Jamaica's Terms of Trade: a Problem of Resource Curse or Dutch Disease ?

BY

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Abstract: ***The paper investigates Jamaican Terms of Trade, the persistence of shocks and the nature of the feedback process. Examination of the autoregressive feedback relationship for the period since 1960, suggested that feedbacks were significant but had finite persistence. However, when allowance was made for a structural break the autoregressive effect became insignificant and the behaviour of the NBTT showed no shock persistence. The implication drawn from these findings is that trade windfalls should be seen as temporary, so that a Jamaican policy response should seek to smooth the consumption effect. Government policy in the 1970's acted as if the positive shock would be persistent and as a consequence created a virtual dutch disease scenario.***

1. *Introduction*:

Jamaica is a small trade-dependent economy with imports standing at over 60% of GDP, as a consequence, changes in the purchasing power of its exports have significant implications for macro performance. Early research on such resource economies focused on the extent to which dependence on primary commodities would limit growth because the inherent tendency to declining terms of trade would result in loss of surplus to the centre and that general instability in earnings would further undermine growth (Prebisch, 1950, Evans,1987). These perspectives created a view that resource abundance may be a poisoned chalice. This standard debate has been conducted with reference to the trends in the Commodity Terms of Trade (CTT) of primary: manufactured goods. This paper is concerned with the effects of shocks to Jamaica's terms of trade and this requires a measure which captures country-specific trade characteristics. To achieve this country-specific perspective, the Net Barter Terms of Trade (NBTT) offers the appropriate direct measure.[1] Shocks to the NBTT influence real purchasing power over imports, so they impact directly on macro performance and require policy responses. Recent work on windfall trade shocks has concluded that the appropriate policy is conditional on the persistence of shocks. It is generally accepted that policy should be designed to sterilise temporary shocks whilst facilitating adjustment to more persistent shocks. (Gelb 1988, Roemer 1985, Auty 1997, 1998, Auty & Mikesell 2000)

Jamaica was once the Jewel in the West Indian Crown endowed with extensive and fertile sugar land (Pares 1960, Sheridan 1970, Dunn 1973). However, with its economy dominated by a sequence of commodities - sugar, bananas, bauxite, sun and sand , it has since succumbed to a series of cycles. Through the early years of independence in the 1960's , bauxite and tourism came on stream and helped to maintain stability in the NBTT by countering the tendency to adverse commodity terms of trade in sugar and bananas. The early 1970's saw positive price changes for all the key commodities and a consequent large shock to the NBTT. However following this brief positive shock Jamaica fell from a relatively high to notably weak

[1] Commodity terms of trade refers to the price of primary commodities to the price of manufactures, while NBTT is the ratio of a countrys unit export price index to unit import price index , hence it is country specific rather than assuming that all low income economies export primary and import manufactures in the same proportions, which would be implicit in CTT as a measure of trade shocks to an economy.

growth path relative to less well endowed neighbours (Atkins & Boyd 1998, King 2001)

The dominant explanation for Jamaica's performance switch rests on the economic mismanagement and the socialist agendas of the government lead by Michael Manley. (King 2001, Stephen & Stephen 1986, Sharpley 1983). These may be a part of the story, but this paper seeks to widen the picture by considering the switch with reference to hypotheses concerning the problematic impact of resource wealth on development. Section 2 briefly outlines the resource curse (RCH) and dutch disease (DDH) hypotheses and links them to aspects of the behaviour of the NBTT. Section 3 presents a sketch of Jamaica's trade structure to confirm its commodity concentration and to support the view that the islands economic performance will be highly susceptible to shocks to its terms of trade. Section 4, examines the behaviour and the adjustment processes of the NBTT. The econometric investigation reveals that shocks generally have little persistence, but the large the positive price shocks of the mid 1970's marked a clear shift in the underlying behaviour of the NBTT. Section 5 concludes by considering how this picture might be associated with a form of induced dutch disease.

2. Perspectives on Resources and Development

The consensus of the literature is that weak performance by a resource rich mineral economy could be a reflection of two apparently related phenomena which condemn the well endowed to a scenario of underperformance and growth failure. The RCH may be associated with a long run pessimism while the DDH focuses on short term windfall effects and the failure to benefit from positive terms of trade shocks. (Roemer, 1985, Auty, 1993)

The resource curse hypothesis is concerned with the observation that less endowed economies such as Korea, Taiwan have broken into self sustained growth and structural change while in comparison, the resource rich economies have had weak long run performance (Auty, 1998 Auty and Mikesell, 2000, Sachs and Warner, 1995). The RCH with its concern over secular growth failure when compared to dissimilar economies should be evident in an overall negative trend in NBTT.

In contrast, when seeking to explain Jamaica's weakness within the context of a relevant 'growth club', DDH with its country specific focus on shocks and responses would seem more relevant. The DDH identifies adverse effects that positive export shocks may impose if policy responses fail take account of persistence. The windfall may be generated either by price or production shocks, although the majority of shocks come through prices which are characterised by significant instability. (Deaton, 1999). The DDH is associated with high but temporary export earnings which yield a foreign exchange windfall and constitute a shock to the economy. The 'disease' then refers to the crowding out of the non boom traded-good sector as resources move into the boom sector or into non-tradeables. Corden (1984), Corden & Neary, (1982) remain the standard model arguing that export price and revenue booms create resource movement and spending effects causing appreciation of the currency and therefore subjecting domestic producers of non boom tradeables to more intense competition

Resource movements involve transfers into the booming sector, which (assuming tight markets) create shortages of labour and capital and may therefore put upward cost pressures into the economy. Labour demand and local linkages from mineral resource sectors are notoriously low (Baldwin, 1966, Hirschmann, 1958, Girvan, 1967, Horesh, 1985). A consequence of such weak linkage is that these economies are more susceptible to the spending effect, created by increased public and private earnings which raise demand for non-traded goods. Both effects generate domestic inflationary pressures and tend to result in overvaluation of the real exchange rate. In the true DD it is the windfall/shock not just the long run production specialisation structure which sets off the adjustment process (Cook & Sieper 1984, Gelb, 1988).

The dutch disease debate focuses on countries' failure to reap the benefits of a positive economic shock. Gelb (1988) presents comparative country cases to support the view that a beneficial outcome is dependent on the adoption of policies appropriate to the duration of the shock. The key rule derived is that temporary shocks should be sterilised. Such sterilisation should render an inter-temporal consumption smoothing effect, so preventing a windfall from creating exchange rate pressures.

Although the resources in development literature often elides the DDH &RCH, the above discussion suggests a need to distinguish between them as DD should be manageable by corrective treatment appropriate to the persistence of shock effects (van Wijnbergen, 1984). This paper develops the view that susceptibility to DD can be identified by size and persistence of shocks, and therefore examines the evidence for shock persistence in NBTT. This should offer an indicator of susceptibility and thereby provide useful information for policy choices.

By examining Jamaica's NBTT for shock persistence this paper considers whether some of the economic collapse of the last 25 years might be attributed to a form of DD.

3. *Tarnishing of the Jewel.*

Jamaica is a small trade-dependent economy that has operated with a large and increasing trade deficit (Table 1 and Fig 1). The economy was always resource dependent but has switched from being crop to mineral driven. The outcome is that the dominant economic sector operates as an enclave with minimal direct local linkages (Girvan 1967). The mineral sector's local engagement has been primarily through financial channels: provision of foreign exchange and fiscal contributions (royalties, taxes and special levy). In fiscal year 1995/6 the bauxite industry taxes and production levy contributed 10% of total government revenue (IMF 1999). This significant and direct impact on state finances, makes expectations about the industry's performance a vital component in government policy plans.

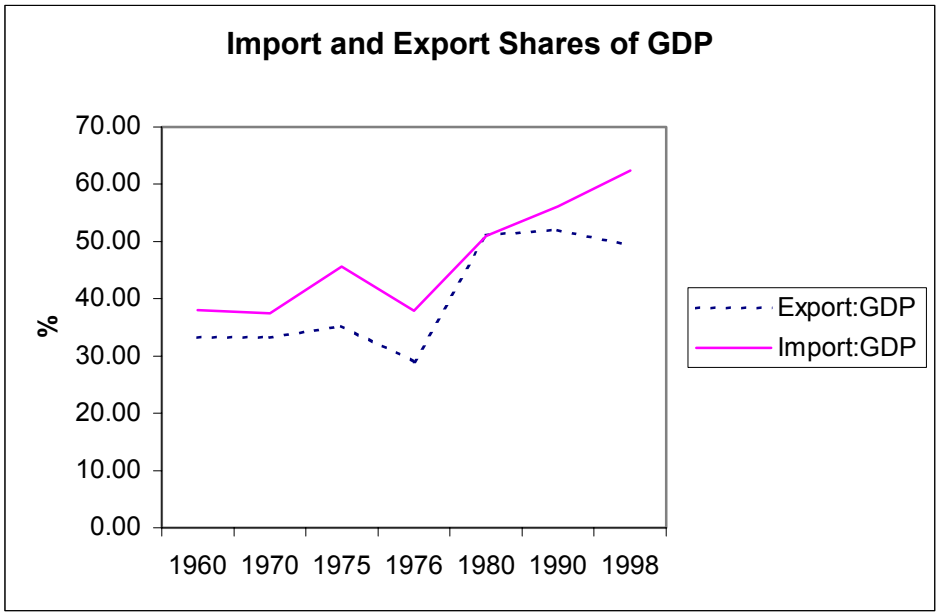
Table 2 shows an economy with a clear commodity-dominated structure. With this compounded by the budgetary dominance of the bauxite sector, movements in the terms of trade are a crucial determinant of aggregate performance and the general picture makes Jamaica a prime candidate for DD problems associated with the resource windfalls of the 1970's

Table 1 Imports and Exports as percentage of Jamaican GDP.

	EXPORT: GDP %	IMPORT: GDP %
1960	33.24	38.05
1970	33.23	37.42
1975	35.26	45.61
1976	29.05	37.89
1980	51.07	51.04
1990	51.96	56.08
1998	49.32	62.42

Source WDI 2000

Figure 1



Source WDI 2000

Table 2: Economic Contributions of Major Items of Traditional Exports (1997)

	% share of Exports	
Year	**1972**	**1997**
Aluminium	40.98	48.20
Bauxite	23.38	5.38
Banana	4.05	3.38
Sugar	11.53	7.46
	Export as % GDP	
Aluminium	9.93	10.44
Bauxite	5.67	1.16
Banana	0.98	0.73
Sugar	2.80	1.62

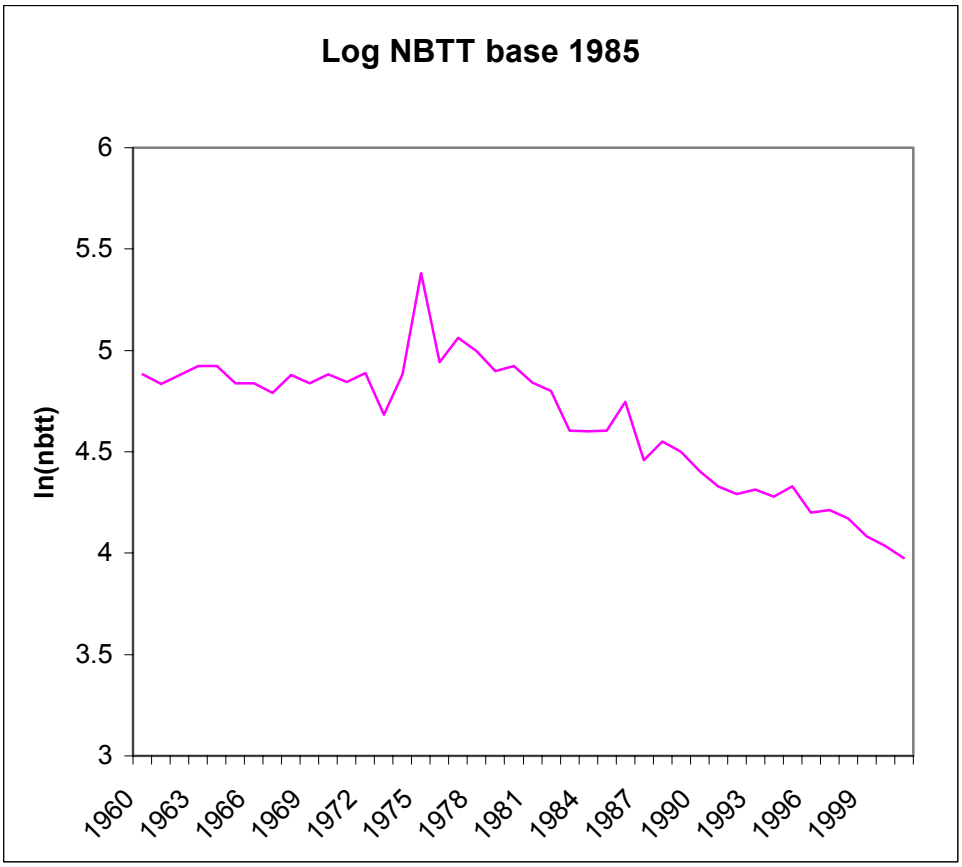
Source: Statistical Yearbook.Jamaica.

4. *The Behaviour of Terms of Trade in Jamaica*

Empirical investigations of terms of trade have principally focused on commodity terms of trade and whether there is evidence of secular decline in accordance with the Prebisch-Singer hypothesis (Powell, 1991, Leon & Soto, 1997, Sappsford, 1985, 1988, Bleaney & Greenaway, 1993) or they have used cross section studies to investigate the link between the CTT and country growth (Auty & Mikesell, 2000, Ranis, 1991, Sachs & Warner, 1995, 1997, Gylfasson (2000), Gylfasson & Zoega (1997). Investigating the impact of shocks on economic performance requires an account of country-specific effects and a recognition that if windfalls have short-run impacts on expenditure and growth, these will be particularly important where there is growth feedback and hence path dependence

Cashin & Portillo (2000) investigated the behaviour of NBTT for a number of African economies and found that the persistence effect of shocks to NBTT is variable between countries. This section investigates the behaviour of Jamaica's NBTT and generally follows the methodology of Cashin & Portillo. The discussion is then extended to consider feedback mechanisms and whether the behaviour of NBTT offers evidence for a trend decline associated with RC or shock effects which might generate DD.

Fig 2 Graph of log(NBTT) *Base 1985*



Source: World Bank 1995 & Data Stream, for discussion of construction see Appendix.

The graph indicates that Jamaica's NBTT had three phases: i) relative stability 1960-74, ii) a major positive shock in 1974/5, iii) a period of secular decline after the windfall shock of 1975. In view of the probable structural break, the investigation of the behaviour of NBTT was conducted first for the entire sample period, and then for the two sub-periods (excluding the windfall shock of 1975).

The descriptive statistics for NBTT suggest that normality cannot be rejected (JB statistic 1.88), but that the distribution may be mildly leptokurtic (Kurtosis 3.67), indicating that large shocks are more frequent than might be expected. If this is the case it is important to investigate the persistence of such shocks, which if short lived should be met by policies designed to sterilise their short term impact.

The question of shocks was investigated by looking at the time series autoregressive characteristics of NBTT. Initial examination of the graph of NBTT, suggested that 1975 was a significant outlier and that there was a structural break in the underlying behaviour around this point. In view of this feature it was not appropriate to undertake standard Dickey Fuller tests, rather the autoregressive relationship was estimated with a dummy to take account of the 1975 outlier. The form of the general equation was

$$n_t = \alpha + \beta n_{t-1} + \gamma t + \delta D_{75} + e_t$$

Where n : log net barter terms of trade
t : time trend
D : dummy for 1975 outlier

Estimating this for the data set 1960- 1999 yielded:

$$n_t = 1.91 + 0.62 n_{t-1} + 0.56 D_{75} - 0.01 t$$

t	4.10	6.80	5.67	3.75
se	0.47	0.09	0.10	0.002

$R^2 = 0.90$
SER = 0.097
DW = 2.48
The coefficients were examined first for significance and then for evidence of persistence. The t statistics shown above, indicated that all coefficients were significantly different from zero, and the DW suggested there was no significant residual autocorrelation. In this context persistence was investigated by a t test for H_0: $\beta = 1$. This gave t=4.02 and hence strongly rejected the existence of a unit root and problems of infinite persistence.

The S.E. of the regression was 0.10 indicating that one third of the time the NBTT is hit by shocks of more than 10%

With the autoregressive coefficient $\hat{\beta} = 0.62$, the impulse response function is

$$IRF(\tau) = \sum_{\tau=0}^{\tau=\infty} \beta^{\tau}$$

the Cumulative response , $CIR = (1-\beta)^{-1} = 2.86$
and the Half Life of a Shock (time before half of shock is dissipated)
HLS = $ABS(\log(1/2)/\log\beta) = 1.6$yrs

It appears that fitting for the entire period suggests a relationship with a downward trend, a response to shocks which demonstrates finite persistence and a relatively small cumulative response of 2.86.

Investigating the Structural Break

The underlying equation

$$n_t = \alpha + \beta n_{t-1} + \gamma t + e_t$$

was estimated for the two sub periods 1960-74 and 1976-1999, the periods being defined by the visually identified break in 1975:

1960-74

$$\hat{n}_t = 6.76 - 0.38 n_{t-1} + 0.007 t$$

t	(4.62)	(1.28)	(1.63)
s.e	(1.46)	(0.30)	(0.004)

$R^2 = 0.21$
SER = .059
RSS = .038
DW = 1.93

1976 – 1999

$$\hat{n}_t = 6.28 - 0.11 n_{t-1} - 0.05 t$$

t	*(7.21)*	*(0.72)*	*(6.69)*
s.e.	*(0.78)*	*(0.15)*	*(0.007)*

$R^2 = 0.94$
SER = .070
RSS = .104
DW = 1.67

Since the variances in the two sub periods are not significantly different, it was valid to undertake an F test for a structural break between the two periods. where Residual Sum of Squares: (1960-99), $S_0 = .633$, (1960-74), $S_1 = .038$, (1976-99) $S_3 = .104$, k= 3 (number of parameter), $n_1 = 14$, $n_2 = 24$

$F_{3,32} = 4.6$, $F^*_{1\%} = 4.5$, hence rejecting structural stability.

The result show, firstly that the evidence supports a structural break in 1975, the F test strongly rejects stability, and secondly that by splitting into the two sub periods AR coefficients are insignificant, so that fluctuations are essentially white noise implying no shock persistence.

These results accord with the visual impression that for:

1960-1974 there is a simple white noise process $n_t = \alpha + e_t$

1976-2001 there is white noise with trend $n_t = \alpha + \gamma t + e_t$

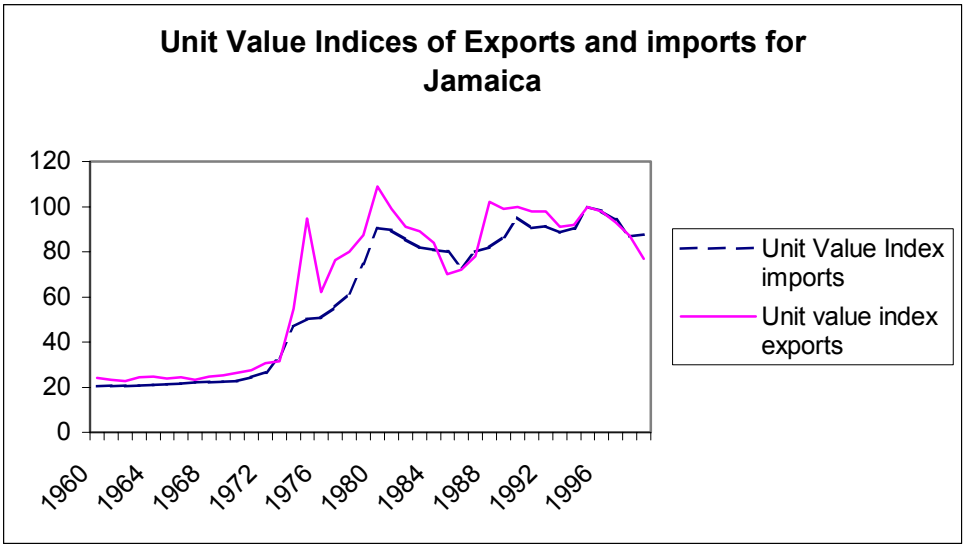
Allowing for the structural break appears to remove the autoregressive relationship and the consistent negative trend. The trend behaviour appears as an after effect of shock and would seem to reflect DD rather than simple RC problems. The absence of an AR relationship means absence of persistence so that corrective policy responding to a positive shock would do best to assume its temporary nature and seek to spread the windfall, rather than allowing it to create a major injection and structural changes.

Investigating the Adjustment Process

The conventional consensus is that policy choices need to take account of the degree and persistence of shocks, and the evidence reviewed for Jamaica indicates that terms of trade shocks are not persistent. To understand the implications of shocks more fully requires discussion of the feedback mechanisms by which the NBTT is adjusted to its long run equilibrium.

The NBTT is constructed from the ratio of unit values of exports to unit value of imports and it is the behaviour of these underlying series which contributes both shocks to, and adjustment of the NBTT. From Figure 3 it appears that both import and export unit values experienced a significant upward adjustment in the mid- 1970's followed by a return to relative stability from the early 1980s. The import index has a steady upward adjustment throughout the 1970's, and then settles on a relatively stable but higher level, while the export index shows a much sharper adjustment in 1975/6 and then continues to exhibit large oscillations.

Figure 3



Source : UNCTAD: Handbook of Statistics.

The detailed feedback process can be examined by using the identity

$n = x - m + r$
where all values are expressed as log.
x - unit price of exports
m – unit price of imports.
r – measurement error – explicit allowance was required because of the problems with the published NBTT data as discussed in the data appendix.

Testing the import and export unit value series for 1960-99 shows both indices to be I(1). The Johansen test reported in Table 3, shows a single significant co-integrating relation and a coefficient on the import index of (- 0.94), not significantly different from (-1), therefore suggests a virtual one to one long run relationship. (The coefficient is significantly different from zero, but is not significantly different from 1). Hence the co-integrating relation is : $x_t - \beta m_t$ where $\beta = -0.94$ not significantly different from –1. The VECM specified below is used to investigate feedback processes, the structure imposes $\beta = -1$, so that the error correction term (z_t) becomes:

$z_t = x_t - m_t$ (which is log of NBTT - n_t)

The Johansen adjustment coefficients show greater adjustment by export rather than import value, with 62% of deviation from long run equilibrium of export value corrected in next period and about 7% , of deviation from equilibrium value of imports

Table 3: Johansen Co-integration Results

Variable	Coefficient	Standard Error
Ln x_t	1.00	
Ln m_t	-0.94	0.034
Adjustment Coefficients		
Δln x_t	-0.62	0.17
Δ ln m_t	0.07	0.12

Investigation of shocks examined the autoregressive structure of the NBTT , and found that while there was weak persistence and a negative trend for a long period 1960-98, when account was taken of the structural shift the two sub periods gave a process for NBTT :
1960- 1974 $n_t = \alpha + e_t$
1976-2001 $n_t = \alpha + \gamma t + e_t$
To investigate the feedback the restriction $\beta = 1$ was imposed on VECM so that the error correction term corresponds to the NBTT. The estimated VECM imposing restriction and allowing for measurement error

$$\Delta x_t = \alpha_1 + \beta_1 n_{t-1} + \gamma_1 t + \delta_1 D_{75}$$
$$\Delta m_t = \alpha_2 + \beta_2 n_{t-1} + \gamma_2 t + \delta_2 D_{75}$$
$$\Delta n_t = \alpha_3 + \beta_3 n_{t-1} + \gamma_3 t + \delta_3 D_{75}$$
$$\Delta r_t = \alpha_4 + \beta_4 n_{t-1} + \gamma_4 t + \delta_4 D_{75}$$

The estimated equation for Δn_t can also be written in level form as originally estimated in equation (1), as

$$n_t = \alpha_3 + (1+\beta_3)n_{t-1} + \gamma_3 t + \delta D_{75}$$

From the adjustment information in the co-integration test the expectation is that $\beta_1 < 0$ and large, while $\beta_2 > 0$ and small.

These equations were estimated for the full sample and the two sub- periods, with the results shown.

The legitimacy of the restriction $\beta = 1$ was checked by examining the consistency of coefficient estimates in the different equations. By the adding up properties of least squares estimates then $\alpha_3=\alpha_1 - \alpha_2+ \alpha_4$, $\beta_3=\beta_1 - \beta_2+ \beta_4$, $\gamma_3=\gamma_1 - \gamma_2+ \gamma_4$, these hold for all the sub periods, as shown in the results tables below.

Table 4 shows that trends in export and import unit values are small, but contribute to a small overall negative trend in NBTT. Most of the feedback comes from exports . The measurement error, r, has no significant trend or feedback from NBTT

Table 4: VECM Results 1960-99 (standard errors in parentheses)

Variable	c	N_{t-1}	T	D
N_t eq	1.91 * (0.46)	0.62 * (0-.09)	-0.008 * (0.002)	0.56 * (0.10)
Δx	1.06 (0.69)	- 0.21 (0.14)	-0.005 (0.003)	0.54 (0.15)
Δm	-.44 (0.41)	.10 (0.08)	0.0005 (0.002)	0.02 (0.09)
Δr	0.41 (0.38)	-0.08 (0.08)	-0.002 (0.001)	0.03 (0.08)
Δn	1.91 * 0.47	-0.39* (0.09)	-0.008* (.002)	0.56* (0.10)
Consistency check for imposed constraint. coefficients				
$\alpha_3=\alpha_1 - \alpha_2+ \alpha_4$	1.91			
$\beta_3=\beta_1 - \beta_2+ \beta_4$		-.39		
$\gamma_3=\gamma_1 - \gamma_2+ \gamma_4$			-.008	
$\delta_3=\delta_1 - \delta_2+ \delta_4$				-.55

Table 5: !960-74

Variable	c	N_{t-1}	T
Coefficient LNBTT eq	6.76 * (1.46)	-.38 (0.29)	-0.007 (0.004)
Δx	8.41 * (2.2)	-1.74 * (0.44)	0.009 (0.006)
Δm	2.59 (1.72)	-0.54 (0.35)	0.01* (0.005)
Δr	0.93 (0.16)	-0.19 (0.16	-0.002 (0.002)
Δn	6.76* (1.46)	-1.38* (0.30)	-0.007 (0.004)
Consistency check for imposed constraint. coefficients			
$\alpha_3=\alpha_1-\alpha_2+\alpha_4$	6.75		
$\beta_3=\beta_1-\beta_2+\beta_4$		-1.39	
$\gamma_3=\gamma_1-\gamma_2+\gamma_4$			.001

Table 5 shows that for 1960-74, the trends in export and import values cancel out leaving, an insignificant negative trend in NBTT. Most of the feedback comes from exports. The measurement error r has no significant trend or feedback from NBTT
Table 6: shows that for 1976-99 the negative trend in exports price dominates to leave a significant negative trend in NBTT. Again there is significant feedback from exports . The measurement error r has no significant trend or feedback from NBTT

Table 6: 1976-99

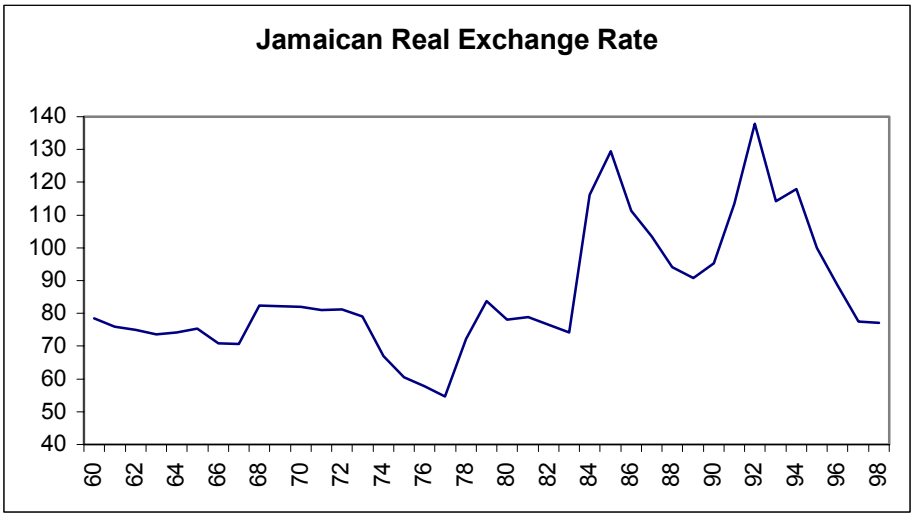
Variable	c	N_{t-1}	D	T
Coefficient LNBTT eq	6.28* (0.92)	-0.11 (0.16)		-0.05 * (0.007)
Δx	4.52 * (1.63)	-0.78 * (0.28)		-0.03 * (0.01)
Δm	-0.14 (0.85)	0.05 (0.17)		-0.002)
Δr	1.61 (1.28)	-0.28 (0.22)		-0.01 (0.01)
Δn	6.28* (0.92)	-1.1* (0.16)		-0.05* (0.007)
Consistency check for imposed constraint. coefficients				
$\alpha_3=\alpha_1-\alpha_2+\alpha_4$	6.27			
$\beta_3=\beta_1-\beta_2+\beta_4$		-1.1		
$\gamma_3=\gamma_1-\gamma_2+\gamma_4$				-0.04

5. *CONCLUSIONS*

The econometric story for NBTT shows that taking account of the 1975 structural break there is no evidence of shock persistence, indicating that in the face of a windfall, the ideal policy response would seek sterilisation and consumption spreading. In the 1970's the Jamaican government did the opposite, it anticipated continuing positive windfalls and further believed that the government share of these would be enhanced by the new bauxite levy . The new revenue source, complemented by positive price shocks for all major exports in 1975 generated overoptimistic expectations and the anticipated revenue was committed to a variety of welfare and public sector programmes. The Economic and Social Survey 1974(p.53) states " … recurrent expenditure has risen more rapidly than revenue. However the government as a major part of fiscal policy has imposed a production levy (7.5% of realised price of primary aluminium on all bauxite mined in Jamaica). The levy is expected to raise $194m for the period to march 1975 to finance the shortfall." The realised levy income for 1975 was J$133.8m, (Economic & Social Survey 1978) Government plans clearly incorporated an optimistic view on the size and persistence of the windfalls: In three years 1975-78 government expenditure increased from 31% to 38% of GDP and within this total capital expenditure fell from 27 to 22% . However the basis for this rosy scenario quickly evaporated as commodity prices fell and the NBTT went into reverse. The income fall was compounded by the bauxite companies registering their aversion to the levy by shifting production, so that Jamaica's output fell 35% from 1974-76 and its share in world production fell from 19% in 1974 to 13% in 1976 with Australia stepping into the breach (world market share increased from 13-19%).

The spending and its pattern channelled funds towards non-tradeables, accelerating domestic inflation and consequently increasing pressures on the real exchange rate, as shown in figure 4. The real exchange rate increased by 44% from 1974-77, but was then checked by a series of nominal devaluations from 1978. The problem therefore manifested in severe instability of the real exchange as devaluations struggled to keep pace with escalating domestic costs. The outcome had all the symptoms of dutch disease rather than a simple resource curse problem

Figure 4



Source: data stream and WDI

Data Note: Real Exchange Rate calculated :
(Index Jamaican Exchange rate) (US GDP Deflator / Jamaica GDP Deflator)*
All in index form base year 1995, exchange rate LCU/US$.
Rise in the index represent devaluation of RER

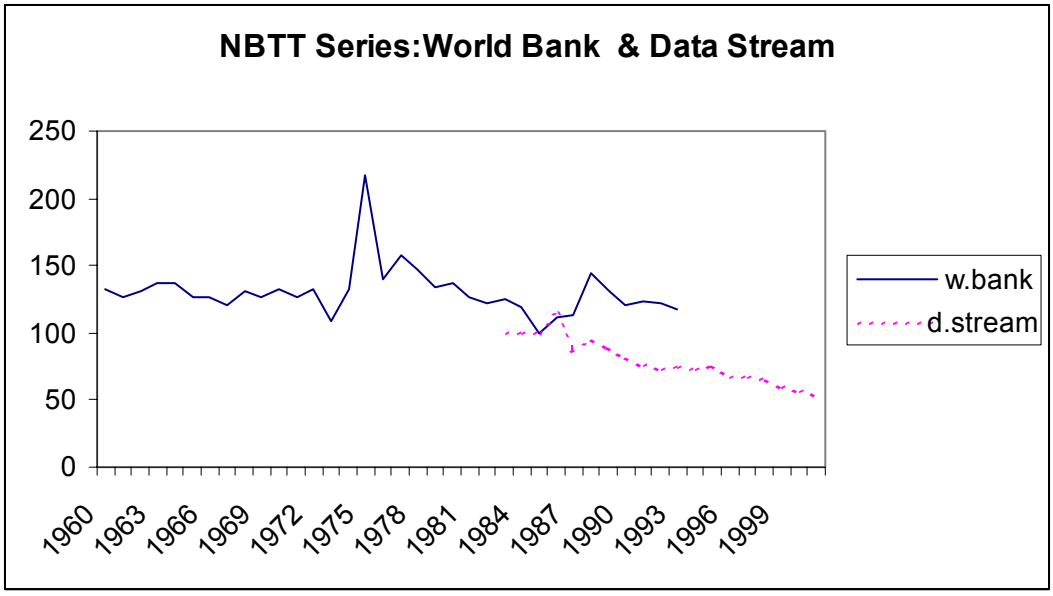
Appendix : Data Note on NBTT

The analysis is based on annual data on Net Barter Terms of Trade (NBTT) for the period 1960-1999 for Jamaica.. NBTT are calculated as the ratio of an index of a country's export prices to an index of import prices. (The NBTT may be calculated in US $ or local currency units). NBTT measures the purchasing capacity of a unit of exports and is an important determinant of macroeconomic performance for any small commodity dependent economy.

To consider the external shocks to the Jamaican economy requires a long data series to capture the structural shift from sugar to bauxite dependent exporter which occurred from 1960. The Terms of Trade series proved difficult to obtain . The World Banks Data Base (WDI) provides NBTT data in its 1995 edition but has subsequently ceased to do so. In order to incorporate performance through the 1990's it was therefore necessary to consider how to extend the series.

Data was sought from the Jamaican Statistical Institute Publications: Statistical Yearbook, Statistical Abstract and Bulletin of External Trade . The problem with these sources were first that the recent 2000 Yearbook only provided NBTT to 1989 and second the yearbooks only provided sequences of relatively short term series (max 10 years which were often subject to revision) so that repeated splicing would be required to construct a long series. These publication were however useful in that they provided information on the index calculated in both US $ or local currency (J$) units. Ideally the two should be similar, and examination of the two revealed a close match with just occasional disturbances. This evidence was helpful since neither the WDI series 1960-93 nor the Data stream series (1983-2001) explicitly stated the currency of the underlying prices.[2] Although these two series were not identical in their overlap period, their pattern was similar. (See Figure 5). Since the Data Stream information is most recent it is assumed that it has incorporated most corrections and updates, it is therefore used as the series from 1983. The WDI series was rebased from 1987 to 1985 this provided a spliced series from 1960-2001.

[2] Data stream information service indicated that their series was based on local currency.



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