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MONETARY STUDIES

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EVALUATING THE IMPACT OF FISCAL AND MONETARY MEASURES ON THE TRINIDAD AND TOBAGO MACROECONOMY

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HILTON INTERNATIONAL
BARBADOS
October 27 - 31, 1997

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Paper to be presented at the 29th Annual Monetary Studies Conference
Hilton International
Barbados
October 27-31 1997

October 1997

Introduction

Are monetary and fiscal policy measures effective in a small open economy like that of Trinidad & Tobago? How effective are they? Which is the more effective? In this paper, we seek answers to these questions within the framework of a medium-sized macroeconometric model of the Trinidad & Tobago economy constructed to take into account various fiscal and monetary policy instruments. Why such a model despite the chorus of criticisms raised against them? It is because, as Wallis and Whitley (1991) observe, such models continue "to support internally consistent quantitative analysis of policy alternatives".

The model used in this paper is rooted firmly in the IS/LM tradition. Within such a framework, theory predicts that, in a small open economy with a floating exchange rate regime, it is monetary and not fiscal policy that should be used to attain goals consistent with high incomes to or close to a level that is compatible with full employment in an environment of a stable exchange rate and moderate price levels.

Consider the effects of an expansionary fiscal policy. This would increase incomes and interest rates simultaneously (by shifting the IS curve to the right). However the increase in interest rates causes capital inflows into the economy, which increase the supply of foreign exchange. This will, under a regime of floating exchange rates, cause an appreciation of the domestic currency. As the domestic currency appreciates, imported goods become less expensive relative to their domestic counterparts. This results in falls in the levels of domestic incomes and expenditures as leakages from the circular flow of income occurs. Hence the initial goal to increase incomes over time is not realised.

What about the effects of monetary policy? An expansionary monetary policy brought about, for instance, by a lowering of the prime interest rates (in this study the Treasury Bill rate), would increase incomes also (by shifting the LM curve to the right). However this results in a simultaneous fall in interest rates (as opposed to the increase that accompanied the increase in income following the corresponding fiscal policy measure) and this would engender capital flight. This is followed by an increased demand for the existing foreign exchange receipts. This would result in a depreciation of the domestic currency. There would then result a switch in consumption patterns away from the imported goods to the now relatively cheaper domestic currencies. This decrease in the leakage from the circular flow of income would result in a further increase in domestic incomes (through a rightward shift of the IS curve).

To determine whether these claims are justified in the case of the Trinidad & Tobago economy, we develop and use a model which takes as its point of departure the Watson-Clarke (1997) model. The following important differences in the two versions of the model are to be noted:

1. The original model used a data set that went up to 1989. The current model uses a data set that goes to 1996

2. Behavioural equations have been modified to take into account some new economic realities, in particular the existence since 1993 of a floating exchange rate regime
3. The econometric methodology is quite different in that the current model takes into account, among other things, the modern notion of cointegration

The paper develops as follows: in the following section the econometric methodology used to obtain the model is introduced and justified. Following that, the structure and content of the model are sketched and discussed. The results of the estimation and model evaluation exercises are then discussed in the following section after which the main policy implications are considered. The paper then concludes.

Econometric Methodology: a debate

Standard practice in the past, following traditions laid down by the Cowles Commission, has been to fit models of the general form:

$$\mathbf{B}(L)\, y_t + \Gamma(L)\, x_t = u_t,\ t = 1,2, .., T \qquad (1)$$

where $\mathbf{B}(L)$ is a G×G matrix and $\Gamma(L)$ a G×K matrix of polynomials in L and $\mathbf{u}_t$ a G×1 vector of independently, identically distributed random variables with mean zero and covariance matrix Ω. Equation (1) may be written in somewhat different form as

$$\sum_{j=0}^{p} B_j y_{t-j} + \sum_{j=0}^{q} \Gamma_j x_{t-j} = \mathbf{u}_t$$

For even moderately sized values of G and K estimation of the B and Γ matrices would almost certainly be on the basis of Ordinary Least Squares (OLS) notwithstanding its inconsistency and the existence of consistent estimating procedures like Two Stage Least Squares (2SLS) and others. See, for instance, Klein and Young (1980) and Harrison and Smith (1977).

Then came the cointegration revolution following the seminal paper of Engle and Granger (1987) and equation systems like (1) were cast in the time series framework along the lines of Johansen (1989):

$$A(L)\, w_t = v_t \qquad (2)$$

where $A(L) = [B(L)\ \ \Gamma(L)]$, $w'_t = (y_t\ \ x_t)$ and $v'_t = (u_t\ \ \varepsilon_t)$. In the Cowles Commission framework ε_t is likely to be the null vector because the x-variables are fixed. Of course such "exogeneity" can be assured by assuming that $\Gamma(L)\, x_t = \varepsilon_t$ is a closed VAR. In the time series framework, however, there is no a priori assumption of exogeneity (it is the data rather than economic theory which determines that) and v_t is vector of

independently, identically distributed random variables with mean zero and covariance matrix Ω^*.

Suppose the elements of w_t are I(1) as most of the variables in our model turned out to be. The time series approach uses the data to determine the presence (or absence) of cointegration. The Cowles Commission approach, on the other hand, preassumes such presence (or absence). Hsiao (1997a), (1997b) argues, among other things, that in the structural (Cowles Commission) approach it is the standard concerns of identification and estimation (and not integration and cointegration) which are pre-eminent. He shows that OLS is not consistent and that 2SLS is. He also derives the limiting properties of the latter when the variables in the w vector are nonstationary and cointegrated.

The approach suggested by Hsiao seems to run counter to the Hendry et al. (1988) methodology. In this case we do not start with the "incredible restrictions" (Simms (1980)) usually associated with the structural form approach. Rather, we start from a reduced form which is considered as a "congruent" representation of the Data Generating Process (DGP). The structural form is specified as a set of overidentifying restrictions which are tested against the reduced form.

Neither the Hendry nor the Hsiao approach is to be applied to estimate the coefficients of the model developed in his paper. In the first instance, both require fairly small linear models and, correspondingly, small values of G and K (the words "small" and "linear" in fact appear in the title of the Hendry et al. (1988) article). We are tempted by the cogent arguments of Hsiao to go the route of the structural approach but the specified model is neither small nor linear which therefore precludes against the use of 2SLS. What to do?

The only plausible compromise seems to be the use of OLS to the structural equations for very much the same reasons why it was applied to large models notwithstanding the work of the Cowles Commission to provide alternative estimators. See Klein (1960).

We go some way, however, to meet the modern requirements. Firstly, 24 behavioural equations were specified on a priori economic grounds and each variable appearing in an equation was subjected to unit root testing. With minor exceptions, all were found to be I(1). Then each such equation was subjected to the Johansen cointegration analysis to ensure that at least the variables appearing in the equation were cointegrated with economically meaningful parameter values. Following this, each behavioural in (1) was estimated by OLS and, in the spirit of General-to-Specific modelling, restrictions on the lags imposed and tested. In most cases, lag lengths of one year (annual data from 1970-1996 was used) were satisfactory. Residuals of each retained equation were also checked to verify cointegration.

Once the model is estimated it is solved and standard checks made on its overall fit. This includes use of the conventional Theil statistics and dynamic multiplier analysis as was done in Watson and Clarke (1997).

This approach may appear highly unsatisfactory but the given "technology" does not provide much choice for a large non linear model.

The model

The basic structure of the model used in this paper is described in some detail in Watson and Clarke (1997). It comprises 138 equations (and endogenous variables) of which 24 are behavioural and 66 exogenous variables. The modified model used in this paper is presented in Appendix.

The major differences in the previous and modified models lie in the form and structure of the behavioural equations which, to some extent, follows automatically from the econometric methodology employed. Consider, for instance, the Private Consumption equation which appears as equation (16) in the appendix. We started off with a general specification of the form:

$$\text{Log(pfce)} = \alpha_0 + \alpha_1 \log(\text{pfce}_{-1}) + \alpha_2 \log(\text{pfce}_{-2}) + \beta_0 \log(\text{pri\_disp}) + \beta_1 \log(\text{pri\_disp}_{-1}) + \beta_2 \log(\text{pri\_disp}_{-2}) + \gamma_0 \text{tbr\_r} + \gamma_1 \text{tbr\_r}_{-1} + \gamma_2 \text{tbr\_r}_{-2}$$

All three variables in the model proved to be I(1) and the Johansen cointegration test showed that they were cointegrated. We ended up with the following estimated equation:

$$\log(\text{pfce}) = 0.43916 * \log(\text{pfce}_{-1}) + 0.43786 * \log(\text{pri\_disp}) + 1.00969$$

after carrying out a series of tests for redundancy. The "general" specification was, of course, based largely on economic theoretic considerations which were different from those of the original model where the corresponding fitted equation was:

$$\log(\text{pfce}) = 0.76757 * \log(\text{pri\_disp}) + 0.62258 * \log(\text{per\_disp\$} / \text{pri\_disp\$}) + 0.34464 * \text{domfa\$}_{-1} / \text{pri\_disp\$}_{-1} + 1.91051$$

which was obtained by the traditional Cowles Commission approach. Similar alterations were made to the other behavioural equations in the model.

Consider another illustration, equation (126) which is equation explaining the Private Final Consumption Expenditure Deflator. The specific form of the equation retained was:

$$\log(\text{pfcedef}) = 0.66283 * \log(\text{pfcedef}_{-1}) + 1.26558 * \log(\text{cpi85}) - 0.93258 * \log(\text{cpi85}_{-1}) - 0.02518$$

Both variables tested as I(1) and were cointegrated. Compare the equation retained in the previous model:

$$\Delta \log (\text{pfcedef}) = 0.98621 * \Delta \log (\text{cpi85}) - 0.01600$$

Since the two variables are cointegrated, this form of the equation is actually misspecified because of the absence of at least one error correction term. In fact in the presence of cointegrated I(1) variables, equation (1) may be represented equivalently as:

$$\mathbf{B}^*(L)\Delta \mathbf{y}_t + \Gamma^*(L)\,\Delta \mathbf{x}_t + \mathbf{B}(1)\,\mathbf{y}_{t-1} + \Gamma(1)\,\mathbf{x}_{t-1} = \mathbf{u}_t \qquad (3)$$

where $\mathbf{B}(1)\,\mathbf{y}_{t-1} + \Gamma(1)\,\mathbf{x}_{t-1}$ is the error correction (EC) mechanism. See Hsiao (1997a). Since, this paper is concerned largely with the model's usefulness for the evaluation of fiscal and monetary policy, we have chosen to use (1) rather than (3). Estimation of (3) would have introduced some added complications which include loss of degrees of freedom, the determination of which EC terms to enter which equation etc. which might have caused some deterioration in the information content of the model. Indeed, given the equivalence of the two forms, the information content of (1) will be equivalent to that of (3). Given the potential estimation problems, the content of (1) is likely to encompass that of (3). In the final analysis, short run – long run dichotomy emphasised in in any individual equation in (3) may count for little in guiding overall policy measures which will be based on the overall solution of the model. As we are reminded by Wallis and Whitley (1991), "the effect of incorporating a new equation in the model is often inadequately reflected in its single equation properties".

The main instruments of fiscal policy appearing here (5 in all) are:

The Corporation Tax rate on the oil sector (OIL_CORP_RATE)
The Sales Tax rate (SALESTAX_RATE)
Corporation Tax Rate in the non oil sector (TAX_INC_C_RATE)
Income Tax rate on individuals (TAX_INC_I_RATE) and
Tax rate on foreign trading activity (TAX_TRADE_RATE)

These tax rates are all calculated as broad averages as shown in the appendix.

There was only one monetary policy instrument considered, the Treasury Bill Rate (TBR).

The main targets of fiscal and monetary policy considered in this paper are the following "real" sector variables:

GDP at constant prices (GDPMP)
The unemployment rate (UNEMP_RATE)
The retail price index (CPI85) and
The (nominal) exchange rate (EXCHAVG)

In this model the exchange rates (real and nominal) are modelled as endogenous variables largely because the TT dollar is no longer pegged to the US dollar but floats freely on the market. Currency restrictions are almost non existent in Trinidad & Tobago today.

Estimation and model evaluation

The 24 estimated behavioural equations are shown in the appendix as equations (16), (17), (37)-(41), (95)-(98) and (125)-(138). They were all estimated using AREMOS ver. 5.0 and the results shown are transposed directly from the AREMOS output. The signs and sizes of the coefficient values shown can all be anticipated from standard economic theory.

The variables used in the equations were all I(1) except for PER_DISP (logarithm) which showed some evidence of being I(2). Consequently, it appears in equation (96) of the appendix in first differenced form. All fitted equations passed the cointegration test as discussed in the preceding section of the paper.

The model was evaluated to determine its closeness of fit to the actual data model. It was solved using the Gauss Siedel routine of AREMOS ver 5.0. Goodness of fit of the model is judged on the basis of a series of statistics generated using the COMPARE command in AREMOS (which "COMPARE"s the actual and simulated values). These statistics include the Theil inequality coefficient, U, as well as the decomposition of the Theil U into proportions due to deviations attributable to the mean (UM), the intercept (UR) and the residuals (UD) in a linear regression of the simulated on the actual values. All these terms are positive and by definition sum to unity. In the "ideal" case, UM=UR= 0 and UD=1. These very popular "diagnostic" statistics must, however, be used with caution. They provide a measure of point by point accuracy which cannot on its own be used to judge goodness of fit. Chong and Hendry (1986) are very critical of the use of a model's dynamic simulation properties to judge its goodness-of-fit. However, as Wallis and Whitley (1991) point out, "few formal tests are available for large-scale non linear dynamic models" and evaluation must therefore proceed in a more informal manner than might be desirable in other cases.

The following table provides the diagnostic statistics for 4 key variables based on the dynamic simulation of the model. These variables are the targets of the eventual policy packages.

Table 1
Diagnostic statistics for Target variables based on model simulation

Variable	Theil U	UM	UR	UD
GDPMP	0.0518	0.1196	0.0455	0.8349
UNEMP_RATE	0.1494	0.1024	0.0177	0.8798
EXCHAVG	0.1697	0.0499	0.7480	0.2021
CPI85	0.0691	0.6627	0.1609	0.1764

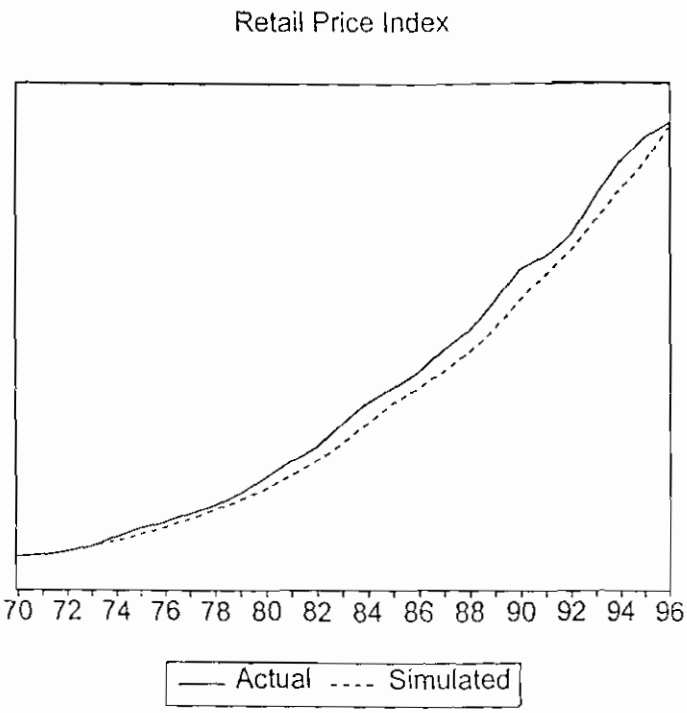
The Theil U statistic is very reasonable in the case of real GDP (GDPMP) and the Retail Price Index (CPI85) and is less than 0.2 for the unemployment and nominal exchange

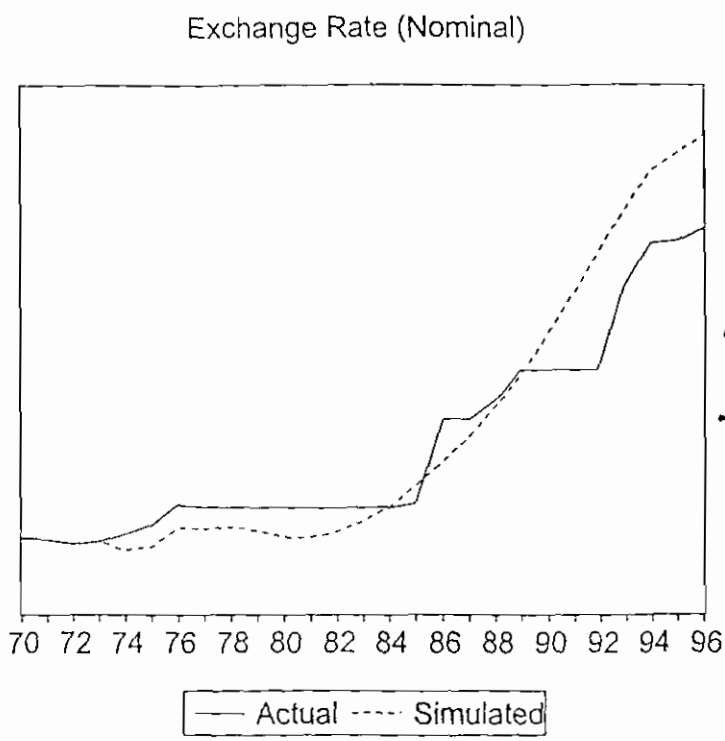
rates. The decomposition is very good in the first two cases, less so in the third and even less so in the fourth.

It is always useful to accompany the use of these summary statistics with an examination of the graphical plot of the paths of the observed and simulated values. This is considered in Figure 1 below:

Figure 1

Graphical Plots of Actual and Simulated Values for Key Target Variables





The above plots present a generally more appealing picture and give us greater confidence in the fitted model.

What policy?

The usefulness of the model in informing policy measures is determined within the framework of the dynamic response of the model (or "multiplier" analysis). Multipliers and elasticities are used to measure the dynamic response of endogenous variables in the system to unit changes in selected exogenous variables, in this case the policy variables. The size and direction of these responses indicate whether the model is responding to stimuli "as it should" and are also fairly reliable indicators of the impact of policy measures on t target endogenous variables.

We have a greater interest in the resulting effects of policy measures on rates of growth of the target variables, and not their levels. The elasticity concept does this and is measured as:

$$ELAST = [\log(Y_s / Y_a)] \div [\log(X_s / X_a)]$$

where Y_s is the simulated and Y_a the actual (observed) endogenous variable values and X_s and X_a the corresponding exogenous values. In tables 2-7 below, elasticities are displayed for GDPMP, UNEMP_RATE, EXCHAVG, and CPI85 for cases where, in turn, the policy variables are subject to a sustained shock over the period 1973-96. The cumulative (long-run) effects of the various measures are also shown.

Table 2
Elasticities based on shocks to *OIL_CORP_RATE*

YEAR	GDPMP	UNEMP_RATE	EXCHAVG	CPI85
1973	0.00000	0.00000	0.00000	0.00000
1974	-0.02885	0.00799	-0.00027	-0.00027
1975	-0.07383	0.02888	-0.00192	-0.00193
1976	-0.08149	0.04018	-0.00598	-0.00599
1977	-0.08347	0.05428	-0.01066	-0.01077
1978	-0.08744	0.06829	-0.01569	-0.01607
1979	-0.09072	0.07133	-0.02073	-0.02163
1980	-0.10549	0.10904	-0.02395	-0.02594
1981	-0.11793	0.11282	-0.02753	-0.03117
1982	-0.11431	0.11733	-0.03293	-0.03923
1983	-0.09518	0.09809	-0.03776	-0.04850
1984	-0.07752	0.06730	-0.04333	-0.06056
1985	-0.06129	0.06982	-0.05039	-0.07554
1986	-0.05063	0.08767	-0.06086	-0.08937
1987	-0.04368	0.07113	-0.05850	-0.10116
1988	-0.03630	0.07765	-0.06051	-0.11415
1989	-0.02862	0.07533	-0.05258	-0.11954
1990	-0.01962	0.07078	-0.03329	-0.12264
1991	-0.01870	0.07370	-0.01664	-0.12660
1992	-0.00711	0.06881	0.00610	-0.12595
1993	-0.00558	0.06406	0.00472	-0.12072
1994	0.00412	0.06226	0.02254	-0.11633
1995	0.01141	0.04366	0.04189	-0.11167
1996	0.01202	0.03311	0.04929	-0.10732
Cumulative effect	-1.20021	1.57351	-0.42898	-1.59305

Table 3
Elasticities based on shocks to SALESTAX_RATE

YEAR	GDPMP	UNEMP_RATE	EXCHAVG	CPI85
1973	0.00000	0.00000	0.00000	0.00000
1974	-0.00158	0.00224	0.00008	0.00008
1975	-0.00338	0.00426	0.00137	0.00136
1976	-0.00376	0.00537	0.00128	0.00130
1977	-0.00332	0.00904	-0.00282	-0.00276
1978	-0.00409	0.01087	-0.00284	-0.00283
1979	-0.00371	0.00895	-0.00240	-0.00247
1980	-0.00305	0.00987	-0.00112	-0.00133
1981	-0.00277	0.00885	-0.00163	-0.00194
1982	-0.00352	0.00894	-0.00178	-0.00228
1983	-0.00522	0.00742	0.00115	0.00038
1984	-0.00700	0.00128	0.00868	0.00783
1985	-0.00646	0.00132	0.00825	0.00819
1986	-0.00897	0.00467	0.00636	0.00751
1987	-0.01132	0.00403	0.00733	0.00991
1988	-0.01219	0.00780	-0.00037	0.00356
1989	-0.01177	0.00972	-0.00495	0.00014
1990	-0.01610	-0.00661	0.03180	0.03800
1991	-0.01418	-0.00841	0.02359	0.03393
1992	-0.02061	0.00487	0.00377	0.01937
1993	-0.03023	0.00900	0.00355	0.02012
1994	-0.02842	0.00639	-0.00099	0.01942
1995	-0.02831	0.00989	-0.01356	0.01088
1996	-0.03062	0.01174	-0.01729	0.00834
Cumulative effect	-0.26058	0.1315	0.04746	0.17671

Table 4
Elasticities based on shocks to TAX_INC_C_RATE

YEAR	GDPMP	UNEMP_RATE	EXCHAVG	CPI85
1973	0.00000	0.00000	0.00000	0.00000
1974	-0.00206	0.00038	-0.00002	-0.00002
1975	-0.00527	0.00140	-0.00013	-0.00014
1976	-0.00506	0.00192	-0.00039	-0.00040
1977	-0.00991	0.00435	-0.00075	-0.00076
1978	-0.01258	0.00761	-0.00135	-0.00138
1979	-0.01303	0.00920	-0.00208	-0.00215
1980	-0.01234	0.01304	-0.00262	-0.00280
1981	-0.01402	0.01308	-0.00308	-0.00343
1982	-0.01735	0.01502	-0.00379	-0.00443
1983	-0.02017	0.01611	-0.00475	-0.00587
1984	-0.01836	0.01288	-0.00623	-0.00810
1985	-0.01508	0.01325	-0.00816	-0.01103
1986	-0.01399	0.01662	-0.01053	-0.01399
1987	-0.01197	0.01366	-0.01131	-0.01681
1988	-0.01233	0.01564	-0.01266	-0.01994
1989	-0.00997	0.01556	-0.01226	-0.02180
1990	-0.00778	0.01491	-0.00972	-0.02308
1991	-0.00675	0.01558	-0.00725	-0.02452
1992	-0.00668	0.01537	-0.00349	-0.02514
1993	-0.01044	0.01590	-0.00367	-0.02498
1994	-0.00815	0.01657	-0.00077	-0.02520
1995	-0.00697	0.01340	0.00238	-0.02539
1996	-0.00752	0.01244	0.00321	-0.02593
Cumulative effect	-0.24778	0.27389	-0.09942	-0.28729

Table 5
Elasticities based on shocks to TAX_INC_I_RATE

YEAR	GDPMP	UNEMP_RATE	EXCHAVG	CPI85
1973	0.00000	0.00000	0.00000	0.00000
1974	-0.01373	0.00052	0.00473	0.00474
1975	-0.02145	0.00678	-0.00006	-0.00007
1976	-0.02892	0.01612	-0.00632	-0.00610
1977	-0.03118	0.03083	-0.01432	-0.01406
1978	-0.03132	0.04538	-0.02315	-0.02313
1979	-0.03668	0.04970	-0.02807	-0.02873
1980	-0.03753	0.07417	-0.03109	-0.03345
1981	-0.04247	0.07829	-0.03756	-0.04219
1982	-0.05713	0.09101	-0.04331	-0.05169
1983	-0.07139	0.09516	-0.04746	-0.06150
1984	-0.07108	0.08603	-0.05824	-0.07984
1985	-0.06784	0.10006	-0.07511	-0.10443
1986	-0.06486	0.13125	-0.10293	-0.13312
1987	-0.05475	0.11248	-0.11347	-0.15916
1988	-0.05662	0.13017	-0.12485	-0.18476
1989	-0.04157	0.13331	-0.12556	-0.20413
1990	-0.02104	0.13266	-0.10745	-0.21966
1991	-0.01312	0.13879	-0.08199	-0.22998
1992	-0.01063	0.13247	-0.04036	-0.22822
1993	-0.01753	0.12834	-0.03543	-0.22227
1994	-0.00466	0.13195	-0.00782	-0.22126
1995	0.01080	0.10429	0.01696	-0.22241
1996	0.01790	0.09000	0.02240	-0.22414
Cumulative effect	-0.7668	2.03976	-1.06046	-2.68956

Table 6
Elasticities based on shocks to TAX_TRADE_RATE

YEAR	GDPMP	UNEMP_RATE	EXCHAVG	CPI85
1973	0.00000	0.00000	0.00000	0.00000
1974	-0.00509	0.00746	-0.00061	-0.00062
1975	-0.01352	0.01887	-0.00263	-0.00319
1976	-0.01754	0.02781	-0.00509	-0.00737
1977	-0.01916	0.04213	-0.00692	-0.01244
1978	-0.02339	0.05701	-0.00776	-0.01835
1979	-0.02371	0.05860	-0.00616	-0.02416
1980	-0.02086	0.08316	-0.00004	-0.02848
1981	-0.01820	0.07713	0.01086	-0.03219
1982	-0.02082	0.07681	0.02647	-0.03687
1983	-0.02155	0.06893	0.05276	-0.04205
1984	-0.01295	0.04805	0.07950	-0.04917
1985	-0.01124	0.05609	0.09918	-0.05841
1986	-0.01609	0.07467	0.08513	-0.06964
1987	-0.00372	0.05829	0.12228	-0.08058
1988	0.00509	0.06087	0.13646	-0.09013
1989	0.01440	0.05462	0.15890	-0.09166
1990	0.02764	0.04563	0.20587	-0.08941
1991	0.02460	0.04792	0.23319	-0.08702
1992	0.03659	0.04152	0.26590	-0.08256
1993	0.02836	0.03806	0.22792	-0.07625
1994	0.03712	0.03416	0.24268	-0.07206
1995	0.05432	0.01287	0.26960	-0.06437
1996	0.05554	-0.00412	0.27351	-0.05217
Cumulative effect	**0.05582**	**1.08654**	**2.461**	**-1.16915**

Table 7
Elasticities based on shocks to TBR

YEAR	GDPMP	UNEMP_RATE	EXCHAVG	CPI85
1973	0.00000	0.00000	0.00000	0.00000
1974	-0.00000	0.00000	-0.00000	-0.00000
1975	-0.01156	0.00334	-0.00018	-0.00019
1976	-0.01718	0.00751	-0.00102	-0.00102
1977	-0.02034	0.01253	-0.00219	-0.00222
1978	-0.02230	0.01739	-0.00376	-0.00384
1979	-0.02178	0.01853	-0.00528	-0.00548
1980	-0.02001	0.02543	-0.00630	-0.00676
1981	-0.02079	0.02414	-0.00709	-0.00798
1982	-0.02113	0.02486	-0.00820	-0.00978
1983	-0.02154	0.02261	-0.00916	-0.01185
1984	-0.02225	0.01795	-0.01034	-0.01464
1985	-0.02210	0.02013	-0.01228	-0.01851
1986	-0.02345	0.02678	-0.01580	-0.02282
1987	-0.02536	0.02367	-0.01711	-0.02766
1988	-0.03062	0.02930	-0.02051	-0.03396
1989	-0.03270	0.03212	-0.02168	-0.03887
1990	-0.03495	0.03465	-0.01964	-0.04348
1991	-0.03731	0.04035	-0.01865	-0.04951
1992	-0.03962	0.04473	-0.01654	-0.05570
1993	-0.05025	0.05111	-0.02143	-0.06092
1994	-0.04871	0.05805	-0.02074	-0.06733
1995	-0.04660	0.05241	-0.01923	-0.07373
1996	-0.04062	0.05115	-0.02135	-0.08135
Cumulative effect	**-0.63117**	**0.63874**	**-0.27848**	**-0.6376**

Consider first the fiscal policy measures highlighted in Tables 2-6 as they impact on income (GDPMP). In all cases, income will increase following a tax cut (the tables show that it will decrease following an increase in taxes). For a 1% cut in the corporation tax rate in the oil sector, income rises by 1.2%. For a similar cut in personal income taxes, income rises by 0.77% while, for the other taxes, the response is quite small. Fiscal policy aiming to affect income should therefore be based largely on the first two instruments.

Does that evidence provided here support the theory that, in the long run, expansionary fiscal measures (tax cuts) will not achieve the goal of higher income and low unemployment? Technically, yes, since some 20 years of sustained tax cuts will eventually result in falling incomes and unemployment rates. The reason why a rising income level is not sustained in the long run is primarily due to the variations of the exchange rate. Consider Table 2: a steady depreciation[1] of the exchange rate accompanies rising incomes resulting from a tax cut. It is only when the rate begins to appreciate that income begins to fall. But the so-called long run is very far off (about 20

[1] The negative exchange rate elasticities indicate an appreciation of the currency since the exchange rate is expressed in TT dollars for US$1.00.

years) and is hardly likely to be of major concern to a policy maker. That the theory is proven to be correct is likely to be no impediment in practice to economic policy makers.

A government which seeks to alleviate the unemployment problem in a climate of expanding economic activity should, therefore seek to lower (oil and personal income) taxes. It must, however, live with the undesirable consequences of rising prices and a deterioration in the exchange rate.

What about expansionary monetary policy measures, more specifically, variations in the Treasury Bill Rate (TBR). Table 7 shows the effects of a sustained 1% rise (and so also a 1% fall) in the TBR on the key economic indicators. A 1% fall in this rate will result in an immediate and sustained increase in incomes and employment, as well as a sustained depreciation in the exchange rates and rising prices. It will raise output in the long run by 0.63%, (compared to 1.2% for a similar cut in oil taxes) and will achieve this objective with an increase in prices of 0.63% (compared to 1.59% for a similar cut in oil taxes). Both measures will result in a depreciation of the TT dollar: by 0.43% for the fiscal measure and by 0.28% for the monetary policy measure. A policy maker may well decide to forego more rapid growth resulting from the fiscal measure in order to have a more stable price level and exchange rate. This seems to support the theory elucidated above that monetary policy may provide a more stable climate for growing incomes and employment levels.

Fiscal measures, however, have a considerably more significant impact on employment levels. The long term effect of a 1% cut in income taxes is to lower the unemployment rate by 2.04% and a similar cut in oil taxes lowers the unemployment rate by 1.57%. A 1% cut in the Treasury Bill rate, however, reduces the unemployment rate by only 0.64%. In a climate where unemployment can become an explosive issue, policy makers may wish to offer some palliative in this direct ion and lean in the direction of fiscal policy measures.

Conclusion

The model used in this paper appears to be well supported by the data. This lends some credence to the econometric methodology employed. There is no clear conclusion to the fiscal-monetary policy debate – the theory holds but only in a lengthy and unrealsitic time frame. The policy measures to be adopted are likely to depend a lot on the shorter run objectives set by the political directorate. Fiscal measures seem to do very well in attaining unemployment and income targets but tend to pay the price of more rapidly deteriorating exchange rates and rising prices. Monetary policy measures tend to find a happy medium: reasonably good income and employment levels accompanied by tolerable exchange and inflation rates. Of course, our study is limited by the fact that only one instrument at a time is used: a more coherent and realistic policy package would include a group of policy instruments acting in unison on the targets.

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Appendix

PRINCIPAL IDENTITIES AND EQUATIONS OF THE MODEL

AGGREGATE EXPENDITURE

IDENTITIES

GDPMP = PFCE + GFCE + GCF + XGNFS - MGNFS (1)
GDPMP$ = PFCE$ + GFCE$ + GCF$ + XGNFS$ - MGNFS$ (2)
FCE$ = PFCE$ + GFCE$ (3)
PFCE$ = PFCE * PFCEDEF (4)
GFCE$ = GFCE * GFCEDEF (5)
GCF$ = GCF * GCFDEF (6)
GCF$ = GCFIXED$ + STOCK_GOV$ + STOCK_PRI$ (7)
GCF_FIXED$ = GCFP_FIXED$ + GCFG_FIXED$ (8)
GCFP_FIXED$ = GCFP_FIXED * GCFDEF (9)
GDPFC$ = GDPMP$ - IT_PLUS_VAT$ + SUBS$ (10)
GDPFC=GDPFC$/GDPMPDEF (11)
GSAVD$ = GCF$ + XGNFS$ - MGNFS$ (12)
GDI$ = GDPMP$+ (XFY$ - MFY$) + (XUT$ - MUT$) (13)
GSAVN$ = GDI$ - FCE$ (14)
NDI$ = GDI$ - DEP$ (15)

BEHAVIOURAL EQUATIONS

Private Consumption (16)

log(pfce)

```
   =    0.43916 * log(pfce)[-1] + 0.43786 * log(pri_disp) + 1.00969
       (3.85498)                  (4.71388)                 (1.72428)

Sum Sq      0.1121    Std Err     0.0684    LHS Mean    9.0728
R Sq        0.8970    R Bar Sq    0.8884    F  2, 24   104.459
D.W.( 1)    1.8481    D.W.( 2)    1.9114
H           0.4175
```

Private Fixed Investment (17)

log(gcfp_fixed)

```
   =     0.68173 * log(gcfp_fixed)[-1] - 1.66740 * tbr_r[-1] + 2.26247
        (5.84043)                       (1.83699)             (2.74365)

Sum Sq      0.8693    Std Err     0.1944    LHS Mean    7.2951
R Sq        0.7598    R Bar Sq    0.7389    F  2, 23   36.3703
D.W.( 1)    1.2480    D.W.( 2)    2.0830
H           2.3687
```

BALANCE OF PAYMENTS (CURRENT ACCOUNT)

IDENTITIES

XG= XG3 + XGX3 (18)
XG3$= XG3 * XG3DEF (19)
XGX3$= XGX3 * XGX3DEF (20)
XG$= XG3$ + XGX3$ (21)
XGNFS$= XG$ + XNFS$ (22)
XNFS$= XNFS * XNFSDEF (23)
XT$ = XGNFS$ + XFY$ + XUT$ (24)
MG = MCONS_DUR + MCONS_NONDUR + MCAPGOODS + MINTER
+ MOTHCOMM (25)
MCONS_DUR$ = MCONS_DUR * MCONS_DUR_DEF (26)
MCONS_NONDUR$ = MCONS_NONDUR * MCONS_NDUR_DEF (27)
MCONS$ = MCONS_DUR$ + MCONS_NONDUR$ (28)
MCAPGOODS$ = MCAPGOODS * MCAP_DEF (29)
MINTER$ = MINTER * MINT_DEF (30)
MG$ = MG * MGDEF (31)
MGNFS$ = MG$ + MNFS$ (32)
MGNFS = MG + MNFS (33)
MT$ = MGNFS$ + MFY$ + MUT$ (34)
MFY$ = FDINT$ + MOTHFY$ (35)
CAB$ = XT$ - MT$ (36)

BEHAVIOURAL EQUATIONS

Non oil exports (37)

log(xgx3)

```
   =     0.24831 * log(xgx3)[-1] + 1.14817 * log(us_gdp)[-1]
        (1.28255)                  (2.90158)

       - 0.66381 * log(xgx3def/(us_indp85*exchavg)) - 7.86523
        (4.19709)                                    (2.95885)

 Sum Sq      0.5061   Std Err     0.1632   LHS Mean    6.8858
 R Sq        0.9075   R Bar Sq    0.8929   F  3, 19  62.1444
 D.W.( 1)    2.4377   D.W.( 2)    1.6108
 H          -3.0678
```

Imports of Durable Consumer Goods (38)

log(mcons_dur)

```
   =     0.40194 * log(mcons_dur)[-1] - 1.08759 * log(mcons_dur_def)
        (2.41009)                      (4.40069)

       + 0.72161 * log(mcons_dur_def)[-1] + 0.61868 * log(per_disp)
         (3.22858)                          (2.11037)

       - 1.82603
         (0.90914)

 Sum Sq      0.8624   Std Err     0.2189   LHS Mean    5.9717
 R Sq        0.8253   R Bar Sq    0.7865   F  4, 18   21.2628
 D.W.( 1)    2.6486   D.W.( 2)    1.7171
 H          -2.8563
```

Imports of Non Durable Consumer Goods (39)

log(mcons_nondur)

```
   =     0.56186 * log(mcons_nondur)[-1] + 0.83819 * log(gdpmp)
        (3.85902)                          (2.33724)

       - 5.27608
         (1.79327)

 Sum Sq      0.4581   Std Err     0.1513   LHS Mean    6.5721
 R Sq        0.7488   R Bar Sq    0.7237   F  2, 20   29.8068
 D.W.( 1)    1.5665   D.W.( 2)    1.6917
 H           1.0743
```

Imports of Capital Goods (40)

log(mcapgoods)

```
   =     4.93651 * log(gdpmp)[-1] - 2.64471 * log(gdpmp)[-2] - 15.7214
        (3.43144)                  (2.01110)                  (3.34285)

 Sum Sq      2.2058   Std Err     0.3241   LHS Mean    6.6176
 R Sq        0.5447   R Bar Sq    0.5014   F  2, 21   12.5635
 D.W.( 1)    1.5897   D.W.( 2)    1.7536
```

Imports of Raw Materials and International Goods (41)

```
log(minter)

   =     0.54134 * log(minter)[-1] - 0.45329 * log(mint_def)
        (3.78183)                   (1.85934)

       + 0.81601 * log(mint_def)[-1] + 3.00117
         (3.28997)                    (3.27637)

Sum Sq      1.0583    Std Err     0.2360    LHS Mean    6.7238
R Sq        0.6915    R Bar Sq    0.6428    F  3, 19  14.1980
D.W.( 1)    2.5186    D.W.( 2)    1.8621
H          -1.7105
```

PUBLIC SECTOR

IDENTITIES

GCEXP$ = GFCE$ + SUBS$ + DINT$ + TRANS$ + OTHEXP_GOV$ (42)
GFCE$ = COMP_GOV$ + NGEG$ + GDEP$ (43)
DINT$ = MCGFINT$ + CGDINT$ (44)
FDINT$ = MCGFINT$ + MSEFINT$ (45)
CGDINT$ = CGINTRATE * AVINTDEBT$ (46)
MCGFINT$ = MCGFRATE * AVCGEXTDEBT$ (47)
MSEFINT$ = MSEFRATE * AVSEEXTDEBT$ (48)
GCREV$ = OILREV$ + NOILREV$ (49)
OILREV$ = OILTAX_CORP$ + OILTAX_ROY$ +OILREV_OTH$ (50)
OILTAX_CORP$ = OIL_CORP_RATE * (OS_G_OIL$ +OS_G_OIL$$_{-1}$) / 2 (51)
OILTAX_ROY$ = (OS_G_OIL$ + OS_G_OIL$$_{-1}$) / 2 * OIL_ROY_RATE (52)
OILREV_OTH$ = (OS_G_OIL$ + OS_G_OIL$$_{-1}$) / 2 * O_OTH_TAX_RATE (53)
NOILREV$ = IT_PLUS_VAT$ + OCF$ +NOILTAX_INC$+ NOILTAX_PROP$
+ NOIL_OTHREV$ (54)
IT_PLUS_VAT$ = SALESTAX$ + NOILTAX_TRADE$+ OTHIT$ (55)
SALESTAX$ = SALESTAX_RATE * (FCE$ +FCE$$_{-1}$)/ 2 (56)
NOILTAX_TRADE$ = TAX_TRADE_RATE * (MG$+MG$$_{-1}$) / 2 (57)
NOILTAX_INC$ = NOILTAX_INC_C$ +NOILTAX_INC_I$ + NOILTAX_OTHINC$ (58)
NOILTAX_INC_C$ = TAX_INC_C_RATE * ((OS_G$-OS_G_OIL$)
+ (OS_G$$_{-1}$-OS_G_OIL$$_{-1}$)) / 2 (59)
NOILTAX_INC_I$ = TAX_INC_I_RATE * (COMP$ +COMP$$_{-1}$) / 2 (60)
NOILTAX_OTHINC$ = ((GDPFC$ - GDPFC_OIL$) + (GDPFC$$_{-1}$
- GDPFC_OIL$$_{-1}$)) / 2 * OTHINC_TAX_RATE (61)
NOILTAX_PROP$ = ((GDPFC$ - GDPFC_OIL$) + (GDPFC$$_{-1}$ -
GDPFC_OIL$$_{-1}$)) / 2 * PROP_TAX_RATE (62)
NOIL_OTHREV$ = ((GDPFC$ - GDPFC_OIL$) + (GDPFC$$_{-1}$ -
GDPFC_OIL$$_{-1}$)) / 2 * N_OTH_TAX_RATE (63)

SAVG$ = GCREV$ - GCEXP$ (64)

CGBR$ = - SAVG$ - GCAPREV_CB$ + GCFGIXED$ + STOCK_GOV$ + CAP_ADJ$ (65)

FINANCIAL SYSTEM

IDENTITIES

CGBR$ = ΔCGTOTDEBT$ (66)

CGTOTDEBT$ = CGINTDEBT$ + CGEXTDEBT$ (67)

ΔCGINTDEBT$ = ΔNONBCRED$ +ΔCOMCRED$ +ΔCBDEPOS$+ΔCBCRED$ (68)

ΔCGBDEBT$ = ΔCBCRED$ + ΔCOMCRED$ +ΔCBDEPOS$ (69)

ΔCGEXTDEBT$ = ΔCGBOPDEBT$ +ΔCGNBOPDEBT$ (70)

SETOTDEBT$ = SEDEBT$ + SEEXTDEBT$+OPUBEXTASS$-CGNBOPDEBT$ (71)

SEBR$= ΔSETOTDEBT$ (72)

ΔEXTDEBT$ = ΔCGEXTDEBT$ + ΔSEEXTDEBT$ +ΔCBEXTDEBT$ (73)

PRIBR$= PFCE$ + GCFPIXED$ + STOCK_PRI$ - PRI_DISP$ (74)

ΔPRIDEBT$ = PRIBR$ + ΔMON$ + ΔQMON$ +ΔOTHLIAB$ + ΔNONBCRED$ - DFI$ - ΔOPRIEXTASS$ - ΔOERR$ (75)

ΔTOTLIAB$ = ΔMON$ + ΔQMON$ + ΔOTHLIAB$ (76)

DOMFA$ = MON$ + QMON$ (77)

ΔDOMFA$=PDFA_PER * PER_DISP$ (78)

PMON = MON$ / DOMFA$ (79)

ΔDOMCRED$ = ΔCGBDEBT$ + ΔSEDEBT$ +ΔPRIDEBT$ (80)

ΔRES$ = CAB$ + ΔEXTDEBT$ + ΔOTHEXTASS$ +ΔEAO$ (81)

ΔOTHEXTASS$ = DFI$ + ΔOPRIEXTASS$ + ΔOPUBEXTASS$ + ΔOADJEXT$ (82)

ΔEAO$ = - ΔNRES$ + ΔOERR$ (83)

ΔEXTASS$ = ΔRES$ + ΔNRES$ (84)

ΔTOTASS$ = ΔEXTASS$ + ΔDOMCRED$ (85)

TOTASS$ = TOTLIAB$ (86)

ΔOADJEXT$ = - ΔCBEXTDEBT$ - ΔCGNBOPDEBT$ (87)

ΔOPRIEXTASS$ = ΔEXTFA$ -DOERR$ (88)

ΔEXTFA$ = PEFA_PER * PER_DISP$ (89)

AVINTDEBT$ = ((CGINTDEBT$ - CBDEPOS$) + (CGINTDEBT$$_{-1}$$ - CBDEPOS$$_{-1}$$)) / 2 (90)

AVCGEXTDEBT$ = (EXTDEBT$ +EXTDEBT$$_{-1}$$) / 2 (91)

AVSEEXTDEBT$ = (SEEXTDEBT$ +SEEXTDEBT$$_{-1}$$) / 2 (92)

IR_LR= (1 + IR_L/100) / (CPI85/CPI85$$_{-1}$$) -1 (93)

TBR_R= (1 + TBR) / (CPI85/CPI85$$_{-1}$$) -1 (94)

BEHAVIOURAL EQUATIONS

Proportion of Personal Disposable Income used for Acquisition of Financial Assets (95)

```
pdfa_per

   =     0.24071 * (os_g$/(os_g$+comp$))
        (1.61709)

       + 0.43313 * (os_g$/(os_g$+comp$))[-1]
        (2.82709)

       + 0.62486 * (domfa$/(per_disp$))
        (3.11296)

       - 0.75622 * (domfa$/(per_disp$))[-1] - 0.14885
        (4.27717)                             (1.89837)

 Sum Sq      0.0244   Std Err     0.0333   LHS Mean    0.0858
 R Sq        0.7881   R Bar Sq    0.7495   F  4, 22  20.4527
 D.W.( 1)    2.1709   D.W.( 2)    2.6338
```

Proportion of Domestic Assets held as Money (M1) (96)

```
log(pmon)

   =     0.58444 * log(pmon)[-1] + 0.68981 * Δlog(per_disp)
        (5.33685)                  (3.89561)

       - 0.27124 * tbr_r[-1] - 0.60970
        (0.91615)            (3.87926)

 Sum Sq      0.1425   Std Err     0.0787   LHS Mean   -1.4090
 R Sq        0.7463   R Bar Sq    0.7132   F  3, 23  22.5492
 D.W.( 1)    2.2509   D.W.( 2)    1.7340
 H          -0.8164
```

Other Liabilities of the Banking Sector (97)

```
(othliab$/cpi85)

   =     0.63052 * (othliab$/cpi85)[-1] + 0.13190 * (domfa$/cpi85)
        (4.71874)                          (2.00897)

       - 221.483
        (0.77570)

 Sum Sq    3491553   Std Err   381.420   LHS Mean   1454.40
 R Sq        0.8117   R Bar Sq   0.7960   F  2, 24  51.7318
 D.W.( 1)    1.7174   D.W.( 2)   2.3612
 H           1.0097
```

Direct Foreign Investment (98)

```
log(dfi$/mcap_def)

   =    0.64682 * log(dfi$/mcap_def)[-1] + 1.05699 * log(reexch)
       (3.93744)                          (1.40627)

      + 0.77730
        (0.76816)

Sum Sq      4.9942   Std Err    0.4997   LHS Mean    5.7175
R Sq        0.5654   R Bar Sq   0.5219   F  2, 20   13.0078
D.W.( 1)    1.7476   D.W.( 2)   1.9906
H           0.8070
```

PRICES, INCOME, OUTPUT, EMPLOYMENT

IDENTITIES

GDPMPDEF = GDPMP$ / GDPMP (99)
XGNFSDEF = XGNFS$ / XGNFS (100)
XG3DEF = OILP_RAT * (OILP_EXT * EXCHAVG) (101)
XGDEF = XG$ / XG (102)
REEXCH = (USPPI * EXCHAVG) / CPI85 (103)
COMP$ = COMP_GOV$ + COMP_OIL$ + COMP_MANUF$ + COMP_OTH$ (104)
COMP_GOV$ = AVWAG_GOV$ * EMP_GOV (105)
COMP_OIL$ = AVWAG_OIL$ * EMP_OIL (106)
COMP_MANUF$ = AVWAG_MANUF$ * EMP_MANUF (107)
COMP_OTH$ = AVWAG_OTH$ * EMP_OTH (108)
OS_G_OIL$ = GDPFC_OIL$ - COMP_OIL$ (109)
OS_G_MANUF$ = GDPFC_MANUF$ - COMP_MANUF$ (110)
OS_G_OTH$ = GDPFC_OTH$ - COMP_OTH$ (111)
OS_G$ = OS_G_OIL$ + OS_G_MANUF$ + OS_G_OTH$ (112)
PER_DISP$ = COMP$ +TRANS$ - OCFS - NOILTAX_INC_I$ (113)
PER_DISP = PER_DISP$ / CPI85 (114)
OSDISP$ = OS_G$ - OILTAX_CORP$ - NOILTAX_INC_C$ (115)
PRI_DISP$ = PER_DISP$+PP_OS * OSDISP$ (116)
PRI_DISP = PRI_DISP$ / CPI85 (117)
GDPFC_OIL$ = GDPFC_OIL * GDPMP_OIL_DEF (118)
GDPFC_MANUF$ = GDPFC_MANUF * GDPMP_MAN_DEF (119)
GDPFC_OTH$ = GDPFC_OTH * GDPFC_OTH_DEF (120)
GDPFC$ = GDPFC_MANUF$ + GDPFC_OIL$ + GDPFC_OTH$ +
COMP_GOV$ + GDEP$ (121)
EMPTOT = EMP_GOV + EMP_OIL + EMP_MANUF +EMP_OTH (122)
UNEMP_RATE = 1 - (EMPTOT / LABF) (123)
EXCHAVG = REEXCH*(@PI85/USPPI) (124)

BEHAVIOURAL EQUATIONS

Retail Price Index (125)

```
log(cpi85/(1+salestax_rate))

   =     0.89778 * log(cpi85/(1+salestax_rate))[-1]
        (32.1371)

       + 0.06910 * log(domfa_s$) - 0.52282
         (2.88730)                 (2.46293)

 Sum Sq      0.0245   Std Err     0.0327   LHS Mean   -0.3220
 R Sq        0.9985   R Bar Sq    0.9984   F  2, 23   7775.34
 D.W.( 1)    1.1887   D.W.( 2)    2.4441
 H           1.5534
```

Private Final Consumption Expenditure Deflator (126)

```
log(pfcedef)

   =     0.66283 * log(pfcedef)[-1] + 1.26558 * log(cpi85)
        (4.18157)                     (3.28790)

       - 0.93258 * log(cpi85)[-1] - 0.02518
         (2.65420)                  (0.63474)

 Sum Sq      0.1287   Std Err     0.0748   LHS Mean   -0.3464
 R Sq        0.9932   R Bar Sq    0.9923   F  3, 23   1122.64
 D.W.( 1)    1.9446   D.W.( 2)    2.2003
 H           0.0084
```

General Government Final Consumption Expenditure Deflator (127)

```
log(gfcedef)

   =     0.16994 * log(gfcedef)[-1] + 0.65184 * log(avwag_gov$)
        (2.24751)                     (10.1982)

       - 2.33660
         (10.0057)

 Sum Sq      0.0630   Std Err     0.0524   LHS Mean   -0.4443
 R Sq        0.9936   R Bar Sq    0.9931   F  2, 23   1796.73
 D.W.( 1)    1.7783   D.W.( 2)    2.4887
 H           0.4912
```

Gross Capital Formation Deflator (128)

```
log(gcfdef)

   =    0.47648 * log(gcfdef)[-1] + 0.57218 * log(mcap_def) - 0.08760
       (4.01533)                   (4.30188)                 (1.95667)

Sum Sq      0.1492   Std Err    0.0843   LHS Mean    0.0892
R Sq        0.9852   R Bar Sq   0.9838   F  2, 21   699.410
D.W.( 1)    2.0717   D.W.( 2)   1.2285
H          -0.4925
```

Imports of Consumer Non Durable Goods Deflator (129)

```
log((mcons_ndur_def)/(1+tax_trade_rate))

   =    0.41857 * log((mcons_ndur_def)/(1+tax_trade_rate))[-1]
       (2.67917)

      + 0.23513 * log(usppi*exchavg) - 0.09103
       (2.53419)                     (1.07554)

Sum Sq      0.4433   Std Err    0.1489   LHS Mean    0.2438
R Sq        0.7897   R Bar Sq   0.7687   F  2, 20   37.5593
D.W.( 1)    1.4403   D.W.( 2)   2.1505
H           1.9495
```

Imports of Consumer Durable Goods Deflator (130)

```
log(mcons_dur_def/(1+tax_trade_rate))

   =    0.31053 * log(mcons_dur_def/(1+tax_trade_rate))[-1]
       (1.93358)

      + 0.40029 * log(usppi*exchavg)[-1] - 0.22811
       (3.01580)                         (1.86867)

Sum Sq      0.7179   Std Err    0.1895   LHS Mean    0.2072
R Sq        0.8233   R Bar Sq   0.8056   F  2, 20   46.5879
D.W.( 1)    1.8655   D.W.( 2)   2.0850
H           0.4775
```

Imports of Raw Materials and International Goods Deflator (131)

```
log(mint_def/(1+tax_trade_rate))

   =    0.43265 * log(mint_def/(1+tax_trade_rate))[-1]
       (2.21450)

      + 0.29900 * log(usppi*exchavg) - 0.07626
       (2.61836)                      (0.79831)

Sum Sq      0.8078   Std Err    0.2010   LHS Mean    0.3850
R Sq        0.7240   R Bar Sq   0.6964   F  2, 20   26.2335
D.W.( 1)    1.6387   D.W.( 2)   1.8738
H           2.1495
```

Imports of Capital Goods Deflator (132)

```
log(mcap_def)

   =    0.41450 * log(mcap_def)[-1] + 0.52364 * log(us_cap85*exchavg)
       (2.58280)                     (3.65949)

      - 2.73866
       (3.53690)

Sum Sq      0.2937   Std Err    0.1212   LHS Mean    0.3516
R Sq        0.9595   R Bar Sq   0.9555   F  2, 20   237.142
D.W.( 1)    2.0793   D.W.( 2)   1.9203
H          -0.3156
```

Imports of Goods Deflator (133)

```
log(mgdef/(1+tax_trade_rate))

   =    0.20521 * log(mgdef/(1+tax_trade_rate))[-1]
       (1.02371)

      + 0.49870 * log(usppi*exchavg)[-1] - 0.26042
       (3.60934)                          (2.48292)

Sum Sq      0.3730   Std Err    0.1366   LHS Mean    0.2759
R Sq        0.8989   R Bar Sq   0.8888   F  2, 20   88.9348
D.W.( 1)    1.5071   D.W.( 2)   2.0440
H           3.7512
```

Average Wage: Manufacturing Sector (134)

```
log(avwag_manuf$/cpi85)

   =    0.78050 * log(avwag_manuf$/cpi85)[-1]
       (10.0044)

      + 0.27801 * log(gdpfc_manuf) - 1.38869
       (3.01723)                   (2.30201)

Sum Sq      0.1661   Std Err     0.0850   LHS Mean    2.7438
R Sq        0.8769   R Bar Sq    0.8662   F  2, 23   81.9130
D.W.( 1)    1.6446   D.W.( 2)    1.9015
H           0.7229
```

Average Wage: non-oil non-government (135)

```
log(avwag_oth$/avwag_oil$)

   =    0.51466 * log(avwag_oth$/avwag_oil$)[-1]
       (3.85857)

      - 1.91960 * unemp_rate - 0.18461
       (3.40936)             (2.07911)

Sum Sq      0.1114   Std Err     0.0696   LHS Mean   -0.9948
R Sq        0.8239   R Bar Sq    0.8086   F  2, 23   53.8155
D.W.( 1)    1.9105   D.W.( 2)    2.4681
H           0.2684
```

Persons Employed in Manufacturing Sector (136)

```
log(emp_manuf)

   =    0.65254 * log(emp_manuf)[-1] + 0.33795 * log(gdpfc_manuf)
       (5.13456)                     (4.87432)

      - 0.55086 * log(avwag_manuf$/cpi85)
       (4.41852)

      + 0.34923 * log(avwag_manuf$/cpi85)[-1] - 0.56028
       (3.12651)                              (1.26420)

Sum Sq      0.0466   Std Err     0.0471   LHS Mean    3.7712
R Sq        0.8311   R Bar Sq    0.7990   F  4, 21   25.8387
D.W.( 1)    1.8928   D.W.( 2)    2.4787
H           0.0466
```

Total Employment in Sectors other than Oil, Manufacturing and Government (137)

```
log(emp_oth/emptot)

   =     0.33873 * log(emp_oth/emptot)[-1]
        (1.95204)

       - 0.08282 * log(avwag_oth$/pfcedef) - 0.06782
        (3.79874)                           (1.29756)

 Sum Sq      0.0057   Std Err     0.0158   LHS Mean   -0.4676
 R Sq        0.7584   R Bar Sq    0.7374   F  2, 23   36.0982
 D.W.( 1)    2.0412   D.W.( 2)    1.7268
 H          -0.4232
```

Exchange Rate (138)

```
reexch

   =     0.86884 * reexch[-1] - 0.00004 * res_s$[-1] + 0.50364
        (11.9711)              (1.99500)               (1.89150)

 Sum Sq      1.1644   Std Err     0.2203   LHS Mean    3.4870
 R Sq        0.8646   R Bar Sq    0.8533   F  2, 24   76.6177
 D.W.( 1)    2.2543   D.W.( 2)    2.1224
 H          -0.7925
```

Appendix

LIST OF EXOGENOUS VARIABLES

AVWAG_GOV$	Average wage: government $TT million
AVWAG_OIL$	Average wage: oil industry $TT million
BOPADJ$	Balance of Payments Adjustment $TT million
CAP_ADJ$	Adjustment on Govt Fiscal Account $TT million
CBEXTDEBT$	Central Bank External Debt $TT million
CBOPDEBT$	Central government External Debt (BOP) $TT million
CGINTRATE	Average Interest Rate on Central Govt internal Debt
CGNBOPDEBT$	Central government External Debt (Non-BOP) $TT million
COMCRED$	Commercial Bank Credit $TT million $TT million
DEP$	Consumption of fixed capital (depreciation) $TT million
DEPRATE	Nominal bank deposit interest rate
EMP_GOV	Employment:Government
EMP_OIL	Employment:Oil Sector
EXCH_ADJ	Adjustment for dual exchange rate in 1986
GCAPREV_CB$	Central Government Capital Revenue $TT million
GCFG_FIXED$	Fixed Public Sector Investment $TT million
GDEP$	General Government Fixed Capital Consumption $TT million
IR_L	Median Commercial Bank Lending Rate
LABF	Labour Force (000's)
MCGFRATE	Average interest rate on Central Govt External Debt
MNFS	Imports of non-factor services 1985 prices
MNFSDEF	Deflator, imports of non-factor services
MOTHCOMM$	Imports of Other Commodities $TT million
MOTHFY$	Fact.inc. pd. abroad (exc. foreign debt interest) $TT million
MSEFRATE	Av Interest rate on State Enterprise External Debt
MUT$	Unrequited Transfers to the Rest of the World $TT million
NGEG$	Govt.net purchases of goods & services $TT million
NONBCRED$	Non-Bank Credit to Government $TT million
NRES$	Non-Reserves: banking system $TT million
N_OTH_TAX_RATE	Tax Rate on "other" revenue of non oil sector
OCF$	Other Compulsory Fees Paid to Govt. $TT million
OERR$	Non-Bank Errors And Omissions $TT million
OILP_EXT	chained oil price-sa/ukbrent
OILP_RAT	Ratio of oil export deflator to Brent
OIL_CORP_RATE	Rate of Taxation of Oil Companies
OIL_ROY_RATE	Rate on royalty revenue of oil sector
OPUBEXTASS$	Other Public External Liabilities $TT million
OTHEXP_GOV$	Other Government Expenditure $TT million
OTHINC_TAX_RATE	Tax Rate,"other" income of non oil sector

LIST OF EXOGENOUS VARIABLES (CONT'D)

OTHIT$	Other Indirect Taxes $TT million
O_OTH_TAX_RATE	Tax Rate,"other" revenue of oil sector
PEFA_PER	Proportion of personal income used to purchase ext assets
PP_OS	Proportion of operating surplus appropriated by private sector
PROP_TAX_RATE	Property Tax Rate, non oil sector
REQ_LIQ	Required Liquidity
SALESTAX_RATE	Tax Rate on Goods & Services (inc VAT).
STOCK_GOV$	Public Sector Investment in Stocks $TT million
STOCK_PRI$	Private sector investment in stocks $TT million
SUBS$	Central Government Subsidies, $TT million
TAX_INC_C_RATE	Tax Rate on Companies (income)
TAX_INC_I_RATE	Tax Rate on Individuals (income)
TAX_TRADE_RATE	Tax Rate on International Trade
TBR	Treasury Bill rate
TRANS$	Other Current Govt Transfers $TT million
USPPI	US. Producer Price Index, 1985 = 1.00
US_CAP85	US capital equipment index
US_GDP	US Gross National Product, 1985 prices
US_INDP85	US industrial goods index
XFY$	Factor (investment) inc.from abroad $TT million
XG3	Exports of goods sitc3, 1985 prices
XGX3DEF	Exports of non-SITC 3 goods, deflator 1985=1
XNFS	Exports of non-factor services, constant 1985 prices
XNFSDEF	Exports of non factor services, deflator 1985=1
XUT$	Exports of unrequited transfers $TT million

Appendix

LIST OF ENDOGENOUS VARIABLES

AVCGEXTDEBT$	Average Central Govt External Debt $TT million
AVINTDEBT$	Average Central Govt Internal Debt $TT million
AVSEEXTDEBT$	Average State Enterprises External Debt $TT million
AVWAG_MANUF$	Average wage: Manufacturing Sector $TT million
AVWAG_OTH$	Average wage: non-oil non-government $TT million
CAB$	Surplus of the Nation on Current Account $TT million
CBCRED$	Central Bank Credit $TT million
CBDEPOS$	Central Bank Deposits $TT million
CGBDEBT$	Central Government Credit $TT million
CGBR$	Total Debt:central government $TT million
CGDINT$	Central Govt Interest Payments on Internal Loans $TT million
CGEXTDEBT$	External Debt:central government $TT million
CGINTDEBT$	Internal Debt $TT million
CGTOTDEBT$	Total Debt:central government $TT million
COMP$	Compensation of employees $TT million
COMP_GOV$	General Government Compensation of Employees $TT million
COMP_MANUF$	Compensation of Employees, Manufac.Sector $TT million
COMP_OIL$	Compensation of Employees, Petrol.Sector prices $TT million
COMP_OTH$	Compensation paid to workers in non-oil and non-government industries $TT million
CPI85	Retail Price Index, 1985 = 1.00
DEPRATE_R	Real Deposit Rate of Interest
DFI$	Direct Foreign Investment Flows $TT million
DINT$	General Government Interest Paid on Loans $TT million
DOMCRED$	Domestic Credit $TT million
DOMFA$	Domestic financial assets (stock) $TT million
EAO$	Errors and omissions $TT million
EMPTOT	Total Employment (all industries)
EMP_MANUF	Persons Employed in Manufacturing Sector
EMP_OTH	Total Employment in sectors other than oil, manuf and Gov
EXCHAVG	Average Exchange rate for 1 U.S.$.
EXP_INF	Expected Rate of Inflation
EXTASS$	External assets: banking system $TT million
EXTDEBT$	Total External Debt $TT million
FCE$	Final Consumption Expenditure $TT million
FDINT$	Interest Paid on Public Sector External Debt $TT million
GCEXP$	Central Government Current Expenditure $TT million
GCF	Gross Capital Formation , 1985 prices
GCF$	Gross Capital Formation $TT million

LIST OF ENDOGENOUS VARIABLES (Cont'd)

GCFDEF	Gross Capital Formation Deflator
GCFP_FIXED	Private Fixed Investment
GCFP_FIXED$	Fixed Private Investment $TT million
GCF_FIXED$	Total Fixed Investment $TT million
GCREV$	Central Government Current Revenue $TT million
GDI$	Gross Disposable Income $TT million
GDPFC	GDP at Factor cost, 1985 prices
GDPFC$	GDP at Factor Cost $TT million
GDPFC_MANUF	GDPFC of Manuf Sector, 1985 prices
GDPFC_MANUF$	GDP at Factor Cost, manuf. Sector $TT million
GDPFC_OIL	GDP at FC, oil Sector, 1985 prices
GDPFC_OIL$	GDP at Factor Cost, Petrol sector $TT million
GDPFC_OTH	Real GDPFC of Sectors exc oil and manuf, 1985 prices
GDPFC_OTH$	GDP at Factor Cost (exc oil and manuf) $TT million
GDPFC_OTH_DEF	Implicit GDP deflator, sectors exc oil and manuf
GDPMP$	Gross Domestic Product at market prices $TT million
GDPMPDEF	GDP(MP) deflator
GDPMP_MAN_DEF	Implicit GDPMP manufacturing deflator
GDPMP_OIL_DEF	Implicit GDPMP Petroleum deflator
GFCE	Government Final Consumption Expenditure, 1985 prices
GFCE$	Government Final Consumption Expenditure $TT million
GFCEDEF	General Government Final Consumption Exp. Deflator
GSAVD$	Gross Domestic Savings (Resource Balance) $TT million
GSAVG$	Gross Govt Savings $TT million
GSAVN$	Gross National Savings $TT million
IR_LR	Real Lending Rate
IT_PLUS_VAT$	Indirect Taxes inc VAT $TT million
MCAPGOODS	Imports of Capital Goods, 1985 prices
MCAPGOODS$	Imports of Capital Goods $TT million
MCAP_DEF	Imports of Capital Goods Deflator
MCGFINT$	Central Govt. Interest paid on Ext. Loans Payments $TT million
MCONS$	Imports of Consumer Goods $TT million
MCONS_DUR$	Imports of Durable Consumer Goods $TT million
MCONS_DUR_DEF	Imports of Cons Durable Goods Deflator
MCONS_NDUR_DEF	Imports of Consumer Non Durable Goods Deflator
MCONS_NONDUR$	Imports of non durable consumer goods $TT million
MCONS_NONDUR	Imports of Cons non durable goods, 1985 prices
MFY$	Factor Income to the Rest of the World $TT million
MG	Imports of goods (adjusted),1985 prices
MG$	Imports of Googs (adjusted) $TT million
MGDEF	Deflator, imports of goods
MGNFS	Imports Of Goods And Non Factor Services, 1985 prices

LIST OF ENDOGENOUS VARIABLES (Cont'd)

MGNFS$	Imports of Goods & Non Factor Services $TT million
MINTER$	Imports of Raw Mat & Inter Goods (adjusted) $TT million
MINTER	Imports of Raw Mat & Inter Goods, 1985 prices
MINT_DEF	Deflator (MINTER)
MNFS$	Imports of non factor services $TT million
MON$	Money (M1) $TT million
MS$	Imports of Services $TT million
MSEFINT$	Interest Payment on State Enterprises' Foreign Debt $TT million
MT$	Imports of Goods,Services and Unreq.Trans $TT million
NDI$	National Disposable Income $TT million
NOILREV$	Govt.Revenue from Non-Oil Sector $TT million
NOILTAX_INC$	Govt.Revenue from Non-Oil Income $TT million
NOILTAX_INC_C$	Corporation Tax, non oil sector companies $TT million
NOILTAX_INC_I$	Income Taxes Paid by Individuals $TT million
NOILTAX_OTHINC$	"Other" Inc. Tax from non oil sector $TT million
NOILTAX_PROP$	Govt.Revenue from Non-Oil Taxes on Property $TT million
NOILTAX_TRADE$	Taxes on International Trade $TT million
NOIL_OTHREV$	"Other" revenue from the non oil sector $TT million
OADJEXT$	Other External Adjustments $TT million
OILREV$	Government Current Revenue from the Oil Sector prices $TT million
OILREV_OTH$	Govt Rev from oil other than Corp Tax and Royalties $TT million
OILTAX_CORP$	Corporation Tax (Oil Sector) $TT million
OILTAX_ROY$	Oil Royalties $TT million
OSDISP$	Disposable Operating Surplus $TT million
OS_G$	Gross Operating Surplus $TT million
OS_G_MANUF$	Gross Operating Surplus, Manufacturing Sector $TT million
OS_G_OIL$	Gross Operating Surplus, Petroleum Sector $TT million
OS_G_OTH$	Gross Operating Surplus, Sectors Exc.Oil And Manuf $TT million
OTHEXTASS$	Other Assets and External Liabilities $TT million
OTHLIAB$	Other Liabilities of Banking Sector $TT million
PDFA_PER	Proportion of personal income used for acquistion of domestic financial assets
PER_DISP	Real personal disposable income, 1985 prices
PER_DISP$	Personal disposable income $TT million
PFCE	Private Final Consumption Expenditure, constant 1985 prices
PFCE$	Private Final Consumption Expenditure $TT million
PFCEDEF	Private Final Consumption Exp. Deflator
PMON	Proportion of domestic assets held as money (M1)
PRIBR$	Private sector borrowing requirement $TT million
PRIDEBT$	Private Sector Credit $TT million
PRI_DISP	Private Disposable Income

LIST OF ENDOGENOUS VARIABLES (Cont'd)

PRI_DISP$	Private disposable income $TT million
QMON$	Quasi_Money $TT million
REEXCH	Real Exchange Rate
RES$	Foreign Reserves held by banking system $TT million
SALESTAX$	Govt Revenue from sales of goods and services $TT million
SAVF$	Net Lending Abroad (Net Foreign Savings) $TT million
SAVG$	Govt. Surplus on current a/c using CB Data $TT million
SEBR$	Change in Total Debt:state enterprises $TT million
SEDEBT$	State Enterprises Credit $TT million
SEXTDEBT$	External Debt:State enterprises $TT million
TBR_R	Real Treasury Bill rate
TOTASS$	Total assets: banking system $TT million
TOTLIAB$	Total Liabilities, banking system $TT million
UNEMP_RATE	Unemployment Rate
XG	Exports of goods, 1985 prices
XG$	Total exports of Goods
XG3$	Exports SITC 3 - Minerals, Fuels,Lubricants & rel mat
XG3DEF	Exports of SITC 3 goods, deflator
XGDEF	Exports of goods, deflator
XGNFS	Exports of Goods & Non Fact.Services, 1985 prices
XGNFS$	Exports Of Goods And Non Factor Services
XGNFSDEF	Exports of Goods & Non Factor Services Deflator
XGX3	Exports of goods excluding sitc3, 1985 prices
XGX3$	Exports of goods excluding SITC 3 $TT million
XNFS$	Exports of Non Factor Services $TT million
XT$	Exports of Goods, Services and Unreq.Transfers $TT million