EXCHANGE RATE MANAGEMENT IN THE EASTERN CARIBBEAN CURRENCY UNION

Wendell A. Samuel
& Lennox J. Andrews
Research and Information Department
Eastern Caribbean Central Bank
St. Kitts

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By

Wendell A Samuel
Lennox J Andrews
Research and Information Department
Eastern Caribbean Central Bank
Bird Rock, St Kitts

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INTRODUCTION

The OECS are a group of small open economies vulnerable to external shocks and natural disasters. The population barely exceeds half million which reflects narrow domestic resource base and potential for growth. Production has been traditionally dominated by agricultural output spurred by the favourable external trade arrangements enjoyed by ACP countries and reflects the price taker nature for the products on the external market. Efforts at economic diversification in the last two decades resulted in tourism and construction increasing their contributions to GDP and employment. Nevertheless, as domestic production has been insufficient to meet demand, imports of consumption goods have been growing and accounted for the continuous deficit on the external current account.

In the Eastern Caribbean Currency Area, the East Caribbean (EC) dollar has been tied to the United States (US) dollar at the rate of 2.70 since July 1976 and since then it has never been changed. That rate has been backed by foreign exchange earned through inflows mainly from the export of tourism services, inflows from foreign direct investment, and the export of banana. During the last decade, foreign receipts from the offshore financial services have also contributed to the maintenance of the fixed exchange rate regime.

In recent years, however a number of international events have been unfolding which may threaten the fixed exchange rate regime. Among these events are the removal of the preferential arrangements for banana on the UK market and the OECD Report on harmful taxation. Regionally, the establishment of an OECS Money and Capital market may well alter the nature of the foreign capital entering the region that so far has been mainly in the form of foreign direct investment. These events together with large fiscal deficits incurred by some member governments can in the first instance place pressure on the region foreign exchange reserves and then on its exchange rate. Under such conditions,

one possible approach to macroeconomic management for the OECS is the devaluation of its domestic currency.

This paper therefore seeks to examine the possible effects of a devaluation of the EC dollar on OECS countries. Specifically, the paper evaluates the impact of exchange rate shock on prices, income and government deficit. The basic argument in the paper is that the effects of an exchange rate shock in OECS countries will be small and short-lived. This is because there is a large import content in domestic production and export. As a result domestic cost of production and prices will be immediately affected by the increase in import prices associated with the devaluation of the domestic currency

Section II examines the characteristics of OECS countries. Section III provides an analysis of the theoretical underpinnings of exchange rate management and establishes the link between devaluation and real sector activity. The next section proceeds to examine the transmission effect of devaluation using a VAR model for the St. Lucia economy. Results of the VAR are then presented and analysed. Conclusions and recommendations follow in the final section.

CHARACTERISTICS OF THE ECCB MONETARY UNION (EMU)

The ECCB Monetary Union comprises eight (8) small-island open economies that are vulnerable to external shocks including the effects of natural disasters. In 1998, the population was about 500,000 and per capita GDP estimated at US$3,575.15. The size of the land mass and small population partly explain why the low level of domestic production has to be supplemented by large amount of imports of consumption items to meet domestic demand.

Being former colonies of Great Britain production has been historically dominated by the output of agricultural commodities encouraged by preferential arrangements of ACP countries on the European Union market. This arrangement reflects the price taker nature of OECS products on the external market. The major traditional agricultural exports are nutmeg and mace, banana and sugar.

With the attainment of Independence in the 1970s and 80s, efforts concentrated at economic diversification and this led to tourism, manufacturing and construction playing an increasingly greater role in output and employment. In addition, there has been an expansion in the output and export of fish and cash crops such as avocado, mango, breadfruit and cut flower to the United Kingdom and North American markets. Nevertheless, traditional agriculture in particular banana and nutmeg and mace still remain important in the islands.

The attainment of independence has also increased the role of government in the ECCU. Motivated by the desire for improved living standards governments facilitated private sector led development through the implementation of a Public Sector Investment Programme. The programme financed mainly from external grants and loans has provided the necessary social and economic infrastructure associated with the region's development plans. It has also supplemented the region's foreign exchange earnings thus supporting the maintenance of a fixed exchange rate regime. Nevertheless, expansionary fiscal policies in recent years have resulted in some member states incurring large fiscal deficits.

In addition to government services sector, the growth in telecommunication sector has also facilitated economic expansion and diversification and increased the range of services available to the population for consumption. In this regard, during the last decade offshore financial services have made important strides in the union, contributing to employment and foreign exchange earnings.

During the 1980s the economies recorded real growth averaging 6.1 per cent with agriculture (3.1 per cent), tourism (8.6 per cent), construction (10.1 per cent), manufacturing (6.7 per cent) and mining (14.3 per cent) being the main contributors. In the services sectors communications, banks and insurance and government services were the main contributors to economic activity. Preferential access to markets and large capital inflows supported these good performances. Output was less impressive in the

1990s with real growth averaging 2.8 per cent attributable in part to worsening terms of trade, decline in external assistance and the threat of removal of preferential treatment for traditional agricultural exports. Real growth in the tourism industry, the construction and manufacturing sectors averaged 3.0 per cent, 4.4 per cent and 0.1 per cent respectively, while the agricultural sector recorded negative real growth averaging 3.1 per cent.

With respect to the sectoral changes in the economy the following can be observed:

- Agriculture has declined significantly in recent years. It declined from 14.4 percent of GDP in 1984 to 8.5 percent of GDP in 1998. In 1977 the percentage was 19.8. While the decline in the contribution of agriculture to GDP is a natural tendency in economies historically the large decline experienced by the OECS countries is noteworthy.

- Hotels and Restaurants, which serves as a proxy for tourism grew from 9.05 percent in 1984 to 10.02 per cent in 1998.

- The contribution of the Manufacturing sector declined from 7.14 in 1984 to 6.0 percent in 1998. The contribution of this sector peaked in 1984, as its contribution was 5.9 per cent in 1977.

- Government services contributed 18.5 percent of GDP in 1980 and its contribution declined to 15.2 in 1998.

- Communications is one of the fastest growing areas in these economies. Its contribution increased from 3.5 percent in 1984 to 9.6 percent in 1998. This growth is reflective of the increased dependence of the modern economy on telecommunication services and consequently the need to have competitive prices.

- Financial services in the form of banking and insurance also increased its contribution, from 6.7 percent in 1984 to10.8 percent in 1998

What clearly emerges from these observations is that the economies have been restructured away from agriculture and manufacturing towards the provision of services. The most surprising has been the phenomenal growth in communication services, which has experienced growth at an average in excess of 25 percent per year.

In a further attempt to achieve higher levels of economic growth, efforts are currently underway to establish a money and capital market that would allow governments and

businesses to raise funds outside the traditional commercial source for current and capital expenditure.

THEORIES OF EXCHANGE RATES MANAGEMENT

In the period before the Second World War, known as the Gold Standard, most countries had their domestic currencies backed by gold. Any excess of import over export meant an outflow of reserves of gold. Under the Gold Standard countries were not allowed to have balance of payments difficulties provided that the obeyed the rules of deflating when they had a surplus of gold and inflating when there was a deficit.

After the Second World War up to 1973, most economies had fixed exchange rates in which their domestic currency was backed by foreign exchange reserves. Under this system, any excess in the demand for foreign currency over its supply was satisfied by a reduction in foreign exchange reserves. If reserves were insufficient then countries had to take corrective measures to contain the outward flow of foreign currency.

With the rapid movement of capital in and out of countries during the 1970s, the so-called Bretton Woods system broke down in 1973. According to Mac Donald (1988) the breakdown of the Bretton Woods system was more a reflection of its failure to deal effectively with the fundamental current account imbalances countries in the 1960s and 1970s. Sohmen (1961) advocated the use of flexible exchange rate in which the market determines the rate at which one currency exchanges for another thus leading to an automatic adjustment of deficits in the balance of payments.

The movement towards the establishment of flexible/floating exchange rates never solved the problem of international adjustment. The widespread feeling was that exchange rates turned out to be more volatile than they were expected to be, than they should be, and perhaps than they need be (Dornbusch 1988).

The issue of exchange rates movements to correct current account imbalance therefore remained a debatable topic in the economic literature. And as a result in the 1980s, practitioners called for some sort of government intervention to stabilise domestic currencies and hence the widespread use of exchange rate targeting.

Generally, there have been a number of approaches to the management of exchange rates. Some of these are now dealt with briefly.

The Purchasing Power Parity Theory

One of the earliest theories of exchange rate determination is the purchasing power parity theory. In its simplest form, the theory states that the price of a homogenous commodity produced in one country should be equal to the price of the same homogenous commodity produced in another country. For this equality to hold there must be no impediments to international trade such as tariff barriers and transactions cost. Under such condition there will be no need for the commodity to be bought in one country and sold in another to make a profit. Such behaviour will only happen if the commodity is produced cheaper in one country relative to another.

The theory therefore implies that if domestic cost of production does not stay in line with that of other trading partners, then domestic exports will fall while imports will rise, leading to a drain on the country foreign exchange supply. If the exchange rate is fixed there will be a loss of foreign exchange earnings for the country. Devaluation will therefore become necessary to reduce domestic cost of production thus keeping it in line with trading partners to reduce the amount of import and with it the level of foreign exchange leaving the country.

The Elasticity Approach

With this approach, the exchange rate is treated as a price, and like any other price its rate is determined by the interaction of the forces of demand and supply. This approach is often referred to as the balance of payments approach because the supply and demand for a currency is derived from the international demand for the goods and services produced

by that country. Such transactions are recorded in the country's balance of payments. For example, the demand for sterling depends on the international demand for the goods and services produced by UK producers, since they would have to be paid in UK currency. Americans who want to import British goods will use United States banks to convert US dollars to sterling. Once this happens, there will at the same time be a build up of US dollars in British banks thus increasing the supply of foreign currency. On the other hand, UK citizens who wish to buy American goods and services will have to go to UK banks and buy US dollars with UK sterling, thus depleting the supply of foreign currency in British banks and increasing the supply of foreign currency (sterling) in American banks. In short, the supply of foreign currency will increase in Britain as more British goods and services are exported abroad; and the supply of foreign currency will decrease in Britain as more UK citizens buy foreign goods. A country will therefore try to ensure that there is sufficient foreign exchange in domestic banks to meet the domestic demand for imports.

How much will the domestic currency exchanges for another will thus depend on (i) the extent to which foreigners buy the goods and services produced by the domestic economy (export) and (ii) the extent to which domestic consumers buy the goods and services produced by foreigners (import). If more foreign people are buying the goods and services produced domestically, then there will be a greater demand for the domestic currency and its price will rise. At the same time there will be a build up of foreign exchange in domestic banks. If on the other hand, few persons are buying the goods and services produced by the domestic economy then there will be little demand for the domestic currency and its price will fall. As a result, there will be a reduction in foreign currency in domestic banks.

In keeping with the Marshallian scissors of supply and demand, the demand curve for a foreign currency will therefore be downward sloping as more of a foreign currency will be demanded at a lower than at a higher price. Hence people in the OECS will be prepared to buy more US dollars (i.e. demand/import more US produced goods and services), as the price of the US dollar relative to the EC dollar falls. On the other hand,

OECS residents would be tempted to buy less US dollar (i.e. demand /import less US produced goods and services) at a higher than at a lower price. The equilibrium exchange rate between the two commodities would be established by the intersection of the supply and demand curves for foreign exchange. If there is an excess demand for foreign exchange relative to its supply, the price will rise and a new equilibrium will be established.

This is what would happen under a flexible system, in which the rate of exchange will be automatically adjusted and there will be no need for accompanying measures to meet the extra demand. However, under a fixed exchange rate system, if the demand for foreign exchange exceeds its supply, the monetary authorities will draw down its reserves to meet the extra demand. If this situation continues for some time, then certain corrective measures will have to be introduced. One such measure is a devaluation of the domestic currency.

Devaluation and the Real Sector

Devaluation carries out two functions in preventing the collapse of the domestic currency. On the one hand, it can give rise to an increase in exports by making them cheaper to foreigners and on the other its reduces imports by making them more expensive to domestic consumers.

After devaluation, exports become cheaper to importers because less of their currency is used to buy the same amount of goods, thus creating the potential for an increase in demand. Whether that increase actually takes place depends on the elasticity of export for the commodity and the level of domestic supply. If the commodity in question is inelastic in demand, then a reduction in its external price may not necessarily lead to an increase in export volumes. Such is the case in the OECS where the level of exports for some agricultural exports (sugar, banana) are of a quota nature fixed by arrangements with the recipient countries. On the other hand a devaluation of the EC dollar may make travel to region cheaper but an actual increase in the number of visitors in the region will

in the final analysis depend on domestic capacity and the quality of service offered. Hence an improvement in the Balance of Payments may not necessarily take place.

Additionally, even if there was an increase in external demand, taking advantage of this increase would require the appropriate and timely response on the part of the domestic conditions of supply. However it has been observed that in many developing countries an increase in export is unlikely with devaluation because of the low level of domestic productive capability. In fact, supply takes time to respond to an increase in external demand, and hence devaluation may only lead to an increase in export volumes in the medium to long term. This is the well-known J-curve effect of devaluation thus OECS countries are unable to meet quota established internationally due to low production possibility frontier associated with limited resource that have strongly competing ends. In the tourism sector an increase in stay over arrivals hinges on the availability of rooms and this takes time.

On the other hand a nominal devaluation of the exchange rate raises the domestic price of foreign currency. This should therefore reduce the demand for imports as more domestic currency will have to be given up to buy a given quantity of imports. However, an actual decline in imports may not necessarily take place since there are certain goods that have to be imported. These goods may include basic consumption items and inputs for the domestic productive sectors. A rise in the price of such inputs pushes up domestic cost of production and if wages are indexed to prices there can be a further increase in domestic cost of production. That increase will also make exports more expensive and not cheaper as is desired. Therefore for devaluation to be successful, the nominal devaluation must be translated into a real devaluation and for this to happen domestic cost of production must at least remain unchanged after the devaluation[1].

[1] A number of approaches have been identified to deal with the increase in domestic cost of production. Noted among these measures is the suspension of wage index clause at the time of inflation. Such a measure will however be faced with great difficulty in OECS countries because of the strength of the Trade Union movement.

According to the Marshall-Lerner condition, for devaluation to be successful, the following condition must hold:

$\eta_m + \eta_x > 1$, where

η_m and η_x refer respectively to the domestic elasticity of demand of imports and the foreign elasticity of demand for country's exports. The condition states that an increase in the price of foreign exchange (a depreciation or devaluation of the exchange rate) will result in a reduced home demand for imports and an increase foreign demand for exports, because of the relatively elastic nature of demand.

The Marshall-Lerner condition is derived from a more general condition for devaluation to improve the Balance of Payments viz.

$$dB = k\left[X_{1f}\frac{s_{1x}(\eta_{2m}-1)}{s_{1x}+\eta_{2m}(1-k)} + M_{1f}\frac{\eta_{1m}(s_{2m}+1)}{\eta_{1m}+s_{2m}(1-k)}\right]$$

Where k is the percentage of the devaluation, X the level of exports, M is the level of imports, η is the elasticity of demand, s is the elasticity of supply 1 is the home country and f represents the foreign country.

As can be seen from equation (12) the effects of devaluation depends on both the demand and supply elasticities. In order to derive the Marshall-Lerner condition from equation (12), it must be assumed that supply elasticities are infinite and the percentage devaluation k is small. In light of the rigidity of resources in small developing economies the assumption of infinite supply elasticities may be untenable. For example World Bank (1990) shows that many of the OECS countries experienced significant periods of recession when they tried to shift from one line of activity to the next. Antigua and Barbuda experienced 11 years of recession when they shifted from sugar to tourism. In

these circumstances the critical value for the Marshall-Lerner condition must be significantly greater than unity.

Fortunately this is not a problem since given that the countries are price takers on the international markets they face horizontal (operationally infinitely elastic) demand curves for the products they sell internationally. This means that the countries can sell as much as they can produce at the world price. Hence the issue for these countries is the improvement of conditions of supply. This points to the need to address the rigidity of resources to make the economies more flexible, pay attention to quality, after-sales service and timeliness of delivery among other issues.

Devaluation would have a positive effect on domestic supply if production becomes more profitable. With a devaluation export revenue calculated in the domestic currency increases. However the impact of devaluation on the cost of production also needs to be considered. We can divide the cost of production into the cost of imported material, cost of locally produced material and labour cost. With a devaluation the cost of imported raw material increases proportionately with the devaluation so there is no cost advantage there. To the extent that the prices of local inputs lag behind the prices increases consequent on the devaluation there can be some temporary cost advantage. The period of time depends on the rate at which imported prices are transmitted to local inputs. Hence countries that have a large local input in their production process (like Trinidad) may gain a sizeable cost advantage for a certain period of time.

In most of the member countries of the ECCU, labour input is the largest element of cost and hence if devaluation induced inflation lowers the real wage rate there can be a cost advantage to the firms. The analysis here is similar to Friedman's analysis of the labour market. Firms and workers look at two different prices when they evaluate labour services. For the exporters the price they use to value the marginal product of labour is the export price which increases with the devaluation. The workers on the other hand calculate their real wage based on the domestic prices. Thus to the extent that domestic prices lag behind the increase in world prices workers will temporarily supply the same

amount of labour at a lower real wage. Hence the production of the commodity by the exporter becomes more profitable and he may try to produce and export more. This is only temporary since as time passes domestic prices would reflect the higher world prices and workers would demand wage increases. In the ECCU due to the high import content in domestic absorption (consumption and investment) the pass through of inflation consequent on a devaluation, is relatively quick and hence the effect would be very transitory.

Longer-term effects are possible if firms use the temporary profits to improve the supply conditions which, would result in an increase in the productivity of labour. The key then to competitiveness of the export sector is improvement in labour productivity which, results in a permanent lowering of unit labour cost. The devaluation only does so temporarily and the firms can use the respite to retool and reorganize to improve productivity. It therefore stands to reason that if productivity is the issue, devaluation is neither a necessary nor sufficient condition for improving competitiveness. If exporters can find the financing to retool and reorganize then the economy can be spared the uncertainty and loss of credibility that comes with a devaluation.

In summary, the most likely effect of devaluation in the OECS is a rise in domestic prices associated with the high import prices arising from the devaluation itself. This effect is also likely to be immediate because of the high import content in domestic production. The productive sectors will respond to devaluation by increasing cost of production thus giving rise to higher domestic prices. Hence wages will rise and the full effect of the devaluation would be manifested in higher prices that will be borne by the population

The Monetary Approach to Exchange Rate Determination

This approach operates under a system of flexible exchange rate, which, according to the literature offers a country independence in the determination of its domestic monetary policy compared to a regime of fixed exchange rate.

The approach can be explained by considering the balance sheet of the consolidated monetary sector. The familiar banking identity can be expressed as follows:

$$M = R + D \qquad (1)$$

Where M is the money supply, R is the reserves and D represents domestic credit. On taking first difference we obtain

$$\Delta M = \Delta R + \Delta D \qquad (2)$$

and on rearranging, we have,

$$\Delta R = \Delta M - \Delta D \qquad (3)$$

where ΔR is the change in reserves, ΔD is the domestic credit expansion and ΔM is the change in the money supply.

Under a fixed exchange rate system the change in reserves (ΔR) or the change in international settlements can also be defined as the sum of the balance on the current account and on the capital and financial account of the balance of payments.

$$\Delta R = CA + CAP \qquad (4)$$

where CA is the current account and CAP is the capital account of the balance of payments.

Under a flexible exchange rate system, the authorities do not interfere with the foreign exchange market and hence the change in net foreign assets equals zero. Therefore the balance on the current account must be equal the negative of the balance on the capital and financial account, i.e. CA = - CAP.

From equation (2) above, the change in the money supply can be due to a change in reserves or domestic credit. Under a fixed exchange rate system in which the economy is operating at full employment an increase in money supply brought about by a growth in credit would lead to a reduction on reserves. This is because the excess purchasing power associated with credit growth can only be met by demanding foreign goods as the economy is at full employment. If however, the economy were operating with a flexible

exchange rate the increased demand for foreign currency would be met with a depreciation of the domestic currency (i.e. the exchange rate) and the change in the money supply would be exactly equal to the change in domestic credit. According to monetary approach to exchange rate determination, under the fixed exchange rate system, monetary authorities cannot implement independent monetary, since it would only result in a redistribution of the money supply between the local economy and the rest of the world.

The New Cambridge Approach

The New Cambridge Approach to the balance of payments posits that a balance of payments problem arises out of the deficit on the government budget. It uses an aggregate expenditure-aggregate income framework. Expenditure and income can be broadly divided between government and the private sector. An external imbalance arises if expenditure and income diverges. If the private sector is fully self-financing then any deficits or surplus on the external accounts are a result of imbalances on the government budget.

The analysis can be formalized in a simple restatement of the basic model of the economy developed in Moshin Khan, et al (1986)[2]:

Assume a four-sector model as follows: The private sector undertakes expenditure (PE) on consumption goods (C) and Investment goods (I). It pays taxes and accumulates savings in the form of money (MS). It must obey the constraint:

$$PDY - PE \equiv \Delta MS + \Delta FP - \Delta DP \qquad (5)$$

where PDY is private disposable income (income minus taxes (Y-T)). ΔMS is the change in money supply, ΔFP is the change in foreign assets held by the private sector and ΔDP is domestic credit to the private sector.

The Government receives taxes (T), consumes (G) but does not invest. It must satisfy the following constraint:

$$T - G \equiv \Delta FG + \Delta DG \qquad (6)$$

where FG and DG are foreign assets and domestic credit of the government respectively.

The external sector obeys the following constraint:

$$M - X \equiv -(\Delta FG + \Delta FP + \Delta R) \qquad (7)$$

M represents imports, X exports and ΔR is the change in the foreign reserve of the monetary authority.

The Central Bank operates just like a moneychanger and the monetary sector and the budget constraint of this sector is given by:

$$\Delta MS \equiv \Delta R + \Delta DP + \Delta DG \qquad (8)$$

Summing equations (5) to (7) yields

$$PDY - PE \equiv (X - M) + (G - T) \qquad (9)$$

Alternatively,

$$Y \equiv PE + G + (X-M) \qquad (10)$$

Or

$$Y \equiv C + I + G + (X-M) \qquad (11)$$

Equation (11) is the well-known National Income identity.

Equation (9) states that the sum of the deficits or surpluses by the Government and external sector is offset by the deficit or surplus of the private sector. Substituting from equation (5) yields

[2] Adapted from Nicholls (1995)

$$\Delta MS = (G - T) + (X - M) + \Delta DP - \Delta FP \qquad (12)$$

In the stationary state all stocks are unchanging and flows are constant, hence, Equation (8) reduces to:

$$G - T = -(X - M) \qquad (13)$$

Equation 13 states that the deficit on the government budget results in an equal and opposite deficit on the external current account.

The final impact on the current account depends on the residual financing for the deficit. With limited access to credit from the Central Bank, governments have to seek alternative sources of residual financing. If it is financed by borrowing from the commercial banks, then:

$$G - T = \Delta DG \qquad (14)$$

If commercial banks are assumed to be fully loaned up the government deficit either crowds out the private sector or commercial banks are required to reduce their foreign assets.

Alternatively borrowing from abroad can finance the government deficit. In which case,

$$G - T = \Delta FG \qquad (15)$$

Again the deficit is financed in such a way that there is no impact on the overall balance of payments.

Export Shock and the fiscal deficit

The impact of an export sector shock on the fiscal deficit can be seen by noting that imports are a function of income. The simplest assumption is that imports are proportional to income:

$$M = aY \qquad (12)$$

Where a is the propensity to import and $0<a<1$.

The most important source of tax revenue is from imported goods. Hence:

$$T = tM = taY.$$

t is the tax rate.

An export shock invokes an automatic adjustment mechanism that reduces real income, employment and spending on imports, and hence tax revenue. In the absence of government expenditure cuts the fiscal deficit increases.

Given the currency board nature of the monetary arrangements a devaluation would eventually result in a redistribution of the supply of money between the domestic and the rest of the world.

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The discussion above suggests that in small open economies like the ECCU, changes in the nominal exchange rate will have only transitory effects on the economy. In particular the effects on real output are minimal and would work themselves out in a short space of time. A second implication is that larger economies with significant locally produced inputs would benefit more from exchange rate changes. The main aim of this section of the paper is to seek to verify empirically the veracity of these deductions. The framework employed is a small, unrestricted Vector Autoregressive (VAR) model based on the striped down version of the Khan et al (1986) model. The model is of the following form:

$$y_t = \Pi_1 y_{t-1} + \Pi_2 y_{t-2} + \ldots\ldots + \Pi_n y_{t-n} + B\, x_t + \varepsilon_t \qquad (1)$$

where y_t is a vector of p endogenous variables and x_t is a vector of exogenous variables. $\Pi_1, \Pi_2 \ldots\ldots \Pi_n$ and **B** are matrices of coefficients to be estimated, and ε_t is a vector of innovations that are correlated with each other but uncorrelated with their own lagged values and uncorrelated with y_{t-1} and x_t. The assumption that the errors are not serially correlated is not too restrictive since any serial correlation could be absorbed by adding more lagged values of y.

The model has six variables viz. The nominal effective exchange rate (NEER), real output (GDP), Prices (CPI), Net international reserves (NIR), Domestic credit (DC) and the Government fiscal deficit (DEF). Although the Eastern Caribbean dollar has been

pegged to the US dollar at EC$2.7 to the US dollar for the last 24 years, nominal effective rate changes are generated by movements of the US dollar against other currencies that are not so pegged. Such movements can generate real output changes as well as variations in prices and government fiscal deficit. This is particularly so since the major merchandise exports of the sub-region, bananas, sugar, nutmeg and mace are denominated in Euros. Hence movements in the US dollar vis-a-vis the Euro affects the profitability of the production of these commodities. Similarly, the European market is one of the major sources of visitors to the ECCU and hence variations in the exchange rate may affect their choice of vacation and even if vacation plans and planned spending in Euros are unchanged the domestic value of the expenditure will be higher. Innovations in the nominal exchange rates are used to simulate the likely effects of policy changes in that variable.

The model though simple has some level of richness since a reinterpretation of the model would yield some of the well-know features. For example, Given that the Eastern Caribbean dollar is pegged to the US dollar movements in the latter largely arise from the monetary policy of the Federal Reserve via an increase in interest rates. Hence to the extent that changes in the EC$/US$ exchange rates reflect monetary policy we may receive the Bernanke and Blinder (1988) effects (at one remove) modeled by LaBorde et al (1999). In some sense this effect may be more effectively transmitted via the exchange rate than directly through the federal funds rate given the interest rate insensitivity and the existence of some level of capital controls in the ECCU. The model also includes a credit variable, which may capture the effect of monetary influences that operate via the credit channel.

DATA AND METHODOLOGY

The model was estimated on the computer package EVIEWS using quarterly variables for St. Lucia over the period 1980 to 1995. Quarterly GDP were constructed by ECCB National Accounts compilers using a set of indicators for the various sectors. The nominal effective exchange rate was computed by the ECCB Statistical Unit using the

weights based on trade patterns in 1985. The CPI and fiscal data were obtained from the Authorities in St. Lucia.

All variables were pre-tested to determine the order of integration using both the Augmented Dickey-Fuller Test and the Phillip-Perron Test. The results given in Table 1 reveal that all of the variables are I(1) in levels and I(0) in first differences. The model is then estimated as an unrestricted VAR in the levels of the variables. The interpretation of the coefficients of the VAR model are not in themselves very useful. Of more importance is the impulse response functions that can be generated from the model estimates.

An impulse response function separates the determinants of the endogenous variables into shocks attributed to specific variables. It traces the effect on the current and future values of the endogenous variables of one standard deviation shocks to the innovations. If the innovations (ε_t) are uncorrelated, the interpretation is straightforward. However, the errors are usually not uncorrelated and may have common components, which cannot be attributed to a specific variable. In these instances the errors are orthoganalized using the Choleski decomposition so that the covariance matrix is lower triangular. The effect of this is to attribute the common effects to the variable that takes precedence in the VAR system. Hence the common effects of the first two variables is attributed to the first etc. While the Choleski decomposition is widely used, it is a rather arbitrary method of attributing effects and changing the order of precedence of the variables can change the impulse response functions significantly.

Table 1

Unit Root Test of the Variables

Variables	ADF Levels	ADF 1st Difference	Phillips-Perron Levels	Phillips-Perron 1st Difference
CPI	-0.1470	-4.2970	-0.7526	-8.2882
DEF	-1.5832	-7.9251	-2.9001	-7.9251
GDP	-0.3729	-6.7619	-0.2210	-14.7067
NEER	-2.8711	-4.1203	-2.2709	-6.2185
REER	-1.9400	-4.7113	-1.7610	-7.7266

THE RESULTS

The impulse response functions generally support the hypothesis that the impact of a devaluation in small open economies is small and transitory. They suggest that a one standard deviation increase (appreciation) in the nominal effective exchange rate results in a small increase in real GDP in period 1 (a j-curve effect) but decline up to period there and thereafter the effect is close to zero. This suggests that the effect of a change in the nominal effective exchange on real GDP dies out after nine months.

The variance decomposition matrix reveals that at its maximum NEER only explains approximately 1.76% of the variation in real income. As expected in period 1, a full 97% of the variation in real GDP is explained by innovations in real GDP itself. This ratio drops gradually to 86.6% and the effect of the Government deficit rises to 8.8%. These results suggest that the variance of GDP is largely related to shocks to GDP.

When the real effective exchange rate is used in the analysis, the effects of an exchange rate change appear to be more permanent and much larger. After 10 quarters innovations in the REER accounts for 9.1% of variations in the GDP much more than the 1.76% for NEER. This is a very interesting but not surprising result. It suggests that some positive effect may be achieved by changes in the REER. However, in an environment where

there is some inflation a given change in the real exchange rate would require a continuous adjustment in the nominal exchange rate. In other words a one-shot devaluation would not be enough to affect real income in the long run.

The effect shocks in NEER on the CPI is immediate and permanent. An appreciation in the NEER results in a decline in the CPI by slightly less than 0.5 standard deviations and it remains at that level. This suggests that a depreciation in the NEER would lead to a permanent increase in the price level – a well-known effect of devaluation. After 10 quarters, 12.6 percent of the variation in the CPI is explained by changes in the NEER, 29.8% by shocks to GDP and 48.3% by innovations in the CPI. The small effect of NEER on the CPI may be explained by the fact that the currency remains fixed in relation to the US dollar from which most of the most of imported goods emanate.

In the case of the current account deficit, 11.4% of its variations is explained by innovations in the NEER after 10 quarters and 9.2% is attributed to shocks in GDP. Shocks in the CPI only account for about 4%. This latter observation is in line with the low inflation experienced by the ECCU during the period under consideration.

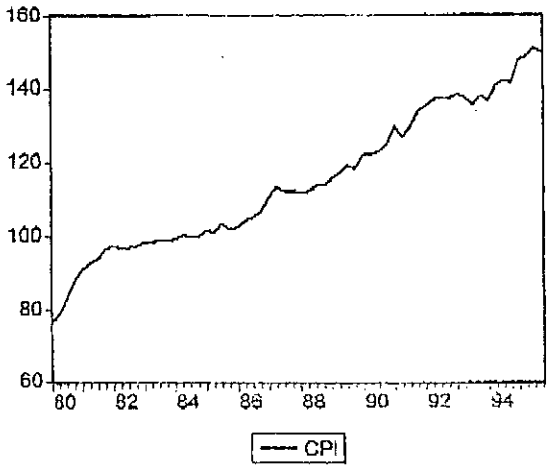
CONCLUSIONS

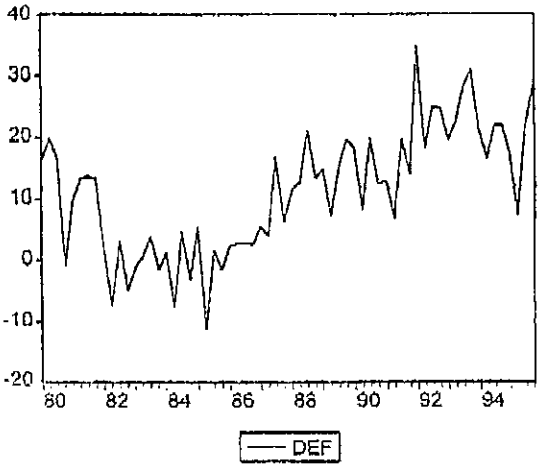
The currency board arrangements of the ECCU offers limited scope for exchange rate arrangements. This paper tries to examine the effects of exchange rate changes in the context of small open economies. The theoretical discussion suggests that the effects of exchange rate changes on real income would be small and short-lived in economies with a high import content in domestic absorption and consumption. Small island economies with significant local input into the production process would benefit more from exchange rate changes. Given the inflexibility of resources, such countries would do well to implement measures to improve the flexibility of the economies and pay attention to the supply side issues.

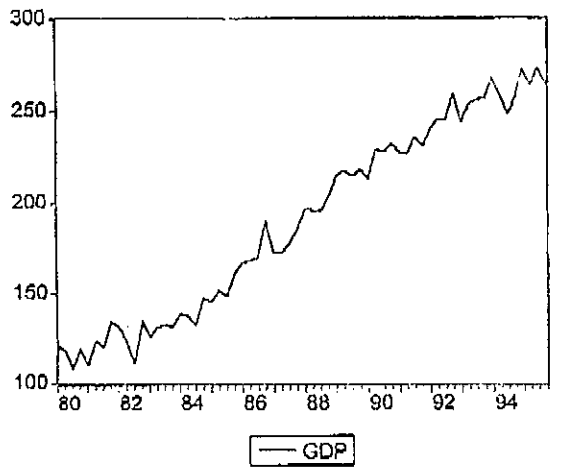
The empirical for St Lucia provide some support for the main thesis of the paper since the effects of the nominal exchange rate on real GDP appears to be small and very transitory.

The effects become negligible after approximately nine months. The effects of real effective exchange rate changes are rather more significant and more permanent. This suggests that the nominal effective exchange rate may need to be changed continuously to achieve competitiveness. The alternative to this would be productivity increases, which are more difficult to achieve but would have more permanent effects.

Exhibit 1
Graphs of Consumer Price Index, Government Deficit,
GDP and Nominal Effective Exchange Rate







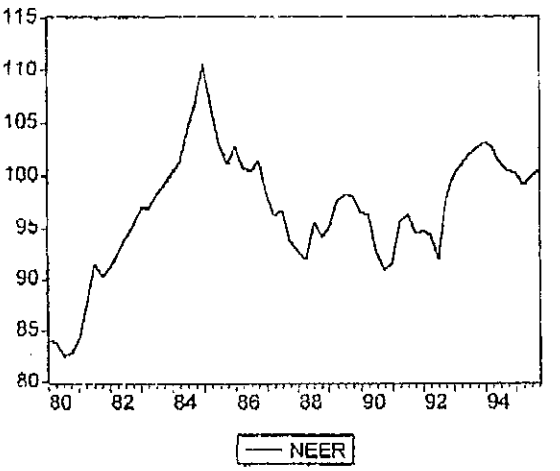
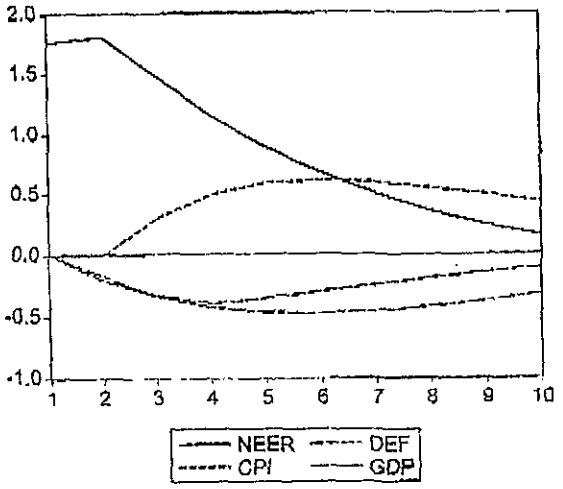
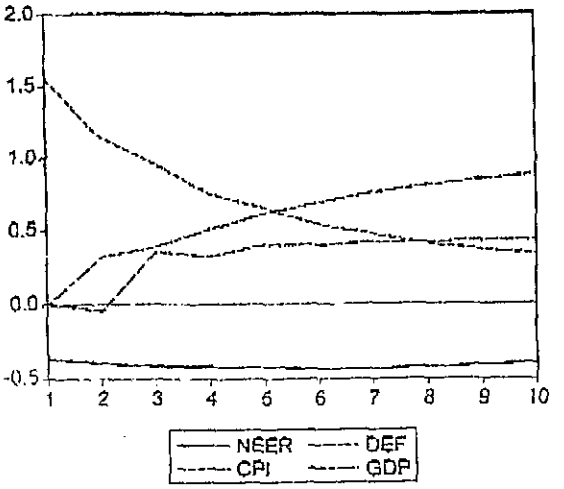


Exhibit 2
Impulse Response Functions for NEER

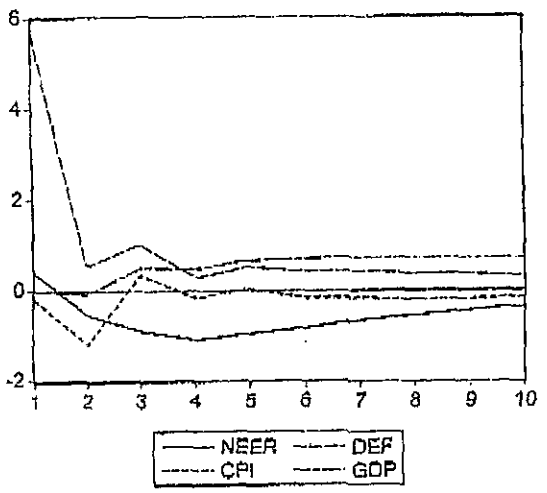
Response of NEER to One S.D. Innovations



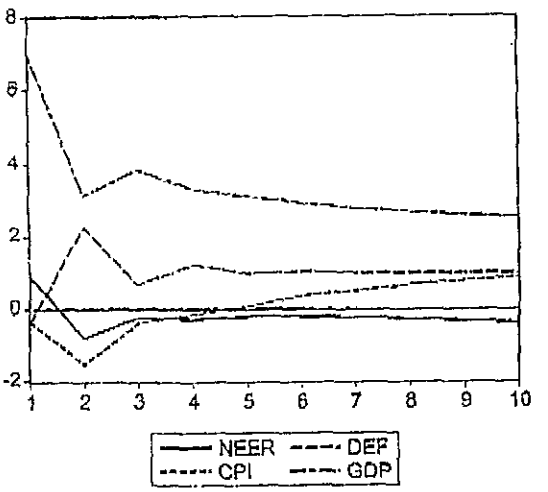
Response of CPI to One S.D. Innovations



Response of DEF to One S.D. Innovations



Response of GDP to One S.D. Innovations



Variance Decomposition

Variance Decomposition of NEER:

Period	S.E.	NEER	CPI	DEF	GDP
1	1.758404	100.0000	0.000000	0.000000	0.000000
2	2.539717	98.86113	0.000366	0.669940	0.468565
3	2.996781	95.67847	0.950682	1.720255	1.650588
4	3.302330	91.10528	2.933229	2.891409	3.070084
5	3.519704	86.55695	5.324331	3.578797	4.539923
6	3.678359	82.58817	7.554634	3.967544	5.889604
7	3.794150	79.34866	9.474927	4.146465	7.029951
8	3.877520	76.81824	11.02039	4.219291	7.942078
9	3.936544	74.91015	12.22079	4.234707	8.634356
10	3.977435	73.52294	13.11654	4.224171	9.136356

Variance Decomposition of CPI:

Period	S.E.	NEER	CPI	DEF	GDP
1	1.592342	5.225493	94.77451	0.000000	0.000000
2	2.029108	7.015401	90.46642	0.047719	2.470457
3	2.341467	8.464600	84.72543	2.243271	4.566702
4	2.564726	9.713256	79.09661	3.445486	7.742647
5	2.776412	10.66298	72.93487	4.997717	11.40443
6	2.969015	11.48733	67.06108	6.149800	15.30179
7	3.156642	12.05707	61.54774	7.176320	19.21887
8	3.336610	12.42506	56.57959	7.999091	22.99625
9	3.511128	12.59958	52.16771	8.687001	26.54571
10	3.679390	12.63036	48.30268	9.246164	29.82079

Variance Decomposition of DEF:

Period	S.E.	NEER	CPI	DEF	GDP
1	5.704265	0.495022	0.088967	99.41601	0.000000
2	5.879374	1.274273	4.262584	94.44685	0.016197
3	6.063272	3.340661	4.306836	91.65080	0.701703
4	6.189662	6.392398	4.208102	88.13860	1.260902
5	6.320199	8.469023	4.037514	85.20537	2.288095
6	6.425282	9.882036	3.990836	82.79864	3.328492
7	6.517567	10.67554	3.950928	80.89425	4.479279
8	6.594687	11.12372	3.970246	79.31957	5.586464
9	6.660536	11.34305	3.980392	78.02917	6.647385
10	6.716001	11.43482	3.987477	76.95745	7.620252

Variance Decomposition

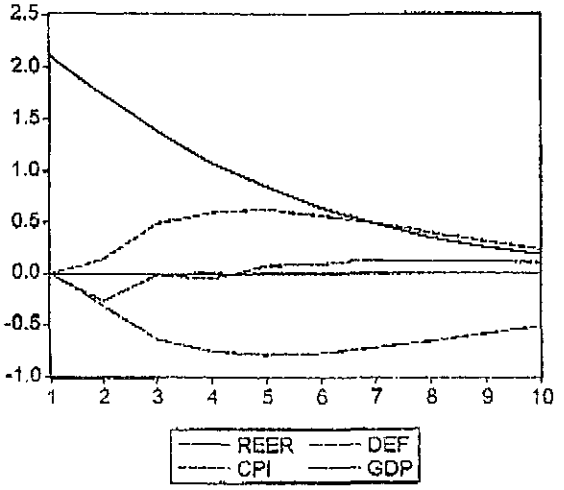
Variance Decomposition of GDP:

Period	S.E.	NEER	CPI	DEF	GDP
1	7.005355	1.559588	0.257824	0.306368	97.87622
2	8.180850	2.092860	3.801096	7.743385	86.36266
3	9.061443	1.768567	3.288444	6.866087	88.07690
4	9.723120	1.618227	2 882152	7.582250	87.91737
5	10.25305	1.497999	2.596883	7.717040	88.18808
6	10.71699	1.409218	2.479616	8.002595	88 10857
7	11.12446	1.353970	2.501750	8.202259	87.94202
8	11.50224	1.326107	2.666492	8.412102	87.59530
9	11.85643	1.327984	2.918660	8.601669	87.15169
10	12.19666	1.357725	3.234318	8.788957	86.61900

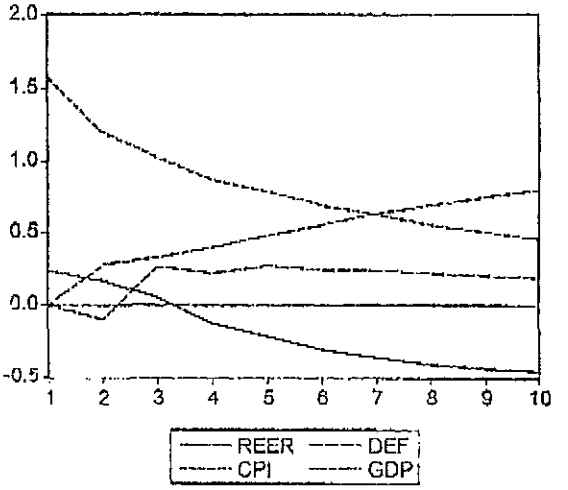
Ordering: NEER CPI DEF GDP

Exhibit 3
Impulse Response Function for REER

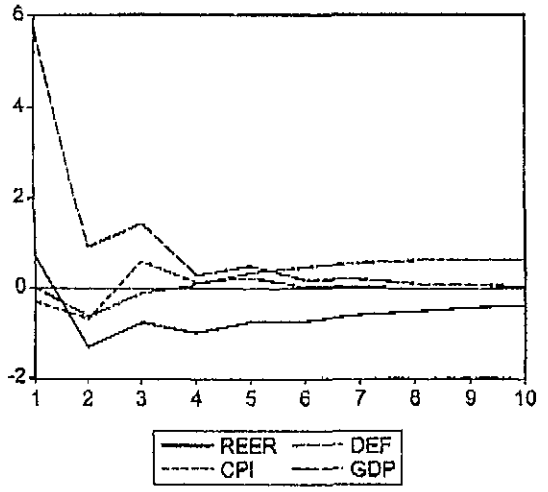
Response of REER to One S.D. Innovations



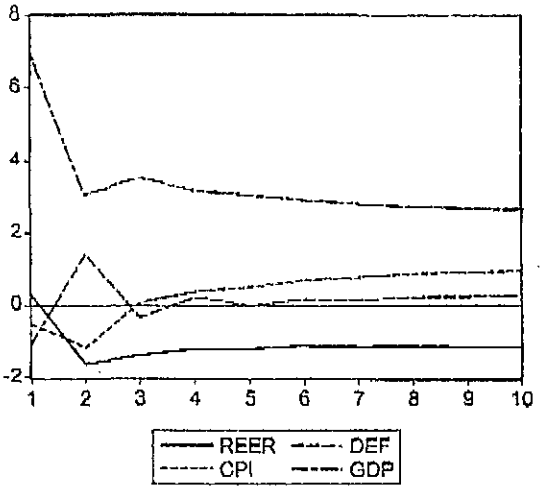
Response of CPI to One S.D. Innovations



Response of DEF to One S.D. Innovations



Response of GDP to One S.D. Innovations



Variance Decomposition

Variance Decomposition of REER:					
Period	S.E.	REER	CPI	DEF	GDP
1	2.105964	100.0000	0.000000	0.000000	0.000000
2	2.765205	97.50951	0.239125	0.955169	1.296200
3	3.200719	91.79314	2.499683	0.714875	4.992304
4	3.511215	86.68689	4.860362	0.615533	8.837218
5	3.750302	80.26257	6.955806	0.570560	12.21107
6	3.923257	76.01828	8.353068	0.569086	15.05956
7	4.049809	72.77496	9.279031	0.624142	17.32187
8	4.139154	70.40498	9.806434	0.682381	19.10621
9	4.201934	68.70040	10.07770	0.741012	20.48089
10	4.245384	67.49789	10.17968	0.785069	21.53735

Variance Decomposition of CPI:					
Period	S.E.	REER	CPI	DEF	GDP
1	1.596973	2.167174	97.83283	0.000000	0.000000
2	2.027544	2.059970	95.81342	0.227378	1.899233
3	2.311292	1.635010	93.42185	1.477451	3.465693
4	2.512543	1.618016	90.94027	2.000979	5.440734
5	2.699789	2.051671	87.34291	2.757264	7.848157
6	2.868844	2.988632	83.18725	3.151453	10.67267
7	3.034020	4.138051	78.60235	3.438903	13.82070
8	3.195306	5.399597	73.89179	3.555406	17.15321
9	3.355448	6.618998	69.25903	3.582818	20.53916
10	3.514023	7.742096	64.85681	3.536956	23.86413

Variance Decomposition of DEF:					
Period	S.E.	REER	CPI	DEF	GDP
1	5.748526	1.439937	0.297533	98.26253	0.000000
2	6.040475	6.018239	1.620234	91.22367	1.137860
3	6.282942	7.074383	2.360460	89.48086	1.084299
4	6.371208	9.402413	2.324358	87.20922	1.064012
5	6.446139	10.60906	2.374021	85.72625	1.290673
6	6.506157	11.74477	2.330436	84.20369	1.721104
7	6.559680	12.43230	2.292567	82.90307	2.372071
8	6.608785	12.93457	2.265131	81.68515	3.115153
9	6.652942	13.24130	2.239062	80.61172	3.907916
10	6.692771	13.44164	2.215591	79.65619	4.686582

Variance Decomposition

Variance Decomposition of GDP:

Period	S.E.	REER	CPI	DEF	GDP
1	7.031765	0.154607	0.583781	2.368543	96.89307
2	8.054451	4.142448	2.512900	4.934575	88.41008
3	8.914829	5.763803	2.057508	4.168252	88.01044
4	9.554830	6.599693	1.952491	3.684469	87.76335
5	10.11765	7.274972	1.992120	3.286130	87.44678
6	10.61835	7.710498	2.240074	3.008669	87.04076
7	11.07529	8.115305	2.548248	2.783141	86.55330
8	11.50350	8.453027	2.936600	2.616490	85.99388
9	11.90902	8.779026	3.340076	2.480696	85.40020
10	12.29864	9.084236	3.753572	2.374777	84.78742

Ordering: REER CPI DEF GDP

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