

INTRODUCTION

The effectiveness of monetary policy has come under severe scrutiny in Caribbean-type open economies. The money supply is treated by central banks as an endogenous variable with limited impact on output, employment and prices. However, the openness of Caribbean economies, evidenced by the high proportion of international trade to Gross Domestic Product, ensures that increases in money affect the balance of trade position more than any other aggregate in the economy.

This paper explores the effect of money on output, prices and the trade balance in the economies of Barbados and Trinidad and Tobago. We use a simple aggregated monetarist model in which real cash balances play a leading role in the determination of output, prices and the trade balance. Excess money balances give rise to an excess demand for goods which results in higher output, rising prices, a higher level of imports and consequently a deterioration in the trade balance. The trade balance effect is significant because of the considerable degree of openness.

Section I describes the openness of the two economies and provides recent trends in trade with the United States of America - the major trading partner. Section II deals with the theoretical framework for monetary mechanisms in a small open

TESTING MONETARISM IN BARBADOS AND TRINIDAD AND TOBAGO

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economy. The empirical results are analysed in Section III and section IV provides the conclusion of this investigation.

SECTION I

The degree of openness of any economy can be measured by proportion of external trade (goods and services) to Gross Domestic Product. In the case of Barbados, the proportion ranged between 1.13 and 1.43 for the period 1975 to 1985 whilst the comparable proportion for Trinidad and Tobago ranged between 0.49 and 1.72. The value of oil imports and exports of Trinidad and Tobago fell drastically due to the cessation of imports of crude oil from Saudi Arabia and together with the falling world price of oil, reduced the extent of trade to gross domestic product from 1.07 in 1979 to 0.49 in 1985. The economies of the United States of America and Japan which are considered "fairly" open provide a stark contrast. Total trade ranges from 17% to 21% of Gross Domestic Product for the United States of America and between 27% and 37% for Japan.

Imports by Barbados range between 62% and 73% of Gross Domestic Product for 1975-1985 and those by Trinidad and Tobago between 20% and 82%. The comparable ranges for the United States and Japan were 9% to 11% and 15% to 18% respectively. For exports Barbados reports between 48% and 72%; Trinidad and Tobago 29% to 90%; the United States 7% to 10% and Japan 15% to 19% of Gross Domestic Product.

The Gross Domestic Product of the United States of America is used as a proxy for the availability of markets for both Barbados and Trinidad and Tobago. For Barbados, visible trade with the United States has increased from 23% of Total Trade in 1975 to nearly 33% in 1985. The decline in 1985 is partially due to competition in the electronic components industry of Japan and other producers. Trinidad and Tobago's trade with the United States ranged from 46% to 52% for 1975-1985 with relative stability between 1976 and 1982 as the proportion averaged 43%. For Barbados trade in services, especially tourism should also be taken into account. No estimate is readily available for receipts from tourism originating in the USA but for the period 1975-1985, tourist arrivals from the United States of America increased from 25% to 41% of all tourist arrivals and at the same time tourist receipts increased from \$156 million to \$625 million. In comparison arrivals from Canada has declined from 34% in 1975 to 20% in 1985. With respect to Trinidad and Tobago tourism plays a less important role in the economy.

SECTION II

THEORETICAL CONSIDERATIONS

In small open economies, the primary constraint on economic growth and development is the performance of the balance of payments. Sufficient foreign exchange must be available from exports of goods and services to purchase the desired levels of

imports. Unfortunately, faced with exogenously determined import and export prices, a small open economy can influence its balance of trade position only by export and import volumes. To manage the balance of payments and sustain economic activity, the Central Bank must pay attention to the domestic component of its "high powered" money balances, defined as domestic credit plus net foreign assets.

According to the monetarist view, an increase in money leads to an expansion in output and eventually greater employment. But there is the danger that excessive expansion of money will give rise to inflation. In the small open economy, the greatest effect of an increase of money is the balance of trade effect. However, an expansion of money may have some price effect, especially on non-tradable goods.

Increases in domestic credit put greater spending power in the system affecting the demand for imports with a lagged adjustment. When this happens, the balance of trade position deteriorates unless there is a commensurate increase in export earnings.

Because of the import lag the income effect of an increase in money may precede the import effect. The total income effect depends on the length of the time lag and also on the propensity to import out of the increased income resulting from the expansion of domestic credit. In addition, the income effect is affected by whether the money is spent on consumer

goods or intermediate goods. Whatever the dominant effect, increases in money which raise total income, may impair the balance of payments position.

In the small open economy, domestic prices are determined predominantly by import prices (Downes [1985]). However, increases in money will result in higher prices, especially for products in the non-tradable sector.

Real money balances have a significant impact on the level of output, prices and the movement in the trade balance. We therefore specify a three-equation model to test these influences.

The level of prices is a positive function of import prices and real cash balances and a negative function of income. This relationship can be specified as follows:

$$P = f(P_m^+, Y^-, M^+) \quad (1)$$

Where P = GDP deflator

P_m = Import prices

Y = Real GDP (1975=100)

M = Total liquidity in real terms. High powered money (NFA + Domestic Credit)

To the extent that there is an expansion of domestic credit, there will be increased expenditure on tradeable and non-tradeable goods. As a result the level of prices is expected to rise. The increased expenditure may also give rise to an increase in output which would dampen some of the initial price

effect. Import prices are exogenously determined and any increase is transmitted throughout the economy.

Sources of output growth may originate from monetary, fiscal and external influences. Expansionary fiscal policy - which is associated with persistent fiscal deficits - and the level of money balances are the local influences promoting output growth. Therefore the output relationship can be specified as follows:

$$Y = f(M, DEF, GNP_{US}) \quad (2)$$

when Y = Real Gross Domestic Product (1975=100)

M is as listed in equation 1

DEF = Fiscal Deficit

GNP_{US} = Real GNP_{US} (1975=100)

The external influences are proxied by the availability of markets for exports. This variable, which is represented by real GNP in the US, will have a positive impact on output growth (the recent decline in the electronic components industry in the US and the closure of major plants in Barbados bear testimony to the importance of the market).

The third equation relates the trade balance to the level of money balances, output growth and the price of imports relative to domestic prices. This is specified below:

$$TB = f(m, Y, \frac{PM}{P}) \quad (3)$$

TB = Trade Balance (corrected for prices)

Excess money balances result in a greater demand for imported goods with a consequential deterioration in the trade balance. Increasing output should lead to an improvement in the trade balance only if the growth is in the foreign exchange earning sectors. The terms of trade effect is represented by $\frac{PM}{P}$ and any increase in import prices would have a negative impact on the trade balance. This equation is not specified in terms of logarithms because the trade balance was negative for most of the period under consideration.

SECTION III

Empirical Results

A. BARBADOS

The equations were estimated using OLS techniques. The price equation (Equation 1) was corrected for autocorrelation. The results are reported below with 't' statistics in parenthesis under the respective coefficients.

$$1. \quad \text{Log}(P) = 3.127 + 1.173 \text{Log}(PM) - 0.840 \text{Log}(Yr) + 0.423 \text{Log}(M)$$

(2.06) (8.82) (-3.34) (3.09)

$$1.186 \text{Rho}_1 - 0.383 \text{Rho}_2$$

(5.23) (-1.64)

$$\bar{R}^2 = 0.99 \quad \text{SEE} = 0.07$$

$$D-W = 1.75 \quad F = 415.53$$

$$2. \quad \text{Log}(Yr) = -1.229 + 0.313 \text{Log}(M-1) + 0.017 \text{Log}(DEF) + 0.798 \text{Log}(GNP_{US})$$

(-2.15) (6.66) (1.88) (7.15)

$$\bar{R}^2 = 0.99 \quad \text{SEE} = 0.04$$

$$D-W = 1.99 \quad F = 688.62$$

$$1(b) \log P = -9.513 + 0.324 \log P_m + 1.073 \log y_T - 0.672 \log MO$$

-3.34
(2.71)
(2.70)
(-8.39)

$$+ 0.829 \log W$$

(5.83)

$$0.464 \text{ Rho 1}$$

(1.89)

$$\bar{R}^2 = .994 \quad \text{SEE} = 0.075$$

$$D-W = 1.66 \quad F = 812.94$$

There are some differences between the Barbados and Trinidad and Tobago results which merit special comment. In the price equation, the positive impact of the income variable and the negative impact of the money variable are of major concern. With respect to the income variable, tradable sector (oil production) was the engine of growth (unlike Barbados) and there was transmission from this sector to the non-tradeable sector. For example, wages in the tradable sector led wages in the entire economy [Henry 1986] and proved quite the opposite in the Barbadian case [Downes and Leon 1987]. With respect to money, the government of Trinidad and Tobago by creating fiscal surpluses rather than deficits was a net lender to the banking system thereby reducing the quantity of high powered money. The price equation was altered to include a wage variable (Equation 1(b) since studies of the Trinidad and Tobago economy have shown that a wage-price spiral exists. The descriptive statistics have all improved and the variables have all retained their signs and significance. Wages in the tradeable sector of Trinidad and Tobago play a more important role in determining the level of the deflator than import prices which are paramount in the case of Barbados.

Income Equation

$$2(a) \log Y_T = -0.029 + 0.046 \log M_{-1} - 0.00 \text{ DEF} + 1.099 \log \text{USGNP}$$

(-0.07)
(1.35)
(-0.56)
(15.98)

$$\bar{R}^2 = 0.95 \quad \text{SEE} = 0.054$$

$$D-W = 0.93 \quad F = 161.43$$

$$2(b) \log Y_T = 3.627 - 0.003 \log M_{-1} + 2.2D-05 \text{ DEF} + 0.567 \log \text{USGNP}$$

(1.78)
(-0.09)
(1.82)
(2.08)

$$+ 0.679 \log \text{PET}$$

(3.111)

$$0.81 \text{ Rho 1}$$

3.70

$$\bar{R}^2 = 0.982 \quad \text{SEE} = 0.03$$

$$D-W = 1.15 \quad F = 235.92$$

$$2(c) \log Y_T = 2.841 + 2.57 \text{ D-05 Def} + 0.653 \log \text{USGNP} + 0.094 \log \text{PET}$$

(3.43)
(2.46)
(5.07)
(4.20)

$$1.08 \text{ Rho 1} \quad -0.48 \text{ Rho 2}$$

(4.17)
(-1.95)

$$\bar{R}^2 = 0.984 \quad \text{SEE} = 0.03$$

$$D-W = 1.66 \quad F = 286.62$$

The income equation shows two significant developments. Firstly, in applying the model to Trinidad and Tobago, the monetary and fiscal variables are insignificant for reasons posited in the above discussion. The low Durbin-Watson indicates mis-specification of the model when applied to Trinidad and Tobago. A variable was therefore included to take account of the importance of the oil sector. This variable was significant and the deficit became significant at the 10% level although the impact is negligible. Once again the low Durbin-Watson statistic

indicates mis-specification so we opted to omit the monetary variable. The new result (equation 2c) shows that all the variables are significant (5% level).

Trade Balance

$$3(a) \quad TB = -4440.13 - 0.445M_{-1} + 0.155Y_T + 1053.84 \log P_m/P$$

$$\quad \quad \quad (-3.01) \quad (2.38) \quad (1.45) \quad (3.07)$$

$$\bar{R}^2 = 0.26 \quad \quad \quad SEE = 373.28$$

$$\Delta \quad D-W = 1.33 \quad \quad \quad F = 3.72$$

$$3(b) \quad TB = -6040.29 - 0.754M + 0.104PET + 1616.81 \log P_m/P$$

$$\quad \quad \quad (-5.14) \quad (-5.61) \quad (2.71) \quad (5.45)$$

$$0.445 \text{ Rho } 1$$

$$(2.30)$$

$$\bar{R}^2 = 0.778 \quad \quad \quad SEE = 204.55$$

$$D-W = 1.98 \quad \quad \quad F = 21.2$$

The trade balance equation exhibits one major change from its Barbadian counterpart as income is replaced by the oil sector variable because of its importance to the economy. In the original specification, the income variable was insignificant and the Durbin-Watson statistic indicated mis-specification. In the equation (3b), the oil sector variable was significant, and as \bar{R}^2 and Durbin-Watson improved substantially.

In the case of Trinidad and Tobago, the relative price variable (a measure of the terms of trade) was positive. This is to be expected since the strong growth in oil prices relative to import price led to an improvement in the trade balance.

SECTION IV

Conclusion

The purpose of this paper was to examine the effects of money on the level of prices, output and the trade balance in Barbados and Trinidad and Tobago. The model explains quite well the behaviour of the above variables for the Barbadian situation but changes were necessary in the case of Trinidad and Tobago.

The estimated coefficients indicate that excess money is more important in Barbados than in Trinidad and Tobago in as much that it plays a vital role in the determination of prices, output and the trade balance in Barbados whereas the money variable has no significance in trade balance and output equations for Trinidad and Tobago. An excess supply of money leads to higher prices, increased output and a reduction (increase) in the trade surplus (trade deficit).

While the two economies are considered island economies, the results indicate that the inherent structures are dissimilar in that Trinidad and Tobago was a net exporter of oil whereas Barbados was a net importer.

The policy implication for Barbados is that the money supply is important and as for stabilisation purposes, excessive fluctuations should be avoided.

Degree of Openess

Exports and Imports to Gross Domestic Product

Year	Exports				Imports			
	B'dos	Trin.	US	Japan	B'dos	Trin.	US	Japan
1975	.57	.62	.10	.17	.70	.75	.09	.09
6	.48	.82	.10	.17	.70	.90	.10	.16
7	.54	.58	.10	.15	.67	.70	.10	.14
8	.59	.55	.10	.15	.68	.58	.11	.12
9	.66	.44	.09	.18	.73	.56	.10	.19
1980	.67	.49	.10	.17	.72	.63	.11	.18
1	.58	.44	.10	.17	.72	.53	.11	.18
2	.63	.44	.08	.16	.73	.37	.09	.16
3	.66	.32	.08	.17	.71	.29	.10	.15
4	.72	.24	.08	.17	.71	.27	.10	.15
5	.64	.20	.07	n.a.	.62	.29	.10	n.a.

Source: (1) International Financial Statistics
Central Statistical Office
(2) The National Income of Trinidad & Tobago
1966-1985

Trade with the United States

1975-1985

Year	Barbados			Trinidad Total Trade %
	Total Trade %	Tourist Arrivals %	Tourist Expenditure \$M	
1975	23	25	156	45
1976	25	25	167	45
1977	26	26	223	45
1978	27	27	277	44
1979	33	25	416	42
1980	35	23	507	43
1981	33	21	528	41
1982	34	25	509	41
1983	43	35	510	49
1984	40	35	510	49
1985	33	41	625	52

Source: Central Bank of Barbados
(1) Annual Statistical Digest 1986
(2) Balance of Payments 1985
Central Statistical Office
(3) The National Income of Trindiad and Tobago
1966-1985

Bibliography

- Aghevli, Bijan B. and Carlos Rodriguez, "Trade Prices and Output in Japan: A Simple Monetary Model". Staff Papers Vol.26, 1979, p.38-54.
- Downes, A.S. and H.L. Leon, "Testing the Lending Sector Wage Hypothesis in a Small Open Economy - a Causal Approach". Mimeo May 1987, UWI, Cave Hill.
- Henry, Angela, "An Examination of the Holder, Worrell Macroeconometric Model of the Barbadian Economy in the Trinidad and Tobago Context", Mimeo Sept. 1986, UWI, St. Augustine.