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TRINIDAD AND TOBAGO: AN EVALUATION OF MACROECONOMIC MANAGEMENT AND DEMAND DURING OIL SHOCKS

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Trinidad and Tobago: An Evaluation of Macroeconomic Management and Import Demand During Oil Shocks.

by

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Abstract

This paper evaluates macroeconomic policy during two windfall periods in Trinidad and Tobago. Econometric analysis which employs cointegration methodology is utilised in assessing the effects of the windfall on import demand. The impact of the booming sector on sectoral output on non-boom sectors is evaluated. The role of several macroeconomic variables notably terms of trade effects, net capital flows quantitative restrictions and other policy instruments as they affect import demand is ascertained.

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Introduction

The destabilising impact of a booming sector (Dutch Disease) on the other economic sectors and economic growth has been addressed [Corden, 1984]. More relevant however, the impact of the oil price shock on the economy of Trinidad and Tobago has been documented [Auty and Gelb, 1986]. The present paper seeks to extend this analysis by: (a) giving a critical assessment of the macroeconomic management during the windfall period; as well as (b) to evaluate the effects of the windfall on import demand using recent developments in econometric analysis, an approach to the authors knowledge, not previously attempted for Trinidad and Tobago. In particular, the fundamental determinants of the real exchange rates as they affect aggregate import demand are explored.

The study is presented in four sections. The following section starts with a general discussion of the impact of the "Dutch Disease" on the open economy and proceeds by critically evaluating some of the policies undertaken by the Government of Trinidad and Tobago (GOTT) during the period. Section three outlines and discusses the theoretical underpinnings of the model utilised to analyse how the windfall impacted on import demand. Section four provides the methodological approach as well as a detailed discussion on the model results. The last section is devoted to providing some conclusions and policy implications of the research.

Macroeconomic Management During Windfall Period

Theory notes that there are two major effects associated with a booming sector on the other sectors in the economy *viz* the resource movement and spending effects. The resource movement effect is manifested through the movement of mobile factors into the booming sector

thereby bidding up rents and leading to contraction in the other sectors as the real exchange rate appreciates. This was manifested in Trinidad and Tobago by unemployment in the tradable sector declining by 10 percent to 94,600 in the 1974-81 period when compared with the 1966-73 period and employment in the non traded sector expanding by 31.7% to 245,800 over the same period. One variation in the core Dutch disease model provides an explanation for the anomaly of output expansion in the manufacturing sector which is typically classified as tradable. It is suggested that the manufacturing sector in many oil-exporting countries expanded for reasons related to protection afforded by quotas. This umbrella of protection results in divergencies between international and domestic prices rendering output in some sectors as semi-tradable [Neary and Van Wijnbergen, 1986]. This wedge between internal and external prices coupled with imperfect substitution between manufactures and imports results in the manufacturing sector benefitting from the effects of the boom. It is further suggested that, excess demand that ensues from the increase in national income due to oil revenues, raises the relative price of manufacturing output and results in an expansion in output. In the Trinidad and Tobago context, the resource effect may be small on account of the oil sector functioning as an enclave and the main link to the domestic economy is via tax revenue and royalties to government [Hilaire, 1992]. In this regard, the spending effect through the increase in purchasing power should be greater than the resource effect. The spending effect impacts through an excess demand for non traded goods resulting in a real appreciation and an increase in the relative profitability of this sector and contraction of the traded goods sector. Identification of the recipient of the boom may have implications for the spending effect since government policies instituted during the boom may not be easily reversible. The rigidities associated with wages in the Trinidad and Tobago

economy resulted in high recurrent costs. Attempts at removing cost of living allowances resulted in labour disputes and litigation which the government subsequently lost.

The oil price hike has dominated economic performance in Trinidad and Tobago in the 1970's and after. It had a dramatic effect on income growth and led to a strengthening of fiscal, monetary and balance of payments performance especially between 1974-81. During this period consumption expanded rapidly but was still overshadowed by investment growth. Investment was spurred on largely by home construction and GOTT's public investment programme primarily in capital intensive energy based industry.

Auty and Gelb [1986], posit that 70 percent of the first windfall was invested abroad, 12 percent was invested domestically and 18 percent consumed while 50 percent of the second windfall was saved abroad, 25 percent domestically and 25 percent consumed. This approach i.e. the choice between savings and consumption was in general correct. However, the authors postulate that the rate of increase of consumption was too great and suggest that more should have been saved. The authors further posit that consumption was encouraged by the authorities as a result of the several increases in allowances (exemptions) in income taxes as well as subsidies and indirectly by the level of domestically invested resources. Auty and Gelb, [1986], estimated that deflated consumption increased by 27 percent of non-mining output compared with the base period of 1970-72 and as such accounted for a sizeable share of the second windfall. We agree with Cuddington [1986], who suggests that increases in consumption from a temporary windfall should not exceed the rate of return on increases in wealth if the country is to sustain the increased consumption indefinitely. Hill and Mokgetki [1989], lends support to this thesis and stress if consumption exceeds the rate of return on wealth future consumption will be

reduced and will result in macroeconomic instability and welfare loss.

The next issue pertains to the manner in which GOTT allocated savings. During both booms, the major portion of the savings was allocated to increasing reserves. This helped to sterilise the effects on the monetary base. Nevertheless, the question that remains is was it *sufficient*? The impact of the funds domestically invested had a significant impact on domestic credit to the private sector which expanded appreciably during the two sub periods, moving from TT $665 mn in 1974 to TT $7710 mn in 1992. The overall effect on domestic credit was however, reduced to the extent that the government was a net lender to the banking system.

Very little was spent on debt reduction. In fact GOTT used its build up of reserves as a means of testing its ability to borrow abroad. The country's debt bearing capacity was used to cushion the adjustment and increased foreign borrowing was utilised to delay the adjustment process. The policy of not reducing debt but instead increasing it, was efficacious only if the interest on debt was less than that interest on reserves. The reserve buildup was used to fuel consumption between the first and the second boom as well as after the boom period had ended. This is evidenced by the pace at which consumption was maintained and the consequent decline in reserve levels. A warning was issued by the IMF in their 1978 Staff report that:

> "While the Government's policy of using part of the increased oil revenue for the benefits of lower-income groups and for the improvements in the quality of life in Trinidad and Tobago can be justified, the staff feels that this policy if over emphasised, could lead to undesirably high levels of consumption. Considering that oil reserves are estimated to last only about 10 years at the projected rate of production, a word of caution is also in order about the Governments policy of reducing taxes. A continuation of such a policy

could erode the non-oil tax base and lead to yet higher dependence on oil revenue, which now provides about 55 percent of total central government revenue." [1]

Further macroeconomic instability was manifested in the deterioration in the fiscal situation where the deficit amounted to 67 percent of oil revenues and the current account deficit US $1.9 billion. The emerging problem was recognised by the Trinidad and Tobago authorities when in successive budgets between 1973-1980 it was argued that the recurrent expenditure will present considerable difficulty if the revenue base is weakened.[2] In fact from the late 1970's it should have been obvious that some adjustment was necessary. However, the reserve buildup allowed Trinidad and Tobago to postpone the implementation of necessary macroeconomic policies including the encouragement of food production.

GOTT purchasing of private companies, its involvement in the development of the gas based industries along with its massive expenditure on both the social and economic infrastructure resulted in decreases in the rate of return largely through increasing labour costs and creation of bottlenecks. It also resulted in straining the capacity of GOTT to properly analyse the projects undertaken leading to long delays and massive overruns. We believe that the process of increasing investment above the trend rate created excess expenditure in the system. The authors postulate that it might have been more prudent for GOTT to have operated in a countercyclical manner thereby reducing pressure on wages and absorptive capacity in the boom period and picking up the slack during the "bust" period in order to stabilise the economy. Further in light of the inflationary pressures, restraint in the growth of public expenditures necessitated strengthening and control over the management of the budget, public sector investment programme and the operations of the entire public sector.

The increasing wage trend in the government and petroleum sectors resulted in demands for similar increases in other sectors. At this time GOTT should have, with the assistance of the social partners implemented a wages policy to slow the increase in wages especially in the other sectors. Instead GOTT subsidised labour by creating "jobs" in the government sector, leading to employment in government almost doubling. This "job" creation was accompanied by wages which exceeded those in lagging sectors, especially agriculture and manufacturing. Auty and Gelb [1986], argue that wage increases were in excess of both productivity gains and inflation. They further argued that despite subsidies and controls, inflation rose rapidly after the second oil boom. This rise in inflation may be attributed to the wage indexation policy which was in place at the time. The combination of rising wages and prices coupled with an expanding money supply led to an appreciation of the real exchange rate thereby making the agricultural production in particular and the tradeable sector in general, uncompetitive and in the final analysis the demise of the agricultural sector. This resulted in the contraction of the tradeable sector outside of petroleum and an expansion of the non-tradeable sector. An incomes policy should have been put in place to arrest the appreciation of the real exchange rate and reduce the dependence on the oil sector through diversification. Such an agreement with the trade unions despite the inherent difficulties, would have relieved the pressures of accelerating wage growth on productivity and factor movements from labour intensive sectors.

The policies of increasing reserves by investing overseas, and the effort to diversify by utilising the abundant resource were consistent with the management of a temporary boom. However, (1) the sizeable increase in consumption which was assisted through subsidies, tariff reductions and price controls, (2) the rapid expansion in wage rates, the rising inflation and the

expanding monetary base which led to the appreciation of the real exchange rate and contraction in the tradeable sector along with the procyclical nature of government expenditure were not.

Model Specification

The import demand function employed in this study is embedded in traditional consumer theory where real imports are a function of real income and relative prices. Relative prices can include price indices for both the traded and non traded sectors as these commodity types form part of the consumption basket of consumers. However in this study the real exchange rate is included to allow for the transmission of terms of trade shocks to import demand behaviour. Formally, the import demand function is outlined as follows:

$$M_t = f(Y_p, Y_c, RER) \qquad (1)$$

where Y_p measures real permanent income, Y_c real cyclical income and RER the real exchange rate. Infinite import supply elasticity is assumed given the openness of the economy.

Three measures of real income are employed in the analysis. One measure motivated by Khan and Ross [1975], and by Nyatepe-Coo [1994], disaggregates the transitory and cyclical components of income due to temporary impacts of oil shocks on aggregate import demand and is constructed as a four year moving average. Alternatively, oil revenues are included in the income budget constraint since oil revenues are exogenous and output cannot be altered to finance imports because of OPEC arrangements, This measure of income defined by real non-oil GDP plus oil revenues was motivated by Saleh-Isfahani [1989], in examining the exogeneity of oil revenues as it affects import demand in Nigeria. Finally, real gross domestic product is utilised as the third measure. An evaluation of these alternative methods was performed.

In accounting for the effectiveness of the real exchange rate in influencing import demand

behaviour, real factors or economic fundamentals such as the terms of trade, quantitative restrictions, capital flows and the level of private consumption were assumed to be of major importance. This definition of the real exchange which is a variation of an approach adopted by Edwards [1989], assumes the simultaneous attainment of internal and external equilibrium and generates a vector of equilibrium rates that vary over time. The real exchange rate becomes a major transmission mechanism for policy through changes in the domestic price level. Variability in the real exchange rate affects economic performance by acting as a mechanism through which resources are allocated between the tradeable and non tradeable sectors thus affecting productivity, adjustment costs and the length of the investment horizon. The coefficient associated with the terms of trade is expected to be positive as improvement in the terms of trade results in increased spending on all goods raising domestic prices relative to foreign prices. Improvements in the terms of trade represent an increase in real income and increased purchasing power to consumers. Favourable terms of trade shocks that are associated with a reduction in profitability in the tradeable sector have been described as the "Dutch disease" phenomenon. In the case of a fixed exchange rate, the available supply of foreign exchange may be inadequate in meeting import demand. Consequently, import data may not reflect desired imports as determined by real income and relative prices [Saleh-Isfahani, 1989]. Hilaire, [1992], demonstrated that exchange controls generally tightened after the oil boom thus augmenting relative prices and real income as the determinants of real import demand in Trinidad and Tobago. If export earnings fall or there is a reduction in capital inflows governments invariably tighten import restriction through quantitative controls. Increases in demand for imports in the face of quantitative restrictions tend to increase the rents to agents with the rights to import.

Although, tariffs on imports were constrained by the adherence to CARICOM Common External Tariff. Hilaire, [1992] has demonstrated that there was a slight narrowing of the differential between domestic and foreign prices of imports over the first oil boom but which later widened over the second boom. Khan [1974], argues that the exclusion of quantitative restrictions leads to misspecification such that the error term will account for the difference between actual and desired imports. Increases in net capital flows that can arise for reasons that include, removal of domestic capital controls, increases in net borrowing, increases in direct foreign investment or aid flows tend to appreciate the real exchange rate through increased spending on all goods. Unsustainable macroeconomic policies untimately lead to an overvaluation of the real exchange rate and can result in a nominal devaluation as a short run corrective action. An excess supply domestic credit is expected to increase domestic prices resulting in a real appreciation and may induce nominal devaluation. In order that the real exchange rate be constant domestic inflation must equal foreign inflation plus devaluation [Cottani et al., 1990]. The real exchange rate was specified as a function of real factors as these fundamentals tend to be the determinants of equilibrium[3]:

$$RER = f(TOT, PCON, QR, CF, XSCRD) \qquad (2)$$

where TOT, represents the terms of trade, PCON private consumption, QR quantitative restrictions, CF net capital inflows and XSCRD denotes an excess supply of domestic credit. Increases in the level of quantitative restrictions reduces the degree of openness and can lead to an appreciation of the real exchange rate. Increases in private consumption augmented by the distribution of the oil windfall will trace through to domestic prices resulting in an appreciation of the real exchange rate. Net capital inflows to the extent that they are not sterilised by the

central bank tend to enhance spending resulting in an appreciated real exchange rate. Substitution of equation 2 in equation 1 leads to the following reduced form:

$$M_t = f(Y_p, Y_c, TOT, PCON, QR, CF, POL) \quad (3)$$

where POL represents a macroeconomic policy variable.

Method of Analysis

A review of the recent literature on Dutch disease revealed that few studies had employed cointegration analysis in the investigation of the non-stationarities that may exist among the multiple time series [Corden, 1984; Saleh-Isfahani, (1989); Farmanesh, 1991; andNyatepe-Coo, 1994]. Most macroeconomic time series tend to display an upward trend over time leading to the question of differencing in conferring of stationarity properties to the variable. The idea of a common trend in time series data has motivated the concept of cointegration developed by Engle and Granger [1987]. Dickey and Fuller [1981], developed two test statistics the Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) to test for the order of integration. These along with the cointegrating regression Durbin Watson (CRDW) statistic developed by Sargan and Bhargava (1983), will be used to determine the presence of cointegration among the variables in the reduced form equation. A high R^2 close to unity, a non-zero CRDW and a significant Dickey-Fuller and Augmented Dickey-Fuller statistics on the residuals from the static equation are employed as evidence of a cointegrating relationship. The Johansen and Juselius [1990], test for the order of cointegration will also be applied to determine the optimal number of cointegrating vectors holding the import demand system together. The presence of a linear trend will also be evaluated. The Johansen and Juselius [1990], procedure gives rise to three possibilities based on the following error correction model:

$$\Delta X(t) = \alpha_o + \sum_{i=1}^{s-1} \alpha_i D_{it} + \sum_{i=1}^{k-1} \Gamma_i \Delta X(t-i) + \pi X(t-k) + \epsilon(t) \quad (4)$$

where Γ_j, j=1 to k-1 and

$$\pi = -(I - \sum_{i=1}^{k} \pi_i)$$

(1) If rank of π=0 there is no long run information and the appropriate model is a traditional VAR in differences;

(2) if the rank of π is p i.e full rank implying that X(t) is stationary in levels and a VAR in levels is an appropriate description of the data.

(3) If rank of π is r where $0 < r < p$ giving rise to cointegration and implying that there are pxr matrices α and β such that $\pi = \alpha\beta'$.

D_{it} denotes seasonal dummy variables.

Estimation of the reduced form regression will be based on the Engle-Granger two step estimator which explores an error correction model of the joint processes among the vector of variables that form a cointegrating relationship. Ordinary lest squares regression of past changes in the vector of variables and lags on the residuals from the cointegrating regression is proposed. The following general model is suggested:

$$\Delta X(t) = \sum_{k=1}^{K} A(k)\Delta X(t-k) + \sum_{k=1}^{K} B(k)\Delta Y(t-k) + C(1)ECM(t-1) + \epsilon(t) \quad (5)$$

where ECM(t-1) is the observed residual from the cointegrating regression of X(t) on Y(t), Δ the difference operator and A(k), B(k) and C(1) are the parameters to be estimated.

In view of the difficulties of choosing among the three alternative models with their

associated measures of income, artificial nesting of the models using the J-test was proposed in assessing the predictive performance of the models. Davidson and McKinnon, [1981], proposed the following nested regression:

$$M_t = (1-\alpha_i)X_i B_i + \alpha_i \Phi_i Z_i + \epsilon_t .... \quad \forall\, i=1...3. \tag{6}$$

where M_t represents aggregate imports, X_i a vector of variables outlined in equation 3 and Z_i a predictive variable after netting out the effects common with the vector X_i. The null hypothesis that $E(M_t)= X_i\beta_i$ obtains if $\alpha_i=0$ versus the alternative $E(M_t)=\Phi_i Z_i$ when $\alpha_i=1$. The test is based on either the Likelihood Ratio test or the standard t-test on the parameter α_i. The benchmark model I will be formulated using the measure of permanent income (Y_p) while model II on oil revenues, (GDY) and model III real GDP (RGDP).

Data Issues

Data on real imports, terms of trade, real GDP, net capital flows and private consumption were obtained form the IMF *International Financial Statistics Yearbook.* Quantitative restrictions were obtained from various issues of Trinidad and Tobago *Annual Digest of Statistics.* Imports were deflated using 1985 import prices. The terms of trade (TOT) was defined as a ratio of export to import prices with 1985 as base year. Cyclical real income (Y_c) was measured using agricultural share in non-oil GDP (YAG). Real permanent income (Y_p) was measures as a four year moving average of real income. The other measures of income were defined as real GDP (RGDP) and real non-oil GDP plus oil revenues (GDY). Net capital inflows (CF) and private consumption (PCON) were utilised as ratios to GDP in the estimated equations. Similarly, quantitative restrictions (QR) were proxied as the ratio of import duties to total government revenues. Excess supply of domestic credit (XSCRD) was defined by growth in domestic credit

less growth in GDP less foreign inflation. All data were converted to natural logs except net capital flows and excess domestic credit. The annual time series employed in the study covered the period 1965-91.

Empirical Results

All the variables in the reduced form equation were integrated of order one, I(1) and warranted first differencing to achieve stationarity (Table I). Table 2 illustrates the results from the static long run equation showing that the models with the three definitions of income indicate the presence of cointegration on the basis of DF and ADF tests. Further corroboration of the presence of a cointegrating relationship was verified using the Johansen and Juselius procedure (Table 3). Johansen [1993], provides a method for sequential testing to jointly decide the rank of the cointegrating vector (r), in addition to whether there is a linear trend in the model. If there is no linear trend hypothesis $H_2(r)^*$ is restricted while if there is a linear trend this hypothesis $H_2(r)$ is unrestricted. On examining Table 3 the trace test hypotheses $H_2(0)^*$, $H_2(0)$, $H_2(1)^*$, $H_2(1)$,$H_2(2)^*$ and $H_2(2)$ all suggest rejection of no linear trend and presence of a linear trend respectively. At $H_2(3)^*$ one unable to reject the hypothesis of no linear trend. Therefore on the basis of this finding there are three cointegrating vectors without a linear trend holding the import demand system together. The greater the number of vectors allows for the reduction in space spanned by the cointegrating vectors and increases the likelihood of a policy impact between control and target variables.

Proceeding from the following general model where the maximum lag length was

$$\Delta M_t = \alpha_0 + \alpha_1 \Delta M_{t-1} + \sum_{i=0}^{k} \beta \Delta X_{t-i} + \lambda ECM_{t-1} \qquad (7)$$

chosen on the basis of Akaike's final prediction error criterion (FPE) and the constraint of small sample size. The vecto X_t was summarised as follows X_t=(YAG,Y_p, RGDP, GDY, QR, PCON, TOT, CF, POL). No restrictions were placed on the coefficient of the price variable.

The residuals from all regressions were white noise based on the Lagrange Multiplier test (LM) for serial correlation and the Jarque Bera test for normality (NORM) confirmed that the residuals were normally distributed. The null hypothesis of constant residual variance against the alternative of autoregressive conditional heteroscedasticity could not be rejected on the basis of the ARCH test. Constant residual variance was also corroborated by the WHITE test for heteroscedasticity. Sequential CHOW tests for model stability indicate stable aggregate import demand functions over the period of study. Furthermore, the coefficient of the error correction term (ECM) was significant and of correct sign in all estimated equations. The magnitudes of the coefficient was less than unity therefore suggesting a damped convergence in the long run.

The computed t-statistics for α_1 which evaluated Model I vs II (permanent income vs oil revenues), α_2, I vs III (permanent income vs real GDP), and α_3, II vs III (oil revenues vs real GDP) from the J-test were 2.8, 2.6 and 0.26 respectively. The coefficients α_1 and α_2 were significant at the 1 percent level while α_3 was not significantly different from zero. The results suggest that modeling of income using real non-oil GDP with the addition of oil revenues was a better specification relative to permanent income and real GDP. This finding underscores our proposition that oil revenues were an important determinant of the increases in import demand. The inclusion of oil revenues (GDY) and real GDP measures of income yielded much more

robust results (Table 5 and 6 respectively). The results from the three specifications were contrasted for both magnitude and sign of the estimated coefficients. Two measures of the macroeconomic variable (POL) defined by the excess of domestic credit and a dummy variable indexing nominal devaluation in 1985 were not significant in any of the estimated import demand equations and resulted in a deterioration of the goodness of fit statistics. This variable was therefore excluded on the basis of this finding and the models were reparameterised.

Some of the results from the equation using permanent income were unsatisfactory whereby neither the estimated coefficients of permanent nor cyclical income components proved significant. The estimated income coefficient was of expected sign and obtained an elasiticity of 0.24. However, the relative roles of quantitative restrictions, private consumption, terms of trade and net capital flows were of expected sign and very significant in explaining import behaviour over the period of study. The results show that import demand in Trinidad is inelastic with respect to permanent income and relative prices (Table 4). The impact of oil income on import expenditures although inelastic, 0.19 in magnitude, was significant in explaining import demand behaviour. The elasticity associated with real GDP was largest (1.08), suggesting that much of the variation in imports is accounted for by combinations of transitory and permanent components of total income. Our results are not strictly comparable to those of Saleh-Isfahani [1989], nor Nyatepe-Coo [1994], who both examined Dutch Disease and import demand in Nigeria as they did not examine the stationarity properties of the time series data. Nevertheless, the impact of income on imports in Nigeria was much lower compared to Trinidad and Tobago given an elasticity of 0.09. Our results show a much stronger impact of income on import demand and may be partial reflection of the consequences of GOTT policies of subsidies, tax

concessions and increases in personal emoluments.

The results indicate dynamic adjustment of imports which may obtain for reasons of habit persistence and contractual arrangements in the import demand in the equations with oil revenues (GDY) and real GDP. The results also provide evidence of the negative impacts of the booms on the agricultural sector as a result of resource movement and spending effects. For a 10 percent decrease in the share of agriculture resulted in an increase in imports that varied between 1.5 to 2.7 percent. This would imply that the decline in food production was offset through increased imports.

Quantitative restrictions were important in all equations and corroborates with the continuous downward revisions to the tariff structure by GOTT which facilitated the increased importation of goods.[4] A 10 percent decrease in quantitative restrictions resulted in increases of 2.8 and 3.4 percent of imports in the real GDP and GDY equations respectively. The coefficients of the quantitative restrictions variable were on average twice the magnitude of those in the Nyatepe-Coo [1994], study again possibly reflecting the government policy of subsidies and tax relief.

An increase in private consumption had a significant impact on import demand across all estimated equations. The relative importance of this variable in the import relationship is borne out by the magnitudes of the estimated elasticities which ranged from 0.87 to 0.98 and which support the contention of Auty and Gelb [1986], that a considerable proportion of both oil windfalls were allocated to consumption. Furthermore this would have been aided by the procyclical policies of GOTT that fueled consumption.

The impact of the oil shock was also evident through the positive and significant effect

of terms of trade effects. The elasticities associated with the terms of trade ranged from 0.47 to 0.66. A 10 percent increase in the terms of trade led to a maximum increase in imports of 6.6%. This finding also supports the prediction associated with 'Dutch Disease' that improvement in the terms of trade as a result of higher oil prices leads to increased levels of consumption which is only satisfied through higher levels of imports. The coefficient associated with net capital flows which is a semi-elasticity was significant and of expected sign. The full impact net capital flows would be modified by the degree of Central Bank sterilisation.

Conclusions and Policy Recommendations

The findings of this paper represent an addition to "Dutch Disease" analysis of the Trinidad and Tobago economy. In particular, the oil boom resulted in the sectoral decline in agriculture without the compensatory expansion in the manufacturing sector i.e. although having the receipts from the boom there was a some inability to diversify the export base. The latter finding runs counter to the findings of Fardmanesh [1991], for several developing countries and may underscore the negative impact of the upward trend in wages on productivity in the manufacturing sector in Trinidad and Tobago. Moreover, through the utilisation of modern econometric techniques a long run relationship was found to be evident for aggregate import demand. Reductions in tariffs, increased subsidies and other forms of tax relief that were utilised to fuel consumption to the long run detriment of the economy.

There are a number of policy issues that emerge from these findings that are relevant to macroeconomic management of windfalls. First booms in essence should be viewed as a temporary phenomenon and as such long term macroeconomic policies should not be based on such gains. Governments as such should avoid increasing government expenditure above the

rate of return on increases in wealth if such consumption is to be sustained and instead fiscal policy must be consistent with the concept of the long run stability of income growth. To maintain a more stable growth path it would be more prudent that government expenditure move in a counter cyclical fashion. This policy lesson is underscored by export price uncertainty whose costs include balance of payments disequilibrium and unstable growth. The less the need to adjust to shocks minimises the short term costs of such adjustment. Second, management of the nominal exchange rate is essential such that pressure on the real exchange rate to appreciate would be minimised. This would entail measures to control those variables that place upward pressure on the exchange rate. The moderation of this pressure would reduce the temptation to reallocate resources from non boom to boom sector. Third, the results suggest that wages should be linked to productivity gains to reduce the impact of the demonstration effect hence removing the tendency of investment diverting from labour intensive activity and increasing the level of unemployment. This would also have impacted positively on the level of profitability in the tradable sector since the price of tradables is determined outside the system much unlike the price of non tradables. The end result may have been expansion in investment, employment and foreign exchange. Another policy implication is that the balance of payments can be protected by implementing measures to (a) control consumption and (b) increase investment or savings. However, care must be taken in choosing the type of investment as poorly appraised projects may result in the deterioration of the incremental capital output ratio. Fourth, a determination should be made as to whether the windfall gains should be kept as reserves or utilised to reduce the level of debt outstanding based on the relative interest rates. If the choice is to build up reserves, it should be sterilised so that it does not affect the domestic monetary base and therefore putting

undue pressure on the nominal exchange rate.

In conclusion, the generous granting of subsidies, duty concessions and increases in the money supply all combined to fuel consumption beyond a level that was sustainable given the rate of investment and productivity and the uncompetitiveness of the non-oil tradeable sector. The rapid decline of reserves after the second windfall suggested that some immediate compression of demand was necessary to bring about internal and external balance. The appreciation of the real exchange rate through terms of trade effects and excess purchasing power also stymied productivity and indicated some need to implement policies to slow appreciation of the real exchange rate. This might have been accomplished through an incomes policy in conjunction addition to fiscal and monetary restraint.

NOTES

1. See page 84 of " Accounting for the Petrodollar", Government Printery, Government of Trinidad and Tonbago, 1980.

2. ibid.

3. The real exchange rate equation was tested for the presence of a long run relationship based on the trace test reported in Table A1 in the Appendix. One cointegrating vector was found to hold the variables in the exchange rate equation. The results fromthe error correction model are reported in Table A2.

4. See pages 46-50 of "Accounting for the Petrodollar".

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Table 1. Stationarity Tests[1]

Variable	*DF(ADF) Statistics*
M_t	-1.24(-1.24)
ΔM_t	-12.23(-7.58)
YAG_t	-2.09(-1.84)
ΔYAG_t	-6.21(-5.19)
Y_p	-1.29(-1.23)
ΔY_p	-6.12(-3.03)
QR_t	-1.89(-1.80)
ΔQR	-5.38(-5.09)
$PCON_t$	-2.15(-2.11)
$\Delta PCON_t$	-5.24(-4.98)
TOT_t	-1.55(-2.49)
ΔTOT_t	-3.81(-3.07)
CF_t	-1.92(-1.55)
ΔCF_t	-6.08(-2.99)

[1] The test statistics are calculated as t-statistics where the null hypothesis is that the series has a unit root. The critical value for rejecting the null hypothesis is -3.00 at the 5 percent significance level and are based on the following regression:

$$\Delta X(t) = \beta_0 + \beta_1 X(t-1) + \sum_{i=1}^{K^*} \alpha_i \Delta X(t-i)$$

where $\Delta$is the first difference and K^* the optimal lag for the dependent variable.

Table 2. Cointegrating Regressions for Permanent Income (Y_p), Real Non-Oil GDP with Oil Revenues added (GDY) and with Real GDP (RGDP).

Variables	Coefficients		
constant	13.67 (2.81)	7.83 (8.84)	5.04 (1.24)
YAG_t	-0.10 -(0.56)	0.10 (0.53)	-0.14 (-0.91)
Y_p	-0.57 (-1.06)	-	-
GDY_t	-	0.07 (0.82)	-
$RGDP_t$	-	-	0.31 (0.73)
QR_t	-0.04 (-0.17)	0.24 (1.03)	0.13 (0.54)
$PCON_t$	-0.42 (-0.75)	-0.88 (-1.93)	-0.78 (-1.42)
TOT_t	0.93 (2.94)	0.52 (1.72)	0.58 (1.87)
CE_t	4.83 (2.46)	6.88 (3.48)	4.81 (2.17)
R^2	0.74	0.74	0.74
CRDW	1.71	1.64	1.76
DF	-4.43	-4.32	-4.52
ADF	-4.27	-4.30	-4.36

Table 3. Trace Test on Alternative Cointegration Specifications of Aggregate Import Demand With and Without a Linear Trend[1].

p-r	r	T^*	$C^*(5\%)$	T	C(5%)
7	0	202.9	131.7	211.62	124.24
6	1	139.0	102.14	147.36	94.15
5	2	83.67	76.07	90.11	68.52
4	3	49.95	53.12	54.27	47.21
3	4	27.02	34.91	28.8	29.68
2	5	11.01	19.96	12.74	15.41
1	6	2.6	9.24	3.26	3.76

[1] C^* is taken from Table 1* at the 95 percent Quantile of Osterwald-Lenum.
C is taken from Table 1 at the 95 percent Quantile of Osterwald-Lenum.
T^* is calculated under the hypothesis of no linear trend.
T is calculated under the hypothesis of a linear trend.
p the number of series equals 7.
r is the number of cointegrating vectors.

Table 4. Dynamic Import Equations with Permanent Income.

Variable	Coefficient
ΔM_{t-1}	-0.07 (-0.91)
ΔYAG_{t-1}	-0.15 (-1.29)
ΔY_p	0.24 (0.28)
ΔQR_t	-0.38 (-2.48)**
$\Delta PCON_t$	0.87 (1.96)*
ΔTOT_t	0.66 (2.27)**
ΔCF_t	4.4 (2.95)***
ECM_{t-1}	-0.68 (-3.07)***
Constant	-0.03 (-0.95)

* significant at the 10 percent level
** significant at the 5 percent level
*** significant at the 1 percent level

Adj. R^2 = 51; D.W. = 1.71; Norm[$X^2(2)$] = 1.08
L.M. F[1,16] = 1.13; WHITE[$X^2(16)$]=16.38;
ARCH[$X^2(6)$] = 1.02; CHOW F[9, 17]=1.45

Table 5. Dynamic Import Equations with Oil Revenues added to Real Non-Oil GDP (GDY).

Variable	Coefficient
ΔM_{t-1}	-0.11 (-1.79)*
ΔYAG_{t-1}	-0.27 (-2.82)***
ΔGDY	0.19 (2.62)***
ΔQR_t	-0.34 (-2.64)***
$\Delta PCON_t$	0.98 (2.74)***
ΔTOT_t	0.47 (2.09)**
ΔCF_t	6.51 (4.84)***
ECM_{t-1}	-0.72 (-4.28)***
Constant	-0.06 (-2.12)

* significant at the 10 percent level
** significant at the 5 percent level
*** significant at the 1 percent level

Adj. R^2 = 65; D.W. = 1.61; Norm[$X^2(2)$] = 0.72
L.M. F[1,16] = 0.42; WHITE[$X^2(16)$]=8.96 ;
ARCH[$X^2(6)$] = 1.02; CHOW F[9,17]=1.23.

Table 6. Dynamic Import Equations with Real GDP (RGDP).

Variable	Coefficient
ΔM_{t-1}	-0.10 (-1.71)*
ΔYAG_{t-1}	-0.20 (-2.23)**
$\Delta RGDP_t$	1.08 (3.09)***
ΔQR_t	-0.28 (-2.23)**
$\Delta PCON_t$	0.71 (1.95)*
ΔTOT_t	0.58 (2.61)**
ΔCF_t	4.99 (3.89)***
ECM_{t-1}	-0.76 (-4.17)***
Constant	-0.03 (-1.16)

* significant at the 10 percent level
** significant at the 5 percent level
*** significant at the 1 percent level

Adj. R^2 = 64; D.W. = 1.51; Norm[$X^2(2)$] = 0.85
L.M. F[1,16] = 0.27; WHITE[$X^2(16)$]=16.38;
ARCH[$X^2(6)$] = 1.02; CHOW F[9,17]=1.10.

Appendix

Table A1. Trace Test on Alternative Cointegration Specifications of The Real Exchange Rate With and Without a Linear Trend[1].

p-r	r	T^*	$C^*(5\%)$	T	C(5%)
6	0	139.54	131.7	138.56	124.24
5	1	77.34	102.14	88.66	94.15
4	2	44.84	76.07	51.86	68.52
3	3	23.17	53.12	29.97	47.21
2	4	6.19	34.91	11.30	29.68
1	5	2.16	19.96	3.74	15.41

C^* is taken from Table 1^* at the 95 percent Quantile of Osterwald-Lenum.
C is taken from Table 1 at the 95 percent Quantile of Osterwald-Lenum.
T^* is calculated under the hypothesis of no linear trend.
T is calculated under the hypothesis of a linear trend.
p the number of series equals 6.
r is the number of cointegrating vectors.

Table A2. Real Exchange Rate Equation

Variable	Coefficient
ΔRER_{t-1}	0.13 (0.69)
ΔQR_t	-0.08 (-2.37)**
ΔQR_{t-1}	0.10 (2.35)**
ΔTOT_t	-0.002 (-0.02)
ΔTOT_{t-1}	0.23 (1.92)*
$\Delta PCON_{t-1}$	0.04 (0.32)
ΔCF_t	0.21 (0.36)
$\Delta XSCRD_t$	-0.03 (-2.98)***
$\Delta XSCRD_{t-1}$	0.03 (2.93)***
ECM_{t-1}	-0.43 (2.93)***
Constant	0.01 (0.88)

* significant at the 10 percent level
** significant at the 5 percent level
*** significant at the 1 percent level

Adj. R^2 =0.69; D.W. = 1.91; Norm[$X^2(2)$] = 1.01
L.M. F[1,16] = 1.45; WHITE[$X^2(20)$]=17.25;
ARCH[$X^2(6)$] = 1.07; CHOW F[9,17]=1.60.