earnings causes instability in the economy was tested by Coppock (1962) who correlated the instability index for national income with the instability index for export earnings and from which he obtained a very low correlation coefficient of .07. When the countries in Coppock's study were categorized on the basis of the magnitude of instability in their export earnings, the resultant pattern indicated that one-third of the countries which have the highest degree of instability in export earnings, also have the highest degree of instability in national money income. MacBean (1966) in his study also tested the hypothesis that instability in export earnings causes instability in domestic economic activity. Considering first a sample of 35 LDC's and then 15 of the LDC's with relatively high ratios of trade to GNP. MacBean obtained correlation coefficients of .015 and -.15 respectively, when the instability index for GNP was regressed on the instability index for export earnings. The estimated coefficients obtained from the regressions were insignificantly different from zero. A further analysis using time series date for ten countries with very high ratios of trade to GNP, was used by MacBean in order to examine the direction rather than the magnitude of the fluctuations between export earnings and GNP. The results indicate on a current-year basis that GNP

moved in the same direction as exports sixty-one times out of ninety-nine. A further comparison of current year GNP to exports lagged by one year, indicated from a total of eighty-nine changes in export earnings that GNP moved in the same direction only forty-four occasions.

For Guyana, we performed a test of the hypothesis that excessive changes or fluctuations in export earnings causes similar excessive changes or fluctuations in GNP. The following equation was estimated:

$$(4 - 7) \quad IY = a + b_{Iy}IX + e$$

with the expectation that b_{Iy}, should have a value greater than one. Using annual data for the period 1952 to 1972, the annual deviations from the growth path were computed and the following results were obtained:

$$IY = \underset{(1.62)}{.002} + \underset{(3.47)}{1.01}\ IX \qquad R^2 = .38;\ D\text{-}W = 1.58$$

The results (with t-statistics in parenthesis) indicate that the coefficient for instability in export earnings, is significantly different from zero. In addition the annual fluctuations in export earnings around its growth path account for only 38 percent of the annual fluctuations in GNP from the growth path.

Induced Changes In Imports

The adjustment process entails not only the contraction and expansion of income, in response to changes in exports. It also entails in addition to contraction and expansion of imports in response to the induced contraction and expansion in income (Polak, 1957-58, pp. 19-24; Prais, 1959-1961). This requirement that imports also increase in

response to an increase in income, in conjunction with the supposition that domestic investment in the LDC's is dependent upon imported capital goods[3], has led to the hypothesis that fluctuations in export earnings cause similar fluctuations in domestic investment (MacBean, 1966 p. 69).

MacBean (1966) in his book tested this hypothesis for twenty LDC's. The countries were first ranked according to their degree of export instability and then grouped into thirds. It was found on this basis that the middle group had the highest average degree of instability in investment. Following this the instability index for investment was regressed on the instability index for export earnings. The correlation coefficient obtained from this regression was non-signifianct at the 10 percent level of significance and the fluctuations in export earnings explained only about 12 percent of the inter-country fluctuations in investment. Usint time-series data for ten Latin American countries, MacBean's results indicated for eight of the ten countries that changes in capital goods imports moved in accordance with the fluctuatiions in exports. However when the relationship between changes in investment and the fluctuations in export earnings was tested, "the supposed initiating force of export fluctuations is significant for only three out of eight" (p. 75).

We tested for Guyana the hypothesis that in an open economy injections into the income stream arising from increases in external transactions must if full adjustment

occurs within the economy, eventually all leak out of the system in the form of imports. Using annual data for the period 1955 through 1973, the following equation was estimated:

$$(4 - 8) \quad \Delta I = c\Delta(X + K) + e$$

The corollary hypothesis that fluctuations in export earnings cause similar fluctuations in investment will be tested for the same period by the following equation:

$$(4 - 9) \quad IV = a + b_1 IX + u'$$

It is anticipated that in the case of equation (4-8) that the coefficient, c, should have a value close to 1, if there was full adjustmetn within the year. It is also anticiapted in the case of equation (4-9) that if the fluctuations in exports produce similar fluctuations in investment, that the coefficient b_1 should be positive and have a value close to one.

The regression results for the two equations are presented in Table IV-4. The coefficient, c, has a value of .7. This indicates that within the current period imports adjusts fairly rapidly to the changes in exports and net capital inflow. For equation (4-9) the coefficient b_1 is not significantly different from zero. The null hypothesis in this case cannot be rejected.

<u>The Balance of Payments</u>

The low values which have been obtained in the previous section for the coefficentts, and b_{IY} and the statistical insignificance of b_1, suggests that there might be some mechanism in operation within the economy which tends to

TABLE IV-4

ESTIMATES FOR THE CHANGES IN IMPORT EQUATION AND THE INSTABILITY IN DOMESTIC INVESTMEMT EQUATION

DEPENDENT VARIABLE	CONSTANT	$\Delta(X + K)$	IX	R^2	D-W
ΔI	-	.70 (5.29)		-	1.68
IV	.02 (2.04)	-	.87 (1.09)	.07	1.87

Notes: Figures in parenthesis = t-statistics; D-W = Durbin-Watson statistic.

mitigate the monetary impulses that emanate from the balance of payments and consequently attentuate the process of adjustment within the economy. This dampening of the adjustment process could occur either through increases (decreases) in the credit financed portion of the government budget deficit, or alternatively by the banking system expanding (contracting) bank credit at times when a decrease (increase) in exports and net capital inflows causes a deficit (surplus) in the balance of payments. The adoption of countercyclical monetary policies will by maintaining a fairly constant level of liquidity in the economy, tend to offset any change in domestic expenditure and hence the change in income and imports which would occur naturally as exports increase or decrease.

The excessive use of domestic financial policies in an open economy, however poses severe problems for the monetary authority as its impace on income and the demand for money is only transient. This means that the excessive use

of domestic financial policies will only stimulate expenditures on imports and thereby cause an outflow of foreign assets.

The proposition that an increase in exports and the net inflow of foreign capital improves the balance of payments, whilst an increase in domestic assets hurts the balance of payments will be tested by estimating the following equation

$$(4 - 10) \qquad B = \frac{1}{mv} \Delta(X + K) - b_f \Delta D + V$$

It is anticipated that the estimated coefficient for $\Delta(X + K)$ will measure the proportion of the increase in exports and net capital inflow which would leak out of the economy during the year in the form of imports. It is expected at the end of the year the effect of an increase in exports and net capital inflow on the foreign assets of the banking system, would be very small, if the proportion which leaks our of the economy in the form of imports is large. Conversely, its effect on the system's reserves will be large, if a small proportion leaks out of the economy in the form of imports. It is also anticipated that the coefficient, b_f, should have a value close to -1.0, if the expansion of domestic credit leaks out in its entirety from the system. If the equation (4-10) is estimated by ordinary least squares, and, if in addition, domestic monetary policies were adopted in order to sterlize (or reinforce) the monetary impulses which originated from the balance of payments, the estimated coefficient for D will be biased. The direction of the bias which arises when there is a simultaneous relationship

between the change in reserves and domestic assets, can be shown for the following very simple model: $B = b\Delta D + eV_1 + u$; $\Delta D = \alpha_o + \alpha_1 B + hV_2 + u'$; where V_1 represents an exogenous influence on ΔD, with u and u' being the error terms. By the following formula (Johnston, 1972, chap. 12; Kouri and Porter, 1974, pp. 453-454; Porter, 1973, pp. 402-403)

$$\text{plim } (b - \hat{b}) = \left[\alpha_1(1 - b\alpha_1)\sigma_u^2\right] / (h^2 \bar{M}v_2v_2 + \sigma_u^2 + \alpha_1^2 \sigma_{u'}^2)$$

where σ_u^2 = the variance of u; $\sigma_{u'}^2$ = variance of u' and $\bar{M}v_2v_2$ = asymptotic variance of V_2. Thus if the monetary authority changes its holdings of domestic assets so that it can offset the monetary impulses arising from the balance of payments, the coefficient, α_1, will have a negative sign and the estimated coefficient b, will be biased towards -1. If on the other hand the monetary authority reinforces the monetary impusles arising from the balance of payments unto its holdings of domestic assets, the coefficient, α_1, will have a positive sign, and the estimated coefficient, b, will be biased towards zero. Consequently, in order to recognize this possible simultaneous relationship between the balance of payments and domestic assets, equation (3-9) and the following policy reaction function:

$$(4 - 11) \quad \Delta D = a_1 B + a_2 GD + v^*$$

where

GD = government budget deficit

v^* = error term

will be estimated by a two-stage procedure. The coefficient for the variable GD is expected to be positive.

The results from estimating equation (4-10) first by ordinary least squares and them from estimating equations (4-10) and (4-11) by two-stage least squares are presented below in Table IV-5. A plot of the actual and fitted values of reserve flow, from equation (4-10) is shown in Figure IV-1. The results are very interesting, on the one hand because the estimated coefficient for the sum of exports and net capital inflow is statistically significant at the 5 percent level of significance when the balance of payments equation is estimated by ordianry least squares. The coefficient for the domestic credit variable is -.88. The t-statistic for the hypothesis that the value of the coefficient for the domestic credit variable equal minus one is 1.5. On the other hand the coefficient for the changes in the sum of exports and net capital inflow becomes insignificant when the balance of payments equation in conjunction with the policy reaction function is estimated by two stage least squares. Also the coefficient for domestic credit variable is estimated to be -.64. The two variables in the policy reaction function are also both statistically significant.

TABLE IV-5

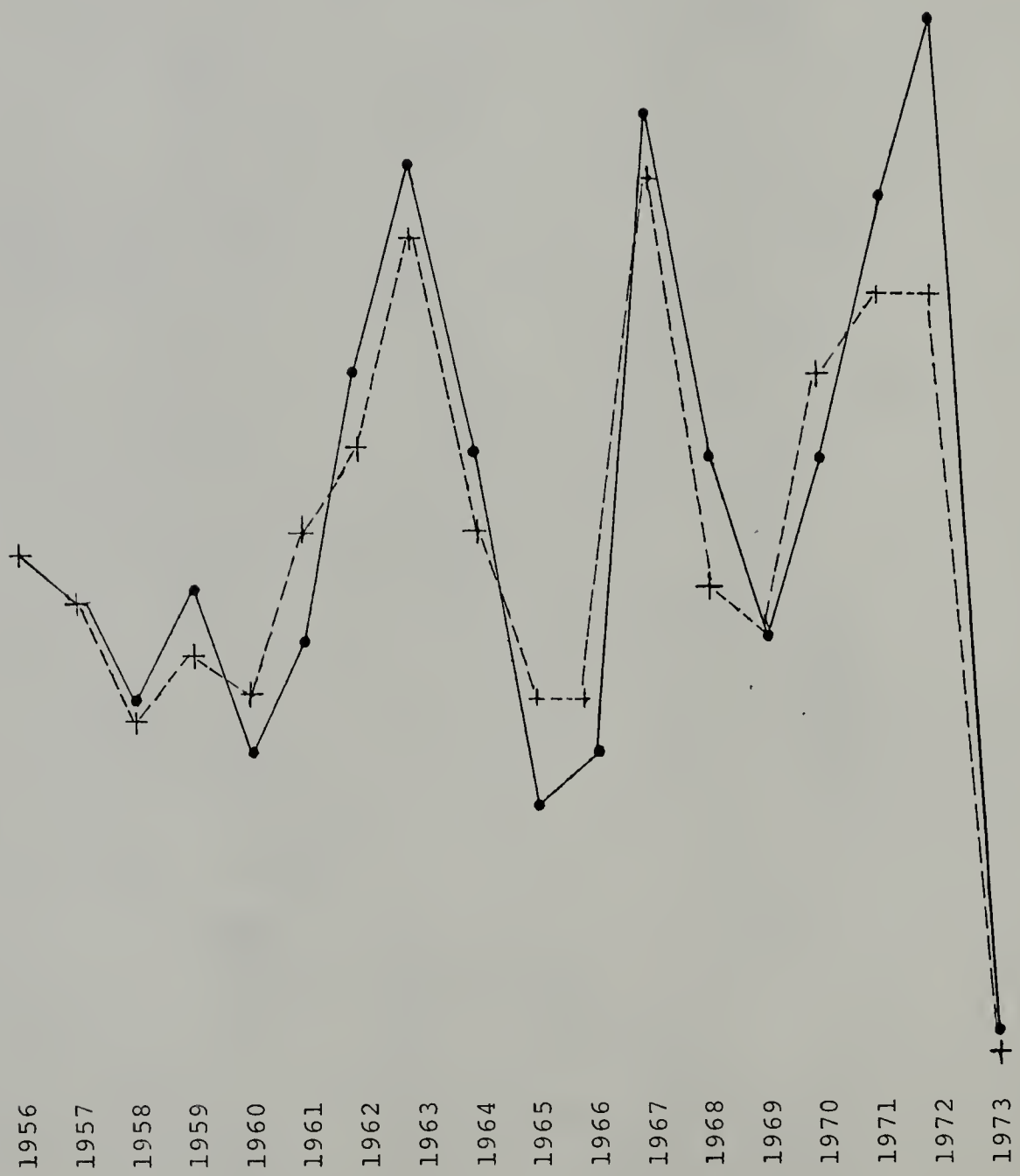
ESTIMATES FOR THE BALANCE OF PAYMENTS EQUATION

DEPENDENT VARIALBE	$\Delta(X + K)$	ΔD	B	GD	R^2	D-W	METHOD OF ESTIMATION
B	.09 (1.85)	-.88 (-10.61)	-	-	.87	1.27*	OLSQ
B	.07 (1.28)	-.64 (-4.69)	-	-	-	-	TSLS
ΔD	-	-	-.86 (-5.42)	.11 (4.66)	-	-	TSLS

Note: Sample period : 1955-1973; Figures in parenthesis are t-statistics; D-W = Durbin Watson Statistics; OLSQ = oridnary least squares; TSLS = two stage least squares; B = balance of payments; ΔD = changes in domestic assets; $\Delta(X + K)$ = changes in the sum of exports and net capital inflow; GD = government's budget deficit.

*The Durbin-Watson statistic is in the uncertain region at the 95 percent level.

FIGURE IV-1



Actual (solid line) and predicted (dashed line) reserve flow.

Notes

[1]See Appendix A for a discussion on the various indices which have been used to measure the degree of excessive changes in income, exports, etc., along with the index which will be used to measure the degree of product and geographic.

[2]The years before the attainment of political independence in 1966 were characterized by political uncertainty, rioting, looting, acts of arson and strikes.

[3]In the less developed countries it is often argued that most of the imported goods is comprised of capital goods, since most of the non-essential imports have been cut to a minimum and also because these countries at their present stage of economic development cannot produce in sufficient quantities the machinery and other capital goods they need in order to increase domestic investment.

CHAPTER V

ECONOMIC GROWTH, DOMESTIC FINANCIAL POLICIES AND THE BALANCE OF PAYMENTS

In this Chapter the second major problem of the study, namely the effects of economic growth and domestic financial policies on the balance of payments will be examined according to the new monetary approach to the balance of payments and balance of payments adjustments. This new approach to balance of payments theory begins by asking the following question: What is the effect of a change in real income, domestic price level, and where appropriate the effect of a change in the interest rate on the demand for money? It is then argued that those variables, which have a direct association with the demand for money will similarly have a direct effect on the balance of payments. Whilst those variables which have an inverse relationship with the demand for money will similarly have an adverse effect on the balance of payments. Furthermore it is argued that if domestic financial policies have no effect on income and hence on the demand for money, the use of these policies will not only hurt the balance of payments but it will in addition cause an equiproportionate change in the country's foreign assets (Johnson, 1972; Komiya, 1969; Mundell, 1968, pp. 126-129 and chap. 9). The balance of payments in an open

economy is therefore seen as the media through which the public's desire for stock changes in asset portfolio is satisfied in such a manner that in the long-run, equilibrium is maintained in the monetary sector of the economy.

The money demand function is accordingly specified as:

(2 - 1b) $Md = kPy$

since it is assumed that in the absence of a highly developed capital market, money balances are held primarily for transaction purposes. The process of money creation is derived from the banking system balance system sheet:

(2 - 2) $Ms \equiv R + D$

with changes in the money supply occuring through changes in domestic and foreign assets:

(2 - 2a) $\frac{dMs}{dt} \equiv \frac{dR}{dt} + \frac{dD}{dt}$

Equilibrium in the monetary sector requires that the demand for money be equal to the money supply, thus:

(5 - 1) $kPy = R + D$

By expressing (2-2b) in logarithmic form and by differentiating with respect to time, the following reserve flow equation is derived:

(5 - 2)

$$r = (R/R + D)g_r = g_y + g_k + g_p - (D/R + D)g_d + e$$

where

$g_r = d \ln R/dt$ = growth in foreign assets

$g_y = d \ln y/dt$ = growth in real income

$g_k = d \ln k/dt$ = growth in the fraction of income that people hold as money balances

$g_p = d \ln p/dt$ = growth in domestic price level

g_d = d ln D/dt = growth in domestic assets.

According to equation (5-2) the expansion of domestic assets whether it is to the general public or to the government sector, is expected to cause a deterioration in the balance of payments. A specific look at the effects of government's budgetary policy on the balance of payments could be obtained if it is assumed on the one hand that there is no lending within the system to the private sector by the banking authorities whilst on the other hand the banking authorities finance the government budget deficit by credit creation. (Dornbusch, 1971; McKinnon and Oates, 1966, pp. 13-17; Mundell, 1968, pp. 123-124). Consequently in this system the growth in domestic assets will be determined primarily by the growth in the government's budget deficit, that is:

$$(5 - 3) \quad g_d = b_5 g_{GD}$$

where

g_{GD} = d ln GD/dt = growth in the government's budget deficit

The substitution of equation (5-3) for g_d in (5-2) leads to the following reserve flow equation:

$$(5 - 4) \quad r = (R/R + D) g_r = g_y + g_p + g_k - b_5 (D/R + D) g_{GD}$$

On the basis of equation (5-2) and equation (5-4) it can be seen that the balance of payments will improve with growth in real income. The coefficient for g_y indicates the effect that a 1 percent increase in real income will have on the demand for money and thereby on the balance of payments. It is expected that the value of the coefficient should be close to unity.

A change in the price level is also expected to exert a favorable effect on the flow of reserves, since an increase in the price level will be reducing the real value of existing money balances lead to an increase in the demand for nominal money balances which will be satisfied by an inflow of reserves. The effect on the flow of reserves could be adverse if the increase in the price level reflects an increase in the domestic price level relative to the world price level, as this would tend to force people to increase their consumption of imported goods relative to domestic goods.

The use of domestic financial policies to increase domestic assets as a whole, and the credit financed portion of the government budget deficit in particular, will if these policies does not affect income and hence increase the demand for money, only increase domestic expenditures on imported goods and services and consequently generate an outflow of reserves.

The estimated coefficients for g_k, g_p, and g_{GD} should have the following values: +1.0, +1.0, and -1.0. The estimated coefficient for g_d is also expected to have a value of -1.0 if in the absence of economic growth, the increase in liquidity mainly stimulated domestic expenditures on imported goods and services in the long-run. Such a result would also indicate that the monetary authority have no control over the domestic money supply and that the monetary authority should consequently control the expansion of domestic credit, for by so doing they will be able to control the balance of payments and thus the division of the country's assets between foreign

and domestic goods. This interpretation of the results reflects an underlying thesis of the monetary approach to the balance of payments and balance of payments adjustment, namely that the monetary impulses emanating from the balance of payments are not offset by changes in domestic assets. It is however plausible in the interest of internal stability on the one hand that domestic assets could be adjusted in a manner which is designed to offset the effects of disequilibrium in the balance of payments on the money supply. On the other hand domestic assets could be changed as suggested by Olakanpo, in such a manner as to accentuate the effects of balance of payments disequilibrium on the money supply. This consequently means that the estimated coefficient of g_d would be biased in the direction of -1.0, if the monetary impulses from the balance of payments are sterilized. The coefficient would be biased in the direction of zero, if domestic credit contracts and expands according to the deficits and surpluses in the balance of payments and thereby adhere to the gold-standard "rules of the game."

In Guyana on the one hand it is quite unlikely in the absence of a highly developed money market that changes in domestic assets wuld compensate for the decreases or increases in liquidity which results from a deficit or surplus in the balance of payments. Also before the Central Bank was established in 1965, there was no domestic central monetary authority in existence to deal with the problem of promoting and maintaining monetary stability. Furthermore even with the establishment of the Central Bank it is quite unlikely that the monetary authority would be acting with the precision and

and accuracy that is needed to offset the monetary impulses from the balance of payments and at the same time make sure that the changes in domestic assets are always consistent with the growth in economic activity. On the other hand it is also quite unlikely that the Central Bank would want to increase the degree of internal instability by varying domestic assets directly in accordance with the surpluses and deficits of the balance of payments. Also with most of the commercial banks being branches of the large multinational banks, it is quite unlikely that the liquidity position of a branch bank in any one country should affect under normal circumstances its lending policies in that country, since the Head Office can shift funds from areas with surplus assets to areas experiencing a decline in their asset position. The possible simultaneous relationship between domestic assets and the balance of payments, in spite of these reasons will nevertheless be taken into account by the following policy reaction function:

$$(5\text{-}5)\quad d = (D/R + D)g_d = b_1(R + D)g_r + b_5 g_{GD} + v''$$

There have been four empirical studies (Bean, 1976; Genburg, 1976; Guitian, 1976; Zecher, 1976) so far that have examined the hypothesis that increases in real income and the price level improve the balance of payments whilst increases in domestic assets and the interest rate hurt the balance of payments. Zecher in a study of Australia; Genberg in a study of Sweden, and Bean in a study of Japan obtained in general very good results when the money demand function was substituted into the banking system balance-sheet identity. They obtained in general coefficients which

were highly significant statistically and which yielded very good fits between actual and predicted changes in reserve flows when quarterly data were used. Zecher obtained a $\bar{R}^2$ of .89; whilst Genberg and Bean obtained, respectively $\bar{R}^2$'s of the following magnitude: .76 and .65. The study on Spain by Guitian however yielded estimates of the variable in the reserve flow equation that were with one exception all statistically insignificant. The only variable which was significant was the domestic credit variable. Genberg in his analysis also allowed for the possible simultaneous relationship between changes in domestic assets and the balance of payments by estimating the coefficients of the reserve flow and the policy reaction equation according to a two-stage procedure. The results using quarterly data, indicated "that the specification of the Central Bank reaction function is inadequate in that the government financing variable fails to be significant." (Genberg, 1976, p. 323). However, when annual data were used instead of quarterly data, the coefficient for the government budget deficit in the policy reaction equation was positive and statistically significant.

For Guyana an initial test was made of the hypothesis that the rate of inflation in the domestic economy is equal to the rate of inflation in the world economy, that is the coefficient in the following equation is equal to unity:

$$(5 - 6) \quad g_p = c(P/P)^{**} + u^*$$

where

g_p = The growth in domestic price level

$(p/P)^{**}$ = The rate of growth of inflation in the world

u^* = Error term.

The result from estimating (5-6) by ordinary least squares for the periods 1956 through 1973 is shown in the following equation:

$$g_p = \underset{(259.5)}{1.00}(\dot{P}/P)^{**} \qquad R^2 = .99;\ D\text{-}W = 1.31^*$$

with the figures in parenthesis being the t-statistics. The estimated coefficient for the rate of growth in the world's rate of inflation corresponds to a priori reasoning, with the R^2 indicating that most of the variation in the domestic price level are induced through changes in the average price level in the United Kingdom, United States, and Canada.

Secondly, the money demand function (2-1) was estimated with annual observations for the period 1955 to 1973 and the following results were obtained:

$$g_m = \underset{(39.12)}{.60}g_y \qquad R^2 = .98;\ D\text{-}W = 1.31^*$$

where

g_m = growth rate in nominal money balances.

g_y = growth rate in money income

*The Durbin-Watson statistic is in the uncertain region at the 95 percent level.

Further substitution of the estimated money demand function into the banking system balance-sheet identity yielded results which confirmed the monetary view that increases in domestic assets and the financed portion of the government's budget deficit, results in an outflow of foreign assets. Whilst an increase in the domestic price level is associated

with an inflow of foreign assets. The coefficient for the increase in the rate of economic growth has the correct sign but it however turns out to be statistically insignificant. The estimates for equation (5-2) and (5-4) are presented in Table V-1. The relationship between actual and predicted reserve flows for equations (5-2) and (5-4) are also shown in Figures V-1 and V-2.

TABLE V-1

ESTIMATES FOR THE MONETARY APPROACH
TO THE BALANCE OF PAYMENTS

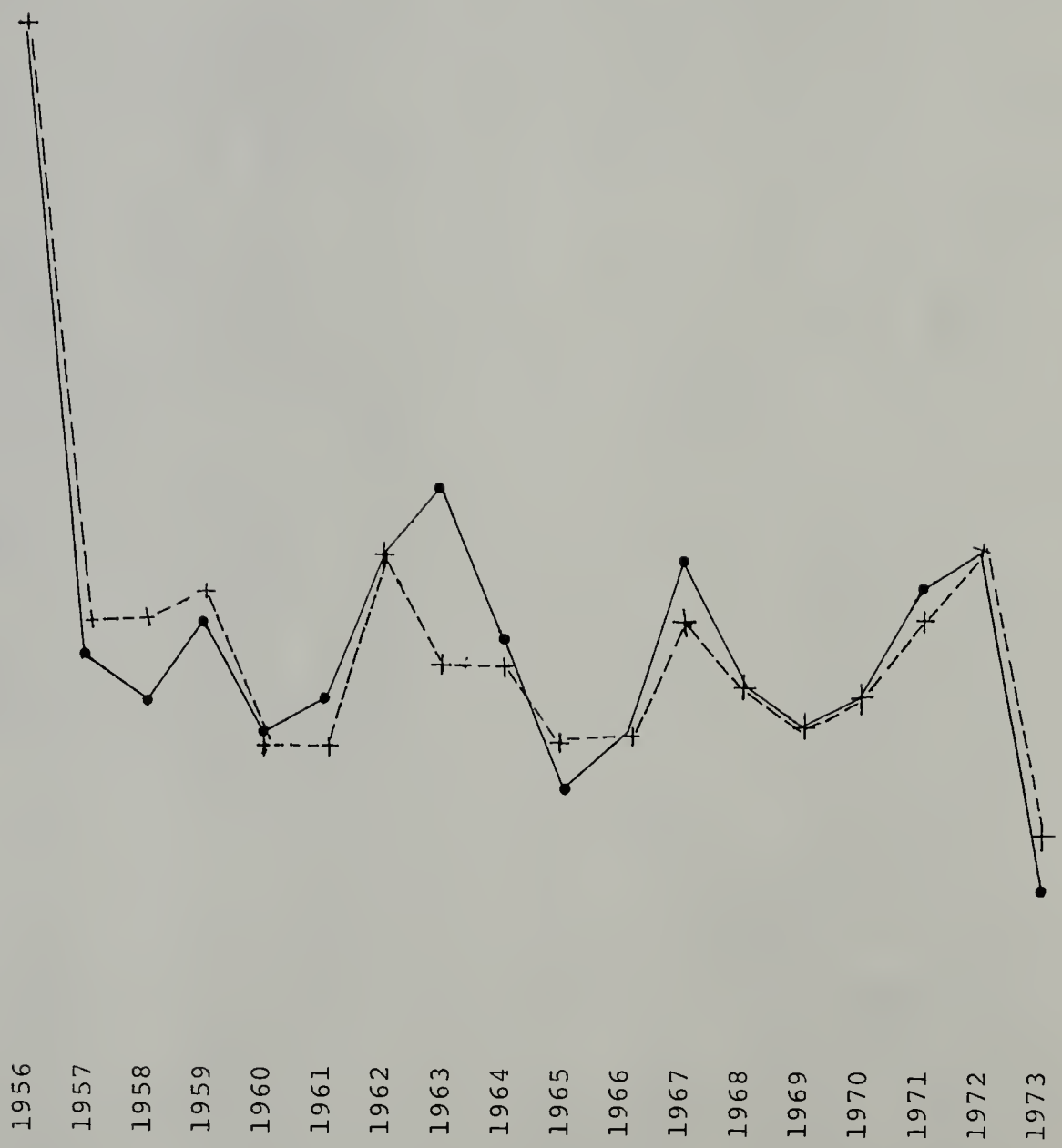
Dependent variable	g_{GD}	g_y	g_p	g_k	$(D/R+D)g_d$	$(D/R+D)g_{GD}$	$(D/R+D)g_r$	R^2	D-W	Method of Estimation
r	-	.62 (.99)	1.48 (7.88)	1.70 (3.69)	-.33 (-3.20)	-	-	.97	1.61	OLSQ
r	-	.17 (.24)	1.51 (6.82)	1.63 (3.06)	-	-.47 (-2.10)	-	.96	1.78	OLSQ
r	-	1.27 (1.02)	1.64 (4.58)	2.31 (2.35)	-.86 (-1.55)	-	-	-	-	TSLS
d	.18 (1.07)	-	-	-	-	-	-.13 (-.84)	-	-	TSLS

$r = (R/R+D)g_r$

$d = (D/R+D)g_d$

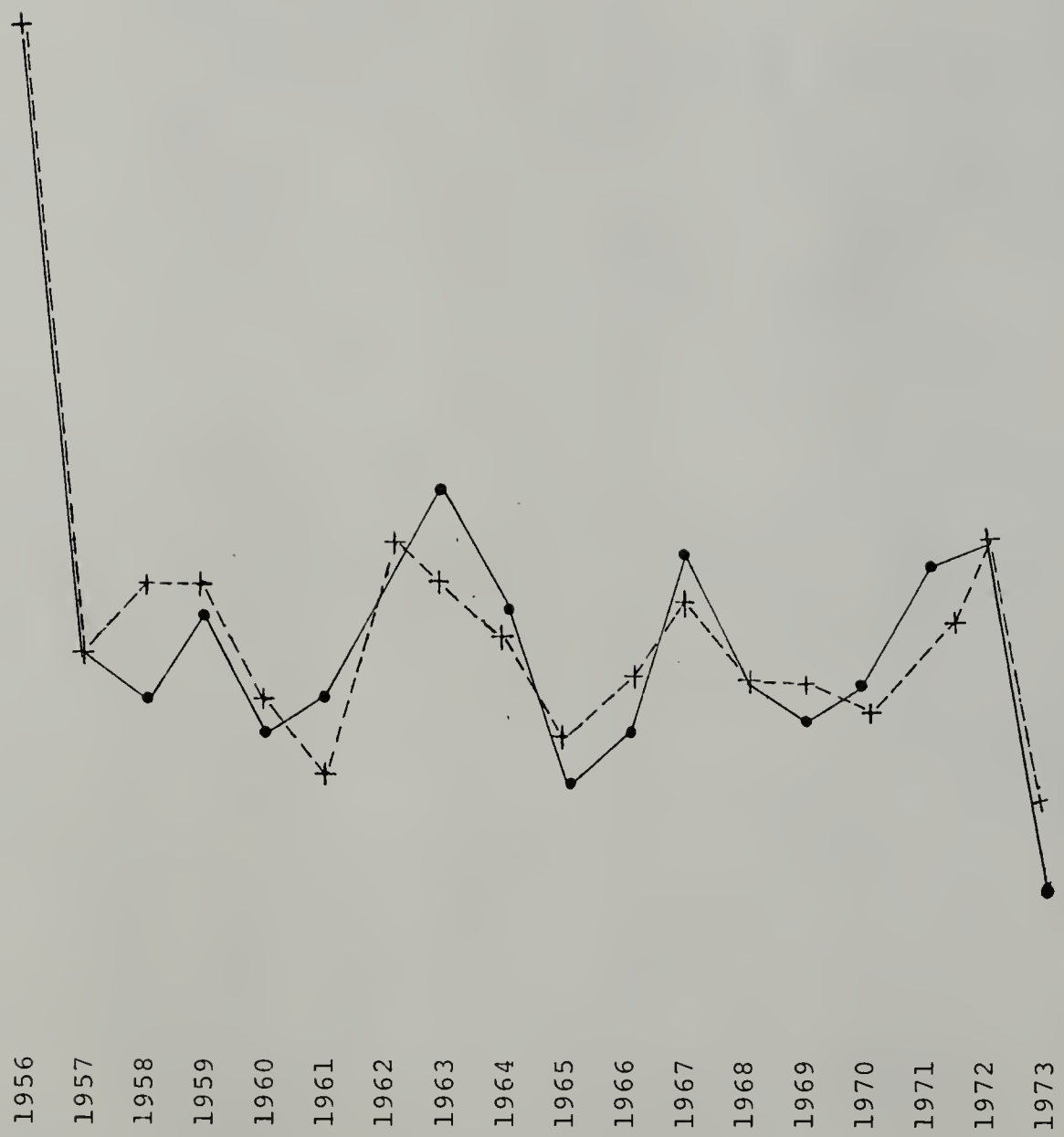
Note: Figures in parenthis are t-statistics; D-W = Durbin-Watson statistics; OLSQ = ordinary least squares; TSLS = two stage least squares.

FIGURE V-1



Actual (solid line) and predicted (dashed line) reserve flows, domestic assets.

FIGURE V-2



Actual (solid line) and predicted (dashed line) reserve flows, Government Budget Deficit.

CHAPTER VI

SUMMARY OF STUDY

Introduction: (Chapter I)

This study empirically examines the monetary process of adjustment in a small, open economy, Guyana, for the period between 1955-1973. In keeping with the monetary approach to balance of payments theory this process of adjustment is considered as occuring automatically, since according to Walras' Law there is an undeniable linkage between the money market and the goods market. This linkage between the money market and the goods market and the subsequent initiation of an automatic process of adjustment in response to a state of disequilibrium in the monetary sector, provides a useful analytic framework for the analysis of certain key issues. For example the effects on the flow of international reserves resulting from a change in the variables that determine the demand for money, and a change in the domestic component of the money supply. It also provides, via a simple version of the quantity theory of money, a framework for analyzing the effects of an increase in exports and net capital inflow on the balance of payments, on the money supply, on income, and imports. The linkage however poses for the short-run, the prob-

lem of choosing between two conflicting alternatives; on the one hand there is the choice between either maintaining equilibrium in the external sector and consequently accepting some degree of internal economic instability. On the other hand the choice is to use domestic monetary and/or fiscal policy to maintain internal economic stability while there is disequilibrium in the balance of payments. The empirical findings of Coppock (1962), MacBean (1966), and Massell (1970), that the degree of instability in export earnings among the developing countries is greater than the degree of instability in export earnings among the developed countries, in conjunction with the process of adjustment according to the old version of the quantity theory of money, has led to the expectation that the instability in domestic economic activity is caused by the instability in these countries export earnings. Furthermore, with their imports consisting primarily of capital goods to be used for investment purposes, it is suggested that the instability in export earnings also causes instability in domestic investment.

To be more specific, this study empircially examines, on the basis of the economic experience of Guyana, the monetary process of adjustment according to the quantity theory of money, that is, it looks at the effect of an increase in exports and net capital imports on the balance of payments, money supply, money income, and imports. It also tests the hypothesis that instability in domestice economic activity is generated by instability in export earnings, and that the

instability in export earnings is caused by the high ratio of primary products exported and the high degree of product and geographic concentration. This study also tests the hypothesis that an increase in real income and domestic prices causes an inflow of foreign assets whilst an increase in domestic assets and the credit financing of the government's budget deficit causes an outflow of foreign assets.

The Theoretical Basis for the Study (Chapter II) Model A: The Classical Adjustment Mechanism in an Open Economy.

The notion that an increase in exports and net inflow of capital can by generating a surplus in the balance of payments, subsequently induce, in the absence of neutralization policies, an increase in the money supply, an increase in domestic expenditures, an increase in money income, and an increase in imports, can be outlined formally, by first assuming the existence of a stable money demand function, which depends upon money income, that is:

$$(6 - 1) \quad Md = kY$$

where

Md = demand for money balances

Y = money income

Money income is defined as being equal to the product of domestic prices and real income, that is $Y = Py$. It is also assumed that the Cambridge k, which represents the proportion of money income held in the form of money balances, is constant and insensitive to changes in the interest rate.

Second, the process of money creation is defined on the basis of the consolidated accounts of the banking system,

which requires according to accounting principles that the total amount of monetary liabilities in the system be equal to the total amount of assets within the system, that is:

(6 - 2) $Ms \equiv R + D$

where

Ms = money supply

R = foreign assets

D = domestic assets

Consequently the changes in the money supply within the system is determined by either the changes in foreign assets and/or the changes in domestic assets. This relationship is expressed as follows:

(6 - 2a) $\Delta Ms \equiv \Delta R + \Delta D$

where

ΔMs = change in the money supply

ΔR = changes in foreign assets

ΔD = change in domestic assets

Furthermore the changes in foreign assets is defined as being equal to the balance of payments which is accordingly defined as the following:

(6 - 3) $\Delta R_t \equiv B_t \equiv X_t - I_t + K_t$

where

$\Delta R_t = B_t$ = the balance of payments

X_t = exports

I_t = imports

K = net autonomous capital inflow

Imports is considered to be dependent upon inomce with, m, representing the fraction of income that is expanded on imports:

(6 - 4) $I_t = mY_t$

Exports and net capital inflow is considered as being determined exogenously and is therefore specified as follows:

(6 - 5) $X_t = X_o$

(6 - 6) $K_t = K_o$

with X_o and K_o representing the annual values of exports and net capital inflow.

In the next equation domestic expenditures is defined as being a function of income and the state of liquidity in the economy, that is:

(6 - 7) $C = Y + \alpha(M_s - M_d)$

where

C = domestic expenditures

On the basis of equation (6-7) one can see that an increase in income and the existence of a state of excess liquidity will increase domestic expenditures; whilst the existence of a state of deficient liquidity will reduce domestic expenditures and that consumer expenditures will equal income when there is equilibrium in the monetary sector.

In the following equation, national income is defined as consisting of the sum of domestic expenditures and the balance on the current account:

(6 - 8) $Y = C + X - I$

In order that we may look at the effects of an increase in exports and net capital inflow on the various endogenous

variables within the system. It is furthermore assumed that there is continuous equilibrium in the monetary sector. Consequently by equating equations (6-1) and (6-2) we have the condition for monetary equilibrium, which is as follows:

$$(6-9) \qquad kY = R + D$$

$$\text{with} \quad k = \frac{1}{v}$$

Following this we can express equation (6-9) and (6-3) in first-difference form, that is:

$$(6-10) \qquad \Delta Y_t = v(\Delta R_t + \Delta D_t)$$

and

$$(6-11) \qquad \Delta R_t = B_t = \Delta X - \Delta I + \Delta K + B_{t-1}$$

By substituting equation (6-11) for ΔR_t in equation (6-10) and by assuming that the change in reserve and income is constant in equilibrium (Polak, 1957-58; Polak and Argy, 1971). The following long-run solution for income is obtained:

$$(6-12) \qquad \Delta Y = \frac{1}{m}\,\Delta(X + K)$$

Consequently, the solutions for the other endogenous variables in the system are expressed as follows:

$$(6-13) \qquad \Delta Ms = \frac{1}{mv}\,\Delta(X + K)$$

$$(6-14) \qquad \Delta I = c\Delta(X + K)$$

$$(6-15) \qquad B = \frac{1}{mv}\,\Delta(X + K) - b_1\Delta D$$

It is anticipated in this model that the estimated coefficient, $\frac{1}{m}$, for the foreign trade multiplier in equation (6-12) should be greater than unity. The estimated coefficient $\frac{1}{mv}$, in equation (6-13) is expected to be positive with the coefficient indicating the proportion of the increase in exports and net capital inflow which leaks out of the economy

in the form of imports. In the case of equation (6-14) it is anticipated that the estiamted coefficient, c, should have a value equal to one, if full adjustment occurs within the current period. The estimated coefficient for $\frac{1}{mv}$, in equation (6-15) is expected to be positive. The magnitude of the coefficient reflects the proportion of the increase in exports and net capital inflow which leaks out of the economy in the form of imports. The estimated coefficient, b_1, for the domestic credit variable in equation (6-15) is expected to be between $-1 \leq b_1 \leq 0$. The value of b_1 should approach -1, if, according to the assumptions of the model, the increases in domestic credit merely increased domestic expenditure on imports and hence leak out in its entirety from the system.

If equation (6-15) is estimated by ordinary least squares and if in addition the monetary authority neutralizes or reinforces the changes in its reserves unto its holdings of domestic assets; then the estimated coefficient will be biased. The nature of the bias which arises when equation (6-15) is estimated by ordinary least squares, can be shown in terms of the following very simple model: $B = b_1\Delta D + eV_1 + u$; $\Delta D = \alpha_o + \alpha_1 B + hV_2 + u^1$; where V_1 represents some other exogenous influence on B; V_2 also represents some other exogenous influence on D with u and u^1 being the error terms. A negative value for the estimated coefficient, α_1, indicates that some sterilization of foreign assets have occured, If the monetary authorities reinforce the changes in foreign assets unto its holdings of domestic assets, then the estimated coefficient, α_1, should be positive. The direction of the

asymptotic bias can be determined from the following formula: (Johnston, 1972, Chap. 10; Kouri and Porter, 1974, pp. 453-454; Porter, 1972, pp. 402-403)

$$\text{plim} \quad (b_1 - \hat{b}_1) = \left[\alpha_1 (1 - b_1 \alpha_1) \sigma_u^2 \right] \Big| (h^2 \bar{M} v_2 v_2 + \sigma_{u'}^2 + \alpha_1^2 \sigma_u^2),$$

where

σ_u^2 = the variance of u;

σ_u^2 = variance of u';

$\bar{M} v_2 v_2$ = asymptotic variance of v_2.

Thus on the basis of this formulae one can see that when α_1 is negative, the estimated coefficient b_1 is biased towards -1 and when a_1 is positive that the coefficient will biased towards 0. Consequently in order to recognize this possible simultaneous relationship between the balance of payments and changes in domestic assets, equation (6-15) in conjunction with the following equation:

$$(6 - 16) \qquad \Delta D = \alpha_1 B + \alpha_2 GD$$

where

GD = government budget deficit

will be estimated by a two-stage procedure.

One of the consequences of this automatic process of adjustment, is that in the absence of the use of counter-cyclical domestic monetary and fiscal policies ther is the constant upsetting of internal stability whenever there is disequilibrium in the external sector. For the developing countries empirical studies by Coppock (1962), MacBean (1968) and Massell (1970) seem to suggest that the principal factor

responsible for initiating the disequilibrium in the external sector is the excessive changes or instability in the countries' export earnings. It is further suggested that the causes of the instability in export earnings lie in their specialization in producing primary producing, their concentration upon too few products for exports, and the concentration of their trading relations to a limited number of countries (MacBean, 1966) that is:

$$(6 - 17) \quad IX = a + b_1 PR + b_2 CC + b_3 GC$$

where

IX = instability in export earnings

PR = ratio of primary product exports to total exports

CC = commodity concentration index

GC = geographic concentration index.

It has also been suggested by MacBean (1966) that non-economic factors such as war and politics within the less developed countries may be more responsible for these countries instability in export earnings. Following this, it is then suggested that instability in domestic money income in the less developed countries is generated by instability in their export earnings, that is:

$$(6 - 18) \quad IY = a + b\ IX$$

where

IY = instability in money income.

Furthermore with part of the adjustment process requiring that there be a direct change in imports for every change in exports, in conjunction with the assumption that most of the imports is comprised of imported capital goods which are used

to increase domestic investment. It is then suggested on this basis, that the instability in export earnings also causes instability in total domestic investment, that is:

(6 - 19) $IV = a + b_1 IX$

where

IV = instability in domestic investment.

Model B: The Adjustment Mechanism in an Open Economy According to the Monetary Approach to Balance of Payments Theory

In the monetary approach to balance of payments theory and balance of payments adjustment, the emphasis in the analysis has shifted from the factors that determine the money supply, to those factors that determine the demand for money. The demand for money as previously specified is dependent upon the level of money income, that is

(6 - 1) $Md = kY$

It is furthermore assumed that in the long-run nominal income will by definition be equal to the domestic price level times the level of real output:

(6 - 1a) $Y = Py$

where

P = domestic price level

y = real income

Hence by substituting equation (6-1a) for money income in equation (6-1) we have the following demand for money function:

(6 - 1c) $Md = kPy$

By further assuming that there is a state of continuous equilibrium in the money market, we have the equilibrium condition, that the demand for money is equal to the money supply, that is

$$(6-20) \quad kPy = R + D$$

Following this the expression in equation (6-20) is expressed in logarithmic form and then differentiated with respect to time, from which the following reserve flow equation is obtained (see Johnson, 1972):

$$(6-21) \quad r = \left(\frac{R}{R+D}\right) g_r = g_y + g_k + g_{P_d} - \left(\frac{D}{R+D}\right) g_d + e$$

where

g_r = growth in foreign assets

r = $(R|R+D)g_r$

g_y = growth in real income

g_k = growth in the fraction of income people hold in the form of money balances

g_p = growth in price level

g_d = growth in domestic assets.

In this new monetary approach to balance of payments theory, increases in real income are assumed to be exogenously determined by increases in the factors of production and increases in productivity. The changes in domestic price level, via the small country assumption are also assumed to be exogenously determined by changes in the world price level. The increases in the domestic credit variable represents the only factor that the domestic monetary authority can control and by so doing, control the flow of reserves.

A specific look at the effects on the flow of international reserves resulting from the credit financing of the government's annual budget deficit can be obtained by assuming first that there is no lending by the banking

system to the private sector. Second, that the government in order to finance its budget deficit, obtains credit from the monetary authority. Consequently, the growth in the government's budget deficit would determine the growth of the domestic credit within the economy, that is

$$(6 - 22) \qquad g_d = b_5 g_{GD}$$

where

g_{GD} = growth in the government's budget deficit.

Hence by substituting equation (6-22) for g_d in equation (6-21) we obtain the following reserve flow equation:

$$(6 - 23) \quad r = \left(\frac{R}{R+D}\right) g_r = g_y + g_p + g_k - b_5 \left(\frac{D}{R+D}\right) g_{GD} + u$$

For equations (6-21) and (6-23) it is anticipated that the coefficient for the income elasticitv of demand for money would be positive and that it would also be in the neighborhood of unity. This direct relationship between growth in real income and the balance of payments represents, on the one hand, one of the major implications resulting from the new monetary approach to balance of payments theory, which views a surplus or deficit in the balance of apyments as a reflection of the process of stock adjustment in the money market. On the other hand, this result is at variance with the theme which was once dominant in the early post World War II period. The economic models in that era seem to suggest that the increase in the rate of economic growth will only result in the increase in imports and thereby cause the balance of payments to deteriorate. (Johnson, 1954).

Changes in the domestic price variable are assumed to exert a positive effect on the flow of reserves, since an increase in the price level will reduce the holding of real money balances. This consequently leads to an increase in the desire for additional money balances. The subsequent reduction in domestic expenditures in response to the increase in the demand for money balances will generate an inflow of reserves.

The coefficient, b_5, for the goverment budget deficit varialbe is expected to have the following value: $-1 \leq b_5 \leq 0$. If the expansion of the government budget deficit does not result in increasing the demand for money, by an amount, which exceeds the increase in the money supply (Dornbusch, 1971). In the extreme case, the value of the coefficient would tend to approach minus one, if the credit financing of the government budget deficit merely stimulates domestic expenditure on imports and hence leaks out of the economy in its entirety.

It is also anticipated that the coefficient for the variables, g_p and $(D|D+R)g_d$ should respectively be +1 and -1. The coefficient for $(D|D+R)g_d$ would however be biased in the direction of -1, if the monetary authority attempt to neutralize the monetary impulses arising from the balance of payments. It would also be biased towards zero if the monetary authority attempt to reinforce the changes in its holdings of net foreign assets unto its holdings of domestic assets (Olakanpo, 1961). Consequently in order to recognize this simultaneous relationship between the changes in foreign assets and domestic

assets, equation (6-21) in conjunction with the following policy reaction function:

(6 - 24) $d = (D|D+R)g_d = b_1(R|R+D)g_r + b_5 g_{GD} + V''$

will be estimated by two-stage least squares

The Empirical Results (Chapters IV and V)

The estimates for equations (6-12), (6-13), (6-14), (6-15) and (6-16) are reported in Table VI-1. In Table VI-2 the estimates for (6-17), (6-18) and (6-19) are reported, whilst Table VI-3 presents some instability indices for three of Guyana's major export products. Table VI-4 records the estimates for equations (6-21), (6-22) and (6-24). It also records the estimated coefficients for the hypothesis that growth in money income increases the demand for cash balances and that the rate of growth in the domestic price level is determined by the average rate of growth in domestic prices in the United Kingdom, the United States of America, and Canada.

The data used in the estimation of equations (6-12) through (6-16) consists of annual data for the period between 1955-1973. A preliminary estimation of equations (6-12), (6-13) and (6-14) by ordinary least squares yielded very low values for the Durbin-Watson statistic which suggested that residuals in these equations were serially correlated. Consequently, these equations were transformed according to the following scheme: $Z^t = Z_t - \rho_1 Z_{t-1} + \rho_2 Z_{t-2}$, where ρ_i is the autoregressive coefficient. The placing of the asterisk next to the regressions reported in Table I indicates that the variable has been transformed according to the above scheme.

TABLE VI-1

ESTIMATES OF THE MONETARY PROCESS OF ADJUSTMENT
ACCORDING TO THE QUANTITY THEORY OF MONEY

DEPENDENT VARIABLE	CONSTANT	Δ(X+K)	ΔD	B	GD	R^2	D-W	METHOD OF ESTIMATION
(12)-ΔY*	-	.81 (4.62)	-	-	-	-	2.45	OLSQ
(13)-ΔMs*	-	.09 (4.62)	-	-	-	-	1.43	OLSQ
(14)-ΔI*	-	.70 (5.29)	-	-	-	-	1.68	OLSQ
(15)-B	-	.09 (1.85)	-.88 (-10.61)	-	-	.87	1.27[a]	OLSQ
(15)-B	-	.07 (1.28)	-.64 (-4.69)	-	-	-	-	TSLS
(16)-ΔD	-	-	-	-.86 (-5.42)	.11 (4.66)	-	-	TSLS

Note: Sample period: 1955-1973; Figures in parenthesis are t-statistics; D-W = Durbin-Watson statistics; OLSQ = oridnary least squares; TSLS = two-stage least squares; B = balance of payments; ΔD = change in domestic assets; Δ(X+K) = change in the sum of exports and net capital inflow; GD = government budget deficit

[a]The Durbin-Watson statistic is in the uncertain region at the 95 percent level.

The results from testing the monetary process of adjustment according to the simple version of the quantity theory of money, indicate that the process of adjustment occurs fairly rapidly. In fact within a year the changes in imports adjust almost completely to changes in the sum of exports and net capital inflows. The estimated coefficient for c, is .70. The estimated coefficients for changes in the sum of exports and net capital inflow for equations (6-13) and (6-15) indicate that a very great proportion of the increase in exports and net capital inflow leak out of the economy in the first year in the form of imports. Thus at the end of the year the increase in exports and net capital inflow have just a marginal effect on the country's net foreign assets and the country's money supply. The coefficient for the domestic credit variable is -.88, when equation (6-15) is estimated by ordianry least squares. The value of the coefficient is -.64 when the equation is estimated by two-stage-least squares. These results indicate that a significant portion of the country's foreign assets are lost as a result of the expansion of bank credit. The estimated coefficient for the foreign trade multiplier is very low.

One of the consequences of this adjustment process is that it entails the persistent upsetting of internal economic conditions in order that equilibrium might be maintained in the external sector. For the developing countries the excessive changes or instability in exports for various reasons - for example, a high ratio of primary product exports to total exports, and a high degree of product and

geographic concentration - have been identified through the persistent disturbance of equilibrium in the balance of payments as the factor which causes instability or excessive changes in domestic economic activity. Table VI-2 reports the effects of the instability in export earnings on domestic economic activity. It also reports the estimated coefficients for the various factors which have been suggested to explain the instability in export earnings. Table VI-3 presents instability indices for three of Guyana's major export products.

The results in Table VI-2 indicate that the instability in Guyana's export earnings have contributed to the instability in domestic money income. The estimated coefficinet for the instability in exports variable is 1.01. The t-statistic indicate that the coefficient is highly significant. The estimated coefficient for the instability index in export earnings when regressed on the instability index for domestic investment is .87. The t-statistic is however insignificant. The results also fail to corroborate any of the various notions which have been advanced to explain the excessive degree of fluctuations in developing countries export earnings. The only significant factor in equation (6-17) is the dummy variable which is included as a means of reflecting the political uncertainties and social unrest which occured between 1955-1965.

The results in Table VI-3 indicate that the export earnings from rice are relatively more unstable than the earnings acquired from exporting sugar and bauxite. It also indicates that instability in the quantity of rice exported is greater

TABLE VI-2

INSTABILITY IN EXPORTS, INCOME AND INVESTMENT

DEPENDENT VARIABLE	CONSTANT	IX	PR	CC	GC	PL	R^2	D-W
(17)-IX	.03 (.59)	-	-.04 (-.80)	-.003 (-.07)	+.04 (1.26)		.15	2.21
(17)-IX	.02 (.45)	-	-.012 (-.20)	+.018 (.42)	-.018 (-.37)	-.010 (1.75)	.32	2.36
(18)-IY	.002 (1.62)	1.01 (3.47)	-	-	-	-	.38	1.58
(19)-IV	.02 (2.64)	.87 (1.09)	-	-	-	-	.07	1.87

Note: Sample period for equation (19) is 1952-1973, whilst for the other equations it is 1955-1973. Figures in parenthesis are the t-statistics; D-W = Durbin-Watson Statistic; IX = instability in export earnings; IY = instability in money income; IV = instability in domestic investment; PR = ratio of primary products exports to total exports; CC = commodity concentration index; GC = geographic concentration index; PL = dummy variable. PL is equal to 0 for the period between 1956 to 1965 and 1 for the period 1966 to 1973.

TABLE VI-3

INSTABILITY INDICES FOR QUANTITY, UNIT VALUE AND TOTAL VALUE OF GUYANA'S MAJOR EXPORT COMMODITIES: 1956-1973

COMMODITY	AVERAGE ANNUAL DEVIATIONS FROM GROWTH PATH (I-I*INDEX)
Rice:	
Quantity	.051
Unit Value	.010
Total Value	.065
Bauxite:	
Quantity	.014
Unit Value	.015
Total Value	.019
Sugar:	
Quantity	.015
Unit Value	.021
Total Value	.019
Total Exports:	
Quantity	.011
Unit Value	.010
Total Value	.007

Note: The instability index (I-I*) was computed according to the method used by Massell (1970).

than the instability in the unit value (price) of rice. Also instability in the quantity of Guyana's total exports is just slightly greater than the instability in the price which Guyana's receives for its exports.

The results from testing the proposition associated with the new monetary approach to balance of payments theory are reported in Table VI-4. These results tend to substantiate in general the various notions associated with the new monetary approach to balance of payments theory. The notion that the rate of inflation in an open economy under a system of fixed exchange rate is determined by the rate of inflation in the world, is substantiated by the experience in Guyana. The estimated coefficient for this regression is 1.00. The t-statistic indicate that the coefficient is significant. The results also indicate that most of the variations in money balances are explained by the variations in money income. The estimation of the reserve flow equation indicates that one of the principal factors generating an outflow of foreign reserves in Guyana is the domestic credit variable. The coefficient for this variable is -.86, when the reserve flow equation is estimated in conjunction with the policy reaction equation, by two-stage-least-squares. The corresponding t-statistic for the test of the hypothesis that the value of the coefficient, for the domestic credit variable is indeed equal to -1 is .25. Thus one cannot reject this hypothesis. The following t-statistics for a test of the hypothesis that the value of the coefficient for g_k and g_p is indeed equal to

TABLE VI-4

ESTIMATES FOR THE VARIOUS NOTIONS ASSOCIATED WITH THE MONETARY APPROACH TO BALANCE OF PAYMENTS THEORY

DEPENDENT VARIABLE	g_y	$(\dot{P}\|P)$**	g_{GD}	g_y	g_p	g_k	d	G	r	R^2	D-W	METHOD OF ESTIMATION
g_m	.60 (39.12)	-	-	-	-	-	-	-	-	.98	1.31[a]	OLSQ
g_p	-	1.00 (239.5)	-	-	-	-	-	-	-	.99	1.31[a]	OLSQ
$r=(R\|R+D)g_r$	-	-	-	.62 (.99)	1.48 (7.88)	1.70 (3.69)	-.33 (-3.20	-	-	.97	1.61	OLSQ
$r=(R\|R+D)g_r$	-	-	-	.17 (.24)	1.51 (6.82)	1.63 (3.06)	-	-.47 (2.10)	-	.96	1.78	OLSQ
$r=(R\|R+D)g_r$	-	-	-	1.27 (1.02)	1.64 (4.58)	2.31 (2.35)	-.86 (-1.55)	-	-	-	-	TSLS
$d=(D\|R+D)g_d$	-	-	.18 (1.07)	-	-	-	-	-	-.13 (-.84)	-	-	TSLS

Notes: Sample period: 1956-1973; Figures in parenthesis are the t-statistics; D-W = Durbin-Watson statistic; OLSQ = ordinary least squares; TSLS = two-stage least squares; g_m = growth in nominal money balances; g_y = growth in money income; $(P|P)$** = average rate of growth in the price levels for the United Kingdom, the United States and Canada g_{GD} = growth in the government's budget deficit; g_y = growth in real income; g_p = growth in domestic price level; g_k = growth in fraction of income that people hold as money balances; g_d = growth in domestic assets; g_r = growth in net foreign assets; $G = (D|R+D)g_{GD}$; $r = (R|R+D)g_r$; $d = (D|D+R)g_d$.

[a]The Durbin-Watson statistic is in the uncertain region at the 95 percent level.

+1 and +1 respectively, are 1.32 and 1.85. The result also indicates that the credit financing of the government's budget deficit has been one of the factors responsible for the country's loss of reserves. One of the disappointing aspect of the results is that the growth rate in real income fails to be statistically significant. Also the estimated coefficients in equation (6-24) are all insignificant.

CHAPTER VII

CONCLUSIONS

The purpose of this study has been to examine on the basis of the economic experience of Guyana between 1955-1973, the monetary process of adjustment in an open economy. This objective is accomplished by looking at the process of adjustment which ensures equilibrium in the money market, according to the monetary approach to balance of payments theory. This study also examines on the basis of a simple version of the quantity theory of money, whether the attempt to maintain equilibrium in the external sector has resulted in excessive changes or instability in domestic economic activity. In particular it examines whether the excessive changes in export earnings by constantly disturbing equilibrium in the balance of payments have resulted in excessive changes or instability in money income and domestic investment. The study also looks at the reasons which have been suggested to explain the instability in export earnings in the less developed countries. Consequently, the main findings of this study can be presented in terms of the following three categories: (a) findings based on the simple quantity theory of money; (b) findings on the relationship between instability in export earnings and instability in domestic

economic activity. This category will also discuss the findings with regards to the suggested reasons for the instability in the export earnings of the less developed countries. The final category (c) will discuss the findings based on the new monetary approach to balance of payments theory.

A. First, one of the interesting aspect of the results based on the adjustment mechanism of the old version of the quantity theory of money, is the indication that within one year the changes in imports adjust almost completely to the changes in exports and net capital inflow. This implies that most of the income generated from an increase in exports and net capital flows is respent within the period of one year.

Second, the analysis indicates that the multiplier effects of an increase in imports and net capital inflows on money income is very small. This therefore, indicates that a large protion of the income generated from exports and net caiptal flow is expended on imported goods and services.

Third, the results suggest that the effect of an increase in exports and net inflows of foreign capital on the country's foreign assets and its money supply is very small, since the ratio of the community deisre for holding money relative to the demand for imports is small. Furthermore, the results demonstrate that the excessive expansion of bank credit is responsible for the loss of reserves by the banking system.

B. Fourth, the analysis indicates for Guyana that the instability in export earnings by constantly upsetting equilibrium in the balance of payments have generated a similar

degree of instability in money income. The empirical analysis however failed to support any of the a priori economic reasons which have been suggested in order to explain the excessive changes in export earnings. It however did indicate that the instability in export earnings have been generated by the political uncertainties and civil strife which occured prior to 1965. The analysis also indicates that instability in Guyana's total export earnings arise more from the instability in the volume of its total exports than from the instability in the price (unit value) that it receives for its exported products. The results also indicate that the export earnings from rice were more unstable than the export earnings from sugar and bauxite.

C. Fifth, the empirical analysis in this section yield results which in general support the basic notions of the new monetary approach to balance of payments. The empirical results indicate that the rate of inflation in Guyana is closely related to the average rate of inflation in the United Kingdom, Canada, and the United States. It also indicates that the growth in money income results in an increase in the demand for money balances. The subsequent substitution of the demand for money function into the banking system, balance sheet identity also yields in general very good fits for the reserve flow equations. The results indicate very interestingly that the growth in real income although positvely associated with reserve flows is nevertheless not a statistically significant factor in explaining reserve flows in Guyana.

It instead demonstrates that most of the flow in reserves occur as a result of the excessive expansion of domestic credit and the financing of the government budget deficit by money creation.

The important policy recommendation resulting from this study, is that the monetary authorities after having determined the desired rate of change in their foreign assets, should attempt to control the expansion of bank credit so that it is consistent with either growth in real income and growth in the domestic price level, or with the anticipated proceeds from exports and net capital inflows.

APPENDIX A

In most studies instability in exports, income, etc., is defined as the fluctuations around the trend value rather than fluctuations around the mean value. The fluctuations around the trend value is chosen as the bench-mark for measuring instability since the total fluctuation for any given year consists of two components; first, a variation which will reflect secular forces and secondly, a variation which will be due to short-run forces. It is these short-run forces which will determine the degree of instability and which if it is not excluded from the secular forces will produce an index which interprets a constant increase or decrease in income, exports, etc., as an indicator of instability.

Measures of Instability

There are basically about seven measures of instability, which have been used at one time or another;

1. The first measure of instability is the square root of the logarithmic variance, which was developed by Coppock (1962). This method of measuring instability eliminates the trend factor from the overall variation by considering the first and last observations.

   $I - I_{CC} = 100 \text{ times anti} \sqrt{V_{log}}$,

where

$$V_{log} = \frac{\Sigma(\log \frac{X_{t-1}}{X_t} - m)^2}{N}$$

where X is the monetary value of a country's exports, income, etc., in year t; N is the number of years minus 1; m is the arithmetic mean of the difference between the logs of the X's, e.g., $X_{t-1} - X_t$; and V_{log} is the logarithmic variance of the series.

2. A second method of measuring instability, which was used by Massell in his 1964 paper was the average annual percentage rate of change in the value of exports. This measure also eliminates the growth factor from the overall fluctuation, and it is also independent of the size of the variables. It is expressed as follows:

$$I - I = \Sigma \frac{w}{n} t$$

where

$$w_t = \frac{|u_{t+1} - u_t|}{\max[Z_t, z_{t+1}]}$$

where

$$Z_t = b_o + b_1 t$$

$$u_t = Z_t - (b_o + b_1 t)$$

n = number of years in the series

3. A third measure is that of the normalized standard error of estimate. This method which has been used respectively by Staller (1964) and Neuberger (1964) also eliminates the trend factor and measures the variation for the entire series around the trend value. This method is algebraically expressed as follows:

$$I = \frac{\sqrt{\frac{\Sigma(u_t)^2}{n}}}{\bar{Z}}$$

where

$Z_t = B_o + B_1 t$

$u_t = Z_t - (B_o + B_1 t)$

n = number of years in series

$\bar{Z} = \Sigma Z_t/n$

4. A fourth measure of instability is that of the normalized value of the standard deviation. This method does not eliminate the trend factor and it also gives the variation for the entire series. The algebraic expression of the normalized value of the standard deviation is simply the standard deviation of the annual observed values divided by the arithmetic mean of the observations, and it is expressed as follows:

$$I - I = \frac{\sigma}{\bar{Y}} = \frac{\sqrt{\frac{\Sigma(Y_t - \bar{Y})^2}{n - 1}}}{\bar{Y}}$$

where

Y_t = annual observations

$\bar{Y}$ = arithmetic mean of the observations y_t

n = number of observations.

4. A fifth method of measuring instability was that used by the United Nations in their 1952 study on <u>Instability in Export Markets of the Underdeveloped Countries</u>. This method does not eliminate the trend and hence can indicate very high levels of instability if there is high but stable level of secular growth. The United Nations index can be computed by obtaining the absolute difference in values from year-to-year, and then expressing the absolute difference as a percentage of the larger of the two annual values. Following this the percentages are averaged. The algebraic expression is as follows:

$$I - I_{un} = \frac{\sum_{t=2}^{n} \left| \frac{Y_t - Y_{t-1}}{Y_t^*} \right|}{n - 1}$$

where

Y_t^* = the larger of Y_t or Y_{t-1}

Y = annual observations

t = the year

n = number of observations

6. A sixth method of measuring instability was used by MacBean who in his book measured the degree of instability as the sum of absolute deviations from a five-year moving average.

7. Massell in his 1970 paper also use a slightly different index of instability, which was based on the sum of squared deviations from an exponential trend line. This method is preferred over the method which measures instability as the deviations from a linear trend line since, as suggested by Massell (1970), economic planners and policy makers are more interested in the rate of growth in income, exports, etc., than absolute changes in these variables. It is this index of instability which was used to compute the degree of fluctuations in income, export earnings, volume of exports, and unit value of exports for Guyana. This index of instability is expressed as follows:

$$I - I^* = \frac{\Sigma W_t}{n}$$

where

$$\Sigma W_t = \frac{|u_{t+1} - u_t|}{\max\left[Z_t, Z_{t+1}\right]}$$

and with $\log Z_t = a + bt + u$

$u_t = \log Z - (a + bt)$

n = number of years

Measures of Export and Geographic Concentration

The Hirschman-Gini coefficient which is a measure of relative dispersion within a series, will be used as a measure of degree of commodity and geographic concentration (Hirshcman, 1945). The Hirshcman-Gini concentration index is expressed as follows:

$$C = \sqrt{\Sigma\left(\frac{X_{ij}}{X_j}\right)^2}$$

with X_{ij} representing for example the value of exports for product i in some specified year and X_j representing the total value of country J's exports in the specified year.

The use of this index possess certain desirable properties along with some defects. The measure of concentration since it is a measure of relative dispersion within the series, would decline if the resources used to produce any given number of exported products are more evenly distributed among those products. The concentration index also incorporates the effects that the number of goods which a country exports have on the degree of concentration. The degree of concentration is determined by the following;

$$\frac{100}{\sqrt{n}}$$

and it has a range between 0 and 100, with the upper limit being attained when n is 1. The lower limit or a low degree of concentration is achieved when n is sufficiently large.

The defects in the use of this index as a measure of concentration have been lucidly pointed out by Michaely, Massell, and MacBean. The commodity concentration index is greatly influenced by the manner in which "commodities" are defined. For example if the one or two digit code of the SITC is used, then it is quite possible that commodities which are heterogeneous will be classified as one commodity, whilst on the other hand if the fourth or fifth digit code of the SITC is used in classifying products, commodities which are

similar are treated as being heterogeneous; so that the number of commodities will be very large. Consequently the degree of concentration will be biased upwards if the one or two digit code of the SITC is used, or it will be biased downwards if the fourth and fifth digit code is used.

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BIOGRAPHICAL SKETCH

Nelson C. Modeste was born on April 21, 1951 at Georgetown, Guyana, South America. He is the son of Mrs. Ethel Modeste and the late Mr. James Modeste. He attended Central Preparatory School and Central High School, Georgetown, Guyana. He received his B.S. (Economics) from Tuskegee Institute (Tuskegee Institute, Alabama) in May 1972.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Michael B. Connolly, Chairman
Professor of Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

William G. Tyler
Associate Professor Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Philip Friedman
Assistant Professor of Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

G. S. Maddala
Graduate Research Professor
of Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

E. D. Emerson
Assistant Professor of Food
Resource Economics

This dissertation was submitted to the Graduate Faculty of the Department of Economics in the College of Business Administration and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December, 1976

Dean, Graduate School