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ABSTRACT

The main objective of this thesis is to investigate the causes of inflation in small open developing economies, using the Eastern Caribbean region as a case study. Orthodox inflation theory is viewed critically with respect to its applicability to the small open developing economy. Instead, a more appropriate model which stresses various structural elements is developed.

The model is specified and empirically tested. The main conclusions which are drawn from the empirical results are that the causes of inflation in the Eastern Caribbean can be primarily explained by rising import prices, domestic monetary conditions and, to a lesser extent, high rates of interest.

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Chapter I

INTRODUCTION

Over the past decade, the world has undergone an "economic crisis" which has come to be called stagflation. This phenomenon relates to a situation in which there has been persistent upward movements in the level of unemployment along with rapid and accelerating rates of inflation. In fact, what one has witnessed over the past years is a definite deterioration in the unemployment-inflation trade-off. The popular Phillips Curve relationship has given way to the prevailing view that there exists a critical unemployment rate, or range of unemployment rates, variously described as the natural rate or the non-accelerating inflation rate of unemployment. This new wave in the literature has led to a re-specification of econometric models in the hope of gaining greater explanatory powers about the dependent variable, namely inflation. As a result, one has seen the emergence of models such as the mark-up model, the expectations model, and the monetarist model. Further, some of these models have been modified in a manner which makes their application conducive to the explanation of inflation in open economies.

There seems, however, to be a tremendous vacuum in the literature pertaining to inflation in small open developing

economies. The realization of this fact has been the main instigating force behind the writing of this thesis. The primary objective, then, is to explain the possible causes of inflation within the context of small open developing economies, and having done that, to prescribe a set of policies which would effectively alleviate the inflationary problems.

We begin in Chapter II with a concise review of some of the more popular theories of inflation. We then proceed to argue that the orthodox theoretic approach is inadequate for explaining inflation in small open developing countries and should thus be rejected in favour of what may be called a 'structuralist' approach to the problem.

Attention is focused exclusively on the economies of the Eastern Caribbean islands. Chapter III furnishes the economic background necessary for a comprehensive examination of the inflationary problems in the respective islands. In Chapters IV and V, we specify and empirically test the model which is to be used for explaining the inflationary process. Chapter VI recommends various policy prescriptions for alleviating inflation and, in the final Chapter, we present the main conclusions arising from the analysis.

Before examining the inflationary problems of the Eastern Caribbean, we shall first specify the definition of inflation to be employed throughout the study and suggest a few reasons why one ought to view inflation with great concern.

1. WHAT IS INFLATION?

The concept of inflation has been defined in different ways by numerous economists.[1] Some choose to define it as a state of affairs in which there is excess demand for commodities in the economy as a whole[2] while others see it as a "process of general price and/or wage increases starting under conditions where the general level of output cannot be increased in the short run and resulting from competition in attempting to maintain total real income, total real expenditure and/or total output at a level which has become physically impossible."[3] For our purpose, however, we have chosen to view inflation as a situation in which there is a persistent upward movement in the general price level, or in which there would be such a persistent upward movement but for the presence of direct controls over prices.[4]

Our definition of inflation has two basic characteristics. First, for any process to be considered as inflationary, the general price level must exhibit a

persistent upward movement. Thus, if prices are temporarily increased and it is expected that the increase will be short lived, then under our definition, this will not be considered as inflation. It is worth pointing out, however, that prices need not always increase for the process to be considered as inflationary. A succession of periods in which the general price level has risen and fallen but with the general direction being unmistakably upward also fits into our definition. Second, the proposed definition of inflation covers not only actual increases in the price level (open inflation) but also potential increases (repressed inflation) as well. Due, however, to the statistical complexities involved in the measurement of potential increases in the general price level, we have chosen to focus our study solely on actual increases.

2. WHY WORRY ABOUT INFLATION?

In recent times there seems to have developed an alarming concern over the problem of inflation. While economists debate what the optimal inflation strategy should be, governments are continually pressurized into finding speedy solutions to the problem.

Inflation is viewed as an intolerable evil which has the potential for causing severe social and economic injustice. Among other things, it leads to an undesirable

redistribution of income and wealth. People whose money income rises less rapidly than the general price level will lose relatively in times of inflation, while those whose money income rises more rapidly than the price level will gain.[5] So, it upsets the notion of Pareto optimality. The losers will probably include creditors, pensioners and other fixed income earners while the gainers will be comprised of debtors, businessmen, who may or may not be debtors, and other non-fixed income earners.

The consequences of inflation are further compounded when examined in the context of small open developing economies. For example, there may exist a situation in which the costs and prices facing foreign producers are rising more rapidly than those facing domestic producers. Then, if the small open economy is heavily dependent on international trade, the immediate consequence may be the transmission of some degree of "imported inflation". If the economy is particularly dependent on the imports of intermediate goods as inputs into the production of finished goods, then balance of payments problems are most likely to arise, and as they intensify, the rate of unemployment will undoubtly increase.

Finally, price stability is a basic requirement for sustained economic development which most Third World

countries strive to achieve. Inflation is harmful to economic growth because it not only reduces the real resources available for investment but it also diverts funds from potentially productive investments to relatively unproductive and speculative ones.[6] Investment is a necessary prerequisite for rapid growth but price instability serves only to disrupt business confidence and to retard economic growth.

NOTES

1. See Hagger A.J., Inflation Theory and Policy. (1977), Ch. 1.

2. See Lerner A.P., "The Inflationary Process." Review of Economics and Statistics (1949), August, pp. 193-5.

3. Turvey R., "Theory of Inflation in a Closed Economy." Economic Journal (1951), September, pp. 531-5.

4. This view of inflation was adopted from Hagger A.J. (1977).

5. Ibid., p. 16.

6. For an alternative view see Sunkel O., "Inflation in Chile: An Unorthodox Approach." International Economic Papers, No. 10 (1960), pp. 107-131.

Chapter II

USEFUL CONCEPTS FROM THE THEORY OF INFLATION

In this chapter we attempt to pursue a concise review of some of the more popular theories which have been proposed for explaining the inflationary process and to suggest reasons why they are inadequate for explaining inflation in most small open developing economies.

Generally speaking, these theories may be classified into two broad groups: either 'monetary/expenditure' theories or 'structural/social' theories. 'Monetary/expenditure' theories range from simple propositions of the 'too much money chasing too few goods' variety to sophisticated statements involving 'a constant velocity of money' or 'the real value of cash balances desired by the community'.[1] Whether we take the simplistic or the more sophisticated view, the basic underlying idea is that the given economy is operating within a disequilibrium mode due to conflicts arising between stocks and flows or between flows and flows. For example, the economy may experience a situation in which the stock of money rises relative to the flow of income or the monetary-expenditure flow rises relative to the flow of output.

The essential point of monetary/expenditure theories can be summarized as follows:

> "... whatever the diagnosis, the policy prescription consists in changing some or other 'relevant' and mainly fiduciary or fiscal variable so that 'equilibrium' may be restored. Basically, inflation is seen simply as a marginal and almost wholly economic problem, requiring only appropriate monetary or fiscal measures (or a judicious mixture of both) to counteract it."[2]

The structural/social theories seek to explain inflation as resulting from gross imbalances in the fundamental elements which characterize the given economic system. These imbalances may take the form of supply bottlenecks resulting from inequity in the distribution of the means of production as well as from wars and/or natural disasters and in turn generate shortages in food and other commodities. The imbalances may also amplify themselves in the form of monopolistic tendencies which operate in such a manner as to place additional upward pressure on the general price level. This aspect has been formalized in the so-called mark-up model of inflation. These theories, however, have the common characteristic that "the imbalance suggested does not lead (as it should in neo-classical economic theory) simply to a 'once-for-all' adjustment of relative prices or incomes: groups which are adversely affected retaliate by attempting to raise their incomes also, and the process develops a 'whip-saw' quality."[3]

Given this brief and general introduction to inflation theory, we shall now proceed to take a more in-depth look at

the various theories which have been proposed. We begin our analysis by considering the underlying forces of the popular Phillips curve.

1. A SURVEY OF VARIOUS INFLATION THEORIES

A. The Phillips Curve

Before Phillips made his observations regarding the relationship between unemployment and money wage increases, Keynes had pointed out that an increase in aggregate demand would result in a reduction in the level of unemployment so long as the economy was operating below full-employment. We have since observed, however, that prices begin to rise long before full-employment is reached and this leads to an inevitable trade-off between inflation and unemployment.

Phillips' analysis of the inflation-unemployment trade-off arose from an observation of the behavior of data on wage inflation ($\dot{W} = \Delta W/W$) and unemployment in Britain between 1857-1913. His findings were not substantiated by any theoretical justification and the original Phillips curve relationship could thus be viewed as an observation in search of a theory. The necessary theoretical foundation was subsequently laid by Richard Lipsey.[4] In his analysis, Lipsey introduced the idea that the rate at which wages change is related to the excess demand, and specifically, the greater is the proportionate disequilibrium, the more

rapidly will wages be changing. He then postulated the existence of an inverse relationship between excess demand and unemployment. By combining both propositions, the end result is an inverse relationship between wage inflation and unemployment (i.e., the typical Phillips curve).

The inflation-unemployment framework described above has several weaknesses. A particularly vulnerable aspect of the model is rooted in the assumption of perfect wage flexibility in the labour market. The Phillips-Lipsey analysis assumes that the sensitivity of the labour market to changes in demand and supply conditions operates in such a manner as to raise the wage rate when there is excess demand and to lower it in times of excess supply. But, in general, nominal wages tend to be sticky downwards since workers do not readily accept a cut in nominal wages, despite the level of unemployment. Further, if the firm in question is unionized, there may be specific wage guidelines which are binding for the life of a contract, regardless of present demand and supply conditions. It therefore seems somewhat impractical to assume that the nominal wage rate is unconditionally flexible, particularly in a downward direction.

B. The Productivity-Gap Hypothesis

We now turn our attention to what can be called the productivity-gap hypothesis. It postulates that the economy

can be segmented into two sectors--one being the leading or competitive sector and the other being the following or sheltered sector. The distinction between the two sectors is based on the rate of productivity growth and, in particular, it is assumed that productivity growth in the competitive sector grows at a faster rate than that in the sheltered sector. The other assumptions of the model are as follows:[5]

1. The rate of growth of wages in the competitive sector is determined by the rate of growth of prices and productivity in that sector. Thus,

$$\dot{W} = \dot{P}_C + \dot{q}_C$$

where $\dot{W}_C$ = growth rate of wages in competitive sector

$\dot{P}_C$ = growth rate of prices in competitive sector

$\dot{q}_C$ = growth rate of productivity in competitive sector

2. Wages in the sheltered sector depend on those in the competitive sector. Therefore,

$$\dot{W}_S = \dot{W}_C$$

where $\dot{W}_S$ = growth rate of wages in sheltered sector

3. Pricing in the sheltered sector is representative of labour costs in that sector. So,

$\dot{P}_S = \dot{W}_S - \dot{q}_S$ where $\dot{P}_S$ = growth rate of prices in sheltered sector

$\dot{q}_S$ = growth rate of productivity in sheltered sector

4. The general price level is determined by a weighted average of prices in the competitive and sheltered sectors. Thus,

$\dot{P} = a\dot{P}_C + (1 - a)\dot{P}_S$ where $\dot{P}$ = overall rate of price inflation

a = weight used for competitive prices

$(1 - a)$ = weight used for sheltered prices

Given the above assumptions, one can now explain inflation by the difference in productivity growth between the competitive and sheltered sectors. To see this, one only needs to look at the reduced form of the given set of equations--i.e., $\dot{P} = \dot{P}_C + (1 - a)(\dot{q}_C - \dot{q}_S)$.[6] Now, it is seen explicitly that as productivity in the competitive sector grows relative to that in the sheltered sector, the general price level will be forced upward; if we arbitrarily set $\dot{P}_C$ equal to zero, as is done in a typical Scandinavian type model, then the rate of inflation becomes solely dependent on the difference in productivity growth between the competitive and sheltered sectors.

C. The Monetarist Hypothesis

We now turn to consider inflation from the monetarist view point and, in so doing, we will use Milton Friedman's work as a prototype.[7] We begin with the equilibrium condition that $MV = PQ$ where M stands for the money stock, V for velocity, P for prices and Q for output. We can go a step further and formulate the above equation in growth form so $\dot{M} + \dot{V} = \dot{P} + \dot{Q}$.[8] Assuming that velocity remains constant (i.e., $\dot{V} = 0$) and output is at full-employment (i.e., $\dot{Q} = 0$), then the rate of growth of the money stock and that of the general price level will be exactly equal to each other (i.e., $\dot{M} = \dot{P}$), with the direction of causation going from money to prices.

Friedman then goes on to hypothesize that in the long run there exists no relationship between the growth in prices and the rate of unemployment--thus giving rise to the famous vertical Phillips curve. The idea here is that any attempt to reduce the level of unemployment below the 'natural rate' will lead to an increase in prices. For example, let us assume that the government attempts to reduce unemployment below the natural rate by embarking on an expansionary monetary policy. The result of this action will lead to a fall in real wages (W/P) as prices rise, and employers will, therefore, have the incentive to hire more

workers. Employees eagerly accept the newly created jobs since their expectations are that there will be an increase in real wages (i.e., $W/P^e > W/P$). These workers did not foresee that prices would increase and thus erode their real wage. Once this is realized, workers will demand higher real wages. If their demands are not satisfied, they will quit their jobs and unemployment will return to the natural rate but prices will remain at a new and higher level.

Friedman and his followers have met with continuous criticisms regarding the basic assumptions of the model. Critics point to various weaknesses such as the assumptions of voluntary unemployment, the individualistic determination of wages and the countercyclical behaviour of real wages. Probably a more fundamental criticism rests in the asymmetical nature of the monetarist hypothesis. Consider the following where $\dot{V}$ is assumed to be equal to zero.

A				B		
$\dot{M}$	= $\dot{P}$	+ $\dot{Q}$		$\dot{M}$	= $\dot{P}$	+ $\dot{Q}$
4%	= 0	+ 4%		12%	= 12%	+ 0
12%	= 8%	+ 4%		8%	= 12%	- 4%
20%	= 16%	+ 4%		4%	= 12%	- 8%

We see in column A that with output at full-employment, increases in $\dot{M}$ lead to increases in $\dot{P}$. But, what happens when we try to control inflation by decreasing the rate of

growth of the money supply? From column B we see that such an attempt may be futile since it may lead to quantity rather than price adjustments. This has therefore led some economists[9] to believe that the Phillips curve is in fact horizontal as opposed to vertical. They argue that firms price on a 'mark-up' basis and prices are thus sensitive only to cost and profit considerations. It is felt that there exists implicit contracts based on fairness and goodwill between employer and employee and between buyer and seller. The overall interest in this area has resulted in the development of 'mark-up' models which endeavour to explain the inflationary process. This type of model is discussed in greater detail in Chapter III.

D. The Structuralist Hypothesis

Finally, we consider the structuralist hypothesis of inflation. Proponents of this hypothesis argue that over time various structural changes have occurred in both the product and labour market and that these changes have led to permanent rigidities in the wage and price structures. According to Tibor Scitovsky:

> "Whenever the balance of power in the labour market differs from that in the product market, price formation in the two markets has conflicting impacts on the distribution of income, and the resolution of that conflict leads to a one-way drift in the general level of wages

> and prices, which is part of the world-wide inflation we experience today. An extreme case of such conflicting power relations is that where producers dominate product markets and organized labour dominate the labour market."[10]

Clearly, the type of rigidities which Scitovsky refers to relate to the changing pattern of the balance of power between employers and employees and/or between buyers and sellers. In particular, it is felt that with the passage of time, employees and sellers have become more organized and thus have been able to acquire the necessary bargaining power to be effective in influencing the wage-price structure. The former group improved its position by joining various pressure groups such as unions while the latter depended on various monopolistic and collusive practices.

A more general version of the structuralists' theory of inflation relevant to developing countries can be found in the works of various writers on Latin American economies.[11] Their views can be categorized into three basic hypotheses: (a) the demand-shift hypothesis, (b) the export instability hypothesis, and (c) the agricultural bottleneck hypothesis.

According to the demand-shift hypothesis, "shifts in the composition of demand, as distinct from generalized excess demand, will create an upward bias in the price level."[12] It is felt that as developing countries endeavour to become more industrialized and as tastes and income

distribution change, there will be an inevitable shift in the composition of demand. Then, as pointed out by Argy,[13] one would expect the average price level to rise more:

(a) the more sympathetic the money supply is to potential upward price movements;

(b) the more downwardly rigid the wages in the declining sector (due, say, to minimum wages, trade union strength, etc.);

(c) the more immobile are the factors of production (requiring in this case larger movements of returns to promote a given shift);

(d) the greater the difference in skills required in the expanding and declining sectors;

(d) the greater the speed of wage movements from expanding to other sectors.

The export instability hypothesis claims that constant fluctuations in export earnings tend to accentuate the long-run path of the general price level. In other words, this hypothesis suggests that there exists a positive functional relationship between the variability in export earnings and the price level, with the causality being transmitted from the former to the latter. The rationale for this thesis may be explained in the following manner. First, as export earnings rise, there is likely to be an

increase in demand which in turn may lead to a demand-pull type inflation; by contrast, as export earnings fall, prices need not fall since the authorities may intervene to maintain demand at its current level, and, also, partly because wages tend to be inflexible downwards. Second, rising export earnings tend to lead to rising wages in the export sector and eventually to an overall increase in the aggregate wage index; the reverse is not necessarily true due to the downward inflexibility of wages. Third, higher export earnings may lead governments to increase their expenditures but, as earnings fall, expenditures are not easily curtailed.

Probably, the most popular version of the structuralists thesis on the problem of inflation relates to the agricultural bottleneck hypothesis. This thesis claims that, among other things, rising incomes and a growing population have exerted and continue to exert added pressures on the demand for food commodities. At the same time, however, due to various structural impediments, food production has not been able to keep pace with the growing demands. As a result, excess demand for foodstuff develops and food prices must rise in order to bridge the gap between demand and supply.

It is sometimes argued that the imbalance between the demand and supply of food commodities need not result in rising prices since domestic supply may be augmented by an increase in imports or by the curtailment of agricultural exports. Due to the pressing need for foreign exchange in developing countries, however, production is normally geared towards cash-crops rather than food-crops, and this prevents a possible reallocation of resources from export oriented goods to those destined for domestic consumption. Further, the scarcity of foreign exchange also implies that imports cannot readily be increased. Thus, price increases therefore seem inevitable.

2. THE RELEVANCE OF ORTHODOX INFLATION THEORY TO SMALL OPEN DEVELOPING ECONOMIES

In the preceding discusison, various theoretical explanations of the inflationary process were high-lighted and some of their deficiencies were brought to the forefront. With the exception of the structuralist view, all of the other theories discussed made the implicit assumption that the economies under consideration were of a developed nature. It, therefore, becomes necessary to examine whether any or all of the proposed orthodox theories can furnish an adequate explanation of inflation in small open developing economies.

The orthodox approach to inflation is formalised on the basis of a reversed L-shaped aggregate supply curve and a downward sloping aggregate demand curve. The original Phillips curve hypothesis has been modified to incorporate the fact that the labour market is influenced by real rather than money wages. It also takes price expectations, which are formed by an 'error-learning' process, into account. The causes of inflation are then most commonly linked to the existence of excess demand brought about by government monetary and fiscal policies.

This orthodox approach is grossly inadequate for explaining the inflationary problems in the small open developing economy. In the first place, the orthodox theory places emphasis on aggregates such as full employment and the 'natural' rate of unemployment; but, it would be a fatal error and a rather meaningless exercise to apply these concepts to less developed countries (LDC's), whose labour force is generally far from being fully employed. Further, assumptions as to the homogenity, mobility, and availability of a trained, wage-earning labour force willing and able to work and responding to incentives are unrealistic for most LDC's. In fact, the whole notion of a "Labour Force" needs to be modified when viewed in the context of the LDC's. One must not only take into account the heterogeneous and

relatively unskilled nature of the workers, but one must also account for the aspect of disguised unemployment or underemployment which refers to the mass of the labour force that is permanently engaged in low-productivity activities. Thus, a change in the level of aggregate demand for wage labour has little or no impact on the level of traditional sector underemployment.[14]

A second, and perhaps more fundamental limitation of orthodox inflation analysis is the use of the concepts of aggregate demand and supply and the postulation of a ceiling to aggregate demand in real terms that is set by aggregate supply.[15] In countries which are characterised by factor immobility, market imperfections and rigidities, and disequilibrium between demand and supply in different sectors of the economy, the orthodox approach becomes difficult to accept. "Substantial underutilisation of resources in some sectors (for example manufacturing) coexists with shortages in other sectors of the economy, and market imperfections (and technological constraints) prevent the movement of resources in response to market signals."[16] It therefore becomes misleading in the context of LDC's to speak about an overall limitation on aggregate supply in light of the sectoral diversity. Inflation can be more usefully analysed in terms of the structural composition of

the economy. It is precisely for this reason why othodox inflation theory is inadequate for explaining the inflationary problems of small open developing economies; it is completely insensitive to the structural factors as aforementioned.

NOTES

1. See Jackson D. and Turner H., Inflation, Stroto-inflation and Social Conflict. Cambridge University Press (1975), Ch. 2.

2. Ibid., p. 12.

3. Ibid., p. 13.

4. Lipsey R., "The Relationship Between Unemployment and Wage Rates." Economica, February 1960.

5. See Lindbeck A., "Imported and Structural Inflation and Aggregate Demand: The Scandinavian Model Reconstructed" in: Lindbeck A. (ed.), Inflation and Employment in Open Economies. North-Holland, Amsterdam (1979).

6. $\dot{P} = a\dot{P}_C + (1-a)\dot{P}_S$

$= a\dot{P}_C + \dot{P}_S - a\dot{P}_S$

$= a\dot{P}_C + \dot{W}_S - \dot{q}_S - a(\dot{W}_S - \dot{q}_S)$

$= a\dot{P}_C + \dot{P}_C + \dot{q}_C - \dot{q}_S - a\dot{P}_C - a\dot{q}_C + a\dot{q}_S$

$= \dot{P}_C + (1 - a)(\dot{q}_C - \dot{q}_S)$ where $\dot{q}_C > \dot{q}_S$

7. Friedman M. (ed.), Studies in the Quantity Theory of Money. University of Chicago (1956). Also see Friedman M., "The Role of Monetary Policy". American Economic Review, March 1968.

8. The dot placed above respective variables indicates 'rates of change'. Thus, $M = dM/dt$.

9. Nordhaus W., "Inflation Theory and Policy." American Economic Association May 1976. Also see Okun A., "Inflation: Its Mechanics and Welfare Costs." Brookings Papers on Economic Activity (1975), No. 2.

10. Scitovsky T., "Market Power and Inflation." Economica, August 1978.

11. See Baer W. and Kerstenetzky I. (eds.), Inflation and Growth in Latin America. Irwin (1964); U.N. Economic Commission for Latin America, Inflation and Growth.

Volume six (1961) (mimeographed); Sunkel O. op. cit. (1960); Seers D., "A Theory of Inflation and Growth in Underdeveloped Economies Based on the Experience of Latin America." Oxford Economic Papers (1962); Maynard G., Economic Development and the Price Level. MacMillan (1962); Olivera J., "On Structural Inflation and Latin American 'Structuralism'" Oxford Economic Papers (1964), November; Mueller M., "Structural Inflation and the Mexican Experience." Yale Economic Essays (1965), Vol. 5, No. 1; Hirschman A. (ed.), Latin American Issues. Twentieth Century Fund (1961).

12. See Argy V., "Structural Inflation in Developing Countries." Oxford Economic Papers (1970), Vol. 22.

13. Ibid., p. 74.

14. See Kirkpatrick C. and Nixson F., "The Origins of Inflation in Less Developed Countries: A Selective Review" in: Parkin M. and Zis G. (eds.), Inflation in Open Economies. Manchester University Press (1976).

15. Ibid., p. 129.

16. Ibid., p. 130.

Chapter III

INFLATION AND THE EASTERN CARIBBEAN ECONOMY

Most economists who are familiar with the operations of small open developing economies would readily concede that any theoretician wishing to explain the inflationary process in developing countries which are characterized by open economies must pay particular attention to the aspect of "imported inflation."[1] We shall therefore begin by analyzing the inflationary pattern over the past decade in a select group of developing economies to see whether or not there is evidence of imported inflation. The set of countries that will be examined is Antigua, St. Kitts and Montserrat (i.e., the Leeward Islands), Grenada, St. Lucia, St. Vincent and Dominica (i.e., the Windward Islands) and Barbados. Before proceeding into the analysis, we shall first give a brief survey of the economic background in these various Eastern Caribbean islands.

1. ECONOMIC BACKGROUND

The Eastern Caribbean islands may be characteristically described as small highly open economies. Being former British colonies, their respective economic structures evolved from the legacy of the plantation type economy which Great Britain had introduced to her colonies during the

colonial days. In particular, British colonialist policies placed all emphasis on the production of crops for export rather than foodstuffs for domestic consumption. Colonies provided their Mother Country with unrefined or primary goods in return for preferential tariff treatment and guaranteed markets. For the most part, this led to the development of export oriented agrarian economies with sugar being 'King' in Barbados and the Leeward islands while citrus and other tropical crops prevailed in the Windwards.

The repercussions of this export oriented agrarian system can still be felt today in most of the islands. There has been very little attempt at economic diversification and, as a result, the respective islands have developed highly dependent economies. The manufacturing sector in most of the islands is still in such a stage of infancy that so far it has failed to exert the kind of economic impact that would facilitate rapid growth. These mini-states therefore depend to a large extent on the earnings from their exports, which are primarily confined to cash crops and tourism, in order to be able to import the necessary foodstuffs and various luxury items.

Some basic structural information about the eight islands is presented in Tables I and II. Table I reiterates our previous point that the economies in question are small

Table I

SELECTED ECONOMIC INDICATORS (1978)

Unit	Indicators	Barbados[a]	Antigua	Montserrat	St. Kitts	Dominica	St. Lucia	St. Vincent	Grenada
sq. mil.	size	166	170	39.5	104.0	289.5	238	150	120
000's	Population	248.983	72.250	11.300	49.800	81.200	117.500	115.400	109.000
EC$M[b]	GDP at Factor Cost	1972.5	164.2	24.1	78.8	110.6	190.1	106.3	132.5
EC$	Per Captia GDP	7922	2273	2133	1582	1362	1618	921	1216
%	Exports as % of GDP	81	20.6	15.3	57.5	98.5	62.8	41.4	34.6
%	Imports as % of GDP	88	66	111.6	83	98.5	81.3	91.9	72.7
EC$M	Government Revenue	568.2	41.5	7.8	34.6	34.5	55.8	31.5	45.4
EC$M	Government Expenditure	501.7	49.0	9.5	32.3	32.8	46.1	35.2	43.2
%	Unemployment Rate[c]	12.6	20	4.7	13.5	23	18	18	17.5

a. Data on Barbados are for the period 1980.
b. $2.70 Eastern Caribbean (E.C.) Equals $1.00 United States (U.S.)
c. These are 1977 unemployment rates, except for Barbados.

Source: World Bank Reports, 1978. Central Bank of Barbados: Annual Statistical Digest, 1980.

Table II

PERCENTAGE DISTRIBUTION OF GDP COMPONENTS AT UNDEFLATED MARKET PRICES (1978)

Sectors	Barbados	Antigua	Montserrat	St. Kitts	Dominica	St. Lucia	St. Vincent	Grenad
Agriculture	8.3	7.8	5.0	18.0	45.3	15.0	19.0	31.0
Mining & Quarrying	0.6	0.7	1.0	3.0	1.0	1.2	0.3	0.0
Manufacturing	9.7	5.7	2.0	15.0	4.6	7.4	9.7	3.0
Construction	6.8	6.7	14.0	6.0	5.1	17.0	10.8	2.0
Electricity & Water	1.4	2.2	4.0	1.0	1.8	2.4	2.2	2.0
Transport & Communication	5.8	18.1	15.0	8.0	5.8	6.7	15.4	7.0
Trade	18.5	11.7	14.0	9.0	9.7	14.6	10.8	14.0
Hotels & Restaurants	10.0	13.5	8.0	2.0	1.2	6.9	1.7	3.0
Banks & Insurance	10.4	6.5	7.0		4.0	12.8	13.1	
Ownership of Dwelling		12.1	4.0		5.9			
Government	13.6	14.3	22.0	20.0	17.4	14.9	19.4	24.0
Other Services	14.9	5.1	5.0	18.0	1.0	4.8	2.8	16.0
Less Imputed Banking Service Charges		4.3	1.0		2.8	3.7	5.2	2.0
GDP at Undeflated Market Price	100	100	100	100	100	100	100	100

Source: Central Bank of Barbados: Annual Reports, 1978; East Caribbean Common Market Secretariat: Abstract of National Accounts Statistic, 1979.

and highly open. Montserrat, the smallest of the islands, is 39.5 square miles while Dominica, the largest, is 289.5 square miles. Barbados, by far the most economically successful, is the most populated and has the highest per capita income. Economic openess and dependence are portrayed by the extremely high ratios of imports and exports to gross domestic product. What is somewhat surprising, however, is the large differences between the ratio of imports to GDP and exports to GDP, particularly in the case of Montserrat. One possible explanation is that there are large inflows of foreign capital via remittances, foreign investments, and tourism. Further, since Montserrat is still a colony of Britain, grants from the Mother Country may also account for the large differences between ratios. Also, the presence of a United States medical school which caters primarily for U.S. and other foreign students no doubt further increases the inflow of foreign exchange into Montserrat. In addition some of these countries do not have a very active export trade, and Montserrat stands out particularly in this respect.

While governments in the region have generally been successful in keeping their expenditures in line with revenues, they seem, however, to have failed dismally in

general job creation efforts; as a consequence, average rates of unemployment are high.

Table II gives the percentage contribution of the various GDP components for the year 1978. The figures indicate that agriculture is of significant importance in St. Kitts, Dominica, St. Lucia, St. Vincent and Grenada while tourism is of greater importance to the economies of Barbados and Antigua. In all of the islands, govenment services are significant contributors to GDP. Finally, it is not suprising that wholesale and retail trading is quite important in all of the islands since the respective economies are highly open.

Given this general introduction to the prevailing economic climate of the Eastern Caribbean, we can now return to our main concern, namely the problem of inflation.

2. THE REGION'S INFLATIONARY EXPERIENCE: 1971-1980

The Eastern Caribbean, as with most other places, has been unable to escape from the inflationary pressures of the seventies. While actual inflation rates differ from island to island, there is clearly a definite long run correlation between rates in the region as a whole (see Figure I and Table III). Generally speaking, the region's inflationary experience can be segmented into four distinct time periods as portrayed in Figure I and Table IV. The first period[2]

Table III

INFLATION RATES

Period	Barbados	Antigua	Montserrat	St. Kitts	Dominica	St. Lucia	St. Vincent
1971	12.4	8.4	16.9	-8.9	3.1	5.2	
1972	7.0	9.2	-0.3	8.2	1.9	10.5	
1973	16.9	14.2	12.1	10.3	8.7	9.4	15.4
1974	38.9	23.5	18.6	31.8	42.7	30.7	38.2
1975	20.3	12.3	25.4	8.3	14.0	22.8	15.1
1976	5.0	18.9	8.6	15.1	14.1	11.8	8.5
1977	8.3	3.6	16.7	17.8	11.9	9.9	12.3
1978	9.5	4.3	7.9	4.2	3.5	10.0	5.3
1979	13.2	20.3	11.5	10.0	16.2	8.2	16.6
1980	12.9	17.9	9.8		35.0	13.8	8.5

Source: Central Bank of Barbados: Annual Statistical Digest, 1980; Annual Reports, 1973-1981; East Caribbean Common Market Secretariat: Abstract of National Accounts Statistics, 1979.

Figure I
A Comparison of Regional Inflation Rates

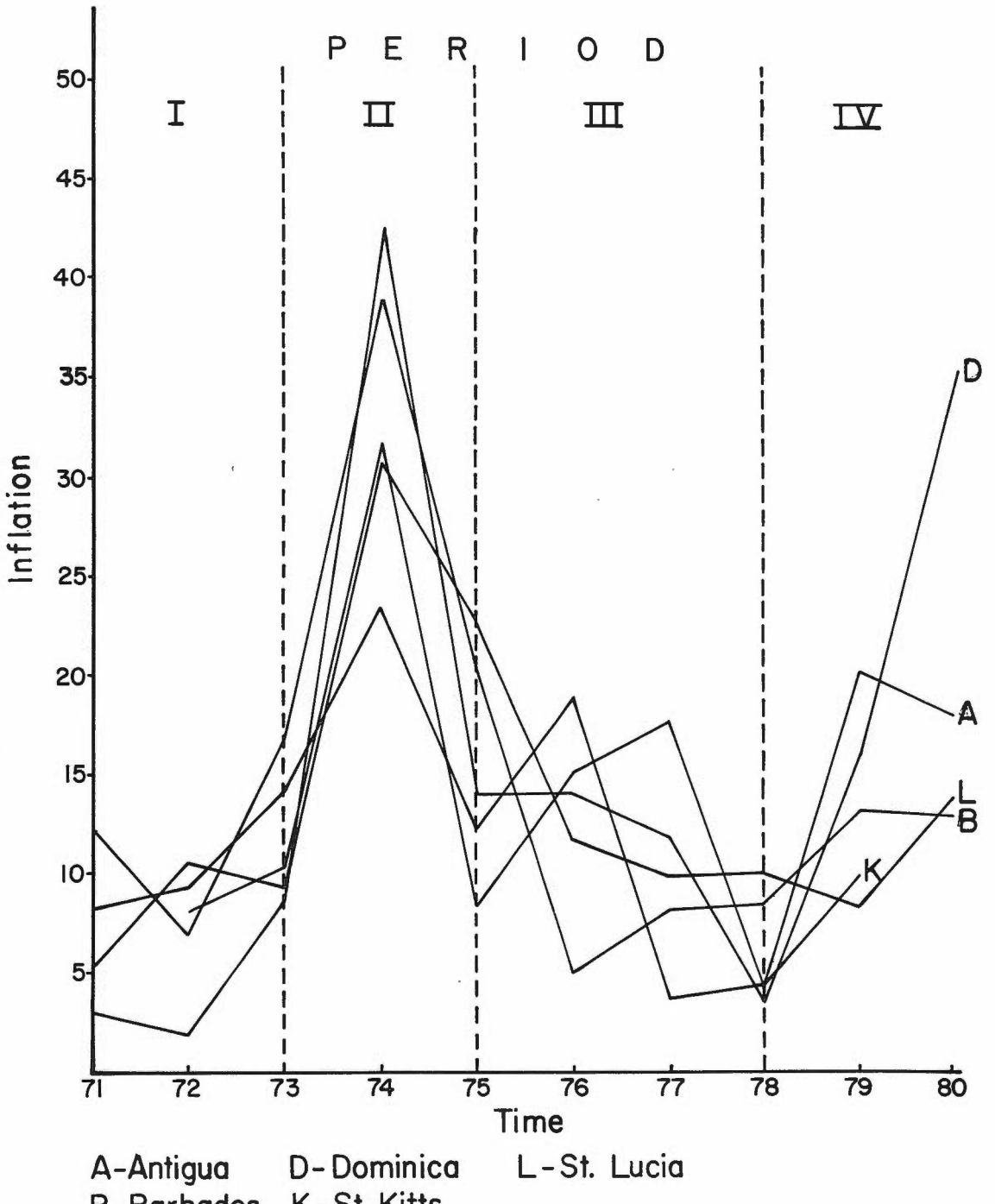


Table IV

AVERAGE RATES OF INFLATION[a]

Country	1971-73	1973-75	1975-78	1978-80
Barbados	12.1	25.4	10.8	11.9
Antigua	10.6	16.6	9.8	14.2
Dominica	4.5	21.8	10.9	18.2
St. Lucia	8.4	20.9	13.6	10.7
St. Vincent	-	22.9	10.3	10.1
St. Kitts	3.2	16.8	11.3	7.1
Montserrat	9.6	18.7	14.6	9.7
Average	8.1	20.4	11.6	12.5

a. Average rates of inflation were computed by taking a simple average of inflation rates in the relevant periods

extends from 1971-1973 and can be described as a period of steady but relatively high and rising prices. Inflation rates average roughly 8.1%. The next period ranges from 1973-1975 and is characterized by severe levels of inflation. Average rates border around 20.4% and are truly reflective of a highly inflationary climate. The third period, dating 1975-1978, sees inflation rates declining and approaching pre-1973 levels with an average rate of around 11.6%. The final period, extending from 1978-1980, indicates a strong potential for accelerating rates. The direction of the general price level is unmistakably upward and the inflation rate, on average, stands at 12.5% (see Figure I).

A few qualitative hypotheses have been proposed to explain this distinct pattern of inflation in the Eastern Caribbean but, for the most part, these studies have been limited to Barbados.[3] Among other things, some cite high interest rates and an increasing tariff structure as being main contributors to the problem. It is contended that, inter alia, the higher rates increase the cost of borrowing and this in turn increases unit prices both of imported and of domestically produced goods. This hypothesis is rationalized from the viewpoint that the openess and financial dependence of the Eastern Caribbean economies necessarily imply that these economies would be unable to insulate

themselves from external effects resulting from movements in foreign interest rates.[4] It is also argued that in the quest for higher government revenues and greater protection for domestically produced goods, regional governments have continually increased import duties and other indirect taxes and thereby have succeeded in forcing prices upward. It is difficult, however, to support this contention unless it can be shown that tariffs and taxes have been quite volatile and also have been clearly exhibiting an upward time path. It is submitted that even if the time path has indeed been upward, tariffs and taxes do not generally display the type of volatility necessary for having a continual and prolonged effect on inflation. It is further submitted that the said parameters have only a once-and-for-all effect on the general price level.

By far, the most favoured explanation of the inflationary problems in the region rests on the aspect of imported inflation. There is a general feeling among many Caribbean economists that domestic price levels are largely reflective of movements in prices of the major foreign trading partners. It is felt that small open dependent economies like those in the Eastern Caribbean are virtually impotent with respect to effectively insulating themselves from most external shocks. As a result, they become very

susceptible to changes in the international economic climate.

This concept of imported inflation has been advanced so extensively that most policy-makers seem convinced that the region's inflation problems are almost solely exogenous in nature. The authorities explicitly echo the view that the achievement of price stability through the conduct of monetary and fiscal policy is a myth; inflation, they claim, originates 'abroad' and is channelled into the domestic economy via international trade. A feasible solution to the problem must therefore be of international content.

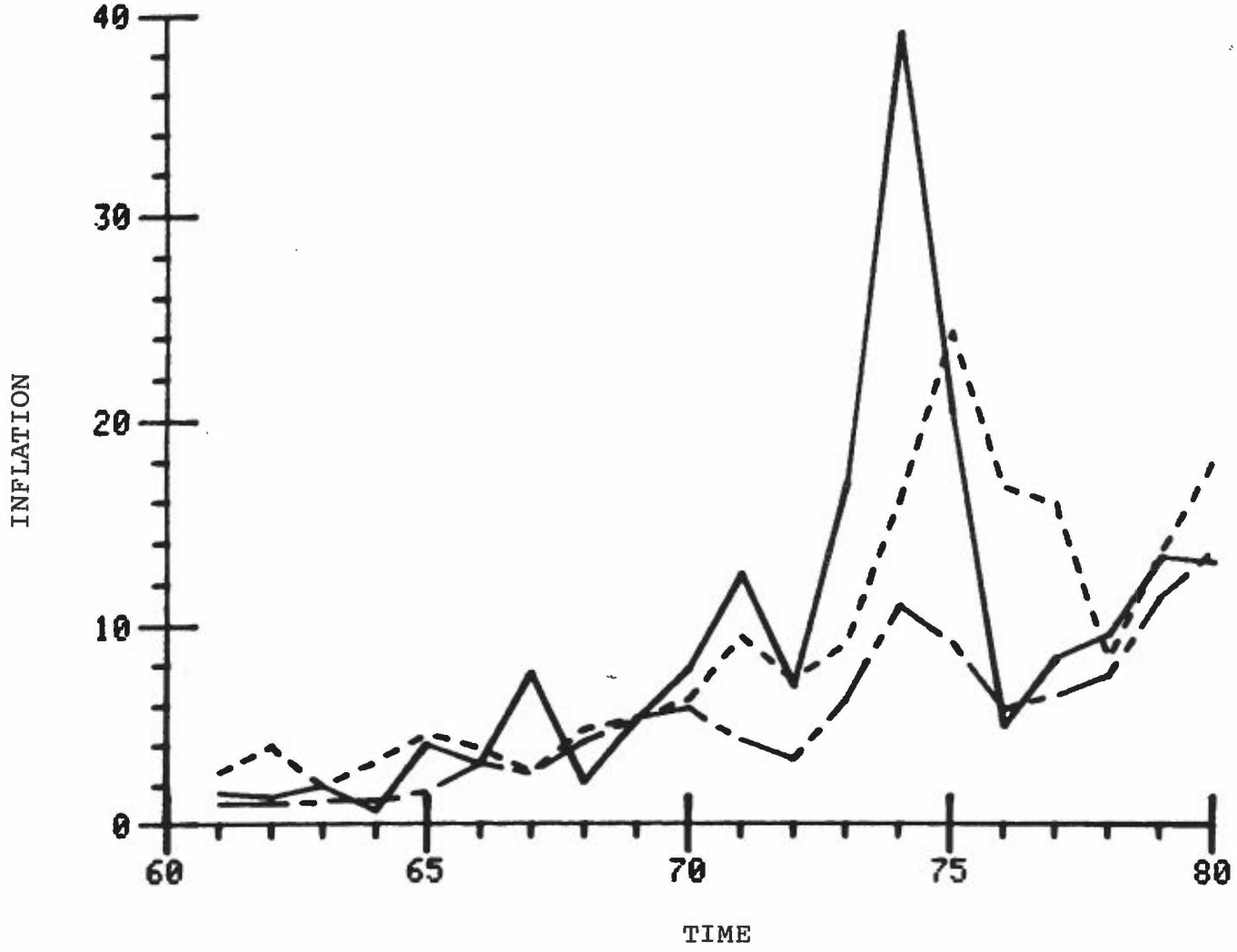
The applicability of the above hypothesis was superficially investigated via a graphical comparison of domestic and foreign prices. Inflation rates, measured by the annual percentage change in the retail price index, for individual islands were compared to inflation rates in the two major trading countries, namely the United States and the United Kingdom. The study period extended from 1961-1980 for Barbados and from 1971-1980 for the other islands.

A priori information would suggest that domestic inflation rates should show a close resemblance to rates in the United Kingdom up until the early seventies. The regional currency at that time was tied to the Pound and

also, the colonial legacy of the islands gave Britain supremacy over trade. By the mid-seventies, the two regional currencies were untied from the Pound and fixed to the U.S. dollar.[5] Also, around the same time, the United States began replacing the United Kingdom as main exporter to the Caribbean region. As a consequence, we would expect domestic inflation rates to typify those in the United States commencing around the post-1975 period. The results as portrayed in Figures II - VIII, however, indicate a relative absence of this expected one-to-one correspondence between domestic and foreign inflation rates. It may well be that a better approximation of domestic inflation can be had by using lagged foreign inflation rates. But, an eye inspection of Figures II - VIII suggests that the inclusion of a lagged adjustment process does not eliminate the variability between the rates. Therefore, while there appears to be a definite relationship among these rates, the correlation does not appear to be strong enough to permit a conclusion that imported inflation is the sole explanatory factor of domestic inflation. The magnitude of the deviations would suggest that there must be other factors which influence the domestic inflationary process.

On the other hand, it may be that foreign inflation rates are not the most appropriate approximation of imported

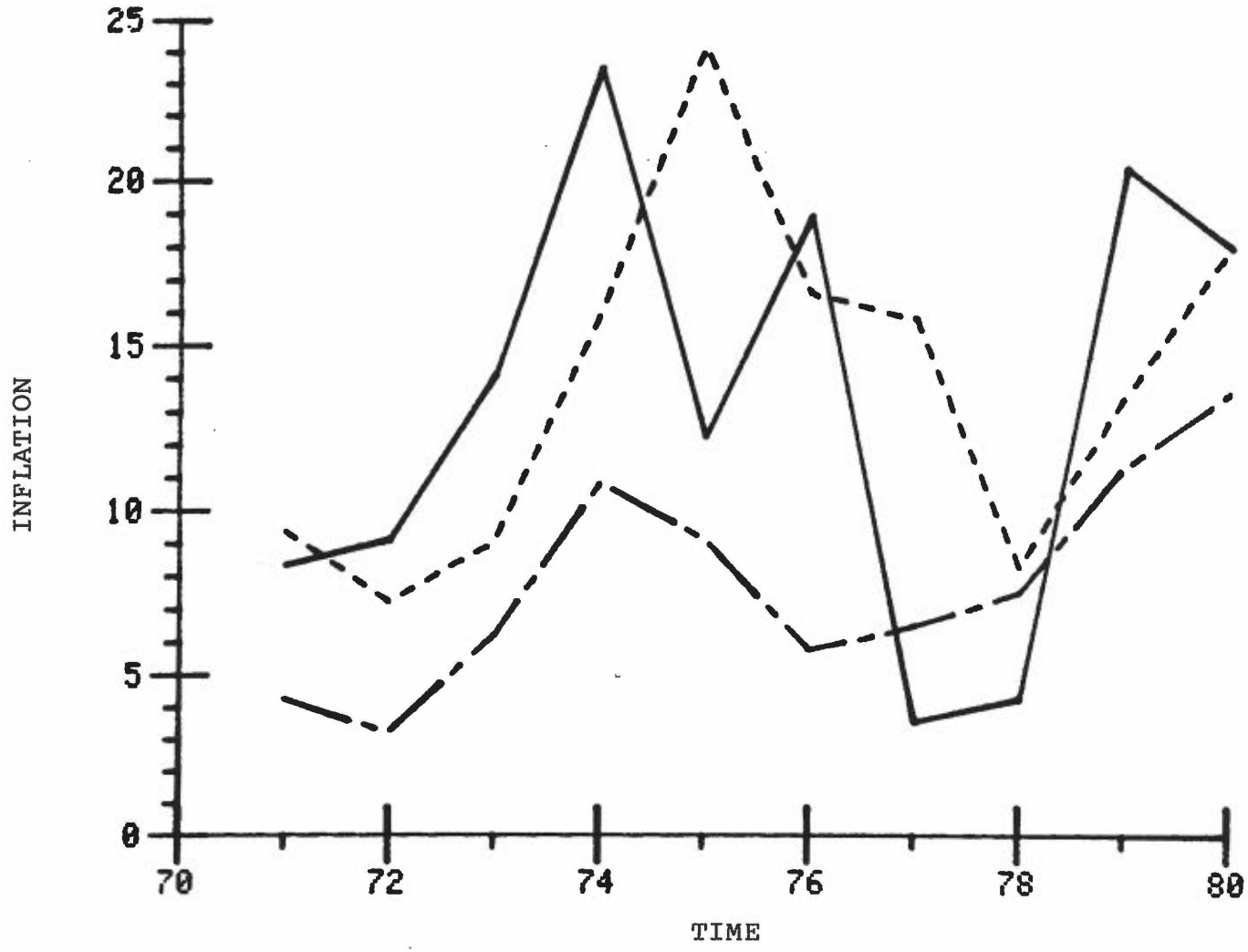
A COMPARISON BETWEEN INFLATION RATES IN BARBADOS,
THE UNITED KINGDOM AND THE UNITED STATES



——— Barbados ------ United Kingdom —— _ —— United States

Figure II

A COMPARISON BETWEEN INFLATION RATES IN ANTIGUA,
THE UNITED KINGDOM AND THE UNITED STATES



——— Antigua ------ United Kingdom —— _ —— United States

Figure III

A COMPARISON BETWEEN INFLATION RATES IN DOMINICA,
THE UNITED KINGDOM AND THE UNITED STATES

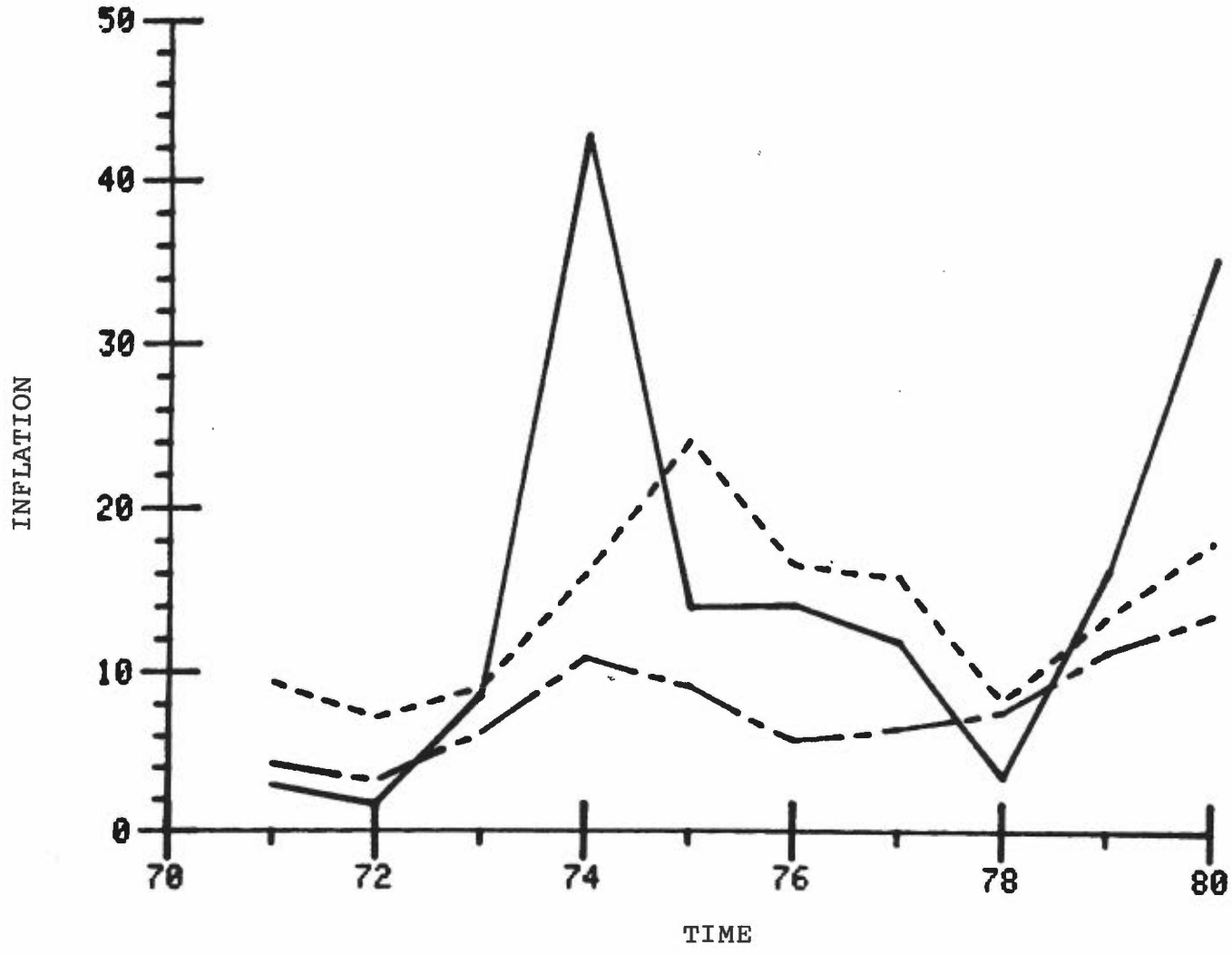


Figure IV

A COMPARISON BETWEEN INFLATION RATES IN ST. LUCIA,
THE UNITED KINGDOM AND THE UNITED STATES

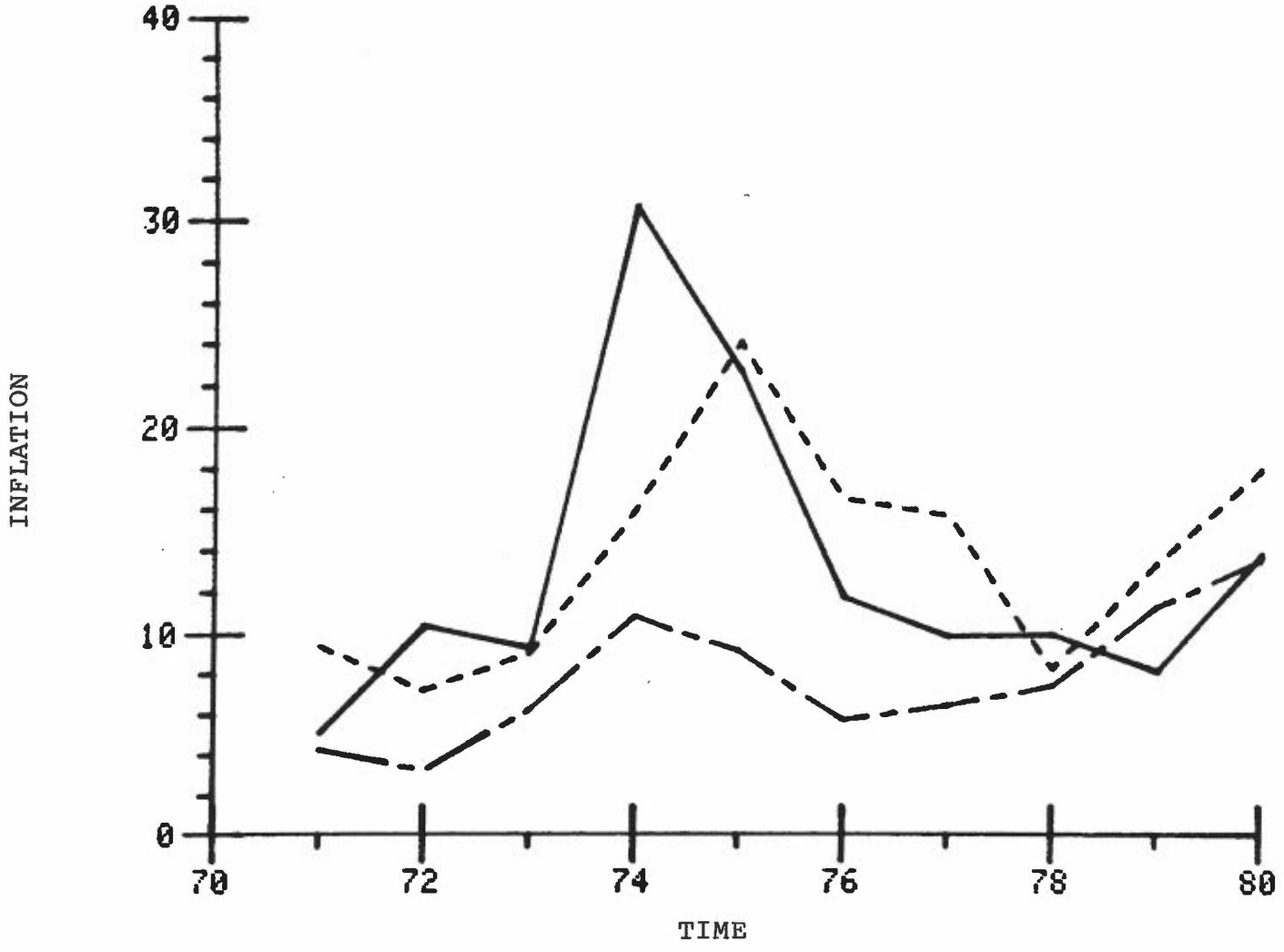
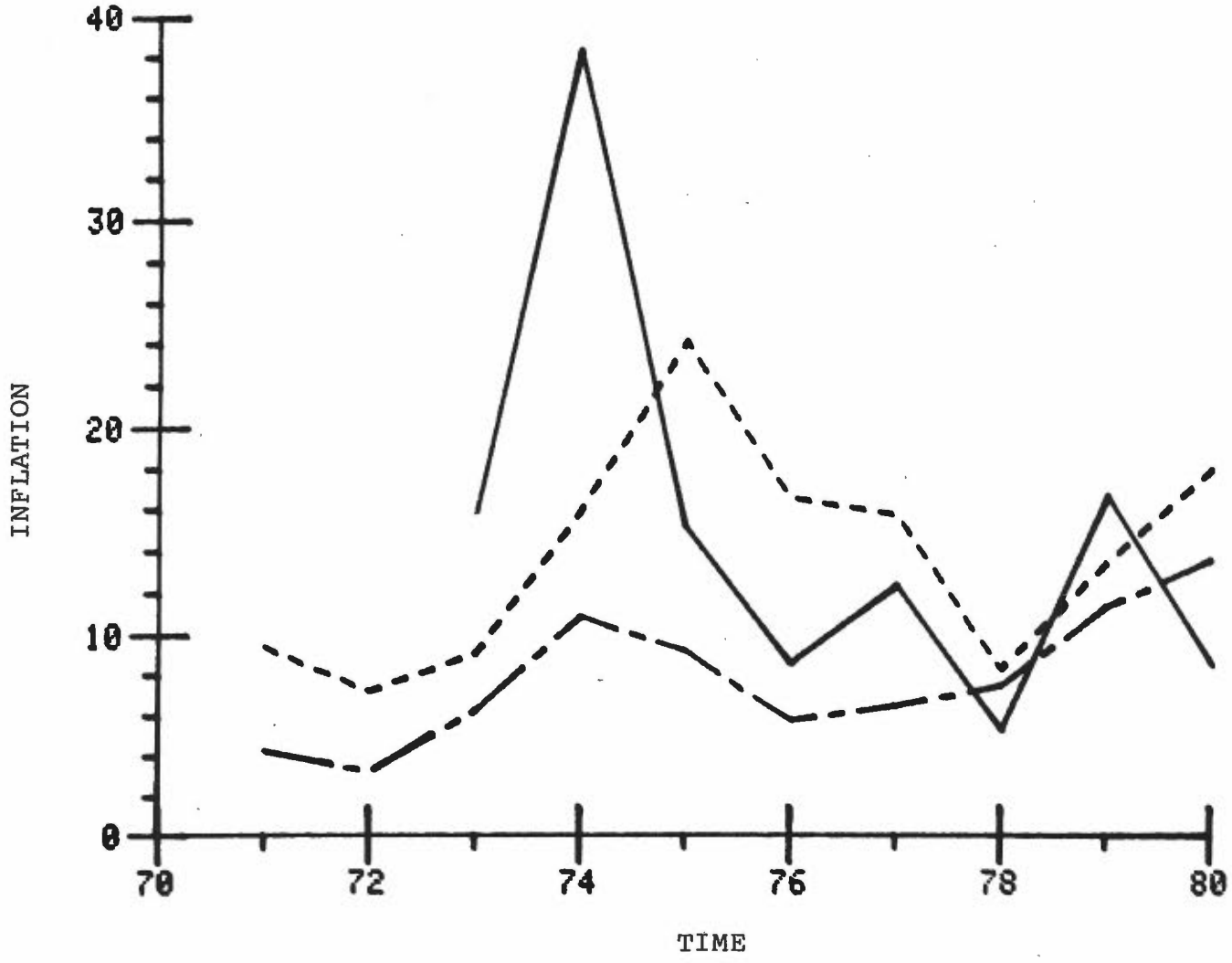


Figure V

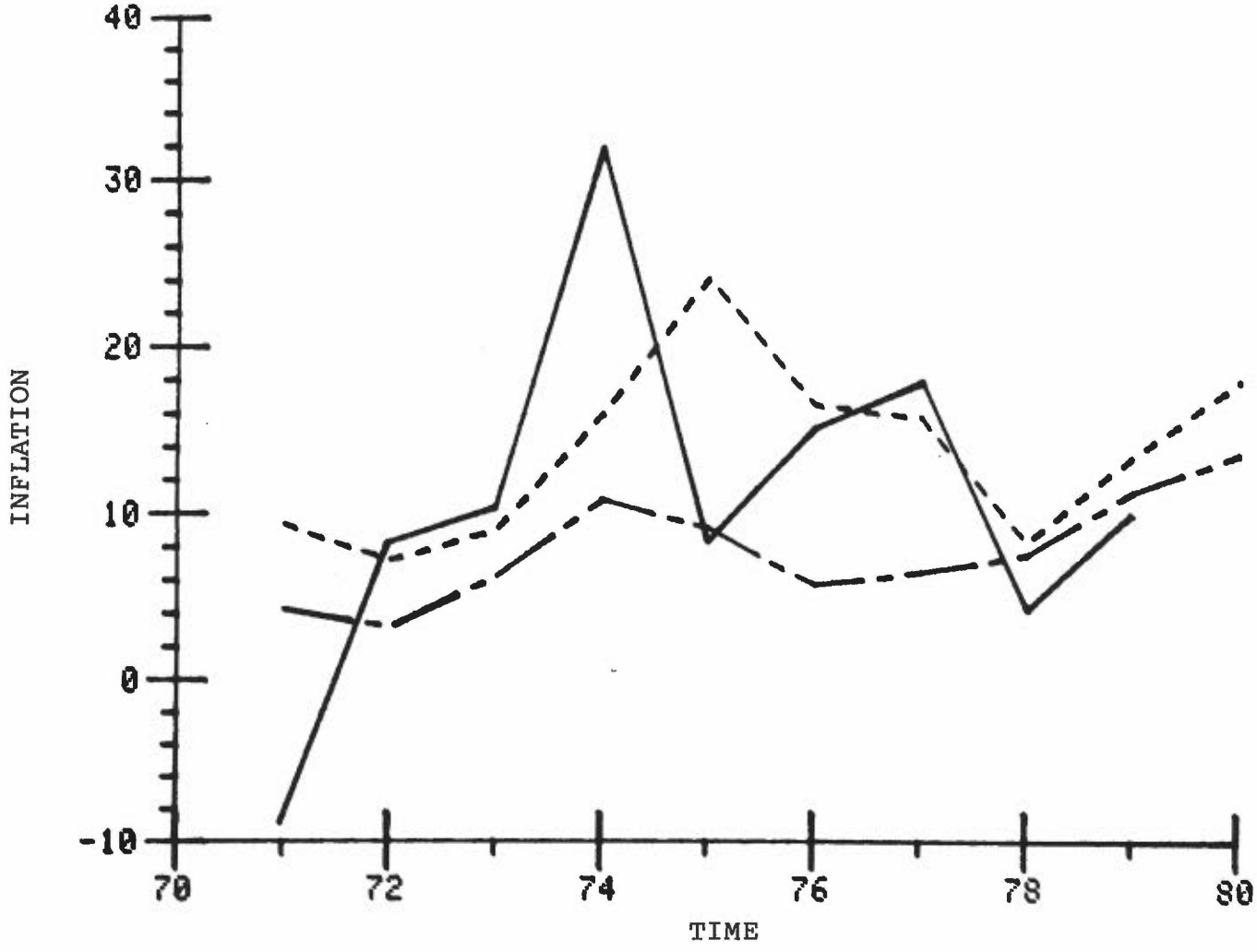
A COMPARISON BETWEEN INFLATION RATES IN ST. VINCENT,
THE UNITED KINGDOM AND THE UNITED STATES



——— St. Vincent ------ United Kingdom —— _ —— United States

Figure VI

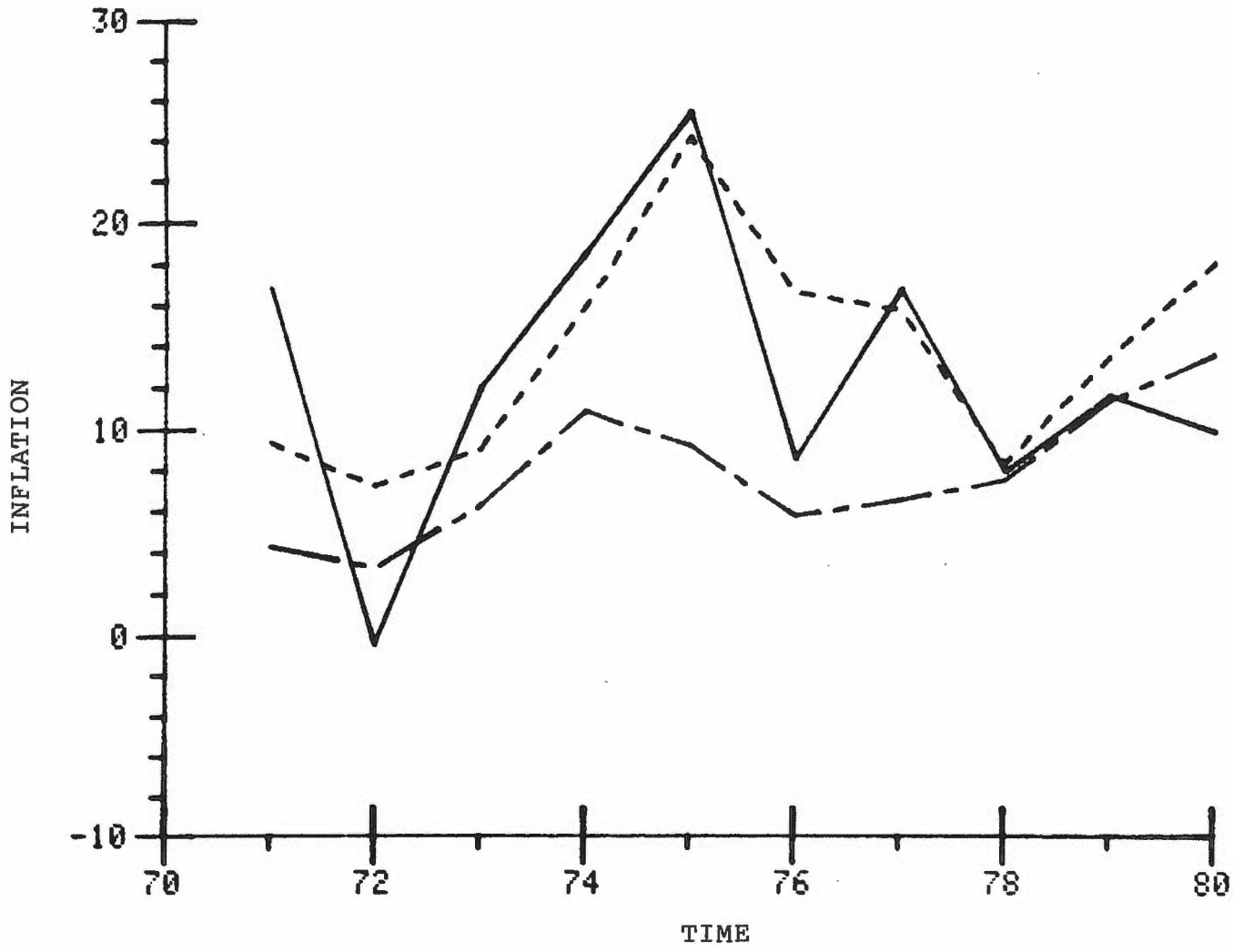
A COMPARISON BETWEEN INFLATION RATES IN ST. KITTS,
THE UNITED KINGDOM AND THE UNITED STATES



——— St. Kitts ------ United Kingdom ___ _ ___ United States

Figure VII

A COMPARISON BETWEEN INFLATION RATES IN MONTSERRAT,
THE UNITED KINGDOM AND THE UNITED STATES

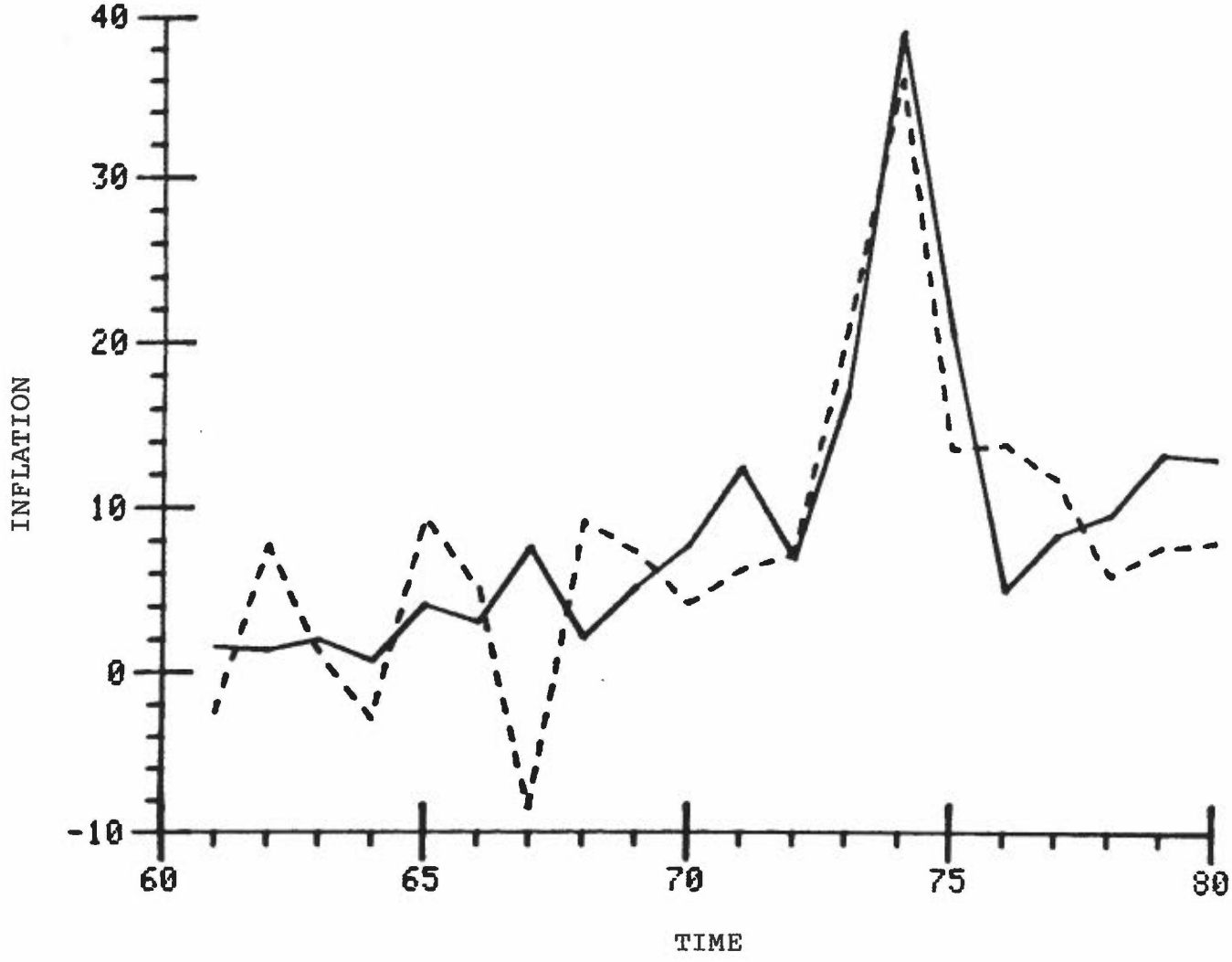


——— Montserrat ------ United Kingdom ——— _ ——— United States

Figure VIII

inflation since the measurement of the former may include a number of commodities which are not directly relevant to the importing country, especially if the importing country has different tastes and customs. A more relevant indicator might be a price index consisting of various imported commodities weighted according to their domestic importance. Such an index, which is called an import price index, was available only for Barbados and Dominica and tests were thus limited to those islands. When the import price index of those two islands was compared with the general price level the resulting relationship appeared to be much closer than that which was depicted by the foreign inflation rates. As portrayed in Figures IX and X, the period from 1972-1975 showed the greatest similarity for Barbados while 1972-1973 and 1979-1980 were the closest for Dominica. Nevertheless, the magnitude of the deviations remains significant enough to render support for our previous conclusion that imported inflation cannot by itself fully explain changes in domestic price levels.

A COMPARISON BETWEEN INFLATION RATES AND IMPORT PRICES IN BARBADOS



——————— General Price Level -------- Import Price Level

Figure IX

A COMPARISON BETWEEN INFLATION RATES AND IMPORT PRICES IN DOMINICA

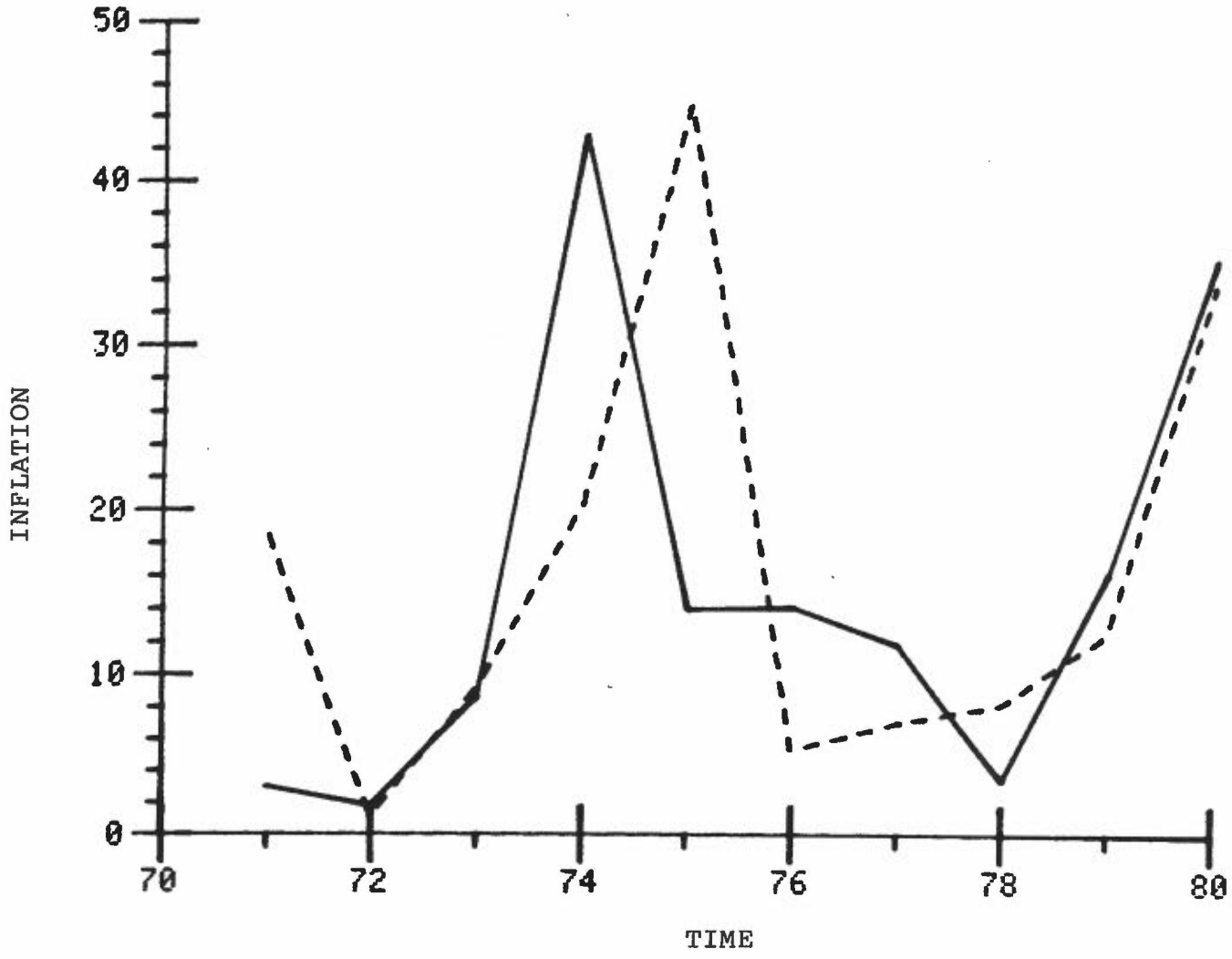


Figure X

NOTES

1. A country is said to import inflation when domestic prices are forced upward due to an increase in the cost of imported items. The more open an economy, the more susceptible it will be to imported inflation.

2. The periods which are distinguished go from the beginning of 1971 to the end of 1972, from the beginning of 1973 to the end of 1975 and so on. Therefore 1971-1973 and 1973-1975 should be interpreted in the above context.

3. See Codrington V., "Inflation in Four Independent Countries of the Commonwealth Caribbean." A paper presented to the Seventh Regional Monetary Studies Conference, Georgetown, Guyana (1975); Cox M., "Inflation in Barbados 1970-1974." Institute of Social and Economic Research, University of the West Indies, Cave Hill Campus (1975); Francis G., "Price Trends in Barbados: 1968-1973" in: Bourne C. (ed.), Inflation in the Caribbean. Institute of Social and Economic Research, University of the West Indies (1977); Whitehead J., "The Control of Inflation in a Small Underdeveloped, Open Economy: The Barbadian Experience." American Economist (1978), Vol. XXII, No. 1. For a more quantitative approach see Downes A., "Inflation in Barbados: An Econometric Investigation." Department of Economics, University of the West Indies, Cave Hill (1981). For a qualitative analysis of the inflationary problems in the other Eastern Caribbean islands see Bourne C. (ed.), op. cit., (1977), in particular, the article by E. Allen.

4. It has been shown that interest rates in the region respond to changes in foreign interest rates. See Cort L., "The Role of the East Caribbean Currency Authority." Unpublished M.A. Thesis, Dalhousie University, Canada, (1979). Also see Howard M., "Interest Rate Behaviour in an Open Developing Economy: The Barbadian Experience 1965-1976." Quarterly Report, Central Bank of Barbados.

5. Barbados and the other seven Eastern Caribean islands used the same currency (i.e., the Eastern Caribbean dollar) up until December 1973 when the Central Bank of Barbados made its first issue of Barbadian dollars. The

Barbadian and the Eastern Caribbean dollar remained linked to the British Pound Sterling at an exchange rate of £1 = BDS$4.80 = ECD$4.80 until mid-1975 and mid-1976 when the linkages were shifted to the U.S. dollar. In July 1975, the Barbadian dollar was fixed at U.S.$1 = BDS$2 while in mid-1976 the Eastern Caribbean dollar was fixed at U.S.$1 = ECD$2.70.

Chapter IV

THE STRUCTURAL MODEL

Over the past decade, several economists have endeavoured to formulate various theories which are capable of explaining inflation in open economies.[1] Most of their work has, however, centered around inflation as it relates to developed open economies, particularly those of the Scandinavian countries. While a limited number of studies have been done on various Latin American countries, the inflation literature with respect to other Third World countries is either very scant or non-existent. Furthermore, given the generally poor quality of the existing data set, most of the published literature on Third World inflation tends to be qualitative in nature.

Although most Third World countries tend to have highly open economies, it would be erroneous to apply in its original form any one of the existing inflation theories on developed open economies for the purpose of explaining inflation in Third World countries. Economic openess in this case is not a sufficient condition to permit application; it becomes necessary to examine the structural difference and, in so doing, make an obvious distinction between developed and developing open economies. Intuitively, the underlying causes of inflation in

developing countries ought to exhibit a direct correlation with, inter alia, basic economic development problems and structural characteristics of the system of production in those countries. Inflation models applicable to those countries should therefore incorporate the various relevant structural elements. It is not permissible, for example, to assume the existence of full-employment or perfect market information or to allow differences in productivity growth between sectors to be a primary explanatory variable. The reason for this is that developing countries are often plagued with high levels of unemployment and gross imperfections with respect to the acquisition of market information. Productivity, represented by output per man, is normally quite low, and one would expect the differentials between sectors to be fairly small since the labour force as a whole usually tends to be relatively unskilled. This does not, however, imply that those factors are completely irrelevant in the modelling of inflation in developing countries. They no doubt have some role to play, however minimal. But, their explicit accountability in a model may not be necessary.

Further, it is felt that the frequently used distinction between traded and non-traded goods is inadequate for explaining inflation in developing economies. This type of

dichotomy does not allow for the explicit incorporation of structural bottlenecks and it thus ignores important information. For example, it is immaterial in this framework whether exports are mainly agricultural cash-crops rather than food-crops or whether imports are comprised of mainly luxury or essential commodities. It also makes little difference whether agricultural and manufacturing sectors are only partially developed or whether the system of production is of a traditional nature. These are important factors which ought to be included in the development of any model pertinent to inflation in developing open economies.

The components of the set of exports and imports are important in the sense that they influence the level of dependence which a country can achieve. In particular, a system geared towards the exportation of cash-crops must necessarily imply that most food and other essential commodities will be imported at prices which are exogenously determined. If these exogenous prices rise, the small developing country, being unable to readily alter its set of importables, will inevitably become prone to the effects of the higher prices. Further, traditional methods of production may mean that firms operate at grossly inefficient levels relative to firms elsewhere. The effects of this are

two-fold. First, prices for domestically produced and consumed commodities will be higher than what could have been achieved under more efficient production methods. Second, the export sector may become relatively uncompetitive and if the level of imports do not fall, ceteris paribus, one can expect a depletion of the country's foreign reserves in the short run. In the longer run, if reserves continue to fall, exchange controls may be imposed and this may in turn force domestic prices upward, as individuals compete for the reduced stock of available goods.[2]

1. THE MODEL: A THEORETICAL APPROACH

The proposed model to be used for explaining the inflationary process in small open developing economies, such as those of the Eastern Caribbean, can be described as a two-sector structural model. Its foundation is based on a theory of a dual or a dichotomized economy in which there are two sets of markets.[3] In one set of markets there are those commodities which typically respond to demand and supply conditions while in the other set, prices are determined by production costs and desired profit margins. We call the first set auction markets and the other set administered markets.

A. The Auction Market

The operational mechanics of auction markets assume that the competitive element is constantly at work so that all markets are usually cleared. A problem arises here in that if all economic agents take auction market prices as given and outside their control, how can prices move? Who is left to adjust prices? This problem is conveniently solved by assuming the existence of a 'Walrasian Auctioneer' whose function is to find the correct vector of prices which leads to the clearing of all markets. The process may be described as follows:

> "At time zero the Walrasian Auctioneer calls out some vector of prices which includes both spot and future prices. All agents present their demands and supplies of current and future goods at those prices. The auctioneer examines the vector of aggregate excess demands and adjusts prices according to some rule, presumably raising the price of goods for which there is excess demand and lowering the price of goods for which there is excess supply. The process continues until an equilibrium price vector is found. At this point, all trades are made including the exchanges of contracts for future trades. The economy then proceeds through time, each agent carrying out the agreed upon contracts."[4]

Even though the above is a very unrealistic portrayal of the operational mechanics in auction markets, the basic idea that prices move in response to excess demand and supply seems plausible.

The type of goods which qualify under the auction market heading are, typically, agricultural and raw commodities, securities, foreign exchange and sometimes internationally traded goods as in the Scandinavian 'export-led' sector. For our purposes, we have chosen to characterize the auction market in the Caribbean setting as being the set of all local agricultural commodities which are entirely domestically consumed. We make an explicit distinction between agricultural commodities which are exported, those which are imported and those which are produced for local consumption. The small open economy is forced to act as a price taker in the world market, and it must therefore take its export and import prices as exogenously given. We feel, however, that the price of locally consumed agricultural products exhibits great sensitivity to variations in demand and supply conditions, especially when one considers the perishable nature of some of the commodities involved. The homogenous characteristic of agricultural products also suggests price volatility based on supply and demand factors. To use William Miernyk's words:

> "Farmers generally are not in a position to differentiate their products. We do not see or hear advertisements urging us to buy farmer X's wheat or farmer Y's beef. You do, of course, hear a great deal about the merits of a particular brand of bread made from the wheat, and some beef ends up in brand-named canned or frozen products.

> But these are processed foods that are sold to ultimate consumers. Most farmers dispose of their output in wholesale markets where prices fluctuate with supply and demand. In such markets short run demand schedules tend to be relatively inelastic within the relevant price range. Supply schedules are highly, or sometimes perfectly, inelastic and shift to the left or right causing prices to move up or down."[5]

Our decision to give primary focus to the domestic agricultural sector is based on the structural characteristics of the Eastern Caribbean economies. For example, since the respective economies do not have any significant endowment of mineral wealth, raw materials of that nature were consequently excluded from our auction market set. Raw materials would possibly have become a relevant component of the set if there had existed a domestic supply and demand for those commodities. It should thus be noted that, in general, the choice of sector(s) depends on the features of the economies in question.

B. <u>The Administered Market</u>

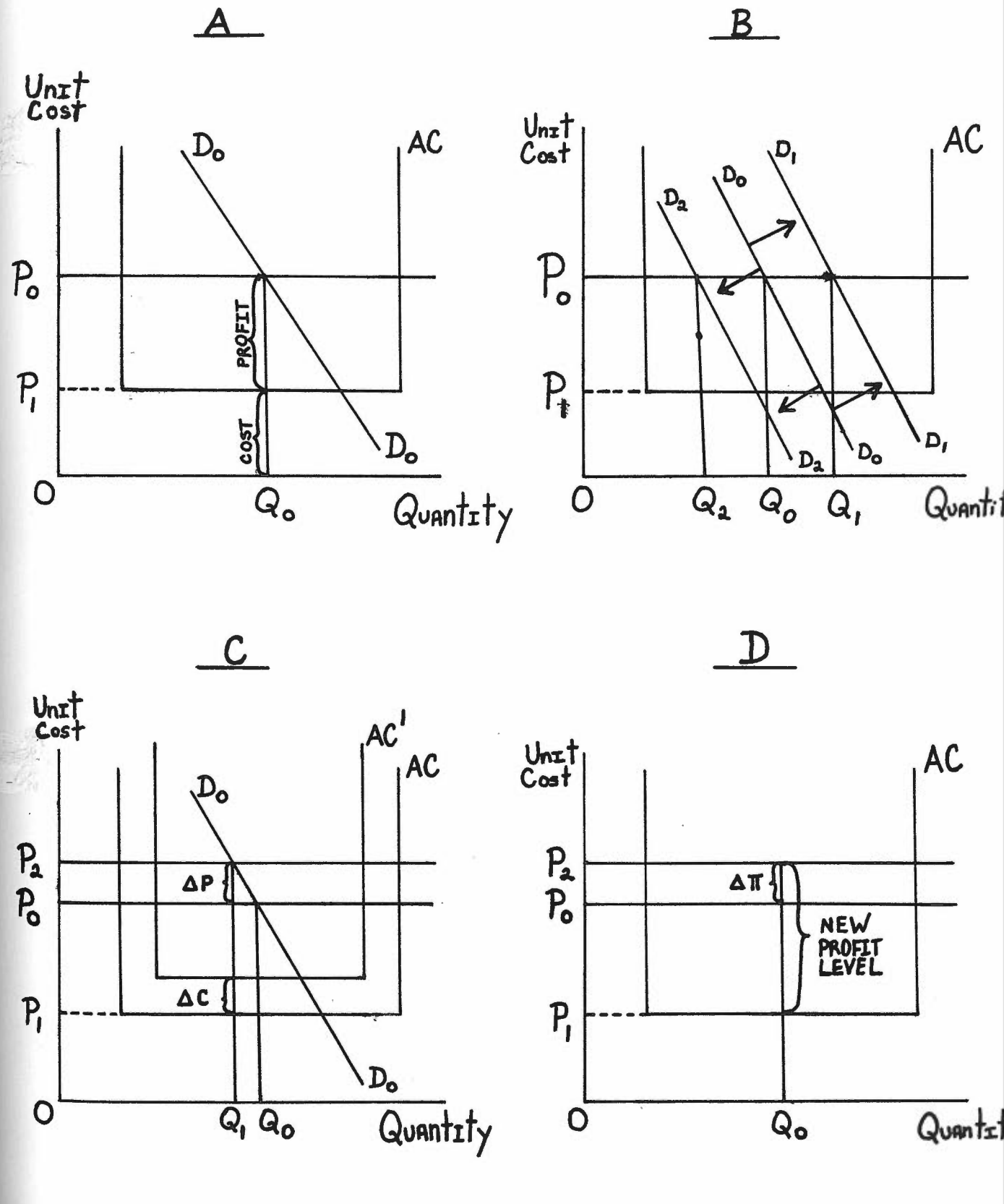
At the other side of the coin lies the administered markets. Prices in these markets are frequently described as 'mark-up' prices because the process by which the seller fixes the price of a unit of output is to 'mark-up' the cost of a unit of output (unit cost)--that is, the process is to add on to unit cost some fraction of the figure, the sum added being known as the profit margin.[6] Prices are

therefore insensitive to demand and supply conditions but react to changes in costs and/or desired profit margins.

Figure XI gives a diagrammatic portrayal of pricing in administered markets. Four various possibilities are considered.[7] First, in graph A, we assume that the firm is in some sort of 'equilibrium' position with an output level of OQ_o and a unit price of OP_o. The cost per unit is OP_1 and the profit resulting from the sale of that output is $(P_o - P_1)Q_o$. In graph B, we assume that some exogenous factor causes the demand curve to shift inwards (D_2D_2) or outwards (D_1D_1). As is shown, this shift has no real effect on the price level but rather, the effects are channelled through a fluctuation in the level of output, with costs and profit margins per unit remaining virtually unchanged. Therefore, prices do not adjust to demand conditions; the adjustment process comes via quantity movements. Graph C examines the effects of a change in the average cost of producing a unit of output. In this example, we assume that unit cost increases so that the average cost curve shifts from AC to AC^1. Assuming the firm wants to maintain the same profit margin per unit at this new and higher level of cost, it is forced to raise its price from P_o to P_2 with the difference between the new and old price being exactly equal to the change in the unit cost (i.e., $\Delta P = \Delta C$). As a

Figure XI

PRICING IN ADMINISTERED MARKETS



result, the old profit margin remains the same but output and total profits may vary depending on the elasticity of demand for the product in question. Finally, we consider the possibility of the firm desiring a higher profit level. In such a case, the firm may raise its price to P_2 and thus increase its per unit profit from P_1P_o to P_1P_2, a difference of $\Delta\pi$.

As we have seen above, in administered markets sellers tend to have significant market power and are therefore able to exert tremendous influence over the determination of prices. This type of pricing policy is particularly characteristic of the distributive sector[8] and it is our contention that the analysis can be generalized to include all sectors which are not included in the auction markets.

2. THE MODEL: ITS STRUCTURAL CONTENT

The following symbols will be used in the formal presentation of the model.

P - price index used to measure inflation

P^A - index of prices in the auction markets

P^{AD} - index of prices in the administered markets

P^F - index of prices of imports in domestic currency

P^{FA} - index of prices of agricultural imports in domestic currency

P^e - index used to measure expected prices

Z^A - the size of the excess demand for domestic agricultural commodities expressed in physical terms

C^A - domestic consumption of agricultural commodities in real terms

G^A - government spending on agricultural commodities in real terms

X^A - exports of agricultural commodities in real terms

I^A - imports of agricultural commodities in real terms

Q^A - output level in the agricultural sector in real terms

e - exchange rate

P_r - terms of trade (i.e., export prices divided by import prices)

YPM - permanent income

FK^A - net inflow of foreign capital to the agricultural sector

CC - index used to measure the cost of credit

CA^A - index used to measure the availability of credit

Y^F - index of real foreign income

Y - nominal GDP

y - real GDP

W^{AD} - index of wage-earnings per man in the administered markets

O^{AD} - index of real output per man in the administered markets

UP - index used to measure unions' pushfulness

M^d - demand for money

M^s - nominal stock of money

Symbols relating to the auction market have the superscript A attached while those relating to the administered markets have the superscript AD. Variables with dots indicate relative rates of change while those with the superscript F relate to a foreign or external index. The relationships of the model may be specified as follows:

$$P^A = b_o + b_1 Z^A + b_2 P^{FA} \qquad (1)$$

where $b_o > 0$, $b_1 > 0$, $b_2 > 0$

Briefly, the idea behind this relationship is that, in the Eastern Caribbean economies, the agricultural sector, which is representative of the auction market, is very susceptible to local demand and supply conditions. We contend that due to the traditional small scale farming practices and the relatively primitive technology of production, agricultural output[9] is constrained well below its optimal level. In addition, the pursuit of agricultural policies which favour the production of cash-crops over food-crops has also served to constrain food production. At the same time, due to population increases, growth in real GDP and an ever expanding tourist sector, aggregate demand for food continues to show a significant rate of increase.[10] This constraint in the supply structures along with the buoyancy

in demands has led to pressures on domestic agricultural prices.

To some extent, these pressures have been somewhat alleviated by the highly open nature of the economies in question. The respective countries may attempt to augment their domestic agricutural supplies with imported foodstuff. But if food imports rise, other imports presumably would need to fall to maintain equilibrium in the balance of payments. This restriction of other imports is likely to be accompanied by some price rise.[11] The supply bottlenecks consequently remain an overriding factor in the price determination mechanism especially since importation is normally subjected to foreign exchange constraints and other import restrictions. Assuming that the rate of growth of the money supply is not reduced, then domestic prices can be expected to rise as the volume of available goods is curtailed.[12]

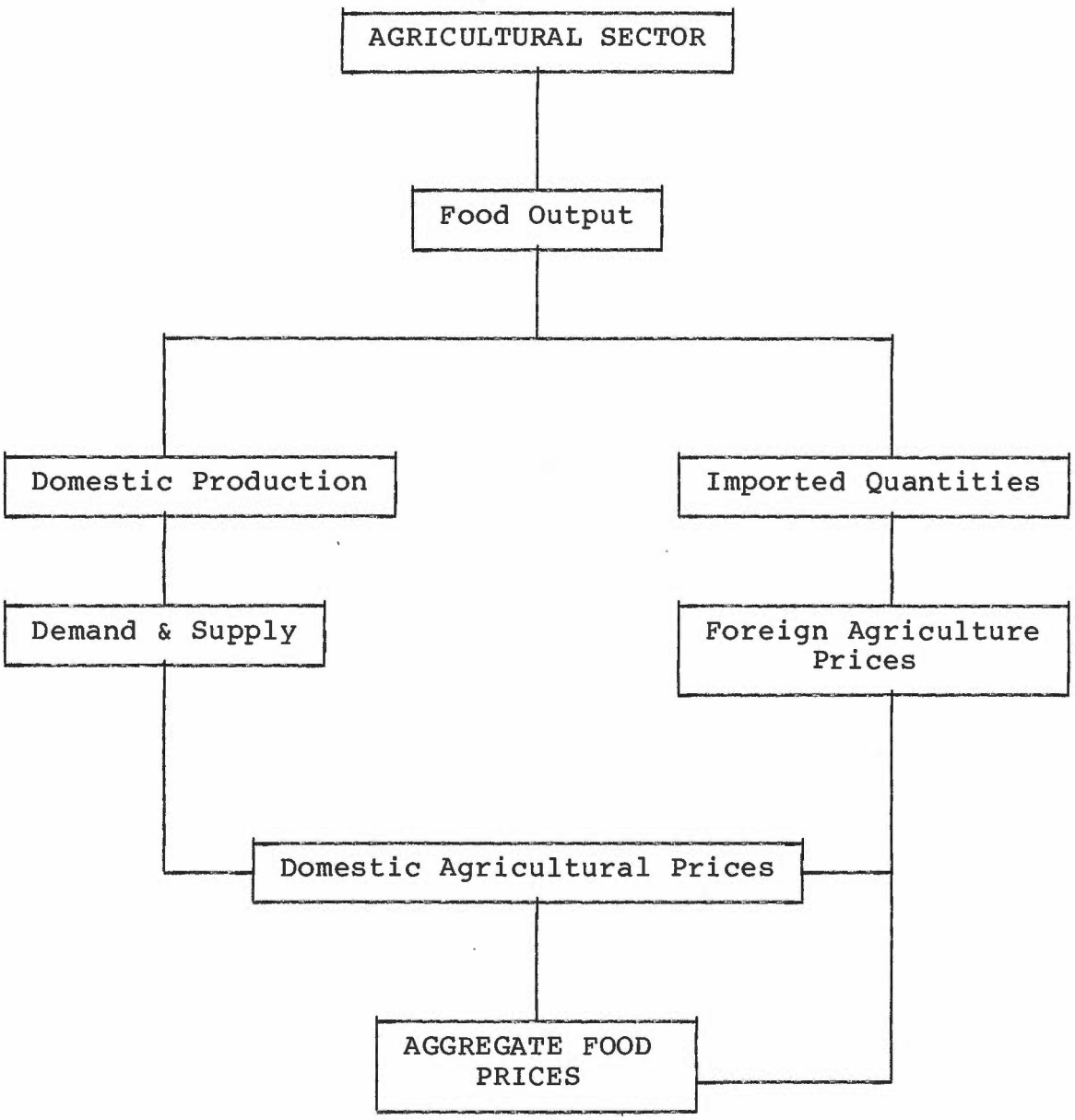
Since our concern is to explain the behaviour of aggregate food prices (i.e., the price of both local and imported food) rather than just local food prices, we find it necessary to modify the theoretical presentation of the model so as to include the influences of foreign food prices. The openess of the economies would surely suggest that foreign agricultural prices will necessarily be an

influential parameter in the determination of domestic food prices. The effects of this variable are transmitted both directly and indirectly. The direct effects are easily discerned since the cost of imported commodities will have a direct effect on the price at which these commodities are sold locally. There are some goods, however, which are locally produced and simultaneously imported; or, there may exist imported goods which are close substitutes for local products. In such cases, the foreign prices will to some extent dictate the price of these locally produced goods. For example, at the proceedings of the fourth West Indian agricultural economic conference, it was pointed out that "although yams and sweet potatoes (in Barbados) were produced and sold cheaply exfield (usually at 4 cents per pound to hucksters[13]), there has been a recent tendency for the hucksters to sell them at 12 to 14 cents per pound, at which price imported English potatoes at the controlled price of 12 cents are competitive."[14]

The price dynamics which are described in the above paragraphs are summarized in Figure XII. The diagram shows that aggregate food prices are affected by two factors. On the one hand, there is excess demand (Z^A) which determines the price of agricultural commodities which are locally produced and consumed. On the other hand, there are foreign

Figure XII

PRICING IN AUCTION MARKETS (i.e., Agricultural Sector)



agricultural prices (P^{FA}) which have both direct and indirect influences on aggregate food prices. The direct influence arise from straightforward importation while the indirect influences are channelled through their effects on domestic agricultural prices. Thus, the price of local food is determined partly by supply and demand at home and partly by foreign food prices while the price of imported food is determined exclusively by foreign food prices. The joint interaction of other variables in turn determines aggregate domestic food prices.

The next relationship to be introduced is a straightforward definitional equation. We define excess demand[15] in the agricultural sector as follows:[16]

$$Z^A = C^A + G^A + X^A - Q^A - (e/P_r)I^A \qquad (2)$$

Further, we assume that C^A, X^A and I^A are dependent variables and can be modelled in the following manner.

$$C^A = C^A(YPM, FK^A, CA^A) \qquad (3)$$

where $C_1 > 0$, $C_2 > 0$, $C_3 > 0$

$$X^A = X^A(Y^F, e/P_r) \qquad (4)$$

where $X_1 > 0$, $X_2 \leq 0$

$$I^A = I^A(y, e/P_r) \qquad (5)$$

where $I_1 > 0$, $I_2 \leq 0$

The consumption function in equation 3 which is used to estimate domestic agricultural consumption expenditures has its foundation in Friedman's permanent income hypothesis. The consumption of domestic agricultural commodites is said to be dependent on some permanent income variable (YPM) which is normally a weighted average of past incomes. It is also a function of the net inflows to the agricultural sector (FK^A) and of some credit availability variable (CA^A). The inflows which we refer to relate primarily to remittances from abroad. These are generated from persons who migrate to the presumably more prosperous developed countries and remit funds to their family and relatives at home. The availability of credit to the agricultural sector attempts to measure the volume of credit which is extended for the purpose of food consumption. In particular, we are referring to the fact that in most underdeveloped countries, there is usually some type of informal credit arrangement between shopkeepers and buyers.

The export and import functions are designed to emphasize the open nature of the economies. Specifically, in the situation where exports compete with other foreign

goods, the index of prices of such export goods relative to foreign goods becomes an important determinant of the aggregate export level. Similarly, where domestic production competes with imports, the index of prices of such imported goods relative to domestic goods becomes an important determinant of imports of such goods into the country.[17]

The index which is used to measure these effects is the terms of trade, adjusted to incorporate fluctuating exchange rates.[18] Assuming exchange rates are fixed, then an increase in export prices relative to import prices (i.e., e/P_r decreases) indicates that, ceteris paribus, a larger volume of imports could be received in exchange for a given volume of exports. But, in small open economies, export prices are exogenously determined and the higher export prices will induce producers to increase the volume of exportables. Therefore, the volume of imports and exports will vary inversely with the variable e/P_r. Finally, as foreign income (Y^F) increases, it is expected that domestic agricultural exports (X^A) will rise while as real domestic income (y) increases, the importation of agricultural commodities (I^A) will also increase.

We now turn to the relationships which explain the workings of the administered markets.

$$P^{AD} = b_1(W^{AD} - O^{AD}) + b_2CC + b_3P^F + b_4M^S/y \qquad (6)$$

where $\frac{\partial P^{AD}}{\partial W^{AD}} > 0$, $\frac{\partial P^{AD}}{\partial O^{AD}} < 0$, hence $b_1 \lesseqgtr 0$

and $b_2 > 0$, $b_3 > 0$, $b_4 > 0$

$$W^{AD} = W^{AD}(W^{AD}_{t-i}, UP, P_{t-i}) \qquad (7)$$

where $W_1 > 0$, $W_2 > 0$, $W_3 > 0$

The price equation in the administered markets is a variant of the conventional 'mark-up' price equation in which P^F, the index of imported prices, and CC, a variable measuring the cost of credit, are used as proxies for the index of unit non-labour cost and where profit margins are taken to be constant over time.[19] We also hypothesize that prices adjust to domestic monetary conditions and have thus included a monetary variable in the form of the ratio of money supply to real gross domestic product (M^S/y). But, monetary dynamics in an open economy would possibly suggest that excessive money creation would lead to balance of payments difficulties rather than inflationary problems. This is, however, not completely correct since the given assertion is valid only for short run analysis; in the

long run, continuous balance of payments deficits will induce governments to react by imposing foreign exchange controls and other import restrictions. Further, an excessive increase in the money supply does not necessarily imply that the entire portion of 'new money' will go towards the purchase of foreign goods and services. Some portion will no doubt remain in the domestic economy and this in turn could lead to inflationary pressures.

The wage equation is relatively straightforward and the only variable which requires some explanation is UP, the index used to measure the pushfulness of unions in the economy. We feel that since one of the main objectives of the trade unions is to see that the money wages of their members advance as rapidly as possible, some explicit account of trade union activities should be incorporated in any wage equation. While admitting that past wages and prices may play a role in determining the degree of trade union pushfulness, we feel that these variables by themselves fail to capture adequately the real forcefulness of unions. Due to the fact that the unions' main concern is to influence current and future wages, it would be fallacious to propound that past wages and prices truly incorporate the immediate effects of the unions' influence on current wages since the time periods are clearly

different. For this reason, we tend to agree with Hines in that it is "desirable to include trade-union influence explicitly, that is to experiment with an independent variable which represents, so to speak, the residual element of trade-union pushfulness--the element that cannot be explained in terms of past wages and prices."[20]

Trade union activity in the Caribbean has traditionally been politically oriented. For the most part, unions had been primarily concerned with attaining political power and it is therefore not surprising that most of the existing political parties evolved from unions. In recent times this situation has changed and unions have begun to show greater concern over the economic welfare of their members.[21]

Up until now, we have not made any explicit attempt to introduce a monetary sub-sector into our inflation model. The following two relationships make such an attempt.

$$M^s = M^d \tag{8}$$

$$M^d = M^d(Y, CC, P^e) \tag{9}$$

where $M_1 > 0$, $M_2 < 0$, $M_3 > 0$

The theoretical foundation of the above equations needs explicit mention.[22] Conventionally, the monetary base or level of high-powered money is viewed as an exogenous variable whose control falls within the realms of the Central Bank. It therefore follows that the desired level of high-powered money is assumed to adjust to the actual, exogenously determined level. In small open economies, however, these assumptions become invalid since Central Banks are rendered impotent with respect to controlling the level of high-powered money with any degree of accuracy. This results from the fact that the net foreign asset component of high-powered money is extremely volatile in small open economies. External leakages from the circular flow of bank credit are sufficiently large in magnitude and sufficiently within the discretion of the private sector to preclude the Central Bank from exerting a high degree of control over the actual monetary base.[23] Consequently, the monetary base in small open economies should be regarded as an endogenous variable. We therefore postulate that the actual level of nominal money balances adjusts instantaneously to the desired level which is predominantly a function of the level of economic activity.[24] It is hypothesized that the demand for money varies directly with the level of nominal income and inversely with the cost of

credit, represented by the rate of interest. The demand for money is also felt to be influenced by a price variable. Specifically, it is hypothesized that money demand is a function of that vector of prices which the public expect will prevail in time period t.

Finally, to round off the model, we have the following two relationships.

$$\Delta P^e = \theta(P - P^e) \qquad (10)$$

$$P = a_1 P^A + a_2 P^{AD} \qquad (11)$$

where $a_1 + a_2 = 1$

Equation 10 can be viewed as an 'adjustment equation' in which θ, the adjustment factor, is a constant lying between zero and unity. As the general price level (P) increases relative to the expected level (P^e), the adjustment factor works in a manner so as to increase price expectations (i.e., P^e increases) and thus returns the system to a stable position. Similarly, as the general price level falls relative to the expected level, the adjustment factor operates so as to reduce price expectations. Equation 11 states that the general price level is simply a weighted average of prices in the auction and administered markets.

The entire model can now be written as follows:

1. $P^A = b_o + b_1 Z^A + b_2 P^{FA}$

2. $Z^A = C^A + G^A + X^A - Q^A - (e/P_r) I^A$

3. $C^A = C^A(YPM, FK^A, CA^A)$

4. $X^A = X^A(Y^F, e/P_r)$

5. $I^A = I^A(y, e/P_r)$

6. $P^{AD} = b_1(W^{AD} - O^{AD}) + b_2 CC + b_3 P^F + b_4 M^s/y$

7. $W^{AD} = W^{AD}(W^{AD}_{t-i}, UP, P_{t-i})$

8. $M^s = M^d$

9. $M^d = M^d(Y, CC, P^e)$

10. $\Delta P^e = \theta(P - P^e)$

11. $P = a_1 P^A + a_2 P^{AD}$

Predetermined Variables: P^{FA}, G^{A}, Q^{A}, e, P_r, YPM, FK^{A}, CA^{A}, CC, Y^{F}, y, Y, O^{AD}, P^{F}, W^{AD}_{t-i}, UP, P_{t-i}

Current Endogenous Variables: P, P^{A}, P^{AD}, P^{e}, Z^{A}, C^{A}, X^{A}, I^{A}, W^{AD}, M^{s}, M^{d}

We have now to show that the above inflationary model is indeed a model of the inflationary process in the sense that it will generate a continuous upward movement in the general price level if an appropriate set of time paths is specified for the data. Several varying time paths qualify for use in our model, but it will suffice to elaborate on one such path.

Let us postulate an initial situation in which the entire model is in general equilibrium and the various price levels are thus constant. Let us now assume that this initial situation is disturbed, possibly by rising wages and/or rising import prices. Then, ceteris paribus, prices in both the auction and administered market will rise[25] thus forcing the general price level upwards. As the general price level increases, price expectations are continually revised upwards and this in turn exerts pressure on the demand for money. As desired money balances rise, the

nominal money stock adjusts so as to accommodate the increase in demands. Assuming that the increase in the money supply exceeds any increase in real gross domestic product, then this in turn leads to a second round effect on administered prices which further forces up the general price level and the whole process once again repeats itself.

We have therefore shown that the model will generate continuously positive values for P if the appropriate time path is correctly specified. We shall now turn to the empirical results of the model.

APPENDIX I

This derivation of the mark-up model is adopted from H. Hagger in Inflation Theory & Policy.

Let price = unit cost + (a x unit cost)

$$= (1 + a) \times \text{unit cost}$$

where a is some fraction representing the relative profit margin.

The precentage increase in price between the current quarter and the preceding quarter is given by:

$$P = M + C \qquad (1)$$

where P denotes the percentage increase in price between the current quarter and the previous quarter, M the percentage increase in the mark-up factor (1 + a) and C the percentage increase in unit cost.

The variable C can be decomposed in the following way:

$$C = b_1 n + b_2 S \qquad (2)$$

where n denotes the percentage increase in some index of unit labour cost in the mark-up sector, S the percentage increase in some index of unit non-labour cost in the mark-up sector and b_1 and b_2 are two constants which sum to unity.

Further, it can be shown that

$$n = W - O \qquad (3)$$

where W denotes the percentage increase in some index of wage-earnings per man and O the percentage increase in some index of output per man.

If we substitute equation (3) into equation (2) and then substitute the resulting expression into equation (1), we obtain

$$P = b_1(W - O) + b_2 S + M$$

In our model, M is assumed to be constant over time and non-labour costs (S) are denoted by the cost of credit (CC) and the cost of imports (P^F).

APPENDIX II

We define the money stock as currency in the hands of the public (CP) plus commercial bank demand deposits (DD). Thus,

$$M = CP + DD \tag{1}$$

Also, the monetary base (H) can be defined as CP plus commercial bank reserves (R) where R represents both required reserves (RR) and excess reserves (ER). So,

$$H = CP + R \tag{2}$$

$$R = RR + ER \tag{3}$$

In general, RR is a function of commercial bank deposits and can thus be expressed as follows:

$$RR = a_1DD + a_2DS + a_3DT \tag{4}$$

where DS and DT are commercial banks' saving and time deposits, respectively.

We can now define the set of portfolio preference equations as follows:

$$DS = b_1DD \tag{5}$$

$$DT = b_2DD \tag{6}$$

$$CP = cDD \tag{7}$$

$$ER = dDD \tag{8}$$

Substituting equations 3-8 into equation 2 we get

$$H = cDD + a_1DD + a_2b_1DD + a_3b_2DD + dDD \tag{9}$$

and $$DD = \frac{1}{c + a_1 + a_2b_1 + a_3b_2 + d} H \qquad (10)$$

So: $$M = (c + 1)DD = \frac{c + 1}{c + a_1 + a_2b_1 + a_3b_2 + d} H = mH$$

where $$m = \frac{c + 1}{c + a_1 + a_2b_1 + a_3b_2 + d}$$

and is called the multiplier.

Conventionally, H is assumed to be exogenous and a straightforward multiplier relationship can therefore be developed. However, in our system, H is an endogenous variable.

Consider: $$H = FA_N + CG_N + CB_G \qquad (11)$$

where FA_N = net foreign assets

CG_N = net claims against government

CB_G = gross claims against commercial banks

Now, suppose the supply of high-powered money exceeds the demand (i.e., $H > H^*$); then, almost instantaneously, net foreign assets will fall since persons will attempt to rid themselves of the excess H and the main channel will be via

importation, given the high degree of openess of the economies concerned. As the foreign asset component falls, ceteris paribus, the stock of high-powered money will also fall and once again the system will approach equilibrium as $H \rightarrow H^*$. Since FA_N tends to be the most volatile and uncontrollable variable in equation 11, it follows that H must be out of the control of the Central Authorities and thus endogenously determined. If H is endogenous, M must also be endogenous.

NOTES

1. For example, see Parkin M. & Zis G. (eds.), Inflation in Open Economies. op. cit.; Also see Lindbeck A. (ed.), Inflation and Employment in Open Economies, op. cit.

2. This assumes that the rate of growth of the money supply is not reduced.

3. See Nordhaus W., "Inflation Theory and Policy." op. cit. p. 108.

4. Varian H., Microeconomic Analysis. W.W. Norton & Company (1978), p. 188.

5. Miernyk W., Economics. Random House (1971), p. 260.

6. For a more detailed discussion see Hagger A., Inflation Theory and Policy. op. cit. pp. 26-35; also see appendix I of this thesis.

7. The assumption here is constant cost but it can be shown that average cost pricing is applicable under a decreasing cost situation. Output level is, of course, determined at the intersection of MC = MR.

8. McClean A.W., "Pricing Policy in the Distributive Sector of Barbados." University of the West Indies, Cave Hill (1979).

9. Here, we are referring in particular to the non-sugar agricultural commodities.

10. See Francis G., "Food Crop Production in Barbados and Its Response to Carifta/Caricom and the Agricultural Marketing Protocol." I.S.E.R., University of the West Indies, Cave Hill (1969), p. 1

11. This point was made by Argy V., "Structural Inflation in Developing Countries." op. cit. p. 78.

12. Implicit to the analysis is the assumption that the net adjustments in trade are made via imports (i.e., although exports may rise, on balance, the fall in imports is greater).

13. The term huckster refers to a 'peddler' in agricultural commodities.

14. See Gooding E.G.B., "Rootcrops in Barbados." Proceedings of the Fourth West Indian Agricultural Economics Conference, U.W.I., St. Augustine, Trinidad.

15. Excess demand (Z^A) is expressed in domestic goods, which requires the imported quantity (I^A) to be multiplied by the exchange rate (e) and divided by the relative price ratio (P_r).

16. This approach was adopted from Nyberg L., "Imported and Home-Made Inflation Under Fixed and Floating Exchange Rates," in: Lindbeck A. (ed.), Inflation and Employment in Open Economies. op. cit.

17. See Boamah D., "Proposed Specification of An Econometric Model of the Barbadian Economy." The Central Bank of Barbados (1981).

18. Note that we define the terms of trade (P_r) as equal to export prices (P_x) divided by import prices (P_m). However, when we include the exchange rate variable (e), we rearrange the term so that the new variable (e/P_r) now becomes the exchange rate multiplied by the reciprocal of the terms of trade as originally defined. To see this, we need only recognize that $e/P_r = e/(P_x/P_m) = e(P_m/P_x)$, where P_m/P_x is the reciprocal terms of trade.

19. See Appendix I for derivation.

20. See Hagger A., Inflation Theory and Policy. op. cit., p. 104.

21. For a more detailed discussion see Gonsalves R., "Trade Unions in the West Indies." Unpublished M.A. thesis, U.W.I. (1972).

22. I am deeply indebted to Wendell McClean for his suggestions regarding the money stock in small open economies. For further information see McClean A.W., "The Stability and Predictive Efficiency of the Traditional Money Multiplier in the Jamaican Context: A Comment on Bourne's Analysis." Univerity of the West Indies, Cave Hill Campus (1979).

23. Ibid., p. 9.

24. Our money demand function is based on the 'new quantity theory' as proposed by Milton Friedman and his associates. For further reading see Friedman M. (eds.), Studies in the Quantity Theory of Money. op. cit.

25. It is readily observed from the model that prices in the administered markets will be forced upward. But, it is not explicitly obvious that auction prices will also increase. To see that this is so, we have only to make two implicit assumptions: (1) wages in the auction sector follow wages in the administered sector and (2) movements in the index of foreign agricultural prices (P^{FA}) parallel those of the general index of foreign prices (P^{F}).

Chapter V

THE EMPIRICAL EVIDENCE

The unavailability of data prohibited the estimation of the model in its entirety. From the given set of islands examined, Barbados proved to have the most adequate data set and the estimation of all but the consumption equation was possible. Annual data extending from 1960-1980 were utilized.

The existing data on the other Eastern Caribbean islands permitted the estimation of only the price equation and the money demand equation. The time period in this case extended from 1971-1980.

Two-stage least squares technique was employed in the estimation of the equations which relate to Barbados since its system involved a set of simultaneous equations. On the other hand, the equations relating to the other islands could be estimated individually, and ordinary least square was therefore employed. The results have also been corrected for first order serial correlation in cases where there was evidence to that effect.

1. DATA SOURCE

The data used in estimating the model came from primarily five basic sources: (1) Central Bank of Barbados: Annual Statistical Digest and Annual Reports; (2) East Caribbean

Currency Authority: Annual Reports; (3) World Bank Reports; (4) International Financial Statistics and (5) East Caribbean Common Market Secretariat: Abstract of National Accounts Statistics.

Data relating to trade figures for the period 1961-1970 were taken from a study done by Gafar and Joefield-Napier.[1] The post-1970 trade figures came from the sources described above.

Data on wages were not readily available but a wage index which was produced in a study done by Downes[2] was utilized in the case of Barbados. In the case of Antigua, we undertook the task of developing an index based on the reported wage levels in a cross section of industries.

All other data originated from the initial sources mentioned above. These sources for the most part specialize in the collection of data on a primary basis, and the overall reliability of the data set should therefore be quite high.

2. THE DATA SET

One of the most difficult tasks in any empirical analysis of inflation is the construction of an index which adequately represents the general price level.[3] Most studies normally resort to using either the consumer price index (CPI) or the implicit deflator of G.N.P. In our study, we utilized the

consumer price index because of the ease in which it could be decomposed into auction prices (i.e., domestic food prices) and administered prices (i.e., prices of all other commodities). This proved to be quite useful for Barbados but such a break-down was unavailable for the other islands.

The indices of imported prices were calculated in two various ways. In Barbados and Dominica data permitted the use of an import price index based on the goods imported by those respective countries while, for the remaining countries, we constructed an import index based on a weighted average of inflation rates of their major trading partners--the United States and the United Kingdom. The volumes of imports were used as respective weights.

A very simple approach was adopted in the formulation of a price expectation index. We assumed that in developing countries price expectations are formed in a naive manner; agents lack immediate and accurate market information and rely on past experiences which are expressed in a one period lag ($P^e = P_{t-1}$).

Two indices of excess demand for agricultural production (Z^A) were used in the study. The first approach was adopted from the works of William Branson.[4] It states that excess demand can be measured by the deviations of actual output

from its trend.[5] In our case, excess agricultural demand was measured by the deviations of actual agricultural output from its trend. In particular,

$$Z^A = \frac{\ln Q^A - \ln Q^{A*}}{\ln Q^{A*}}$$

where Z^A = excess demand for agricultural products

Q^A = agricultural output (excluding sugar)

Q^{A*} = trend of agricultural output

The second measure of excess agricultural demand was simply the average annual rate of change in domestic food prices minus the average annual rate of change in the cost of living for each country.[6]

Data relevant to the consumption of agricultural goods (C^A) were not available and equation (3) was incapable of being estimated. Real foreign income (Y^F) was measured by taking a weighted average of real income in Canada, the United States and the United Kingdom (i.e., the three most important trading partners). The volume of exports from those countries to the respective Caribbean islands was used as the appropriate weights.

Since exchange rates remained fixed throughout the period under examination and because import prices were initially denominated in local currency, the exchange rate

(e) was eliminated from the terms of trade variable (e/P_r) and only the effects of P_r were considered. In so doing, the expected influence of the terms of trade (P_r) on exports and imports was then opposite to the effect hypothesized by (e/P_r) : P_r now varies directly with both the volume of exports and imports.[7]

Wages in the administered sector (W^{AD}), which are equivalent to non-agricultural wages, were available only for Barbados and Antigua, while an index measuring output per man was not available for any of the islands. The variable measuring the pushfulness of unions (UP) was not explicitly computed since unions had only recently begun to exert pressure on wages. Instead, an indirect measure of UP was achieved by including a dummy variable which took the value of zero for periods before 1974 and one for periods after 1973. The year 1973 was used as the cut-off point on a priori grounds. In particular, it was felt that since inflation rates around that period were high, unions would have been continually pressured into providing better conditions for their members.

The study employed the narrow definition of money. These figures were not readily available for the islands (with the exception of Barbados) and had to be calculated by taking the sum of net notes and coins less commercial banks'

cash plus demand deposits. Finally, the cost of credit (CC) was denoted by the prime lending rate in the various territories.

3. EMPIRICAL EVIDENCE

The empirical results are set forth in the proceeding tables. The estimation of the model was not solely confined to the initial specification which was hypothesized. We experimented with various other specifications and the better results are reported below.

The following symbols which appear in the tables are defined as follows:

a = significant at 1% level

b = significant at 5% level

c = significant at 10% level

d = not significant at 10% level

$\bar{R}^2$ = corrected R^2

DW = Durbin-Watson statistic

SEE = standard error of the estimate

F = F - statistic

$$h = r\sqrt{\frac{n}{1 - nV(b_1)}} \qquad \text{where } r = \frac{\sum_{t=2}^{n} e_t e_{t-1}}{\sum_{t=1}^{n-1} e_t}$$

This is a large sample test for serial correlation when lagged dependent variables are present.

A. Results for Barbados

As was pointed out earlier, two different estimates of excess demand for domestic agricultural products were used. Z^{A1} is a measurement of the deviations of actual agricultural output from its trend (i.e., the Branson approach) while Z^{A} measures the difference between the average annual rate of change in the cost of living for each country and the average annual rate of change in food prices (i.e., the Argy approach).

(i) Agricultural Prices

The results in Table V indicate that excess demand in the Barbadian context is not a very significant explanatory variable for agricultual prices. Z^{A}, nevertheless, has the correct sign and performs better than Z^{A1}, but its t-statistic is low. One cannot, however, totally dismiss the influence of Z^{A} since its t- statistic is sufficiently high, though not significant at 10%, to conclude that it exhibits some positive contribution. Probably the low t- value may be due to the fact that in examining annual data, the gap between demand and supply will most likely tend to be less pronounced than if the data were quarterly. Foreign agricultural prices, not surprisingly, are a very significant explanatory variable.

Table V

AGRICULTURAL PRICES (BARBADOS): $P^A = a_o + a_1 Z^A + a_2 P^{FA}$

	P^A	C	Z^A	Z^{A1}	P^{FA}	$\bar{R}^2$	DW	SEE	F- stat.
(1)		-45.236 (7.64)[a]	0.833 (0.71)[d]		1.431 (50.23)[a]	.992	1.86	12.44	1248.9
(2)		-1.079 (0.03)[d]	1.133 (1.04)[d]			.984	1.08	18.12	1166.46
(3)		-40.599 (6.03)[a]		-51.691 (0.89)[d]	1.419 (48.77)[a]	.993	1.89	12.00	1390.60
(4)		-44.118 (8.13)[a]			1.428 (52.95)[a]	.992	1.93	11.94	2808.92

(ii) Real Agricultural Exports

Equations 5-7 in Table VI examine real agricultural exports (X^A). Equation 5 suggests that foreign income (Y^F) is very insignificant in the explanation of X^A in Barbados. That variable was therefore dropped in equation 6 and the results show a favourable improvement. We decomposed the terms of trade (P_r) in order to examine the individual effects of export prices (P_x) and import prices (P_m) on X^A. On a priori grounds, it was expected that X^A would vary directly with P_x. So, for example, if P_x increases, X^A will also increase since suppliers will want to supply more at higher prices. P_m was expected to be inversely related to X^A. Thus, as P_m increases, X^A will decrease because people will attempt to switch from imports to domestically produced goods. Production will therefore shift from being export based to becoming domestically oriented, so as to meet the new local demand. This hypothesis is strongly confirmed by the results expressed in equation 7. Both P_x and P_m have the correct signs and the t- values are highly significant.

(iii) Real Agricultural Imports

Equations 8-12 in Table VII examine real agricultural imports (I^A). The results show that real income (y) and the terms of trade (P_r) do indeed influence I^A. But, when the effects of both variables are taken jointly, relatively low

Table VI

REAL AGRICULTURAL EXPORTS (BARBADOS): $X^A = a_o + a_1 Y^F + a_2 P_r$

	X^A	C	Y^F	P_r	P_x	P	$\bar{R}^2$	DW	SEE	F- stat.
(5)		116.081 (0.88)[d]	-0.978 (0.25)[d]	2.786 (2.84)[d]			.706	2.03	56.93	23.82
(6)		89.648 (1.51)[c]		2.935 (4.54)[a]			.720	2.07	55.55	49.90
(7)		347.435 (4.26)[a]			1.003 (3.28)[a]	-0.766 (2.38)[b]	.705	2.06	57.05	23.69

Table VII

REAL AGRICULTURAL IMPORTS (BARBADOS): $X^A = a_o + a_1 y + a_2 P_r$

	I^A	C	y	P_r	P_x	P	$\bar{R}^2$	DW	SEE	F
(8)		260.14 (2.11)[b]	39.567 (0.92)[d]	-0.251 (0.70)[d]			.733	1.45	23.77	27.09
(9)		370.896 (10.71)[a]		-0.430 (1.43)[c]			.732	1.45	23.83	52.80
(10)		207.950 (2.66)[a]	52.701 (1.66)[c]			-0.599 (6.40)[a]	.745	1.48	23.30	56.12
(11)		59.271 (2.03)[b]	175.077 (9.11)[a]		-0.035 (0.32)[d]	-0.609 (7.03)[a]	.855	1.88	17.49	38.51
(12)		57.104 (2.05)[b]	174.679 (9.21)[a]				.864	1.86	17.00	61.05

t- values are produced and P_r has the incorrect sign (see equation 8). When taken separately, P_r still has the wrong sign but its coefficient has an improved t- value (see equation 9); y has the correct sign and its associated t- value has also improved (see equation 10).

We tried decomposing P_r with the hope that its components would have the correct sign. On a priori grounds, I^A was expected to vary directly with P_x since an increase (decrease) in export earnings would facilitate an increase (decrease) in importation. On the other hand, I^A should be inversely related to P_m such that if P_m increases, ceteris paribus, I^A will decrease due to the higher unattractive import prices. From equation 11 it can be seen that only one component, P_m, had the correct sign. It is interesting, however, to note that the other component (i.e., P_x) not only had the wrong sign but also had a very insignificant t- value associated with its coefficient. This finding led us to drop P_x from the equation and, as shown in equation 12, this new specification led to the most favourable results.

(iv) Administered Prices

Equations 13 and 14 in Table VIII examine administered prices (P^{AD}). The conclusion which must be drawn from equation 13 is that while wages (W^{AD}), interest rate (CC),

Table VIII

ADMINISTERED PRICES (BARBADOS): $P^{AD} = a_o + a_1 W^{AD} + a_2 CC + a^3 P^F + a_4 (M^S/y)$

	P^{AD}	C	W^{AD}	CC	P^F	M^S/y	$\bar{R}^2$	DW	SEE	F
(13)		-8.512 (0.71)[d]	0.558 (4.63)[a]	4.050 (2.47)[b]	0.384 (4.88)[a]	236.973 (0.52)[d]	.996	1.90	6.64	1216.07
(14)		-7.284 (0.63)[d]	0.606 (7.84)[a]	4.200 (2.63)[a]	0.378 (4.92)[a]		.996	2.18	6.58	1652.98

and foreign prices (P^F) are indeed important explanatory variables with respect to explaining changes in administered prices, the monetary effects, denoted by the variable M^s/y, are insignificant. When that variable is removed (see equation 14), the results as indicated by the t- values and the F- statistic are improved. With the exception of the constant term, all the other explanatory variables are significant at the 1% level. Finally, the fact that the monetary variable is insignificant possibly suggests that on a whole Barbados did not suffer any serious balance of payment problems during the study period and was thus able readily to augment domestic production with imports. This point also possibly explains why excess demand for agricultural products (i.e., Z^A or Z^{A1}) was insignificant in the agricultural price equation (P^A)--see equations 1-3 in Table V.

(v) Administered Wages

Equations 15-19 in Table IX examine administered wages (W^{AD}). While lagged administered wages (W^{AD}_{t-1}) are definitely important in explaining changes in W^{AD}, it appears as though lagged prices contribute little to the overall explanatory power (see equations 15 and 16). The model, however, works well if lagged administered prices

Table IX

ADMINISTERED WAGES (BARBADOS): $W^{AD} = a_o + a_1 W^{AD}_{t-1} + a_2 P_{t-1} + a_3 D$

	W^{AD}	C	W^{AD}_{t-1}	P^{AD}_{t-1}	P_{t-1}	P	D	$\bar{R}^2$	DW	SEE	F	h
(15)		-14.267 (1.53)[c]	1.015 (3.62)[a]	0.174 (0.70)[d]			-3.755 (0.23)[d]	.983	2.40	13.34	388.42	N/A
(16)		-12.637 (2.18)[b]	1.043 (4.30)[a]	0.138 (0.75)[d]				.984	2.41	12.94	619.44	N/A
(17)		-10.761 (2.09)[b]	1.223 (35.65)[a]					.984	2.55	12.17	1270.33	-1.28
(18)		-19.808 (3.73)[a]	0.449 (1.97)[b]		0.537 (3.43)[a]			.988	1.84	11.45	793.16	N/A
(19)		-12.629 (2.48)[b]	0.879 (4.09)[a]			0.230 (1.62)[c]		.985	2.28	12.30	686.36	-3.54

(P^{AD}_{t-1}) or current prices (P) are used along with W^{AD}_{t-1}, as is shown in equations 18 and 19.

It is difficult to believe that in small developing countries like the Caribbean, workers' interests are given such priority so as to permit an instantaneous adjustment between prices and wages. It seems reasonable to assume that some time lag must exist and it is therefore felt that P^{AD}_{t-1} is a much more accurate explanatory variable than P.

The dummy variable used to capture the unions' forcefulness is insignificant as shown by equation 15. This does not automatically imply, however, that unions play a negligible role in influencing changes in wages. It may be that the cut-off point used with respect to the dummy variable was incorrect. Or, it can well be that the use of a dummy variable, per se, does not provide an appropriate measurement of unions' forcefulness. It is thus felt that the evidence is inconclusive as to whether unions have indeed contributed to changes in wages.

Finally, it should be pointed out that the Durbin-Watson statistic is not applicable to equations 15-19 since they contain lagged endogenous variables. Instead, the h-statistic was employed wherever its calculation was possible.

(vi) Demand for Money

We experimented with several specifications of the demand for money equation. First, equations 20 and 21 in Table X look at the effects of using expected prices (P^e) and current prices (P) along with the other explanatory variables. The use of expected prices rather than current prices yielded more favourable results, as is shown by equation 20. Second, some economists have suggested that in small open economies the explanatory variable Y should be augmented to include the sum of total imports--i.e., YI = nominal GDP pus imports. This approach was tried in equations 22 and 23 but the results were identical to that of equation 20.

We also experimented using logs (see equations 24-27 in Table XI). The results were not as good as the non-log results but all the parameters had the correct signs. The t- values were, however, low.

It is thus contended that the initial specification of the equation (i.e., equation 20) is the most appropriate.

(vii) General Price Level

By construction, agricultural prices (P^A) and administered prices (P^{AD}) explain virtually all the changes in P.

Table X

DEMAND FOR MONEY (BARBADOS): $M^d = a_o + a_1 Y + a_2 CC + a_3 P^e$

	M^d	C	Y	YI	CC	P^e	P	$\bar{R}^2$	DW	SEE	F
(20)		0.056 (2.09)[b]	0.002 (11.39)[a]		-0.0057 (1.81)[b]	0.0004 (1.32)[c]		.982	1.49	0.01	349.13
(21)		0.0373 (1.38)[c]	0.0001 (2.21)[b]		-0.0039 (1.29)[d]		0.0001 (0.37)[d]	.979	1.64	0.01	314.48
(22)		0.0559 (2.09)[b]		0.0002 (11.40)[a]	-0.0057 (1.81)[b]	0.0004 (1.32)[c]		.982	1.49	0.01	349.38
(23)		0.0373 (1.38)[c]		0.0001 (2.21)[b]	-0.0039 (1.29)[d]		0.0001 (0.37)[d]	.980	1.64	0.01	314.66

Table XI

DEMAND FOR MONEY (BARBADOS): $\ln M^d = a_o + a_1 \ln Y + a_2 \ln CC + a_3 \ln P^e$

	$\ln M^d$	C	lnY	lnYI	lnCC	$\ln P^e$	lnP	$\bar{R}^2$	DW	SEE	F
(24)		-6.522 (5.22)[a]	0.8103 (4.81)[a]		-0.4236 (1.07)[d]	0.0129 (0.26)[d]		.973	1.60	0.12	230.22
(25)		-5.5350 (3.13)[a]	0.3555 (0.50)[d]		-0.3729 (1.09)[d]		0.3962 (0.46)[d]	.975	1.42	0.12	244.33
(26)		-6.5246 (5.22)[a]		0.8106 (4.82)[a]	-0.4236 (1.07)[d]	0.0129 (0.26)[d]		.973	1.60	0.12	230.28
(27)		-5.5554 (3.16)[a]		0.3601 (0.51)[d]	-0.3735 (1.09)[d]		0.3933 (0.46)[d]	.975	1.42	0.12	244.23

Table XII

GENERAL PRICE LEVEL (BARBADOS): $P^A = a_o P^{AD} + a_1 P$

	P	P^A	P^{AD}	$\bar{R}^2$	DW	SEE
(28)		0.5802 (40.26)[a]	0.4218 (24.19)[a]	.999	1.54	1.45

B. Results for Antigua

As mentioned at the beginning of the chapter, data availability for Antigua and the other islands was quite restrictive and permitted only a partial estimation of the model. No information was available on the auction market sector and the related equations were consequently not estimated. Further, it was not possible to separate the general price level into auction and administered prices. We therefore decided to use the explanatory variables of the administered price equation as a proxy for the determinants of the general price level.

(i) General price Level

Equations 1-7 in Table XIII examine the determinants of the general price level (P) in Antigua. Equations 1 and 2 show, inter alia, that wages rates are rather insignificant in explaining price changes. The other three explanatory variables--the prime lending rate (CC), foreign prices (P^F) and the monetary variable (M^S/y)--operate well and are able to explain most of the changes in P. The point is clearly portrayed by the goodness of fit as depicted in equation 7. A further observation is that equations 4, 5 and 6 suggest that foreign prices and monetary considerations are of immense importance in explaining price changes. It should also be noted that the finding with respect to the

Table XIII

GENERAL PRICE LEVEL (ANTIGUA): $P = a_o + a_1W + a_2CC + a_3P^F + a_4M^s/y$

	P	C	W	CC	P^F	M^s/y	$\bar{R}^2$	DW	SEE	F
(1)		-44.345 (1.55)[c]	-0.014 (0.05)[d]	3.631 (1.42)[d]	1.426 (3.63)[a]	1.713 (3.34)[b]	.995	2.74	5.89	446.62
(2)		-89.458 (2.16)[b]	0.019 (0.05)[d]	5.964 (1.48)[c]	2.316 (4.89)[a]		.986	2.65	9.67	219.72
(3)		-89.533 (2.33)[b]		6.024 (1.71)[c]	2.337 (26.74)[a]		.988	2.65	8.96	384.39
(4)		-26.088 (2.47)[b]			2.289 (24.85)[a]		.985	1.56	9.97	617.74
(5)		-3.875 (0.46)[d]			1.263 (4.72)[a]	1.938 (3.91)[a]	.995	2.18	5.97	869.61
(6)		28.071 (2.88)[b]				4.223 (21.67)[a]	.981	2.25	11.41	469.68
(7)		-44.319 (1.69)[c]		3.590 (1.62)[c]	1.412 (5.46)[a]	1.712 (3.66)[a]	.996	2.74	5.38	714.19

significance of monetary considerations is contrary to that which was observed in the case of Barbados.

(ii) Administered Wages

Equations 8 and 9 in Table XIV examine the determinants of administered wages (W^{AD}) in Antigua. Following our previous approach, a dummy variable was used to approximate the influence of union forcefulness over the period. Likewise, the year 1973 was used as the cut-off point--i.e., D = 0 from 1971-1973 and D = 1 from 1974-1980. This variable, unlike in the case of Barbados, performed very well and its coefficient was significant at the 1% level (see equation 9).

Lagged wages and prices were also significant in explaining current wages. The DW- statistic is however meaningless in this case and we thus utilized the h- test and accepted the hypothesis of zero auto correlation on the basis that $h < 1.645$.[8] It must nevertheless be acknowledged that the h- test is a large sample test and nothing is known about its small sample properties. Therefore, one cannot be conclusive about the absence of serial corelation in equations 8 and 9.

(iii) Demand for Money

Equations 10-13 in Tables XV and XVI examine the demand for money (M^d) in Antigua. From equations 10 and 11, it appears

Table XIV

ADMINISTERED WAGES (ANTIGUA): $W^{AD} = a_o + a_1 W^{AD}_{t-1} + a_2 P_{t-1} + a_3 D$

	W^{AD}	C	W^{AD}_{t-1}	P_{t-1}	D	$\bar{R}^2$	DW	SEE	F	h
(8)		32.662 (3.86)[a]	0.386 (2.12)[b]	0.312 (3.43)[a]		.988	2.27	3.61	378.06	-0.49
(9)		30.466 (8.08)[a]	0.437 (3.45)[a]	8.887 (4.44)[a]	0.253 (3.82)[a]	.995	2.95	2.21	672.64	-1.53

Table XV

DEMAND FOR MONEY (ANTIGUA): $M^d = a_o + a_1Y + a_2CC + a_3P^e$

	M^d	C	Y	CC	P^e	P	$\bar{R}^2$	DW	SEE	F
(10)		-4.554 (0.61)[d]	0.1659 (3.81)[a]	0.129 (0.19)[d]	0.044 (1.62)[b]		.973	2.43	1.72	111.2
(11)		1.285 (0.19)[d]	0.1168 (2.41)[b]	-0.342 (0.55)[d]		0.063 (2.46)[b]	.980	2.40	1.46	156.4

Table XVI

DEMAND FOR MONEY (ANTIGUA): $\ln M^d = a_o + a_1 \ln Y + a_2 \ln CC + a_3 \ln P^e$

	$\ln M^d$	C	$\ln Y$	$\ln CC$	$\ln P^e$	$\ln P$	$\bar{R}^2$	DW	SEE	F
(12)		-2.444 (3.34)[a]	0.775 (3.40)[a]	0.076 (0.31)[d]	0.339 (1.78)[c]		.973	2.78	0.06	112.27
(13)		-1.811 (2.85)[b]	0.540 (2.52)[b]	-0.132 (0.64)[d]		0.514 (3.00)[b]	.983	2.60	0.05	184.56

as though income (Y) and prices (P^e & P) are most significant in explaining money demand. The cost of credit (CC), measured by the prime lending rate, seems relatively insignificant in the explanatory process. It would appear that the current price variable (P) rather than expected prices (P^e) is to be preferred. When P is used, the credit variable, although still insignificant, has the correct sign (see equation 11). The above results are reconfirmed when the equations are re-specified in log form (Table XVI).

C. Results for Dominica

(i) General Price Level

Equations 1-5 in Table XVII examine the deteminants of the general price level (P) in Dominica. Equations 1 and 2 show, inter alia, that the cost of credit (CC) is rather insignificant in explaining price changes. By far the most significant explanatory variable appears to be foreign prices (P^F). The monetary variable (M^s/y) is insignificant at the 10% level of significance but its t- values are of sufficient magnitude to render support to a conclusion that it does indeed exert some influence on prices. Equation 4 therefore seems to be the most preferrable of the set.

(ii) Demand for Money

Equations 6-8 in Tables XVIII and XIX examine the demand for money (M^d) in Dominica. The results show that income (Y)

Table XVII

GENERAL PRICE LEVEL (DOMINICA): $P = a_o + a_1CC + a_2P^F + a_3M^S/y$

	P	C	CC	P^F	M^S/y	$\bar{R}^2$	DW	SEE	F
(1)		-38.121 (0.68)[d]	5.246 (0.86)[d]	1.059 (9.76)[a]	0.394 (1.39)[d]	.985	2.87	14.28	199.07
(2)		-40.512 (0.68)[d]	3.968 (0.62)[d]	1.193 (22.62)[a]		.982	2.80	15.20	262.80
(3)		-4.196 (0.34)[d]		1.187 (23.85)[a]		.984	2.83	14.60	569.04
(4)		8.567 (0.56)[d]		1.064 (10.00)[a]	0.357 (1.30)[d]	.986	2.85	14.02	309.62
(5)		276.98 (4.47)[a]			1.89 (5.37)[a]	.961	1.71	22.83	192.41

Table XVIII

DEMAND FOR MONEY (DOMINICA): $M^d = a_o + a_1Y + a_2CC + a_3P^e$

	M^d	C	Y	CC	P^e	P	$\bar{R}^2$	DW	SEE	F
(6)		-18.702 (0.76)[d]	-0.209 (0.94)[d]	0.945 (0.51)[d]	0.161 (2.13)[b]		.820	0.87	3.76	12.26
(7)		-2.411 (0.15)[d]	0.007 (0.06)[d]	-0.690 (0.51)[d]		0.070 (3.24)[a]	.886	1.22	2.99	20.39

Table XIX

DEMAND FOR MONEY (DOMINICA): $\ln M^d = a_o + a_1 \ln Y + a_2 \ln CC + a_3 \ln P^e$

	$\ln M^d$	C	$\ln Y$	$\ln CC$	$\ln P$	$\overline{R}^2$	DW	SEE	F
(8)		-3.645 (0.93)[d]	0.551 (0.74)[d]	-0.731 (0.76)[d]	0.929 (1.69)[c]	.871	1.07	0.22	17.82

and the cost of credit (CC) are not significant explanatory variables. Changes in money demand appear to be influenced primarily by changes in the price level. Again, as was the case in Antigua, current prices (P) appear to be more suitable than expected prices (P^e). This can be seen from a comparison of the goodness of fit between equations 6 and 7--both Y and CC in equation 6 have the incorrect signs.

D. Results for Grenada

(i) General Price Level

Equations 1-5 in Table XX examine the determinants of the general price level (P) in Grenada. The results indicate that all three explanatory variables--cost of credit (CC), foreign prices (P^F) and monetary considerations (M^S/y)--are important determinants of the price level. Equation 1 gives the best overall fit.

(ii) Demand for Money

Equations 6-9 in Tables XXI and XXII examine the demand for money (M^d) in Grenada. The results show that income (Y) is the only significant explanatory variable. Also, consistent with our previous findings, current prices (P) leads to more favourable results than those yielded by expected prices (P^e). This can be seen from a comparison between equations 6 and 7 or equations 8 and 9 in Tables XXI and XXII, respectively.

Table XX

GENERAL PRICE LEVEL (GRENADA): $P = a_o + a_1CC + a_2P^F + a_3M^s/y$

	P	C	CC	P^F	M^s/y	$\bar{R}^2$	DW	SEE	F
(1)		-71.541 (1.59)[c]	12.253 (3.25)[a]	0.721 (1.27)[d]	2.126 (3.58)[a]	.986	2.02	11.29	226.86
(2)		-157.584 (2.53)[b]	15.814 (2.66)[b]	2.714 (15.76)[a]		.965	1.96	18.50	124.41
(3)		87.650 (1.57)[c]		2.014 (5.01)[a]		.955	2.32	19.48	166.06
(4)		80.881 (2.23)[b]		0.693 (1.25)[d]	1.822 (2.85)[b]	.978	2.01	13.74	170.85
(5)		95.221 (3.39)[a]			2.588 (9.13)[a]	.975	1.98	14.26	315.69

Table XXI

DEMAND FOR MONEY (GRENADA): $M^d = a_o + a_1Y + a_2CC + a_3P^e$

	M^d	C	Y	CC	P^e	P	$\bar{R}^2$	DW	SEE	F
(6)		-9.208 (1.18)[d]	0.392 (6.02)[a]	0.295 (0.34)[d]	-0.022 (0.079)		.989	2.67	1.46	296.42
(7)		-3.310 (0.44)[d]	0.329 (6.08)[a]	-0.420 (0.50)[d]		0.005 (0.23)[d]	.989	2.37	1.53	270.39

Table XXII

DEMAND FOR MONEY (GRENADA): $\ln M^d = a_o + a_1 \ln Y + a_2 \ln CC + a_3 \ln P^e$

	$\ln M^d$	C	$\ln Y$	$\ln CC$	$\ln P^e$	$\ln P$	$\bar{R}^2$	DW	SEE	F
(8)		-2.836 (4.23)[a]	1.424 (4.43)[a]	0.200 (0.49)[d]	-0.162 (0.50)[d]		.991	2.40	0.05	336.96
(9)		-2.227 (4.91)[a]	1.052 (6.70)[a]	-0.294 (1.14)[d]		0.232 (1.39)[d]	.992	2.50	0.04	428.43

E. Results for Montserrat

(i) General Price Level

Equations 1-5 in Table XXIII examine the variables which influence the general price level in Montserrat. The results clearly show that foreign prices are extremely important in explaining movements in domestic prices. The exact effect of money (M^S/y) and the cost of credit (CC) on prices is difficult to discern. From equation 1, it would appear that CC is a fairly important explanatory variable but M^S/y, although having a coefficient which is significant at 5%, has the wrong sign. The best fit appears to occur when CC is excluded from the equation, thus leaving only P and M^S/y as in equation 4.

(ii) Demand for Money

Equations 6-9 in Tables XXIV and XXV look at the demand for money in Montserrat. The results show that income (Y) is the only significant explanatory variable. The t- values associated with the other variables are quite low and the credit variable (CC) repeatedly has the incorrect sign.

F. Results for St. Kitts

(i) General Price Level

Equations 1 and 2 in Table XXVI examine the determinants of the general price level in St. Kitts. Data did not permit the monetary effects to be taken into account, but the other

Table XXIII

GENERAL PRICE LEVEL (MONTSERRAT): $P = a_o + a_1 CC + a_2 P^F + a_3 M^S/y$

	P	C	CC	P^F	M^S/y	$\bar{R}^2$	DW	SEE	F
(1)		-66.736 (8.79)[a]	1.835 (5.12)[a]	2.024 (15.41)[a]	-1.13 (3.84)[b]	.998	2.28	0.80	4190.26
(2)		-29.154 (1.05)[c]	1.516 (0.53)[d]	1.360 (23.18)[a]		.985	1.30	6.07	290.58
(3)		-14.86 (2.43)[b]		1.35 (25.26)[a]		.986	1.19	5.79	638.17
(4)		-21.676 (3.89)[a]		1.366 (32.16)[a]	0.257 (2.44)[b]	.991	2.62	4.55	519.71
(5)		137.545 (4.75)[a]			-0.236 (0.20)[d]	-.12	0.11	51.90	0.04

Table XXIV

DEMAND FOR MONEY (MONTSERRAT): $M^d = a_o + a_1Y + a_2CC + a_3P^e$

	M^d	C	Y	CC	P^e	P	$\bar{R}^2$	DW	SEE	F
(6)		-3.637 (2.23)[b]	0.308 (2.17)[b]	0.112 (0.53)[d]	0.008 (0.59)[d]		.934	2.99	0.35	29.33
(7)		-3.501 (2.08)[c]	0.337 (3.23)[b]	0.063 (0.36)[d]		0.005 (0.54)[d]	.934	3.05	0.35	28.93

Table XXV

DEMAND FOR MONEY (MONTSERRAT): $\ln M^d = a_o + a_1 \ln Y + a_2 \ln CC + a_3 \ln P^e$

	$\ln M^d$	C	$\ln Y$	$\ln CC$	$\ln P^e$	$\ln P$	$\bar{R}^2$	DW	SEE	F
(8)		-4.881 (4.51)[a]	1.751 (2.62)[b]	0.291 (0.58)[d]	0.098 (0.29)[d]		.929	2.81	0.09	27.19
(9)		-4.815 (4.64)[a]	1.715 (3.57)[a]	0.251 (0.58)[d]		0.123 (0.51)[d]	.932	2.72	0.09	28.42

Table XXVI

GENERAL PRICE LEVEL (ST. KITTS): $P = a_o + a_1 CC + a_2 P^F$

	P	C	CC	P^F	$\bar{R}^2$	DW	SEE	F
(1)		-122.02 (1.67)[c]	11.204 (1.52)[c]	2.415 (16.01)[a]	.972	1.33	14.43	159.19
(2)		-7.910 (0.32)[d]		2.283 (11.36)[a]	.967	1.37	15.30	281.58

two variable--cost of credit and foreign prices--were capable of explaining most of the changes in domestic prices.

G. Results for St. Lucia

(i) General Price Level

Equations 1-4 in Table XXVII look at the various explanatory variables which influence the general price level in St. Lucia. Once again, foreign prices (P^F) stands out as a chief explanatory factor. Although the monetary variable has an incorrect sign in equation 1, its sign is correct in equation 4 and the associated t- value is significant at the 1% level. This seems to suggest that monetary considerations are important in influencing the general price level.

(ii) Demand for Money

Equations 5-7 in Tables XXVIII and XXIX look at the demand for money in St. Lucia. The results show that income (Y) is the major explanatory variable. Although the credit variable has the correct sign, its associated t- values are insignificant. The t- values associated with P^e are somewhat higher but still insignificant at the 10% level (see equations 5 and 7).

Table XXVII

GENERAL PRICE LEVEL (ST. LUCIA): $P = a_o + a_1CC + a_2P^F + a_3M^S/y$

	P	C	CC	P^F	M^S/y	$\bar{R}^2$	DW	SEE	F
(1)		-177.990 (3.58)[a]	3.86 (0.86)[d]	5.69 (4.17)[a]	-3.61 (2.04)[b]	.988	1.61	11.59	241.80
(2)		25.03 (0.36)[d]	3.50 (0.85)[d]	2.26 (7.18)[a]		.990	1.72	9.87	395.08
(3)		46.93 (1.03)[d]		2.29 (8.18)[a]		.990	1.76	9.68	821.02
(4)		173.55 (2.89)[a]			2.535 (4.54)[a]	.979	1.96	14.67	353.38

Table XXVIII

DEMAND FOR MONEY (ST. LUCIA): $M^d = a_o + a_1Y + a_2CC + a_3P^e$

	M^d	C	Y	CC	P^e	P	$\bar{R}^2$	DW	SEE	F
(5)		-11.696 (0.72)[d]	0.190 (1.96)[c]	-0.173 (0.15)[d]	0.063 (1.05)[d]		.973	1.24	2.54	92.28
(6)		-4.081 (0.27)[d]	0.218 (1.68)[c]	-0.719 (0.54)[d]		0.034 (0.48)	.970	1.66	2.70	81.42

Table XXIX

DEMAND FOR MONEY (ST. LUCIA): $\ln M^d = a_o + a_1 \ln Y + a_2 \ln CC + a_3 \ln P^e$

	$\ln M^d$	C	$\ln Y$	$\ln CC$	$\ln P^e$	$\bar{R}^2$	DW	SEE	F
(7)		-2.485 (1.93)[c]	0.772 (2.21)[b]	-0.263 (0.81)[d]	0.474 (1.25)[d]	.977	1.54	0.08	111.25

H. Results for St. Vincent

(i) General Price Level

Equations 1-5 in Table XXX examine the variables which influence the general price level in St. Vincent. From equation 1, it would appear that all three explanatory variables are important in explaining changes in prices. Both the credit and the monetary variable have coefficients which are significant at the 5% level while that associated with foreign prices is significant at the 1% level.

(ii) Demand for Money

Equations 6-9 in Tables XXXI and XXXII examine the demand for money in St. Vincent. The results indicate that all three explanatory variables--income, cost of credit and prices--are important expanatory variables. Equations 8 and 9 give a particularly good fit.

3. Summary

A. Barbados

Generally speaking, the model performed very well in the Barbadian context. The results show that foreign agricultural prices were the main factor influencing domestic agricultural prices. The influence of excess demand cannot, however, be totally dismissed.

Table XXX

GENERAL PRICE LEVEL (ST. VINCENT): $P = a_o + a_1 CC + a_2 P^F + a_3 M^s/y$

	P	C	CC	P^F	M^s/y	$\bar{R}^2$	DW	SEE	F
(1)		-90.539 (2.31)[b]	11.875 (3.27)[b]	1.632 (5.52)[a]	1.310 (3.28)[b]	.994	2.11	7.30	471.97
(2)		-223.012 (3.95)[a]	19.426 (3.22)[a]	2.885 (20.58)[a]		.979	1.66	15.14	222.90
(3)		44.405 (1.15)[d]		2.255 (8.10)[a]		.981	1.57	13.56	185.62
(4)		19.723 (0.65)[d]		0.746 (0.92)[d]	2.778 (2.74)[b]	.975	1.57	16.56	185.62
(5)		45.208 (3.56)[a]			3.697 (19.42)[a]	.976	2.40	16.41	377.22

Table XXXI

DEMAND FOR MONEY (ST. VINCENT): $M^d = a_o + a_1Y + a_2CC + a_3P^e$

	M^d	C	Y	CC	P^e	P	$\bar{R}^2$	DW	SEE	F
(6)		3.186 (0.58)[d]	0.220 (3.90)[a]	-0.678 (1.18)[d]	0.014 (0.86)[d]		.979	3.27	1.18	141.47
(7)		8.390 (1.58)[c]	0.161 (3.03)[b]	-1.314 (2.22)[b]		0.031 (2.04)[b]	.986	2.69	0.96	214.58

Table XXXII

DEMAND FOR MONEY (ST. VINCENT): $\ln M^d = a_o + a_1 \ln Y + a_2 \ln CC + a_3 \ln P^e$

	$\ln M^d$	C	$\ln Y$	$\ln CC$	$\ln P^e$	$\ln P$	$\bar{R}^2$	DW	SEE	F
(8)		-1.195 (2.40)[b]	0.798 (4.70)[a]	-0.610 (2.58)[b]	0.350 (2.44)[b]		.989	3.13	0.05	294.74
(9)		-1.099 (2.08)[b]	0.772 (4.18)[a]	-0.781 (2.66)[b]		0.412 (2.38)[b]	.989	2.89	0.05	286.92

Real agricultural exports were explained primarily by the terms of trade while real agricultural imports were best explained by real income and import prices.

Wages, the rate of interest, and foreign prices were the main determinants of administered prices, while lagged wages and lagged prices explained administered wages.

The demand for money was best explained by nominal income, the rate of interest, and expected prices.

B. Antigua

The general price level in Antigua was best explained by the rate of interest, foreign prices, and monetary considerations, with the latter two variables being paticularly significant.

Administered wages were best explained by lagged administered wages and current prices. The dummy variable used to capture unions' influence on wages was also significant.

The most significant explanatory variables relating to the demand for money were nominal income and current prices.

C. Dominica

The general price level in Dominica was best explained by foreign prices and, to a lesser extent, by the monetary variable. The most significant explanatory variable relating to the demand for money was current prices.

D. Grenada

The general price level in Grenada was best explained by the rate of interest, foreign prices and monetary considerations. Nominal income appeared to be the only significant explanatory variable relating to the demand for money.

E. Montserrat

The general price level in Montserrat was best explained by foreign prices and by the monetary variable, while nominal income explained most of the changes in the demand for money.

F. St Kitts

The general price level in St. Kitts was best explained by the rate of interest and by foreign prices. No information was available on the demand for money.

G. St. Lucia

The general price level in St. Lucia was best explained by foreign prices and by monetary considerations, while nominal income explained most of the changes in the demand for money.

H. St. Vincent

The general price level in St. Vincent was best explained by the rate of interest, by foreign prices and by monetary

considerations. The most significant explanatory variables relating to the demand for money were nominal income, the rate of interest and foreign prices.

4. CONCLUDING OBSERVATIONS

The results as reported above display a fair degree of similarity when compared across islands. The most significant finding is that foreign prices tended to be the most important explanatory variable in the price equation of each island that was considered. The monetary variable was also important in six of the eight islands examined; it was not important in Barbados and St. Kitts. The rate of interest was significant in influencing prices in five of the islands --Barbados, Antigua, Grenada, St. Kitts and St. Vincent.

With respect to the demand for money, in all but one island (i.e., Dominica), nominal income was an important determining factor. Further, the rate of interest was only an important determinant in Barbados and St. Vincent while prices were important in Barbados, Antigua, Dominica and St. Vincent.

NOTES

1. Gafar J., and Joefield-Napier W., Trends and Patterns of Commonwealth Caribbean Trade 1954-1970, Institute of Social and Economic Research, U.W.I., 1978.

2. Downes A., "A Wage Index for Barbados: An Explanatory Note." Caribbean Studies, Vol. 20, No. 2, June, 1980.

3. For a comparison between various posible indices see Hagger A.J., Inflation Theory and Policy, op. cit., Ch. 1.

4. See Branson W., "Inflation in Small Countries" in: Lecture Notes in Economics and Mathematical Systems, Springer-Verlag, Berlin, 1974, pp. 26.

5. It is not difficult to see that this method can indeed measure excess demand. If we assume that actual output follows a particular path over time, then any deviations from that path will be due to changes in demand and/or supply conditions. For example, suppose excess demand equals zero for periods t-5 to t-1. Suppose further that supply increases, ceteris paribus, in period t. Then, actual output will rise above its trend and the difference will give a measure of excess demand, which in this case will be negative.

6. See Argy V., "Structural Inflation in Developing Countries," op. cit. pp. 78-79.

7. See note 18 in Chapter 4.

8. For a derivation of the h-test see Durbin J., "Testing for Serial Correlation in least Squares Regression when some of the Regressors are lagged Dependent Variables," Econometrica (1970), vol. 38, pp. 410-421.

Chapter VI

POLICY PRESCRIPTION

Recent developments in international monetary theory have emphasised that in a world of fixed exchange rates, the causes of inflation in small open economies must be sought at the international rather than the national level.[1] It is argued that in the long run, countries on fixed exchange rates will have the same rate of inflation though in the short run rates of inflation may differ among economies. Equalization of inflation rates is brought about through monetary flows across countries, each country losing control over its nominal money supply though remaining capable of determining the composition of its backing. It is a prediction of the monetary theory of the balance of payments that, at least in the long run, domestic prices will be determined at the world level by the world money supply.[2] In so doing, domestic monetary policy becomes ineffective with respect to controlling the long run time path of domestic prices.

While the empirical evidence presented in the previous chapter confirms that inflation in the small open economies of the Eastern Caribbean is indeed strongly a function of international inflation rates, the results also suggest that national factors may be important considerations at least in

a few of the islands examined. From a policy viewpoint, four determinants are of particular importance, and they shall be discussed below.

1. POTENTIAL POLICY VARIABLES

(A) Wages

As indicated previously, data on wage rates was available for only Barbados and Antigua, and wages proved to be significant in the determination of prices only in Barbados. For this reason much of the policy discussion will not be centered around this variable. But a few general remarks are desirable.

Although wage increases may have indeed contributed to the inflationary pressures in Barbados, it should not be automatically concluded that a wage restraint policy ought to be imposed. Traditionally, wages in developing countries have been relatively low and it is often argued that employees are not being adequately compensated for their work-effort. Western policy-makers are always ever so eager to place the inflationary blame on the wage earner. While there may be justifiable reasons for doing so in the developed countries, these arguments cannot be readily transposed to the developing countries. For example, arguments involving concepts such as 'wage-drifts' may not be of great significance to developing countries if

they do not in fact have strong pressure groups which mobilize the labour force. In fact, it may be argued that any wage restraint policy applicable to developing countries should be preceded by a thorough investigation into the size of the profit margins of the capitalist entrepreneurs. It may well be that these entrepreneurs possess the necessary market power which enables them to enjoy excessive profit margins at the expense of higher prices.

(B) Cost of Credit (i.e., Rate of Interest)

It is hypothesized that interest rates in the Eastern Caribbean region respond to exogenous rather than to domestic forces. Specifically, because of the historical ties between Britain and the Caribbean, it is believed that the U.K. Bank Rate (UKBR) has been one of the most influencial variables.[3] This hypothesis was tested by regressing a weighted average of the prime lending rate in seven of the islands (excluding Barbados) against the U.K. Bank Rate. Quarterly data from 1969(1) to 1978(4) were used and the results were as follows:

$$\text{(a)} \quad PLR = 8.90 + \underset{(1.30)}{0.033}\ UKBR$$

$$R^2 = .916 \quad F = 400.94 \quad SEE = 0.25$$

The correlation coefficient between the prime lending rate and the rate of interest on time and saving deposits was

0.95, and this suggests that these two variables are strongly correlated.

A similar type of study was undertaken for the Barbadian economy and the results portrayed a similar pattern.[4]

The conclusion which may be drawn is that the above model confirms the hypothesis that interest rates in the Eastern Caribbean are a function of international rates of interest. The resulting implication is that local governments will be unable to influence effectively and/or control the prevailing interest rates in their respective islands. This variable is exogenously determined and, as a consequence, each island becomes an 'interest-taker'.

It might be argued that at least in the short run domestic interest rates could be influenced through the conduct of monetary and fiscal policy. But, in a region where governments suffer from extreme financial hardships and where monetary institutions and capital markets are relatively underdeveloped, the possibility of monetary and fiscal policy having any significant impact on domestic interest rates is rather remote.

The picture which is revealed from the above discussion is that domestic policy is unable to influence significantly (if at all) domestic interest rates. The hope of

influencing the general price level through the control of interest rates is thus lost.

(C) Monetary Considerations

Monetary factors (i.e., M^s/y) appeared to be important in determining the general price level in a majority of the islands which were examined. It therefore becomes necessary to analyse the efficacy of monetary policy in the region in the hope of shedding some light on various possible ways of controlling the variable M^s/y. We begin by examining the nature and structure of the Monetary Authority in the region.[5]

The East Caribbean Currency Authority (ECCA) was established by an Agreement made on January 18, 1965 between the Governments of Barbados, the Leeward Islands, and the Windward Islands, with the exception of Grenada. These participating Governments agreed to set up a common currency for the region and the ECCA was given the sole right "to issue and manage that currency, to safeguard its international value and to promote monetary stability and a sound financial structure in the territories of the participating Governments."[6] Subsequently, the Government of Grenada became a member of the ECCA on July 17, 1968, while Barbados ceased to be a member as of March, 1974.

(i) The General Powers

The duties of the Authority are stated in a very general way in the Currency (No. 2) Ordinance. It does not specify the methods by which the Authority should pursue its objectives but certain powers are granted so that these objectives could be met in light of monetary policy. These powers are discussed below:

(1) The Currency Ordinance requires the Authority to act as fiscal agent for the participating Governments. In this capacity, it can open accounts for and accept deposits payable on demand from any participating Government.

(2) The Authority may buy and sell securities and foreign exchange of or guaranteed by any of the participating Governments; it may buy, sell, discount and rediscount inland bills of exchange and promissory notes payable in East Caribbean dollars.

(3) The Authority is empowered to open accounts for and accept deposits from any commercial bank operating within the participating region. Further, it may grant short-term advances (not exceeding three months) to these commercial banks.

(4) In addition to handling the accounts of the participating Governments and the commercial banks, the Authority may act as correspondent, banker or agent for any

central bank, monetary authority or international financial institution established under governmental auspices.

(ii) The Instruments of Monetary Policy

A central bank may influence credit and monetary conditions within a country in two basic ways. First, it may manage the cash base (the monetary base) of the system in an attempt to influence the cost and availability of credit in the region. In general, instruments for this method are referred to as quantitative controls.

Second, in some countries central banks attempt to manipulate the allocation of money flowing to selected areas of the economy. These particular strategies are referred to as qualitative or selective controls. However, the ECCA has no such powers and, therefore, this control mechanism will not be considered. The main instruments of monetary policy to be discussed will include open market operations, reserve ratios, bank rate and moral suasion.

Open Market Operations

Open market operations involve the Central Bank's intervention into the market to buy or sell Government securities in order to effect changes in the money supply. But, a prerequisite to the buying and selling of Government securities is the existence of a securities market.

Further, the efficacy of this particular policy instrument depends on the level of development of the securities market: the more developed is the market, the greater will be the efficacy of the policy. In the West Indies, particularly in the Eastern Caribbean, there are no developed securities market; for example, it has only been in recent years that Governments in the ECCA region began offering public issues of treasury bills. "Dominica, the first to do so, offered its first issue during the financial year 1970/71, followed by St. Vincent 1972/73, Grenada and St. Lucia 1973/74 and finally Antigua and St. Kitts 1974/75."[7] Furthermore, there is a limit as to the amount of treasury bills the ECCA may hold. In particular, it may hold an amount not exceeding ten percent of the estimated current revenue of each participating Government in any financial year. Table XXXIII gives an idea of the ECCA's holding of treasury bills between 1970-1977.

Reserve Ratios

"In countries where there is not a well organized money market for the central bank to adjust the cash position of the banks by its open market operations, reserve requirements may have to be relied upon as an important tool for cash management."[8] In addition, however, to the underdeveloped nature of the money market in the ECCA area,

TABLE XXXIII

THE ECCA'S HOLDING OF TREASURY BILLS COMPARED WITH STIPULATED LIMIT
($000) E.C. Dollars

Period	Holding	Limit	Shortfall
1970	-	8,870	8,870
1971	295	9,800	9,505
1972	394	11,793	11,399
1973	955	12,480	11,525
1074	4,118	13,795	9,677
1975	8,334	14,514	6,180
1976	10,365	14,773	4,408
1977	10,995	-	-

Source: East Caribbean Currency Authority, Economic and Financial Review, June 1977

the Currency Authority does not possess the powers to impose any legal reserve requirements on commercial banks operating within the area. These commercial banks do maintain certain minimum cash balances with the Authority but these balances are primarily to facilitate inter-bank clearing transactions. The banks also keep interest bearing deposits with the Authority; this is, however, merely a means of diversifying their portfolio and it cannot be viewed as being an avenue for the conduct of monetary policy.

In recent times, some of the participating Governments have imposed a reserve requirement on commercial banks operating within their territories. Depending on the island in question, the reserve requirement may vary between 1% and 5% of the banks' total deposit liabilities and it is deposited at the government's treasury. This unilateral decision on behalf of some individual participating Governments has two major overtones. First, it implies that some governments have by-passed their monetary institution and have adopted one of the main monetary instruments available to central banks. Second, it is believed that this reserve requirement is not meant to regulate the banking sector but rather to alleviate governmental deficits. Consequently, the reserve requirement policy appears to be totally independent of monetary policy.

Bank Rate

The bank rate is that rate at which central banks are willing to (re)discount bills for commercial banks. It is also the rate at which commercial banks are charged if the need arises to borrow from the central authorities. This rate can be an instrument of monetary policy because it tends to act as an indicator for all other prevailing interest rates. A rise (fall) in the bank rate will usually lead to a general rise (fall) in the prime rate and, hence, in all the other interest rates; this in turn should lead to a contraction (expansion) in economic activity. But, unless an economy is virtually closed with regard to both current and capital financial transactions, the chances of pursuing an independent interest-rate policy are small. This contention has been supported in the preceding section on domestic interest rates. That discussion leads to the conclusion that the bank rate would be relatively ineffective as a policy instrument since interest rates in the region tend to respond to exogenous forces such as the U.K. Bank Rate.

Moral Suasion

Central banks may use moral suasion in an attempt to persuade financial institutions to adopt a specific line of policy. However, the cooperation which the central bank

(the persuader) receives from the financial community depends particularly upon the success or failure of the Bank's leadership in the past.

In the case of the East Caribbean Currency Authority, it would be expected that its leadership with respect to the financial community is relatively weak. This is primarily due to three reasons. First, the institution is relatively new and it takes time for it to become fully established and respected in the eyes of the various financial sectors. Second, it appears as though the governments of the participating territories are rather reluctant to allow the Authority to act as an autonomous institution. Thus, there is a strong limitation on its powers. Finally, because of the nature of the banking system in the ECCA area, local bank managers are forced to adhere to the policies exercised by their head offices in the Mother countries. Even if these bank managers were willing to be subjected to moral suasion from the Authority, it would be very difficult to do so if the suggested guidelines came into conflict with head office policies.

Despite these structural setbacks, the Authority has from time to time successfully used moral suasion as a policy instrument. For example, in 1976, the Authority was successful in persuading the financial community that a

shift in the linkage of the E.C. dollar from a U.K.-base to a U.S.-base would result in a much more stable economic position for the region. Nevertheless, the point still remains that moral suasion is generally not a powerful policy tool, especially in a region where it is difficult to supplement voluntary guidelines with mandatory laws.[9]

(iii) Summary

It has been seen that the East Caribbean Currency Authority issues and redeems the E.C. dollar and, to a very limited extent, it acts as a banker for the participating governments and the commercial banks. However, it does not manage commercial bank reserves and further, we have seen that the instruments of monetary policy which are at the disposal of the Authority are very limited. There are no open market operations, nor reserve ratios, nor bank rate policies. In fact, it seems as though the Authority does not possess any effective policy instrument to enable it to influence money and credit conditions in the ECCA area. This, thus, implies that the potential policy variable, M^S/y, in not controlled by the Authority.

An interesting question which arises is whether a Monetary Authority with the ability to influence domestic money and credit conditions can indeed affect M^S/y in such a manner as to ultimately influence the general price level.

It is contended that even if the Monetary Authority was able to influence domestic money and credit conditions, it would still be unable to control M^S/y primarily because the actual level of nominal money balances adjusts almost instantaneously to the desired level which is predominantly a function of the level of economic activity (e.g., see equations 8 and 9 of the model in Chapter 4). While one does not deny that monetary policy can influence the stock of money, it is felt that the money stock cannot be effectively controlled by the pursuit of such policy. Because of the absence of this direct control over the money stock, at best a Monetary Authority can expect to have only an indirect affect on the price level via a direct attempt at influencing the level of economic activity in the country (i.e., $M^d \rightarrow M^S \rightarrow M^S/y \rightarrow P$). Further, since the level of economic activity is not solely determined by domestic factors, it is quite possible that international factors may operate so as to negate any possible effects arising from the conduct of monetary policy. For example, suppose country A wants to use monetary policy in order to reduce its inflation rate. Then, it must attempt to influence the demand for money which is essentially a function of nominal income, the rate of interest and the price level. A priori information suggests that at least in the Caribbean context

the rate of interest cannot be the target instrument for it is determined exogenously. Further, the price variable is also ruled out for that is precisely the variable which we are attempting to influence. That, therefore, leaves the income variable. Assume further that the country does indeed manage to reduce the level of nominal income through its conduct of monetary policy. However, if foreign prices are rising and/or international rates of interest are falling, the domestic money demand will be forced upward and the money stock, by assumption, will necessarily increase. The overall effect on the price level will depend on the magnitude of the changes in foreign prices and/or international interest rates. The conclusion which can be drawn is that the efficacy of monetary policy in influencing the level of domestic prices is dependent on the degree of volatility exhibited by international prices and rates of interest. But, it has already been pointed out that the ECCA is largely impotent with respect to the conduct of monetary policy, and this leads to the further conclusion that monetary considerations cannot be a useful policy variable for controlling inflation in the ECCA region.

Finally, it is worth reiterating that the monetary variable was not a significant explanatory factor in the price equation for Barbados. Had it been significant, then

an argument for influencing the rate of inflation via the conduct of monetary policy would have some strength from the viewpoint that the Central Bank of Barbados is equipped with the necessary instruments so as to enable it to exert some measure of influence on the supply of money. However, as pointed out before, there is no guarantee that domestic prices will react to domestic monetary considerations and, in fact, the unpredictable nature of the outcome should lead policy-makers to be very sceptical in their attempts to implement such a line of policy. It may just be that the side effects from the pursuit of an anti-inflationary program based on the conduct of active monetary policy are more detrimental than any positive achievements to be had from the resulting effects on prices.

(D) Foreign Prices

The foreign price variable was by far the most significant and consistent explanatory variable in the price equation of each island which was considered. The causes of domestic inflation may thus be attributed to a large extent to rising international prices. Any conscientious attempt at curing inflation in the region must therefore first address and provide answers to this aspect of imported inflation. Since the small open developing economy is a price taker with respect to the rest of the world, a feasible solution to

the inflationary problem cannot be attained by an attempt at directly influencing and/or controlling the level of import prices. This is determined exogenously. Rather, policies must reflect the open and dependent nature of the economies, with the aim of reducing the relative susceptibiity to external shocks. But, these policies must be extended beyond the horizon of import controls which are geared primarily at balance of payments as opposed to inflationary problems. Instead, probable solutions can only be had after it is recognised that the economies in question have distinct structural characteristics which require particular attention, and, possibly, fundamental change. On the other hand, one must also realize that it may well be that there are really no practical solutions to the problem which is confronted.

We shall now examine two of the more popular anti-inflationary approaches which have been adopted by a number of developing countries over the past years.

(i) Import-substituting Industrialisation

A vast majority of developing countries have at some stage of their development pursued policies of import-substituting industrialisation (ISI). Typically this begins with the manufacture of consumer goods for which a domestic market is already well established, although such production usually

takes place behind high protective tariff barriers. As a result of this development, the import of fininished consumer goods is reduced but the commodity composition of imports changes towards raw materials, semi-finished inputs and capital goods.[10] However, as pointed out by Winston,[11] one of the main results of this change in import structure is to increase the proportion of domestic value added which is supported by, and dependent on, imports, and this factor introduces an inflexibility into the import structure and generates a trade dependency markedly different from the one that existed prior to the implementation of ISI. It is further argued that this approach makes a country's economic progress (e.g., GDP) directly dependent on its ability to acquire the essential imported inputs and inability to do so could thus breed severe economic recession. The conclusion which is normally drawn from this is that by changing the structure of imports, ISI increases the vulnerability of the economy to imported inflation.

While we do not dispute that ISI may lead to greater dependency, we shall argue that at least in theory this is not a necessary outcome. Import substitution may not lead to further trade dependence if the country undergoes the entire phase of total structural transformation. That is to say:

Phase I : the manufacture of consumer goods for which a domestic market is already well established

Phase II : the utilization wherever possible of domestic inputs into the production process; this may mean that the final product becomes differentiated from but, nevertheless, substitutable for the imported product.

Phase III: a re-orientation of tastes and attitudes away from the unattainable lavish life style of the developed countries and towards a more realistic expectation based on the true potentials of the economy.

More often than not, most countries get stuck at Phase I, and their economies become subjected to a type of dependence which may have consequences of far greater magnitude than those which existed before the ISI program was embarked. However, any genuine attempt at cushioning the impact of foreign prices can only be achieved if all three phases are undergone. But, can small open developing economies really succeed in an attempt to move from Phase I to Phase III? From a practical viewpoint, the answer appears to be negative. First of all, the size of the economies in question will necessarily impose severe constraints on a country's ability to become more self-sufficient.

Natural resources will normally be scarce and/or confined to a limited group of commodities, and it will be impossible for the country to satisfy all its needs with its existing resource base.

Second, developing countries tend in most cases to be severely restricted in their financial capabilities. Thus, any intensive ISI program will more than likely require external financial and, possibly, capital assistance.

Third, even if ISI is able to operate, high tariff barriers will be created so as to protect the domestic goods from foreign competition and the resultant effect may lead to the establishment of inefficient high cost producers. This, no doubt, may generate price effects which are far greater than what were present in the pre-ISI period.

We therefore conclude that ISI fails to provide a practical solution to the inflationary problems of small open developing economies.

(ii) Exchange Rate Policy

The Eastern Caribbean region as a whole operates on a fixed exchange rate system. The East Caribbean Currency Authority and the Central Bank of Barbados are responsible for issuing and redeeming East Caribbean dollars (EC dollars) and Barbadian dollars (BD dollars), respectively. Both currencies are tied to the US dollar. The EC dollar

exhanges at a rate of US $1.00 = EC $2.70 while the BD dollar is pegged at US $1.00 = BD $2.00. Prior to 1976, both currencies were linked to the British pound at an exhange rate of £1.00 = EC $4.80 = BD $4.80. But, due to a prolonged devaluation of the pound during the mid-70's, it was felt that a more stable currency was necessary and the linkage was therefore shifted from the pound to the US dollar. To date, the post-1976 exchange rates have remained unchanged.[12]

Orthodox theory has long advocated a policy of floating exchange rates in order to insulate ones economy from the effects of external shocks and other international aspects such as rising import prices. The traditional Nurksian argument is that an increase in the domestic interest rate will cause the spot price of the domestic currency to rise in terms of foreign exchange.[13] This higher domestic interest rate will be attractive to foreign investors, and they will attempt to maximize the returns from their asset portfolio by switching their holdings into the more profitable domestic interest bearing assets. For similar reasons, it is expected that local demand for foreign assets will fall. Assuming other things remain unchanged, then the increase in demand for local currency will have the effect of raising the currency's traded price. This traded price

may also be influenced by the country's trade flows. For example, if there is a boost in exports and imports remain unchanged, then this will have the effect of increasing the demand for local currency and ultimately pushing up the exchange rate. The rise in the spot exchange rate will in turn cause: (1) a fall in the local currency price of imports, (2) a fall in the volume of exports; and (3)an increase in the volume of imports.[14]

If the flexible-rate economy is small and most of the rest of the world is on fixed rates, world inflation rates will exert a significant influence on domestic policy. Policy-makers will be confronted with the option of choosing how much of the world inflation rate will come from internal sources (domestic inflation) and how much will come via exchange rate appreciation--the two must sum to the world inflation rate.[15] The Central Bank will be expected to use its policy towards nominal money expansion so as to set a desirable mix between domestic inflation and exchange rate appreciation.

Flexible exchange rates certainly appear to be an attractive policy measure for dealing with the aspect of imported inflation. However, there are several factors which dampen the efficacy of such a policy in the Eastern Caribbean. First, under a flexible exchange rate regime,

there is an assumption that domestic interest rates can be readily controlled. It has, however, been shown that these rates are determined exogenously, and therefore it becomes questionable whether a small open economy can, for any appreciable length of time, maintain its domestic interest rate at a level which is significantly different from that of international rates. If domestic rates were to exceed international rates, locals would prefer to invest their money in the domestic market and this in turn would increase the liquidity position of the banking system. But, the higher domestic rates would deter borrowers, and they would prefer instead to borrow abroad at the lower rates. The banking system would thus be forced to lower its rates. On the other hand, if domestic interest rates were lower than those on the international market, locals would prefer to invest their money abroad. The lower rates in the home market would, no doubt, tend to increase the domestic demand for loans but the supply of loans would be severely curtailed by the exodus of funds from the domestic market to the more attractive foreign market which offers the higher rates of interest. As a consequence, domestic rates would necessarily be forced upwards.

Second, the theory behind flexible exchange rates also assumes that investors will react positively to any increase

in interest rates. But, even if interest rates could have been regulated internally, it might well be that other factors such as political and economic instability could give rise to risk factors which out-weigh the potential benefits from the investment.

Third, in theory, a flexible exchange rate regime operates in a manner which leaves the determination of the exchange rate entirely to market forces. In practice, however, this can lead to great instability and uncertainty and a strong Monetary Authority is therefore needed to intervene in times when rates become extremely volatile. But, as pointed out previously, the Monetary Authority in the region is not equipped with the necessary tools to enable it to readily stabilize the value of the currency. This problem is further compounded by the absence of well developed money and capital markets operating within the region.

Fourth, although it is possible for exchange rates to be influenced by trade flows, it would be rather dangerous to rely on such a policy, particularly in the Eastern Caribbean where exports are comprised of potentially unstable components like agriculture and tourism.

Finally, even if the region had possessed developed money and capital markets and it had a strong Monetary

Authority capable of controlling the supply and the cost of credit, it is still not altogether clear that a system of flexible exchange rates could work effectively and efficiently in the Caribbean. For this to be possible, it must be demonstrated that:[16] (1) an international price system based on flexible exhange rates is dynamically stable after taking speculative demands into account; (2) the exchange rate changes necessary to eliminate normal disturbances to dynamic equilibrium are not so large as to cause violent reversible shifts between export and import-competing industries; (3) the risks created by variable exchange rates can be covered at reasonable costs in the forward markets; (4) central banks will refrain from monopolistic speculation; (5) monetary discipline will be maintained by the unfavorable political consequences of continuing depreciation, and it is to some extent maintained today by threats to the levels of foreign exchange reserves; (6) reasonable protection of debtors and creditors can be assured to maintain an increasing flow of long-term capital movements; and (7) wages and profits are not tied to a price index in which import goods are heavily weighted.

In light of the various difficulties pointed out above, the flexible exchange rate policy does not seem to provide a feasible solution to the problem of imported inflation in

the Eastern Caribbean. Such a policy would only lead to great instability in the currency's trade value and the inability to accurately predict the exchange rate at any future time period might have very far reaching and detrimental effects on prices.

2. CONCLUSIONS

Several potential policy variables have been examined within the context of providing solutions to the inflationary problems of the Eastern Caribbean. The discussion which was generated suggests that various features particularly common to small open developing economies operate as a hinderance to the efficacy of possible anti-inflationary programs. Low wage levels, internationally determined rates of interest and prices, an endogenous money stock, and a relatively ineffective Monetary Authority all serve to weaken any policy attempt at curbing domestic inflation. In fact, it would appear that for all practical purposes, the rate of inflation in the Eastern Caribbean cannot be controlled by national policies. The world inflation rate will inevitably determine the level of domestic prices both in the short and in the long run. At best, governments may attempt to alleviate the possible resulting balance of payments problem, but they will be unable to influence domestic prices.

NOTES

1. See Johnson H., Inflation and the Monetarist Controversy, De Vries Lectures, 1971. Amsterdam: North-Holland, 1972; Mundell R., Monetary Theory: Inflation, Interest, and Growth in the World Economy. Goodyear, 1971; Swoboda A., "Monetary Policy under Fixed Exchange Rates: Effectiveness, the Speed of Adjustment, and Proper Use," in: Johnson H., and Nobsy A. (eds.), Issues in Monetary Economics. London: Oxford University Press, 1974.

2. These points were expressly made by Gray M., Ward R. and Zis G., "The World Demand for Money Function: Some Preliminary Results," in: Parkin M., and Zis G. (eds.), Inflation in the World Economy, Manchester University Press, 1976.

3. Interest rates may now be more responsive to the U.S. discount rate due to the shift in the linkage of the E.C. dollar from a U.K.-base to a U.S.-base in 1976.

4. See Howard M., "Interest Rate Behaviour in an Open Developing Economy: The Barbadian Experience 1965-1976," op. cit.

5. Our discussion will be centered only around the Leeward and Windward islands since the money variable was insignificant with respect to Barbados. Also, the discussion which follows is taken from the author's M.A. thesis: The Role of the East Caribbean Currency Authority, Department of Economics, Dalhousie University, 1980.

6. See the Currency (No. 2) Ordinance, 1965, the East Caribbean Currency Authority.

7. East Caribbean Currency Authority, Economic and Financial Review, June 1977, p. 10.

8. Binhammer, H., Money, Banking and the Canadian Financial System, Methuen Publications, 1972.

9. Because the region is divided into seven different islands, any legal changes must meet the approval of all seven individual governments, and legislation must be

passed in all seven islands. This could be a very tedious and lengthy process.

10. See Kirkpatrick C., and Nixson F., "The Origins of Inflation in Less Developed Countries: A Selective Review," in: Parkin M., and Zis G. (eds.), Inflation in Open Economies, op. cit., p. 160.

11. Winston G., "Notes on the Concept of Import-Substitution," Pakistan Development Review, 1967, Spring.

12. In arriving at an optimum exchange rate for the region, primary consideration must have been given to the aspect of international trade, and the agreed upon rates presumably indicate some expected optimal balance between the cost of imports and the price of exports.

13. See Nurkse R., International Currency Experience: Lessons of the Inter-War Period, League of Nations, Geneva, 1944.

14. See Artus J., "Exchange Rate Stability and Managed Floating: The Experience of the Federal Republic of Germany." International Monetary Fund Staff Papers 1976, Vol. 23, pp. 312-332.

15. For a more thorough explanation see Courchene T., Money, Inflation, and the Bank of Canada. C.D. Howe Research Institute 1976, p. 28.

16. See Mundell R., International Economics, MacMillan Co., New York, 1968, pp. 184.

Chapter VII

SUMMARY AND CONCLUSIONS

Our main objective in this thesis was to investigate the causes of inflation in small open developing economies, using the Eastern Caribbean region as a case study. It was recognised that orthodox inflation theory was deficient for our purposes since it failed to reflect adequately various 'bottlenecks' which typically characterise the economic structure of most developing countries. A more appropriate model which stresses various structural elements was developed. Its foundation was based on a theory of a dual economy in which there are two set of markets. In one set of markets there are those commodities which typically respond to demand and supply conditions while in the other set, prices are determined by production costs and desired profit margins. We called the first set auction markets and the other set administered markets.

The type of goods which qualify under the auction market heading are, typically, agricultual and raw commodities, securities, and sometimes internationally traded goods as in the Scandinavian 'export-led' sector. For our purposes, we chose to characterise the auction market in the Caribbean setting as being the set of all local agricultural commodities which were domestically consumed.

Prices in the administered markets were described as 'mark-up' prices because the process by which the seller fixed the price of a unit of output was to 'mark-up' unit cost. This type of pricing policy was particularly characteristic of the distributive sector and we contended that the analysis could be generalized to include all sectors which were not included in the auction markets.

The model was specified and empirically tested. The main conclusions which were drawn from the empirical results were that the causes of inflation in the Eastern Caribbean could be primarily explained by rising import prices, domestic monetary conditions and, to a lesser extent, high rates of interest.

It was recognised that both the import price variable and the interest rate variable are determined internationally and must therefore be viewed as being exogenous to our system. The monetary base was regarded as an endogenous variable and it was postulated that the actual level of nominal money balances adjusts almost instantaneously to the desired level which is predominantly a function of the level of economic activity. The stock of money was therefore viewed as being demand determined. In light of this, it was argued that regional Monetary Authorities cannot control their respective money supply

and, at best, can only attempt to influence it indirectly, through influencing the demand for money. Success in this approach is directly dependent on the efficacy of monetary policy in the region.

An examination of the nature and structure of the East Caribbean Currency Authority (ECCA) revealed that that institution was unable to effectively influence money and credit conditions in the ECCA region and therefore was impotent with respect to influencing domestic prices through the use of monetary policy. The ability of the Central Bank of Barbados to influence the domestic money supply was not seriously investigated since money did not appear to be a significant explanatory variable in the price equation for Barbados.

The various difficulties associated with ISI were high-lighted, and it was argued that that policy does not provide a practical solution to the problem of inflation. Exchange rate policy was also considered but factors such as the exogenous nature of interest rates, the relatively weak Monetary institution and the non-existence of well developed money and capital markets all served to defeat the argument in favour of flexible exchange rates as a cure for domestic inflation.

The ultimate conclusion of our study is that there does not appear to be any anti-inflationary program which is capable of adequately solving or alleviating the problem of inflation in the Eastern Caribbean. The world inflation rate will invariably determine the level of domestic prices both in the short and long-run. Further, it is interesting to note that the inflationary experience in the other larger Caribbean islands (i.e., Jamaica and Trinidad) has been no better than that in the Eastern Caribbean (see Table XXXIV).[1] This finding is quite significant in light of the fact that these larger islands possess relatively developed central banks which are equipped with most of the conventional monetary instruments. This observation may suggest that even if the Monetary institutions in the Eastern Caribbean were more developed, it is unlikely that they would be effective in curbing the region's inflationary problems.

Table XXXIV

A COMPARISON OF INFLATION RATES BETWEEN THE LARGER AND SMALLER CARIBBEAN ISLANDS

Period	Jamaica	Trinidad	Barbados	Antigua	Montserrat	St. Kitts	Dominica	St. Lucia	St. Vincent
1971	4.7	3.5	12.4	8.4	16.9	-8.9	3.1	5.2	N/A
1972	8.2	9.3	7.0	9.2	-0.3	8.2	1.9	10.5	N/A
1973	26.9	14.8	16.9	14.2	12.1	10.3	8.7	9.4	15.4
1974	20.6	22.1	38.9	23.5	18.6	31.8	42.7	30.7	38.2
1975	15.7	17.0	20.3	12.3	25.4	8.3	14.0	22.8	15.1
1976	8.1	10.4	5.0	18.9	8.6	15.1	14.1	11.8	8.5
1977	14.1	11.8	8.3	3.6	16.7	17.8	11.9	9.9	12.3
1978	49.4	10.2	9.5	4.3	7.9	4.2	3.5	10.0	5.3
1979	19.8	14.7	13.2	20.3	11.5	10.0	16.2	8.2	16.6
1980	28.6	17.5	12.9	17.9	9.8	N/A	35.0	13.8	8.5

Source: International Financial Statistics: May, 1977 and August, 1983. Central Bank of Barbados: Annual Statistical Digest, 1980; Annual Reports, 1973-1981. East Caribbean Common Market Secretariat: Abstract of National Accounts Statistics, 1979.

NOTES

1. Some of the inflation may have been due to various domestic policies which were introduced by the national governments in question.

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