MACRO/MONETARY RELATIONSHIPS IN THE CARIBBEAN:

AN ECLECTIC REVIEW OF THE LITERATURE

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(Paper Presented To The 18th Regional Programme of Monetary Studies Conference, St. Kitts, November 5–7, 1986)

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I. THE ROLE OF MONEY IN ECONOMIC ACTIVITY

An overview of a macro-economic analysis in the Caribbean reveals that the early models of Caribbean economy as articulated by Dudley Seers (1964), Kennedy (1965), Brewster (1969) and Bruce (1972) did not explicitly incorporate the monetary sector. On the one hand, this lacuna may have been a mere oversight on the part of these authors who were concerned to explain the process of income determination or, in the case

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The views expressed here are those of the authors and not necessarily those of the Central Bank of Trinidad and Tobago. We describe our review as 'eclectic' partly because we have not sought to include every written piece on the topic, in particular we have omitted some unpublished work, and partly because we sought to identify the more significant writing in the field, which is always a matter of judgement and, ultimately, controversy. Monetary writing has also been reviewed by Howard (1979).

of Seers, employment determination in the small open economies of the Caribbean. On the other hand, the absence of an explicit model of monetary relationships in their macro-economic models may have been quite deliberate, reflecting the fact that, up until 1970, the Caribbean monetary economy was characterised by dependence and relationships inherited from the colonial past. It is only with the advent of Central Banks in the region, and therefore the possibility of active monetary policy, that the question of the role of money in economic activity would have become interesting and important.

I.1 The Colonial Monetary Economy

Prior to Thomas' article in 1963 on the balance of payments and money supply in a colonial monetary economy (Thomas 1963), the dominant thinking on the role of money in economic activity appears to have been that (i) the money supply was a completely endogenous variable, determined by the balance of payments; (ii) variations in the money supply therefore reflected balance of payments surpluses and deficits, which were self-correcting over the short-run and could have no lasting impact on the level of economic activity. In this situation as well, the demand for money was neither particularly interesting nor important although significance could have been attached to the composition of the demand for money i.e. the relative demand for currency, bank deposits and other liquid assets. Interest rates were less important for their

significance in respect of the level of economic activity than they were, proximately at least, for the balance of payments, given free and full convertibility to sterling and a fixed exchange rate.

The institutional basis of this lack of significance of money in the economy was that (i) in the absence of a Central Bank, Governments did not have the capacity to run fiscal deficits which could be financed by Central Bank money creation; (ii) the currency board arrangements and the 100 per cent plus backing of the local currency issues by sterling, served to ensure that the amount of currency circulating in the economy was tightly and indeed inextricably linked to the ability of the economy to generate an export surplus.

Thomas' important contribution to the analysis of the colonial monetary economy was to argue that even though there was no Central Bank with an independent money creation capacity, the foreign-owned commercial banks operating in the system were capable of independent action which could, in the short-run at least, affect the rate of change of the money supply and affect how long a balance of payments deficit could be sustained. The crux of Thomas' argument was that in the colonial monetary economy while the balance of payments did determine the money supply, the supply of money, influenced by the independent action of the commercial banks, could in turn influence the balance of payments. Second, balance of payments problems in such economies were evinced by

changes in the level and pace of economic activity rather than by exchange rate changes, reserve decumulation or an increase in foreign borrowing.[1]

In his 1965 monograph on the colonial monetary economy of British Guyana, Thomas addresses the question of the demand for money in such economies, choosing as his point of attack the constancy or otherwise of the income velocity of money. Thomas argued that the income velocity of money was relatively constant in British Guiana over his reference period, 1945 to 1962. He attributes this relative stability to the fact that income in British Guiana was growing slowly over the period, that most of the wealth of the country was in the hands of foreign investors, and that given the absence of alternative financial assets, goods and services constituted the effective substitute for money.

Essentially, Thomas was arguing that the demand for money was largely a transactions demand and that the interest rate effect in the demand for money function would be negligible. He argued in addition,

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1 Hazelwood (1954) in many respects presages Thomas' arguments of 1963. He argued that banks could expand credit to such an extent that the demand for imports exceeds the sterling available to pay for them. However, this will be reflected eventually in the banks borrowing from Head Office to meet their obligations. If foreign borrowing was not available, a balance of payments problems would be reflected in bank failures. See also Analyst (1953).

that the long run income elasticity of demand for money was likely to be greater than unity. Thomas' model of the demand for money, therefore, is closer to the Classical Quantity Theory of Money than to either the modern quantity theory or post-Keynesian portfolio choice models. However, the empirical support he adduced for the relative constancy of income velocity was, by contemporary standards, weak.

Best and Mc Intyre (1965) in reviewing monetary policy by the then recently established Bank of Jamaica, put forward, implicitly at least, a model in which bank credit is important to the pace of economic activity. They postulated that the rate of interest influences the demand for credit and in turn, therefore, influences investment and the level of income. Their concern was to point out that the defensive use of the re-discount rate by the Bank of Jamaica to prevent an outflow of funds when interest rates in the United Kingdom rose, could be counter-productive in the domestic economy since the ensuing increase in domestic interest rates would lower the demand for credit, investment, and the level of income. In addition, if interest costs were significant in total costs, higher domestic interest rates would serve to push up the domestic price level. While the policy issue raised by Best and Mc Intyre was interesting, the significance of their argument for us here is the importance they attached, along the lines of the Radcliffe Committee, to the cost and availability of credit as the relevant monetary

determinants of the level of economic activity. However, Best and Mc Intyre's arguments were entirely rhetorical. They adduced no empirical support whatever for their arguments.

I.2 The Era of Central Banking

I.2.1 The Demand of Money (Single Equation Estimates)[2]

The first empirical analysis of the demand for money using modern econometric techniques was Bourne (1974). Bourne articulated and elaborated a theoretical structure of the demand for financial assets by households and business firms which incorporated many of the techniques then held to be virtuous in 'rigorous' economic analysis[3]. His actual estimating equation is arrived at by a process of aggregation and by assuming away certain important variables which his theoretical analysis had identified should be incorporated in the demand for money function.

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2 Demand for money functions have appeared in macro-econometric models of various Caribbean economies. These contributions require separate detailed treatment and are not discussed here. See however, Worrell (1973).

3 The article evinces a high degree of mathematical and statistical sophistication of a kind associated with the imperatives of doctoral candidacy or the early years of academic life. The empirical econometric analysis which follows however, seems to be anti-climactic.

His model, based on quarterly data for Jamaica for the period 1962-1 to 1974-4, assumed homogeneity of the degree one in prices and had as its arguments the rate of interest on time and savings deposits, GNP and the expected rate of price inflation. Variants were run for both narrow and broad money, with variants in which real and nominal interest rates were used alternatively. Because the specification of the demand for money function included expectations, the estimated equations contained lagged values of the money supply, the interest rate variable, price changes, and income.

Bourne's results turned out to be inconsistent and, in many respects, implausible. A significant error was his failure to drop the rate on time and savings deposits from the M-2 variant of his model since it becomes an own rate in that specification rather than an opportunity cost variable. The income elasticities obtained were in some instances negative or had implausible positive values. The rate of interest is not statistically significant, although this does not prevent Bourne from calculating elasticities from a zero interest rate co-efficient. The real value of Bourne's study is that it virtually pioneers the use of modern econometric techniques in the investigation of particular economic phenomena, in this case the demand for money in the Caribbean economies. Bourne's approach and methods were to be replicated by Howard (1979 and 1981) who estimated the demand for money function for Trinidad and Tobago

and Barbados, Joefield Napier (1979) for Trinidad and Tobago and Ramsaran and Maraj (1985) also for Trinidad and Tobago.

Essentially, four (4) issues have arisen in the empirical analysis of demand for money functions in the Caribbean over the last twelve (12) years. The first concerns whether real or nominal money should be used in the specification, an issue which turns on the degree of homogeneity of the demand for money in respect of the general level of prices. Bourne used real money balances, an approach consistent with the metropolitan literature on the demand for money where homogeneity of degree one in the general level of prices has apparently been empirically established. Howard, on the other hand, has argued that the distinction between real and nominal money is less important in the open economy and pointed to his study of the demand for money in Barbados which suggested that the price elasticity of demand of nominal money balances was significantly different from unity (Howard 1979).

The second issue is the appropriateness of current or permanent income or wealth in the specification in the demand for money. Virtually all of the econometric studies have suggested that current income is the preferred variable although Ramsaran and Maraj (1985) attempt to make a case for 'permanent income'.

The third issue concerns the significance or otherwise of the interest rate in the demand for money function. Bourne and Howard found

that the interest rate co-efficient was not significantly different from zero. However, Howard, in his study of Trinidad and Tobago, suggested that, in partial adjustment specifications, the interest elasticity of the demand for money was low but statistically significant, although it was not significant in other specifications[4]. In his study of Barbados, he finds that the interest rate variable is not significantly different from zero. Joefield-Napier (1979) finds the short-term interest rate variable statistically significant in his model of the demand for money in Trinidad and Tobago over the period 1970-1 to 1978-4. Joefield-Napier does not discuss this result at any length, an especially curious situation since the interest rate coefficient carries the wrong sign!

The fourth issue concerns the inclusion of other variables in the demand for money function, a practice which has been popular in models of the demand for money in LDCs. The one variable which has proved to be important has been the rate of inflation or price expectations, reflecting the substitutability between money and goods and services.

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4 It must be pointed out however that a low, but statistically significant interest elasticity of demand for money is economically insignificant. For an eye-opening and entertaining discussion of this issue of 'significance', see D. Mc Closkey, 'The Rhetoric of Significance Tests' in his The Rhetoric of Economics Wheatsheaf, 1986.

The significance of this variable in the demand for money function in Caribbean economies, suggests that monetary factors may influence the inflationary process in these economies, an issue we turn to later in this review.

I.2.2 The Credit Conditions Approach

Another approach to the analysis of the role of monetary variables in economic activity and the role of monetary policy has been articulated in recent times by Worrell (1984). This approach focuses on credit conditions i.e. the cost of availability of credit to firms, households and Government. The approach has its intellectual antecedents in the work of Best and Mc Intyre who had themselves drawn on the Radcliffe Committee. Also relevant to this approach are the empirical surveys of business financial behaviour and the link between firm behaviour and commercial bank portfolio decisions [Bourne (1972), Farrell, Najjar and Marcelle (1986), Ramkissoon 1982)].

Worrell's analysis breaks new ground, however, in that (i) he employs a simultaneous equation model explaining the demand for credit, the cost of credit (the loan rate of interest), bank deposits and foreign borrowing by commercial banks; (ii) the analysis is grounded in a view of finance as a factor of production and an empirical analysis of bank

portfolio behaviour. Such an approach had been hinted at by Bourne in his theoretical approach in the demand for money in Jamaica and has also recently been developed by Ramkissoon and Watson (1984) in their model of the financial sector in Trinidad and Tobago.

Worrell's results, however, are mixed. While the demand for credit function is well established, he has considerably less success in explaining the determination of the loan rate of interest, foreign borrowing by banks and the deposit rate of interest. Foreign borrowing by banks in Trinidad and Tobago in order to lend locally is virtually non-existent and it is therefore not surprising that Worrell's equation fails for Trinidad and Tobago. It may have failed in Barbados and Jamaica for the same reason. Interest rate modelling has proved difficult in the Caribbean and Worrell's results bear this out, as do Bourne's (1979).

I.2.3 The Money Supply Process

Up until Thomas' 1972 review of the structure, performance and prospects of central banking in the Caribben region (Thomas 1972), there had been no systematic attempt to develop a theory of the money supply process. Post-Keynesian theory and the Modern Quantity Theory viewed the money supply as exogenous, where exogeneity meant that, in the context of the IS-LM model, the money supply was (ultimately) not influenced by

income or interest rates but rather it could be controlled precisely by the actions of the monetary authorities who could offset or negate any endogenous influence on the money supply arising from the actions of the non-bank public or the commercial banks. Largely because of the adoption of this view, the money multiplier approach to the money supply process became standard, since it allowed appropriate attention to be directed to the stock of base money which the monetary authorities could influence directly by changes in reserve requirements or by open market operations.

Thomas (1972) argued that the traditional multiplier analysis 'had little to offer dependent economies' because there were 'no fixed operating reserve ratio for the commercial banks' and the important currency ratio and the ratio of the change in base money (arising from an increase in foreign assets) to the change in money were 'likely to be very high and very unstable'.[5] Bourne (1976) has pointed out the flaws in Thomas' analysis, in particular the fact that the overseas leakage has to be traced through changes in the stock of base money. What Thomas had attempted to do was to incorporate the leakage coefficient in assessing

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5 Thomas' 1972 p. 47-49. Thomas' notation in this analysis leaves a lot to be desired reflecting perhaps some haste in writing the monograph. His definition of the change in money is also incorrect leading to error in his analysis. One needs to remember that Thomas is writing about monetary systems which still had a strong legacy of colonial relationships and with fledgling central banks, hence, perhaps, his assumptions about the reserve ratio and the currency ratio.

the first round effects. Bourne does not give Thomas enough credit for identifying the potential importance of the overseas leakage and his attempt to incorporate it thus. The point is that conceptually and in practice, the leakage does not occur as a first round effect, but in the second round after changes in bank credit have impacted on the level of expenditures.

Bourne (1976) adopts the Friedman-Schwartz (F-S) approach to money supply determination. He identified another 'leakage' arising from the possibility that commercial banks could hold foreign assets and presumably, move freely between local earning assets and foreign assets. In fact, at the time Bourne was writing, this avenue for portfolio diversification had been all but closed in Jamaica and in Trinidad and Tobago, and it is not surprising therefore, that Bourne found the F-S multiplier was 'the better empirical model of the money multiplier' than the local earning assets model.

Bourne's 1976 article is however, otherwise useful in that it attempts to identify the source components of the stock of base money and assesses the relative contribution of each, although his definition of the source base is incomplete. Bourne may have instead defined the stock of base money in terms of the Central Bank's balance sheet rather than attempt to go immediately to the current account of the balance of payments, since, in the event, net capital inflows or outflows are not

accounted for in his scheme. Arguably, the problem may have originated in his definition of base money as 'the sum of those financial assets which without any further transactions (conversion) can be used as reserve assets by the commercial banking system'. The definition we favour is that base money comprises 'the obligations of the monetary authorities in the hands of the banks and the non-bank public', a definition which makes the proximate determinants of base money easy to define and manipulate.

Bourne is not particularly successful in modelling the behaviour of the reserves/deposits ratio and the currency/deposits ratio for either narrow or broad money by the goodness-of-fit criterion, although his explanatory variables are statistically significant. Bourne's lack of success here therefore lent credence to Thomas' assumptions about the 'instability' of these ratios. Bourne also constructs and estimates an 'excess reserves' model of money stock determination, which essentially involves manipulating the money supply identities to show excess reserves or its determinants explicitly as an explanatory variable. The excess reserves specification, which is really a variant of the standard model, does not work well for the narrow definition of money, although the results are reasonable for broad money where the principal explanatory

variable is simply GDP.[6]

Ramsaran (1979) adopted Bourne's approach in an analysis of money supply determination in Trinidad and Tobago. However, Ramsaran remains bound to the straightforward F-S model and does not examine the influences on the source components of base money, nor the determinants of the component ratios of the money multiplier. Money supply determination has also been analysed in the Trinidad and Tobago context in Farrell (1981a) and Farrell (1981b), where particular attention is paid to the link between government fiscal operations, changes in net foreign assets and the monetary base.

The studies of the money supply process in Caribbean economy all conclude that the money supply is endogenous which is taken to mean here that, unlike closed economies where changes in base money arise largely from government fiscal operations, changes in base money are influenced by the balance of payments and government fiscal operations and central bank control of the stock of base money is not firm and far from precise.

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6 It must be noted that the F-S multiplier model is a behavioural model. The constancy or otherwise of the reserve ratio and the currency ratio is a behavioural phenomenon which in theory, can be explained by bank portfolio decisions and the asset preferences of the non-bank public.

The central bank may be able to sterilize inflows of foreign exchange or control outflows, or it may be able to offset, partially at least, the monetary effects of government fiscal operations. The central bank is however, handicapped in these operations by the instruments of control available to it and the sheer force and magnitude of the variables against which it must countervail. This is no doubt the reason why the regional central banks have eschewed, instinctively perhaps, monetary targets, and have looked instead at credit conditions and the evolution of the balance of payments.

It is interesting to note in this regard, that the recent experience of metropolitan central banks suggests that their control of the money supply is also not firm or precise. Over the last few years we have witnessed (i) political pressure for monetary targeting and the setting of targets, (ii) central banks ignoring these targets, or validating their reactions by varying targets in accordance with actual changes in the target variables and finally, (iii) the virtual abandonment of these targets as inflation has come down and concern has been heightened about the level and structure of real interest rates.

II. INFLATION.

This section surveys Caribbean studies of inflation over the period 1970-1984, a period when Caribbean countries experienced a significant change from the low inflation rates of the 1960's to double digit rates of the 1970's and 1980's, some of the highest rates encountered since World War II. The upsurge in inflation was due to both international and domestic developments.

II.1 The Structuralist Approaches of the 1970s

The earlier studies of the inflationary process tended to emphasise (i) the mechanisms through which international inflationary pressures were transmitted to the Caribbean economies; and (ii) domestic supply conditions — inelastic supplies of key commodities, high mark-ups, etc., as the major sources of inflationary pressure. As such these studies, whether the empirical method is econometric or statistical, tended to lean toward a structuralist interpretation of the inflationary proces, reflecting the influence of Seers (1962).

Most of the earlier work on inflation adopted a disaggregated, statistical approach to the identification of sources of inflationary pressure. This approach involved on an annual basis, the decomposition of the price index and the associated weights and the identification of

changes in those factors which were thought to influence the changes in the components of the price index. In some cases, the correlation between the determinant factors and the price index or its components were calculated.

II.1.1 Statistical (Non-Econometric) Approaches

Latibeaudiere (1974) examined demand pull, cost push and structuralist theories of inflation and their degree of applicability to Jamaica's inflationary process. In this study, Latibeaudiere used annual data series for the period 1969 - 1978 to explore the theoretical relationships. Latibeaudiere failed to find any relationship between changes in money supply and price changes over the period considered. Therefore, he concluded that over the study period "excess demand" was not a major cause of inflation in Jamaica.

In order to examine the applicability of cost push theory Latibeaudiere looked at labour costs, mark-ups on goods, costs of inputs and taxes. His analysis showed that, while labour costs were significant in 1973, over the period, the major factor influencing prices was the cost of distribution, especially in the rural areas of Jamaica. Latibeaudiere found that there existed a structural deficiency in the Jamaican economy which exemplified itself in increasing imports of consumer goods and attendant balance of payments deficits. He suggested

however that, given the structure of the Jamaican economy, imports of raw material, capital equipment and intermediate goods were necessary. Through changes in import prices, the inflationary pressures in Jamaica's main trading partners were passed on to the domestic economy.

Ally (1974) considered the impact of seven variables on Jamaica's inflation rate. Using annual data for the period 1964 to 1974, he identified the following variables: (i) imported inflation; (ii) inelasticity of supply of domestic goods; (iii) growth of labour incomes; (iv) the mark-up on goods; (v) interest rates; (vi) deficit financing, and (vii) increases in the money supply.

Ally found that from mid-1972 imported inflation assumed a major role in the Jamaica's inflationary process. In 1973, foreign prices in Jamaica dollar terms rose by 27 1/2 per cent compared with 4 1/2 per cent a year in the preceding three years. In some cases Ally found that there was a lag in the effect of foreign prices on domestic prices, and that price movements were parallel to the movements of Jamaica's main trading partners.

Ally also found that variations in the supply of domestic foodstuffs with low price elasticities of supply in Jamaica resulted in an almost simultaneous acceleration in the price index of food and drink. In addition, he found that between 1967 and June 1974, prices and

interest rates (the prime lending rates) moved in the same direction in the four periods 1967, 1971, 1973 and the period ending June 1974. However, for the years 1968 through 1970 he concluded that changes in the price level were not influenced by changes in the commercial bank's prime lending rate. Ally also found that the cost of distribution of goods formed a significant part of the final cost of goods to the customer. Except for the years 1967 and 1968, Ally showed that mark-ups and price increases moved in the same direction, but he was unable to determine which one influenced the other.

In the period 1964 to 1974, Ally found no evidence to support any significant influence of deficit financing on inflation in Jamaica. Ally also examined the effects of increases in money supply (M-1 and M-2), on changes in prices. He found little correlation between these variables between 1964 and 1972. However, in the post-1972 period, the relationship was stronger.

E. Allen (1977), W. Allen (1977) and G. Francis (1977) conducted similar statistical analyses of the inflationary process for the Eastern Caribbean, Bahamas, and Barbados, respectively.[7] Francis examined

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7 These studies were done for the 1975 Regional Programme of Monetary Studies Conference and were reproduced in Bourne (ed) (1977).

price trends in Barbados over the period 1968-1973. Her main focus was the influence of import prices on Barbados's retail prices. She also considered the effects of domestic factors such as the rate of change and the level of import tariffs, consumption taxes and other levies, distributor's margins and other commercial practices. W. Allen, reviewed price trends in the Bahamas from 1969 to 1974 and also focussed mainly on imported inflation. In addition, he considered the effects of wages and changes in the money supply on the inflationary process. E. Allen concluded that inflation in the Eastern Caribbean over the 1971 - 1974 period was not due to either wage push or demand pull (monetary expansion) factors, but that imported inflation was the principal cause of domestic inflation.

II.1.2 Econometric Analyses of Inflation

Econometric analysis of the inflation process in the Caribbean was pioneered by Eric St. Cyr (1974) where study is a classic in empirical econometric analysis in the Caribbean. It evinces a complete command of the econometric issues, the utmost sensitivity in the application of econometric technique and the economics is tightly linked to the econometric analysis. St. Cyr also kept an eye on the policy implications of his analysis. St. Cyr's theoretical framework is also notworthy. While his approach can clearly be located within the Structuralist school, he points out that the factor(s) which initially trigger inflation may be different from those which validate and sustain it.

After a careful examination of the trends in retail prices, import prices, wages and earnings between 1940 to 1971 for Trinidad and Tobago, St. Cyr developed his single equation model of the inflationary process in Trinidad in which prices are held to be a function of import prices, wages, government expenditure (as a policy for 'autonomous') and per capita material income. Annual data for the 1956–1970 period and the 1964–1970 period were used.

St. Cyr finds that import prices are the most important explanatory variable along with price expectations. In addition, St. Cyr found that (lagged) wage rates added nothing to the explanation of the inflationary process, though a wage transmission mechanism operating through aggregate demand is admitted.

Ramjeesingh (1974) constructed two models to explain Trinidad and Tobago's inflationary process over the period 1954 to 1968. Model I is Structuralist in approach and he isolated the degree of openness of the economy, measured as the imports/income ratio, as an important variable, alsong with the level of income, which was interpreted as a supply side variable, and the net terms of trade. Ramjeesingh's second model concentrated on the demand–supply mechanism to explain the determinants of price changes. In this model he explained changes in prices by changes in personal consumption expenditures, productivity and wage rates.

Ramjeesingh found that the ratio of imports/income was significant while his net terms of trade variable was not. Ramjeesingh speculated that this unexpected outcome was due to the inclusion of sheltered exports in the calculation of the terms of trade which served only to cloud the results. The level of money income was also significant in explaining price changes. Ramjeesingh's second model showed wages as the only significant variable. The other two variables productivity and consumption expenditure were not statistically significant.

Manhertz (1977) sought to examine and explain the movement of consumer prices in Jamaica over the period 1966 through 1974. His approach hypothesised that changes in retail prices reflected changes in costs, ad hoc mark-ups, and other non-quantifiable, psychological influences arising on the consumer demand side. Using annual data, the major explanatory variables identified were: (i) the ratio of the industry wage-bill to gross output; (ii) import prices, and (iii) the ratio of inventory changes to gross output. He found import prices to be the most important single influence on the level of retail prices over his period of analysis. However, he also found labour costs to be important.

All of the studies reviewed were inspired to a greater or lesser degree by the Structuralist approach to inflation. Where demand side influences were investigated they were found to be unimportant. Most authors also concluded that wage-push was not important in the inflationary process up to the mid-1970s. Import prices appeared as the most important variable explaining domestic price movements, serving to push prices up through higher input costs and/or mark-ups. The results reflect the situation prevailing at the time. But by the mid-1970s, the inflation process was being internalized and other factors began to come into play. As a consequence, the later studies were somewhat less dogmatic about the causes of inflation and adopted an eclectic approach to the analysis of inflation, leading to what we describe as 'hybrid models'.

II.2 Hybrid Models of Inflation

Bourne and Persaud (1977) were the first to develop and estimate an explicitly hybrid model of the inflation process, incorporating both 'demand-pull' and 'costs-push' elements to explain the 'propulsive role of monetary and financial variables'. They articulate a 15 equation structural model which they reduce to a single equation model in 16 explanatory variables which include wages, import prices, output (GNP), loan rate, bank credit, the money supply, price expectations, foreign investment expenditure, exports and the government budget deficit.

Lagged values of some of these variables also appear in the reduced-form equation. The exchange rate and an index of foreign prices are also incorporated as determinants of the level of import prices.

Bourne and Persaud estimate variants of this basic equation on quarterly data for Trinidad and Tobago and Jamaica over the periods 1967(1) to 1974(4) and 1968(1) to 1974(2), respectively. They found that the wage rate (lagged four quarters), the import price index, the bank loan rate and government debt are the primary influences on the rate of inflation in Trinidad and Tobago, while import prices and the loan rate are important in the Jamaican case, where the wage variable was omitted for lack of data.

Bynoe (1981) divided the Trinidad and Tobago economy into tradeable and non-tradeable sectors. Her main hypothesis was that Trinidad and Tobago's inflation was externally-induced. Based on this hypothesis she used the monetarist approach to the balance of payments to examine the inflationary process. However, this approach was modified to include the role of fiscal policy, since there existed a close link between aggregate demand pressures induced by deficits and the monetary process. The main variables Bynoe considered were foreign prices, inflationary expectations, money supply, and government expenditure. She used annual data over the period 1956-1976 to test the applicability of this model for the Trinidad and Tobago economy.

Bynoe's results suggested that import prices were important in the explanation of inflation along with the fiscal activity variable , real non-oil GDP and the money supply variable. Up to that time, Bynoe's study was the most explicitly monetarist in inspiration and approach, although even she felt compelled to include non-monetarist explanatory variables. However, she did not include the wage rate as a possible determinant.

Farrell (1983) sought to explain the inflationary process over the period 1972-1982 in Trinidad and Tobago. One of his main assumptions was that the sources of inflation vary over time and that these affect the inflationary process in different ways. Farrell incorporated the money supply, wages, import prices, price expectations, interest rate and nominal effective exchange rate as his explanatory variables. In addition, Farrell used a variable designated 'real supply' which was defined as real GDP adjusted for 'net real imports' i.e. real imports minus real exports. The rationale for this adjustment was that in a small open economy, with a large, export-oriented enclave sector, real GDP does not correctly reflect the transactions or expenditures to which money balances are related. A significant proportion of output is exported and therefore is not available for domestic expenditures and an equally significant proportion of total supply is imported. The expenditure or consumption possibilities open to the domestic economy will therefore be smaller or larger than domestic output, depending on

the terms of trade. Where the terms of trade are improving, real supply will exceed real GDP. The demand for money is therefore a function of real supply rather than real GDP. The explanatory variables were expressed as average annual percentage changes. It was admitted that insufficient degrees of freedom would affect the robustness of the results.

Farrell found that the real supply variable, and the wages variable were consistently significant. Import prices did not perform well, suggesting that it was a less important factor over the period. The exchange rate variable was also statistically significant. The results for current and lagged M-2 were curious. Current M-2 was significant and correctly signed, while lagged M-2 was significant but incorrectly (negative) signed. This indicates that an increase in the broad money supply serves initially to push up prices but then have a negative effect, probably because expenditure shifts toward imports which increases real supplies which lower domestic inflationary pressures.

Holder and Worrell (1985) developed and tested a price formation model for the Caribbean. Like Bynoe, they divide the economy into a tradeables and a non-tradeables sector. Prices in the tradeable sector are influenced by foreign prices while prices in the non-tradeables sector are influenced by prices in the tradeable sector as well as purely domestic effects. The overall price level is a weighted average of

prices in the tradeables and the non-tradeables sectors. The model they developed is a simultaneous equation model in seven endogenous variables and include monetary and real explanatory variables in the system.

Using annual data for 1963 to 1983, they tested this model for Barbados, Jamaica and Trinidad and Tobago. The major variables identified by Holder and Worrell as influencing the level of prices were foreign prices, exchange rate changes, trade controls, interest rates, wage increases and real income. The significance of each of these varied among the three countries. For example, they find evidence of a damped wage-price spiral in Jamaican, but no wage push effect in Trinidad and Tobago. Interest rates are inflationary in Barbados, deflationary in Jamaica and of indeterminate effect in Trinidad and Tobago!

III. MACRO-MONETARY RELATIONSHIPS: FURTHER RESEARCH

Our survey had indicated a rich literature on the question of macro-monetary relationships, far richer than in many other areas of Caribbean political economy. This is no doubt due to the excellent base provided by the earlier work of C.Y. Thomas, Maurice Odle and others, and the pioneering spirit in econometric work of Bourne, St. Cyr and latterly Worrell.

There are two issues we wish to explore briefly here. The first is the integration of monetary variables in a macro-econometric model and the second concerns the implications for monetary policy. It is interesting to note that Caribbean monetary economists have yet to develop a simple didactic model of Caribbean macro-economy along the lines of Hicks. The one attempt of which we are aware is C.J. Bruce's unpublished piece entitled 'Income Determination and the Money Supply in Highly Open Developing Economies'. However Bruce, who favours the use of the differential calculus, is anything but easy to read. He does however hit on the important point that the interest rate cannot be the link between the real and monetary sectors in Caribbean economy, partly because the investment function is apparently not interest-sensitive, nor is the demand for money interest-sensitive. Instead he seeks to incorporate a real balance effect in the consumption function. The empirical simultaneous equation models developed by Bourne and Persaud

and Holder and Worrell could be the forerunners of an integrated real and monetary model. But these authors hastened to the computer rather than developed the theoretical foundations in the way suggested here.

In respect of future research, we are not fully convinced that the cost of finance (the interest rate) is not at all important. The problem we suspect has to do with how interest costs affect business activity. Worrell's 'Monetary Mechansims' paper gropes toward a way of formulating the possible impact, while Farrell, Najjar and Marcelle asked firms how important the interest rate was. The effect would seem to vary depending on whether the economy is growing or stagnating. This issue must find a place in our research agenda for the future.

Another question concerns the possibility of real balance effects in the consumption, investment and imports expenditure functions. The real balance effect has an important place in metropolitan theory and empiricism but has yet to receive the same attention in the Caribbean. It is noteworthy that the policymakers in the region's central banks act as if the real balance effect does exist and is important. This too is worthy of sustained empirical research.

The region's central bankers also appear to disregard the view that interest rate policy is likely to be ineffective. Some central banks have set interest rates, others monitor the rates and use suasion to bring them into line. It is either the central bankers are fooling themselves, or they know something the researchers don't. Either way the issue must be explored.

Finally, there is the question of the controllability of the money supply or other monetary aggregate. None of the region's central banks appear to have taken up active control of any monetry aggregate. Yet they seem to have a view about the rate of expansion of bank credit relative to the state of the balance of payments and also pay a great deal of attention to the fiscal deficit and government borrowing from the banking system. But what are the parameters within which credit conditions are deemed to be appropriate or otherwise? Do central bankers in the region have some kind of reaction function with certain trigger points? If so, what is the nature of the reaction function and how do they determine those trigger points? The Regional Monetary Studies Programme which brings together the central bankers and the academics is an excellent place to initiate these inquiries.

IV. SOME COMMENTS ON EMPIRICISM BY ECONOMETRICS

One of the major features which distinguishes the working of the early writers (1960-1974) from the later generation of economists is the use of the econometric technique of multiple regression as the preferred empirical method. The early writing was either rhetorical (in Mc Closkey's sense) or evinced a painstaking empiricism which involved as comprehensive data collection relevant to the issue as possible and traditional statistical analysis. The work of Thomas and Odle were typical of this genre.

There were probably two reasons why the earlier writers adopted the methods they did. First, the institutions of the monetary and financial system had not yet been properly described, especially from a regional perspective. Description and classification are the first steps in the conventional scientific method, and the first generation of regional economists probably, and quite properly, saw as their first task to describe and classify and criticise what they observed.

The second reason is that the use of modern econometric techniques in related the access to computing facilities. Econometric work was done in the 1960s in the metropolitan countries, but it was almost as painstaking as traditional empiricism. Such facilities were not available in the Caribbean or to Caribbean economists. (It is

interesting to note that Bourne reports that he had to go to the U.S.A. to do the econometric work for his 1974 study of the demand for money and St. Cyr did some of the work for his 1974 study of inflation at his alma mater, the University of Manchester.) As the facilities have become available, and as Caribbean economists have learnt the techniques, the frequency of econometric empiricism has increased tremendously.

Whilst the use of econometric empiricism has certainly been an advance, it has been in many respects a mixed blessing, not least because the limitations and weaknesses of the tool itself have apparently not been fully appreciated, and partly because new toys are apt to be abused by the enthusiasm of their owners. We will identify a few issues which hopefully will make the point.

First, the basic reason for the econometric work on the demand for money has been to try to identify a stable demand for money function. Two problems have arisen. The first is methodological. Essentially what is done is to define money and its determinants empirically in such a way as to generate a stable function. This is clearly fudging the problem. The second problem, which applies with particular force in the Caribbean, is that the (fudged) function is estimated on historical data (which is the only data we have!). Given, that the structure of commercial banking was changing, central banks were

becoming active and changes were being induced in the structure of the economy, influencing thereby the process of income generation, should we have expected to find a stable function at all?

The same problem is indicated in the empirical analysis of inflation. There are different dominant determinants of the inflation rate over time. At certain times it will be import prices, at another, wage rates and at yet another time, increases in the money supply. Depending on the time period over which the econometric exercise is done, the dominant determinant will be different. This has, as we might imagine, enormous implications for forecasting and for policy based on such forecasts.

A second, to our minds, unhealthy practice which has grown up with the use of econometric empiricism is 'experimenting' with the data. Researchers 'try' different formulations or variants with the same data base. It is a practice which tends to disregard the source and quality of the data and also at times makes a mockery of the scientific method. Gone are the days when data were carefully and painstakingly collected, and hypotheses carefully formulated and tested. Today, data are pulled from wherever, placed in the memory of the PC and 'experiments' are conducted on them. Miraculously, 'results' are obtained, of which researchers report their 'best' ones, as if the worst results do not also have something important to say to us. The results which are 'best'

conform to certain statistical criteria developed under extreme assumptions, but which are regularly violated and abused by researchers who must have results by this means at any cost.[8] The greater irony is that the discussion of these results is largely in terms of the statistical criteria (t - values, R^2, Durbin-Watson 'd's and 'h's, and more recently, with the advance of simulation, Theil's coefficient). One may search in vain for the economic significance of the results and/or the significance for policy. Small wonder then that the region's policymakers have continued to trust their 'economic instincts' and serendipity, rather than deliver up their souls to the new god.

There is need for some stocktaking in this issue. To abandon econometric empiricism would be regressive. We need to instil a greater sensitivity and creativity in the use of the instrument and a much greater respect for the data. Also important, we must also teach our students the 'conventional empiricism'. We must teach them to conduct surveys and analyse the results, to investigate data sources and create data series. At the end of the day, good economic policy will come from the sensitive and sensible use of the available empirical techniques and good 'economic instincts', which will tell you what the data never can!

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8 See Watson (1984).

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