
MEDIUM-TERM FORECASTING WITH AN ECONOMETRIC MODEL
OF THE TRINIDAD AND TOBAGO ECONOMY: CBMOD1

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INTRODUCTION

In June 1988, the Research Department of the Central Bank of Trinidad and Tobago presented the first version of its macroeconomic model of the Trinidad and Tobago economy. This model (entitled CBMOD1) was designed primarily to assist policymakers in forecasting and policy analysis. CBMOD1 has since been tested for its power in explaining the major economic relationships in the economy and for its accuracy in predicting the effects of specific policy "shocks" in the short term. This paper represents the first attempt at "passive" forecasting over the medium term.

The present study aims to map out the course of the Trinidad and Tobago economy over the next five years, given the present policy situation and expected external developments. It seeks to predict the movements of the major economic variables - in particular, GDP, the government budget balance, the balance of payments and the rate of

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employment - with a view to identifying any potentially unfavourable developments.

The structure of the paper is as follows: Section I discusses the structure of CBMOD1, and analyses the estimation and historical simulation results; Section II presents the Forecast methodology while Section III discusses the Forecast Results.

SECTION I

CBMOD1: STRUCTURE

CBMOD1 attempts to capture the relationships which are central to the Trinidad and Tobago economy; (i) the prominence of oil exports; (ii) the importance of government oil revenue and government expenditure in the economy; (iii) the links between the government budget, oil exports and the money supply; (iv) the significant role of imports as a leakage from the circular flow of income.

The model is divided into the following seven sectors.³ Note that an asterisk (*) denotes an identity relationship.

Government Sector

1. ROIL = AO + A1.XOIL + U1
[AO, A1 ≥ 0]
2. RIMP = B0 + B1. IMPOR + U2
[B0, B1 ≥ 0]
3. RPT = C0 + C1.NGDP + U3
[C1 ≥ 0]
[C0 ≥ 0]
4. ROR = D0 + D1.NGDP + U4
[D0, D1 ≥ 0]
- 5.* REV = ROIL + RIMP + RPT + ROR
6. GCUR = E0 + E1.GCUR(-1) + E2.REV + U6
[E0, E1, E2 ≥ 0]

$$7^* \quad \text{GOVEX} = \text{GCUR} + \text{GCAP}$$

$$8^* \quad \text{BUD} = \text{REV} - \text{GOVEX}$$

Monetary Sector

$$9. \quad \text{MS} = \text{F0.BASET} + \text{U9} \\ [\text{F0} \geq 0]$$

$$10. \quad \text{BASET} = \text{NDAT} + \text{NFA}$$

$$11. \quad \text{NDAT} = \text{G0} + \text{G1.BUD} + \text{G2.NDAT}(-1) + \text{U11} \\ [\text{G0}, \text{G2} \geq 0, \text{G1} \leq 0]$$

$$12. \quad \text{NFA} = \text{H0} + \text{H1.CAB} + \text{H2.NFA}(-1) + \text{U12} \\ [\text{H0}, \text{H1}, \text{H2} \geq 0]$$

$$13. \quad \text{MD} = \text{I0} + \text{I1.GDP} + \text{U13} \\ [\text{I0}, \text{I1} \geq 0]$$

Price Determination

$$14. \quad \text{PR} = \text{J0} + \text{J1.MS} + \text{J2.GDP} + \text{J3.WAGRET} + \text{J4.PIMP} + \text{U14} \\ [\text{J0}, \text{J1}, \text{J3}, \text{J4} \geq 0] \\ [\text{J2} \leq 0]$$

Balance of Payments

$$15^*. \quad \text{XOIL} = (\text{EXCH1.POIL.VXOIL1})$$

$$16. \quad \text{VXMAN1} = \text{K0} + \text{K1.FPXOR} + \text{K2.FGDP} + \text{K3.VIMKT} + \text{U16} \\ [\text{K0}, \text{K2}, \text{K3} \geq 0] \\ [\text{K1} \leq 0]$$

$$17^*. \quad \text{XPORT} = \text{XOIL} + (\text{VXMAN1.PXOR}) + \text{XSERVM}$$

$$18^*. \quad \text{FPXOR} = (\text{PXOR/EXCH1})$$

$$19. \quad \text{VIMC} = \text{L0} + \text{L1.GDP} + \text{L2.MCR}(-1) + \text{L3.PIMC} + \text{U19} \\ [\text{L0}, \text{L1}, \text{L2} \geq 0] \\ [\text{L3} \leq 0]$$

$$20. \quad \text{VIMK} = M0 + M1.GDP + M2.MCR(-1) + M3.PIMK + U20$$

[M0, M1, M2 \geq 0]
[M3 \leq 0]

$$21. \quad \text{IMS} = N0 + N1.GDP + N2.MCR(-1) + U21$$

[N0, N1, N2 \geq 0]

$$22*. \quad \text{IMPOR} = (\text{VIMC.PIMC}) + (\text{VIMK.PIMK}) + \text{IMS}$$

$$23*. \quad \text{PIMC} = (\text{EXCHL.FPIMC})$$

$$24*. \quad \text{PIMK} = (\text{EXCHL.PMI})$$

$$25*. \quad \text{PIMP} = \text{AA1.PIMC} + \text{AA2.PIMK}$$

$$26*. \quad \text{CAB} = \text{XPORT} - \text{IMPOR}$$

$$27*. \quad \text{RESCHG} = \text{CAB} + \text{KAB}$$

Consumption

$$28. \quad \text{CONS} = P0 + P1.YPD + U28$$

[P0, P1 \geq 0]

$$29. \quad \text{YPD} = Q0 + Q1 [\text{GDP}(i)] - \text{RPT}(i) + U29$$

Labor Market and Wage Determination

$$30. \quad \text{LD} = R0 + R1.NGDP + R2.XOIL + U30$$

[R0, R1, R2 \geq 0]

$$31*. \quad \text{UNR} = (\text{LS-LD})/\text{LS}$$

$$32. \quad \text{WAGRET} = S0, S1.PRE + S2.UNR + U33$$

[S0, S1 \geq 0]
[S2 \leq 0]

National Income

$$33*. \quad \text{GDP} = \text{CONS} + \text{INVEST} + \text{GOVEX} + \text{CAB}$$

$$34*. \quad \text{NGDP} = \text{GDP} - \text{XOIL}$$

where

- AA1 = share of consumer goods in total merchandise imports.
- AA2 = share of capital and intermediate goods in total merchandise imports.
- BASET = monetary base
- BUD = government budget balance
- CAB = current account balance
- EXCHI = exchange rate - \$TT per \$US
- FGDP = indwx of foreign gross domestic product: GDP of the foreign importers of domestically manufactured goods
- FPIMC = import price index for consumer goods (TT\$)
- FPXOR = index of export prices of manufactured goods (US\$)
- GOVEX = total government expenditure
- GCAP = government capital expenditure
- GCUR = government current expenditure
- GDP = gross domestic product
- IMPOR = total value of imports
- IMS = total value of imports of services
- KAB = capital account balance
- LD = demand for labour
- LS = supply of labour
- MCR = import cover ratio
- MD = demand for money
- MS = money supply
- NDAT = net domestic assets of the Central Bank
- NFA = net foreign assets of the Central Bank
- NGDP = non-oil gross domestic product
- PIMC = import price index for consumer goods (TT\$)
- PIMK = import price index for intermediate and capital goods (US\$)
- PIMP = overall import price index (TT\$)

PMI = import price index for capital and intermediate goods
(US\$)

POIL = foreign oil price (US\$)

PRE = expected price level

PXOR = index of export prices of manufactured goods (TT\$)

REV = total government revenue

RESCHG = changes in foreign exchange reserves

RIMP = government import duty revenue

ROIL = government oil revenue

ROR = other government revenue

RPT = government revenue from personal income taxes

VIMC = volume of consumer imports

VIMK = volume of capital and intermediate imports

VXMAN1 = volume of manufactured exports

VXOILL1 = volume of oil exports

WAGRET = wage rate

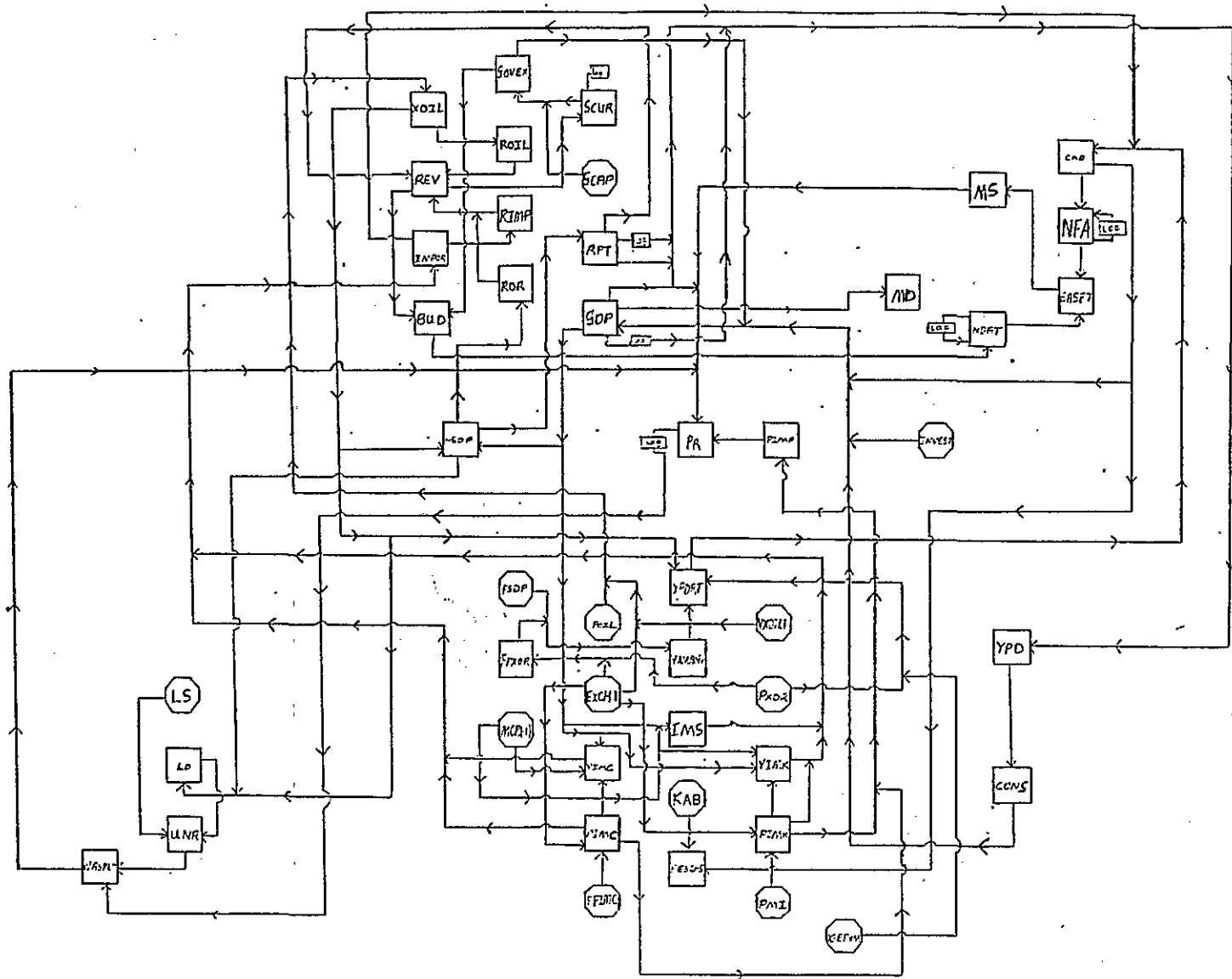
XOIL = value of oil exports

XPORT = total value of exports

XSERVM = value of non-oil, non-manufactured goods and services

YPD = permanent disposable income

BLOCK DIAGRAM OF CBMOD1



CBMOD1: ESTIMATION

The seventeen (17) behavioural equations of CBMOD1 were estimated in linear form over the period 1966 - 1986. The system, identified as a block recursive system, utilized 53 variables, of which 34 were endogenous. The Two Stage Least Squares (TSLS) estimation procedure was used. Analysis of the residual patterns of the behavioural equations indicated serial correlation in equations ROR, RPT, MD, MS, VXMAN1, VIMC, VIMK, CONS, LD and WAGRET.

The reported estimates were corrected for first-order autocorrelation using the Beach Mac Kinnon procedure. Where the Durbin Watson test was inconclusive, additional tests (Ljung-Box and Breusch-Godfrey) were performed on the residuals. With reference to the summary statistics, the estimation results were satisfactory, except in the case of the VXMAN1 equation, where the R^2 statistic was quite low. The results are presented in Table 1.

TABLE 1: CBMOD1: ESTIMATION RESULTS

GOVERNMENT SECTOR

$$(1) \quad ROIL = 15.733 + 1.042 XOIL \\ (0.215) \quad (27.807)$$

SER = 211.9 D.W. = 1.901 $\bar{R}^2 = 0.976$ F = 773.5

$$(2) \quad \text{RIMP} = -7.175 + 0.0655 \text{ IMPOR} \\ (-0.445) \quad (20.009)$$

SER = 43.177 D.W. = 2.285 $\bar{R}^2 = 0.955$ F = 400.337

$$(3)* \quad \text{ROR} = -38.788 + 0.111 \text{ NGDP} \\ (-0.553) \quad (15.204)$$

SER = 123.019 D.W. = 1.978 RHO = 0.395 QSTAT = 3.691
(1.722)

BG = 1.376 $\bar{R}^2 = 0.967$ F = 557.19

$$(4)* \quad \text{RPT} = -222.700 + 0.100 \text{ NGDP} \\ (-2.304) \quad (10.722)$$

SER = 91.551 D.W. = 1.138 RHO = 0.721 QSTAT = 6.547
(4.593)

BG = 2.561 $\bar{R}^2 = 0.976$ F = 774.83

$$(5) \quad \text{G CUR} = -64.288 + 0.705 \text{ G CUR}(-1) + 0.303 \text{ REV} \\ (-0.422) \quad (8.266) \quad (4.11)$$

SER = 429.19 Dh = -0.513 $\bar{R}^2 = 0.967$ F = 282.84

MONETARY SECTOR

$$(6) \quad \text{NDAT} = -115.909 - 1.006 \text{ BUD} + 1.108 \text{ NDAT}(-1) \\ (0.662) \quad (-6.491) \quad (15.140)$$

SER = 598.988 Dh = -1.525 $\bar{R}^2 = 0.923$ F = 114.868

$$(7) \quad \text{NFA} = 169.168 + 1.095 \text{ CAB} + 1.058 \text{ NFA}(-1) \\ (1.612) \quad (13.278) \quad (34.256)$$

SER = 329.421 Dh = -0.806 $\bar{R}^2 = 0.984$ F = 586.895

$$(8)* \quad \text{MD} = 482.002 + 0.356 \text{ GDP} \\ (0.504) \quad (6.374)$$

SER = 401.906 D.W. = 0.818 RHO = 0.926 QSTAT = 9.446
(12.542)

BG = 8.272 $\bar{R}^2 = 0.982$ F = 1045.92

$$(9)* \quad MS = 3.320 \text{ BASET} \\ (34.707)$$

$$SER = 303.527 \quad D.W = 1.276 \quad RHO = 0.501 \quad QSTAT = 14.324 \\ (2.262)$$

$$BG = 2.245 \quad \bar{R}^2 = 0.990$$

PRICE SECTOR

$$(10) \quad PR = 32.070 + 0.060 MS - 0.021 GDP + 3.360 WAGRET \\ (2.974) \quad (6.062) \quad (-4.564) \quad (0.839)$$

$$+ 0.818 PIMP \\ (4.668)$$

$$SER = 13.666 \quad D.W. = 1.813 \quad \bar{R}^2 = 0.991 \quad F = 540.919$$

BALANCE OF PAYMENTS SECTOR

$$(11)* \quad VXMAN1 = 1.128 - 0.0110 FPXOR + 0.025 FGDP + 0.051 VIMK \\ (1.340) \quad (-3.999) \quad (1.1929) \quad (0.775)$$

$$SER = 0.369 \quad D.W = 1.613 \quad RHO = 0.311 \quad QSTAT = 15.046 \\ (1.308)$$

$$BG = 6.133 \quad \bar{R}^2 = 0.429 \quad F = 5.73$$

$$(12) \quad VIMC = 6.605 + 0.0005 GDP + 0.182 MCR (-1) - 0.034 PIMK \\ (11.049) \quad (5.052) \quad (2.991) \quad (-3.690)$$

$$SER = 0.759 \quad D.W = 1.706 \quad RHO = 0.421 \quad \bar{R}^2 = 0.877 \quad F = 45.97 \\ (1.862)$$

$$(13)* \quad VIMK = 3.452 + 0.0004 GDP + 0.289 MCR(-1) - 0.019 PIMK \\ (5.333) \quad (2.713) \quad (4.483) \quad (-2.171)$$

$$SER = 0.865 \quad D.W = 1.637 \quad RHO = 0.341 \quad QSTAT = 7.113 \\ (1.441)$$

$$BG = 7.663 \quad \bar{R}^2 = 0.851 \quad F = 37.14$$

$$(14) \quad IMS = 96.070 + 0.155 GDP - 22.776 MCR(-1) \\ (1.175) \quad (15.506) \quad (-1.989)$$

$$SER = 204.198 \quad D.W = 1.514 \quad \bar{R}^2 = 0.959 \quad F = 225.088$$

CONSUMPTION SECTOR

$$(15)^* \quad \text{CONS} = -662.512 + 0.819 \text{ YPD} \\ \quad \quad \quad (-0.616) \quad (8.370)$$

$$\text{SER} = 1,013.54 \quad \text{D.W} = 1.365 \quad \text{RHO} = 0.717 \\ \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad (4.587)$$

$$\bar{R}^2 = 0.965 \quad F = 523.89$$

LABOUR MARKET AND WAGE DETERMINATION

$$(16)^* \quad \text{LD} = 316.818 + 0.005 \text{ NGDP} + 0.001 \text{ XOIL} \\ \quad \quad \quad (29.370) \quad (4.375) \quad \quad \quad (0.309)$$

$$\text{SER} = 9.467 \quad \text{D.W} = 1.310 \quad \text{RHO} = 0.746 \quad \text{QSTAT} = 8.281 \\ \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad (5.132)$$

$$\text{BG} = 2.614 \quad \quad \quad \bar{R}^2 = 0.938 \quad F = 143.97$$

$$(17)^* \quad \text{WAGRET} = 10.931 + 0.071 \text{ PR}(-1) - 92.490 \text{ UNR} \\ \quad \quad \quad (3.282) \quad (13.978) \quad \quad \quad (-3.961)$$

$$\text{SER} = 1.376 \quad \text{D.W} = 1.041 \quad \text{RHO} = 0.629 \quad \text{QSTAT} = 17.891 \\ \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad (3.535)$$

$$\text{BG} = 7.943 \quad \quad \quad \bar{R}^2 = 0.982 \quad F = 510.32$$

SER - Standard Error of the Regression
D.W. - Durbin Watson 'D' Statistic
Dh - Durbin Watson 'H' Statistic
RHO - Serial Correlation Parameter
QSTAT - Ljung-Box Q Statistic
BG - Breusch-Godfrey Chi-Square Statistic
 \bar{R}^2 - Adjusted R-squared
F - Fischer-Snedecor test Statistic
(.) - t-statistics
* - Corrected for first-order serial correlation by the Beach-McKinnon (1978) Maximum Likelihood Method.

ESTIMATION PROCEDURE- MAJOR FINDINGS

- (i) The progressivity of the income tax system was indicated by a significant negative intercept in the RPT equation.

- (ii) The coefficient of import duties in the Import Revenue equation indicated that the average rate of duty on imports was approximately 7 per cent.
- (iii) the taxes were found to be generally elastic with respect to their respective bases. For oil revenue, the elasticity was 0.990, for import duties 1.021, for personal income taxes 1.418 and, for other revenue, 1.060.
- (iv) The money multiplier was estimated at 3.20.
- (v) Money Supply and import prices were found to have a significant effect on the domestic price level.
- (vi) The level of foreign prices and foreign income were found to be significant factors in determining the volume of manufactured exports. The price elasticity of manufactured exports was computed to be less than 1.0 in absolute value (0.605).
- (vii) The volume of capital and intermediate imports was found to be more price and income elastic than the volume of consumer imports.
- (viii) The marginal propensity to consume was computed to be 82 per cent of permanent disposable income.

HISTORICAL SIMULATION: PERFORMANCE

The endogenous variables were simulated over the period 1968 to 1986. Simulation statistics appear in Appendix I. The plots of the actual versus the simulated values of the endogenous variables are shown in Appendix I. These plots include forecast values for the period 1987 - 1988.

In general, the simulation results were satisfactory, except for those of the monetary sector and the prices equation, where underestimation of the actual series in the 1970s gave way to overestimation in the 1980s.

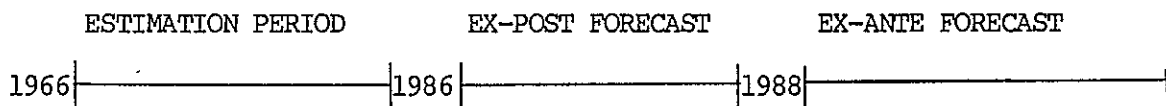
SECTION II

FORECAST METHODOLOGY

Ex-ante and Ex-post forecasts were undertaken for CBMOD1. For the ex-post forecasts, actual values for both the endogenous and predetermined variables in the system were known and available. The model was simulated over the period 1987-1988 and simulated values for the Endogenous variables were used as forecasts and compared with the actual values. A tabular summary of the ex-post forecasting performance of the major endogenous variables in CBMOD1 over the period 1987-1988 is presented in Table 2.

In the 'ex-ante' procedure, CBMOD1 forecasts for the values of the dependent variables, over the period 1989-1993, were based on projections of the exogenous variables over the Forecast Period, 1989-1993.

FORECAST MAP



Projections for the exogenous variables over the period 1989-1993 were based partly on in-house projections of the Research

TABLE 2

FORECAST PERFORMANCE OF CBMOD1 - SELECTED VARIABLES

VARIABLE	YEARS	ACTUAL	FORECAST	ABSOLUTE ERROR	PERCENTAGE ERROR
ROIL	1987	1958.1	1964.8	6.7	0.34%
	1988	1552.7	1770.3	217.6	14.01%
GCUR	1987	5562.9	5568.3	-60.7	-1.08%
	1988	5064.3	5512.8	448.5	8.86%
REV	1987	5232.0	5472.9	240.9	4.60%
	1988	4703.7	5306.8	603.1	12.82%
BUD	1987	-1248.7	-947.2	301.5	-24.15%
	1988	-1040.9	-886.3	154.6	-14.85%
MS	1987	8190.7	9726.9	1536.2	18.76%
	1988	8841.6	13026.8	4182.2	47.30%
BASET	1987	2777.6	2929.9	152.3	5.48%
	1988	2372.7	3922.9	1550.2	65.33%
PR	1987	565.6	611.8	46.2	8.17%
	1988	609.7	826.7	217.0	35.59%
VXMAN1	1987	2.6896	2.5778	-0.1118	-4.16%
	1988	2.7273	2.6240	-0.1033	-3.79%
IMPOR	1987	6953.5	6345.4	-608.1	-8.75%
	1988	7246.8	6468.6	-778.2	-10.74%
CAB	1987	-995.6	-418.1	577.5	-58.01%
	1988	-812.3	-64.4	747.9	-92.07%
CONS	1987	13622.1	13924.4	302.3	2.22%
	1988	13176.8	1363.4	457.2	3.47%
WAGRET	1987	27.5	30.4	2.9	10.58%
	1988	26.6	33.7	7.6	26.44%
UNR	1987	0.223	0.174	-0.048	-21.74%
	1988	0.221	0.193	-0.027	-12.42%
GDP	1987	16991.7	17810.9	819.2	4.82%
	1988	16490.7	18144.4	1653.7	10.03%

Department and on structural adjustment considerations.* In particular, forecasts of the price of oil and oil production levels assume stable market conditions. Foreign demand, as measured by foreign G.D.P., is expected to grow marginally by 0.5% an average over the period, while the exchange rate is assumed to remain fixed at its 1989 level.

The model consists of thirteen exogenous variables all of which are relatively simple to obtain. A summary listing of the Forecast values for the variables is contained in Table 3.

TABLE 3
FORECAST VALUES FOR THE EXOGENOUS VARIABLES

	GCAP	KAB	LS	EXCH1	POIL	VXOIL1
1986	978.3	-112.5	471.7	1.756	3.44	328.7
1987	851.7	-25.4	478.7	1.756	3.76	283.7
1988	680.3	309.8	476.8	1.863	3.29	274.4
1989	66.7	442.0	463.2	2.073	3.77	255.0
1990	660.4	592.5	465.5	2.073	3.88	250.0
1991	434.2	571.2	466.0	2.073	3.88	248.0
1992	650.0	535.2	475.3	2.073	3.88	250.0
1993	650.0	535.2	484.4	2.073	3.88	250.0

* See Letter of Intent of Government, Quarterly Economic Bulletin, Volume XIII, No. 4, December 1988.

TABLE 3 (Cont'd)

	FGDP	PXOR	XSERUM	MCR	FPIMC	PMI
1986	111.0	249.6	2,831.4	2.9	155.1	211.7
1987	113.7	265.8	3,371.9	0.8	162.9	219.1
1988	116.0	283.1	3,978.1	0.5	161.1	213.7
1989	118.3	288.8	4,574.8	2.0	164.3	217.3
1990	120.7	294.5	5,032.3	3.0	167.6	221.6
1991	121.3	300.4	5,183.3	5.0	170.9	226.0
1992	121.9	306.4	5,338.8	5.0	174.4	232.8
1993	122.5	312.6	5,498.9	7.0	177.8	237.5

SECTION III

FORECAST RESULTS

EX-POST FORECASTS

(Exogenous Variables Known: 1987-1988)

In the course of construction and estimation of CBMOD1 over the period 1966 to 1986, data for two additional years became available. It was therefore possible to test the forecast performance of the model against actual outcomes. A subsequent revision of the model will extend the estimation period to include these years.

Table 4 and the charts provided in Appendix II provide give comparisons of the forecast values of key endogenous variables with their actual paths. In general the forecasting performance of CBMOD1 was satisfactory, particularly for the year 1987. The evolution of the economic structure suggests that the parameter values were more stable the closer the forecast year to the estimation period. It is therefore likely that the forecast errors would progressively widen up to 1993, the last year of our forecast.

The government and balance of payments sectors were particularly strong on forecasting. The average prediction error for current revenue was 8.7 per cent and for current expenditure 3.9 per cent. The larger positive margin of error for prediction of oil revenue in 1988 was due to an alteration in the tax regime whereby the ratio of oil taxes to value of oil production would decrease steadily up to 1990.

The average forecast errors for total imports was -9.7 per cent and manufactured exports -4.0 per cent. Although the model underestimated import levels, government import duties were overestimated. This was a result of the change in the exchange control mechanism which altered the composition of imports towards more capital and intermediate goods bearing less duty as compared with consumer goods. The movements in the current account were correctly predicted although the magnitude of the deficits were underestimated.

The poor (within-period) simulation of the money supply was reflected in its forecast performance, with forecast errors of 19 per cent and 47 per cent in 1987 and 1988 respectively. The model successfully predicted the direction of the monetary aggregate but overestimated the magnitude of changes. The predictions of price were influenced by the dominance of the monetary effects with forecast errors of 8 per cent and 36 per cent in 1988 and 1989 respectively.

The average forecast error for nominal GDP was 7 per cent, although the model predicted a 1.9 per cent increase in nominal GDP compared to its actual 2.9 per cent decline in 1988. This was due essentially to overprediction of government spending and underestimation of the size of the current account deficit. In the labour market the actual unemployment rate was 22 per cent in 1988, compared with the forecast of 19 per cent.* The model did not capture the dip in the wage rate in 1988.

* The large jump in the unemployment rate reported by the Central Statistical Office from 17 per cent to 22 per cent between 1986 and 1988 appears to be linked to a change in the CSO's methodology in estimating the rate. CBMOD1, however, works with the rate unadjusted for the statistical change.

III(b) EX-ANTE FORECASTS

(Exogenous Variables Unknown: 1989-1991)

The accuracy of predictions from econometric models depends essentially on three factors: (i) the accuracy of predictions of exogenous variables; (ii) the accuracy of the model as a representative of the structure of the economy; and (iii) the stability of the model over time.

The assumptions governing our predictions of the exogenous variables have been spelt out in Section 2. In general, we maintained an exchange rate fixed at the 1989 level, and assumed fairly stable oil prices and oil production. Foreign prices of imports are expected to increase by 2 per cent per year with foreign incomes rising by 2 per cent up to 1990 and 0.5 per cent thereafter. Non-manufactured exports are predicted to grow by 10 per cent up to 1990 and 3 per cent thereafter. Government capital expenditure is predicted to initially decline up to 1991 and then rise up to 1993. After a decline in 1989, the labor supply is expected to increase slowly in subsequent years. The capital account is expected to achieve a surplus averaging approximately \$550 million.

The estimation results and simulation performance of CBMOD1 indicate that the model worked well over its estimation period, although simulation of the monetary sector was not as satisfactory as that of the other sectors. Several factors are likely to alter the parameter values after 1986. These include tax changes such as the Supplemental Petroleum Tax, marginal rate changes for direct taxes and the introduction of a Value Added Tax in 1990. Important policy changes would also come from

conditionalities associated with the International Monetary Fund Stand-by Arrangements and World Bank Structural Adjustment Loans.

SUMMARY AND CONCLUSION

Given these caveats and considerations, our forecasts indicate a reduction in the governments' overall budget deficit which turns into surplus past 1990. This is caused by steady oil revenues, a reduction in capital expenditure and a level of current expenditure that initially declines and then rises very slowly. Increases in the value of oil and other exports contribute to balance of payments current account surpluses from 1989. These surpluses, however, are somewhat offset by the forecast growth in imports. Nominal GDP is forecast to increase slowly and, with it, nominal personal disposable income. After an increase in 1989, the nominal wage rate is forecast to decline in each year; the unemployment rate rises steadily after a decline in 1989. The paths of the monetary variables as well as the price level follow a downward trajectory to 1993. The link indicated by CBMOD1 to exist between the monetary base and the government budget seems to contribute to the decline in the money supply. While a continuously declining price level does not seem to be plausible, the forecast results appear to indicate a low underlying rate of inflation in Trinidad and Tobago.

TABLE 4

ACTUAL FORECAST RESULTS OF CBMOD1: 1980-1993

	<u>ROIL</u>		<u>GCUR</u>		<u>REV</u>	
	<u>Actual</u>	<u>Forecast</u>	<u>Actual</u>	<u>Forecast</u>	<u>Actual</u>	<u>Forecast</u>
1980	4,136.5		3,075.0		6,226.4	
1981	4,253.0		3,493.8		6,850.7	
1982	3,274.2		5,893.5		6,824.7	
1983	2,461.4		6,242.9		6,438.8	
1984	2,759.7		6,291.1		6,551.7	
1985	2,457.1		6,077.9		6,361.2	
1986	1,690.6		5,636.3		5,234.6	
1987	1,958.1	1,964.8	5,629.0	5,568.3	5,232.0	5,472.7
1988	1,552.7	1,770.4	5,064.3	5,512.8	4,703.7	5,306.6
1989		2,091.8		5,286.1		5,871.3
1990		2,110.5		5,319.9		5,982.7
1991		2,093.7		5,292.1		5,891.0
1992		2,110.5		5,329.6		6,014.7
1993		2,110.5		5,357.0		6,105.1

TABLE 4 (Cont'd)

ACTUAL FORECAST RESULTS OF CBMOD1: 1980-1993

	BUD		MS		BASET	
	Actual	Forecast	Actual	Forecast	Actual	Forecast
1980	760.1		4,601.4		1,237.2	
1981	175.8		4,902.3		1,505.1	
1982	-2,652.4		6,414.7		2,086.2	
1983	-2,344.1		7,561.6		2,486.9	
1984	-1,756.2		8,129.8		2,438.6	
1985	-1,361.8		8,220.4		2,404.2	
1986	-1,379.9		8,079.9		2,212.2	
1987	-1,248.7	-947.3	8,190.7	9,724.3	2,777.6	2,929.1
1988	-1,040.9	-886.4	8,841.6	1,302.8	2,373.7	3,922.0
1989		-81.5		10,960.4		3,301.4
1990		2.4		9,609.0		2,894.4
1991		164.7		9,035.9		2,721.7
1992		35.1		9,045.1		2,724.5
1993		98.1		8,886.3		2,676.7

TABLE 4 (Cont'd)

ACTUAL FORECAST RESULTS OF CBMOD1: 1980-1993

	<u>PR</u>		<u>VXMAN1</u>		<u>IMPOR</u>	
	<u>Actual</u>	<u>Forecast</u>	<u>Actual</u>	<u>Forecast</u>	<u>Actual</u>	<u>Forecast</u>
1980	261.5		1.145		6,920.1	
1981	299.0		2.812		7,036.7	
1982	333.2		2.278		8,843.6	
1983	389.0		2.033		8,509.3	
1984	440.2		1.703		7,399.5	
1985	474.7		1.822		6,483.6	
1986	511.0		2.774		7,895.6	
1987	565.6	611.7	2.690	2.578	6,953.5	6,347.1
1988	609.7	826.6	2.727	2.624	7,246.8	6,471.3
1989		724.4		2.805		6,883.4
1990		622.6		2.812		7,670.5
1991		592.6		2.794		7,796.4
1992		585.9		2.794		8,131.9
1993		566.3		2.777		8,288.2

TABLE 4 (Cont'd)

ACTUAL FORECAST RESULTS OF CBMOD1: 1980-1993

	CAB		CONS		WAGRET	
	Actual	Forecast	Actual	Forecast	Actual	Forecast
1980	1,132.3		6,864.7		15.743	
1981	946.2		8,196.8		19.625	
1982	-1,615.7		11,102.5		26.483	
1983	-2,464.1		15,501.1		27.912	
1984	-1,336.3		14,763.4		27.414	
1985	-263.4		14,188.3		27.152	
1986	-2,385.2		14,468.4		27.476	30.4
1987	-995.6	-418.9	13,622.1	13,923.9	27.476	30.4
1988	-812.3	-65.3	13,176.8	13,633.4	26.626	33.7
1989		494.5		13,711.8		37.1
1990		199.8		14,243.9		33.4
1991		191.3		14,117.3		33.0
1992		74.7		14,130.5		31.9
1993		88.9		14,427.9		31.6

TABLE 4 (Cont'd)

ACTUAL FORECAST RESULTS OF CBMOD1: 1980-1993

	UNR		GDP	
	Actual	Forecast	Actual	Forecast
1980	0.099		14,966.1	
1981	0.105		16,438.0	
1982	0.099		19,175.5	
1983	0.111		18,719.4	
1984	0.133		18,828.7	
1985	0.157		18,076.8	
1986	0.172		17,223.9	
1987	0.223	0.174	16,991.7	17,809.5
1988	0.221	0.193	16,490.7	18,142.8
1989		0.157		19,359.1
1990		0.161		20,024.0
1991		0.167		20,034.9
1992		0.180		20,584.8
1993		0.193		21,323.9

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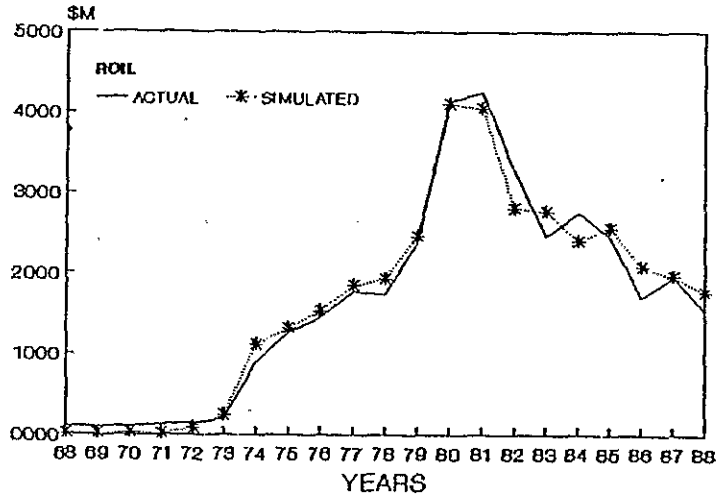
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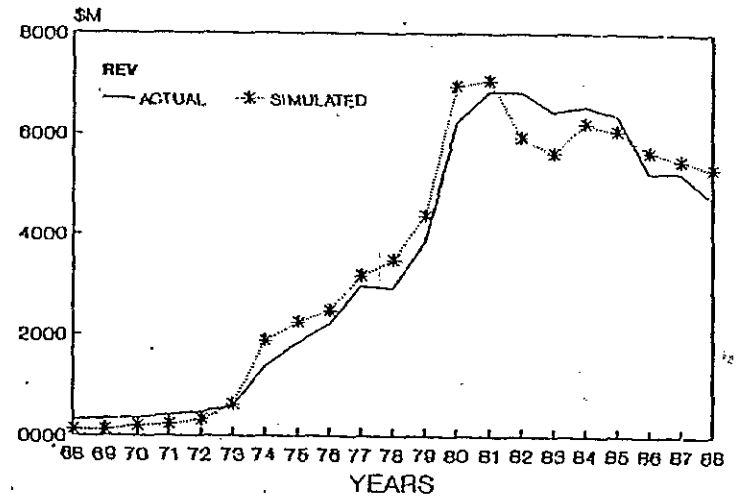
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APPENDIX I

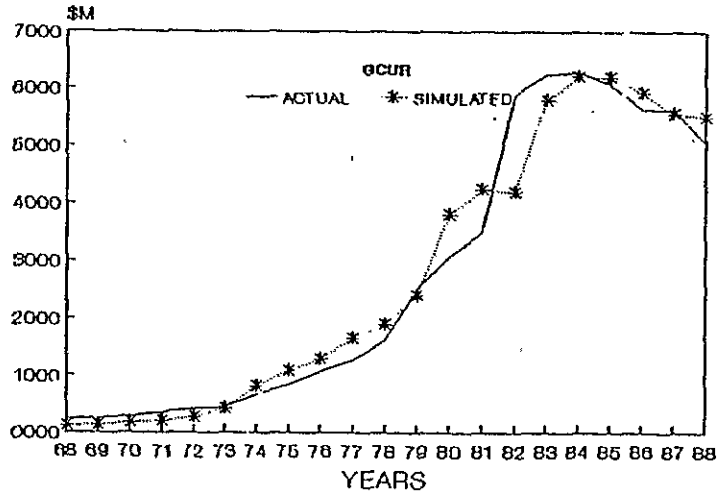
ROIL: OIL REVENUE



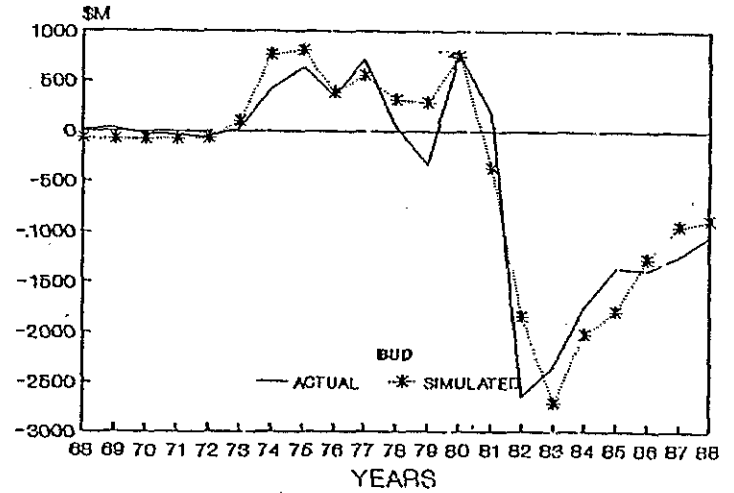
REV: GOVERNMENT REVENUE



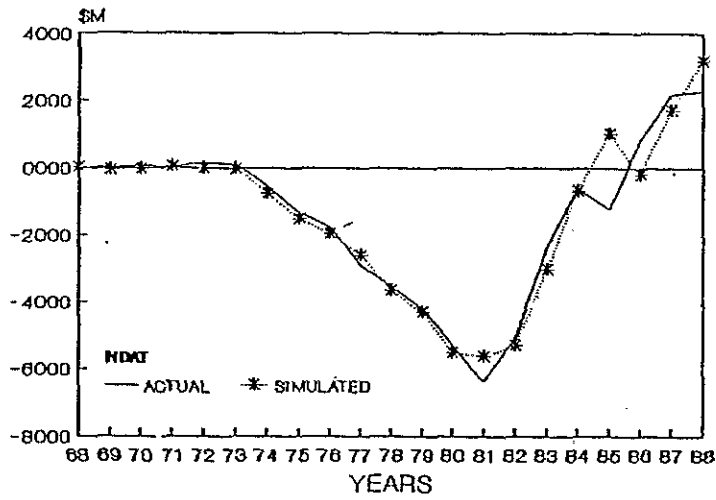
GCUR: GOV'T CURRENT EXPENDITURE



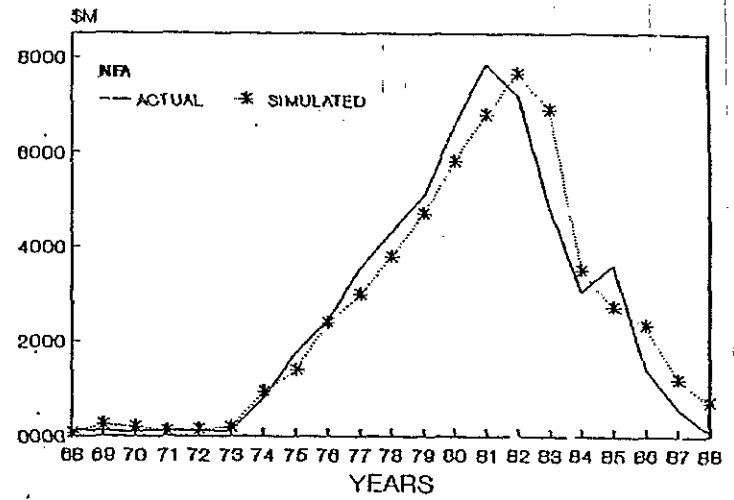
BUD: GOVERNMENT BUDGET BALANCE



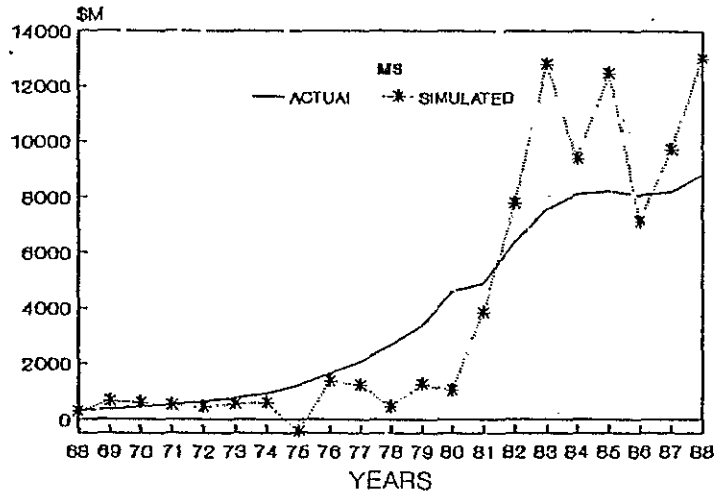
NDAT:CENTRAL BANK NET DOMESTIC ASSETS



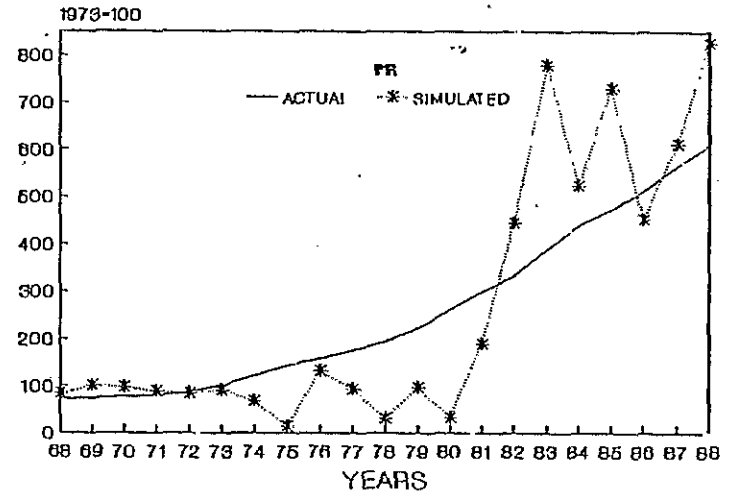
NFA:CENTRAL BANK NET FOREIGN ASSETS



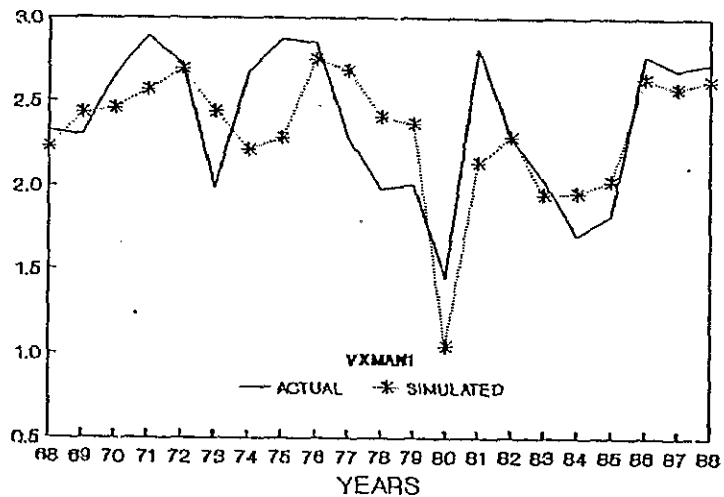
MS:MONEY SUPPLY



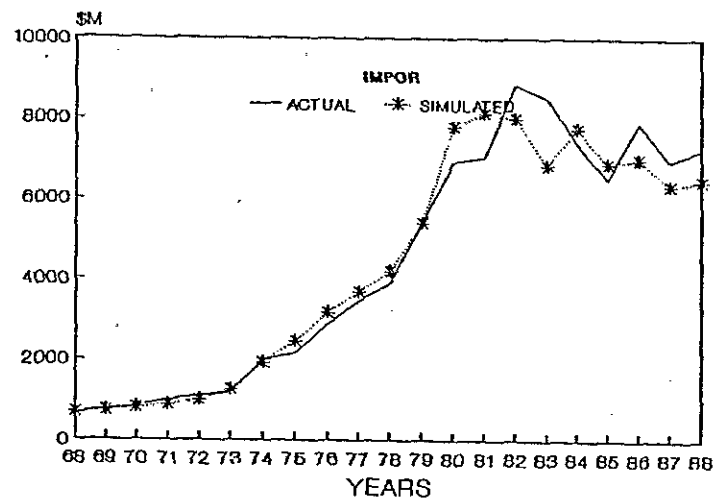
PR:PRICE LEVEL



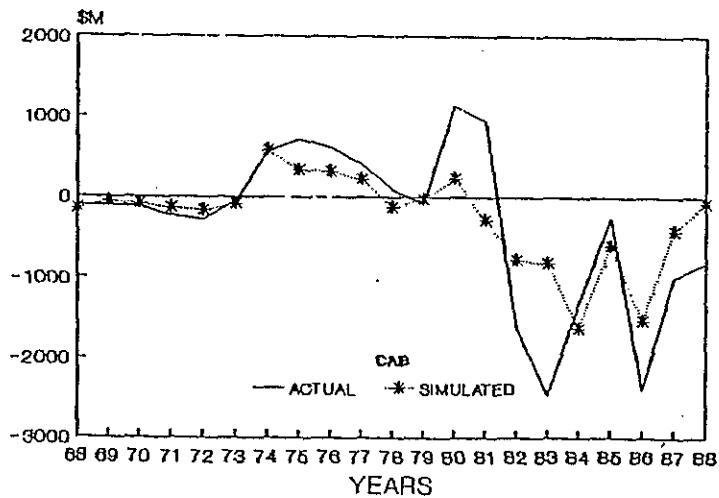
VXMAN1: VOLUME OF MANUFACTURED EXPORTS



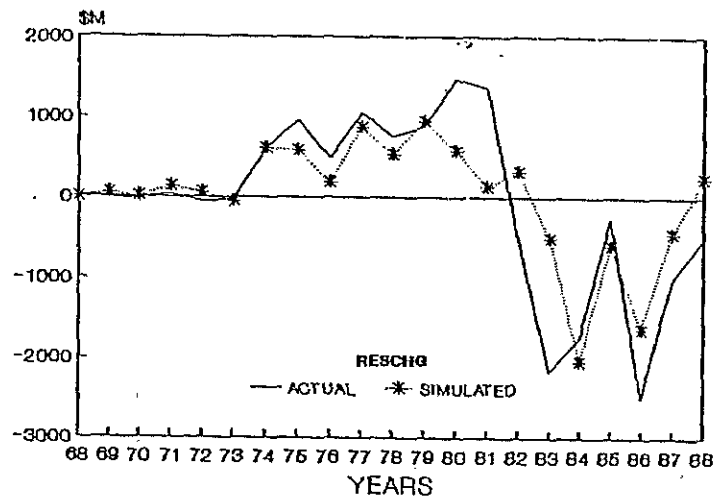
IMPOR: VALUE OF TOTAL IMPORTS



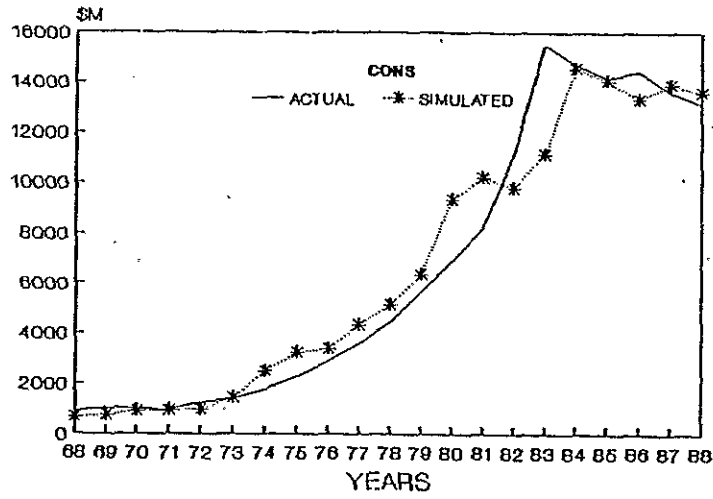
CAB: CURRENT ACCOUNT BALANCE



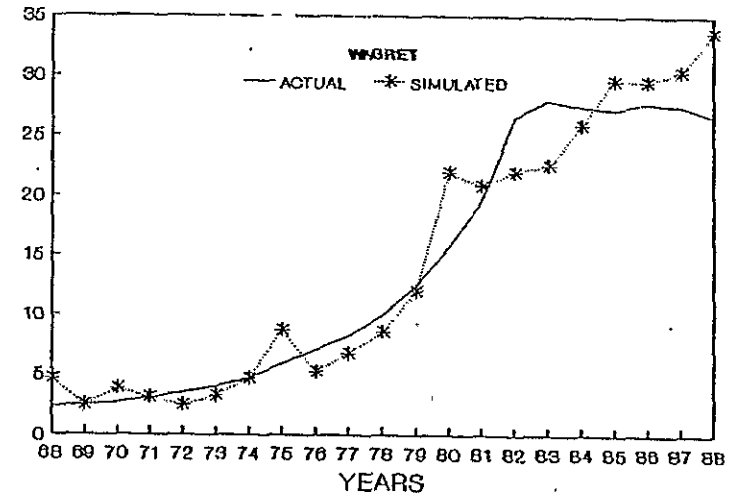
RESCHG: CHANGE IN FOREIGN RESERVES



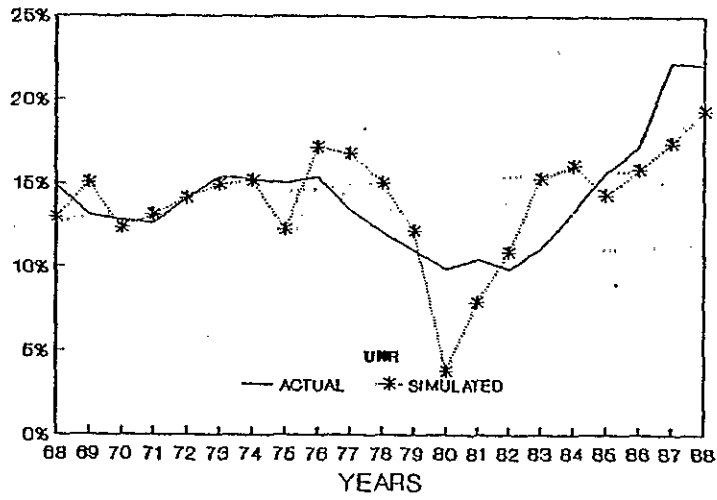
CONS:PRIVATE CONSUMPTION



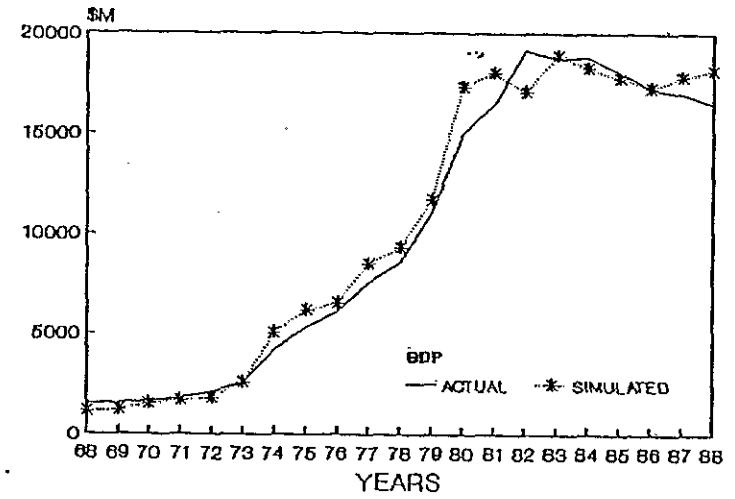
WAGRET: WAGE RATE



UNR:UNEMPLOYMENT RATE

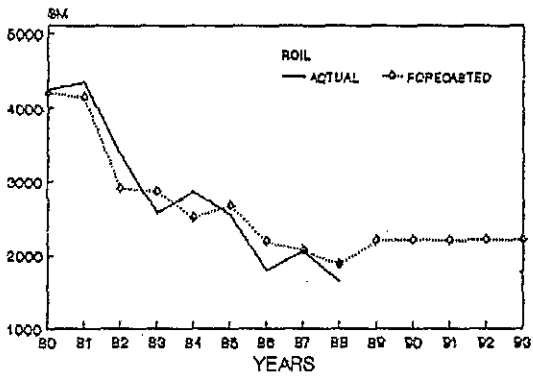


GDP:GROSS DOMESTIC PRODUCT

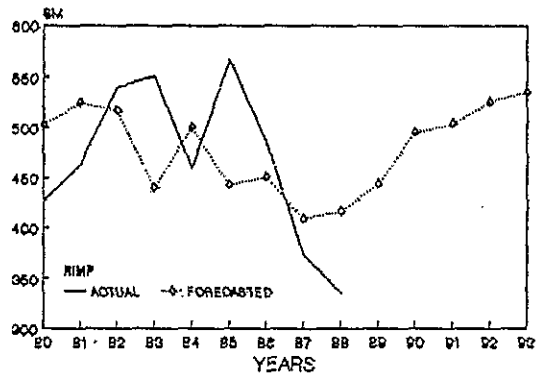


APPENDIX II

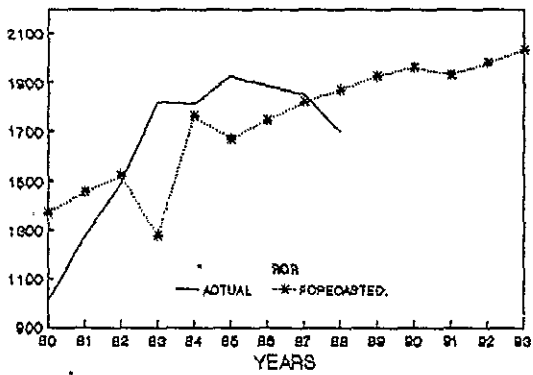
ROI: OIL REVENUE



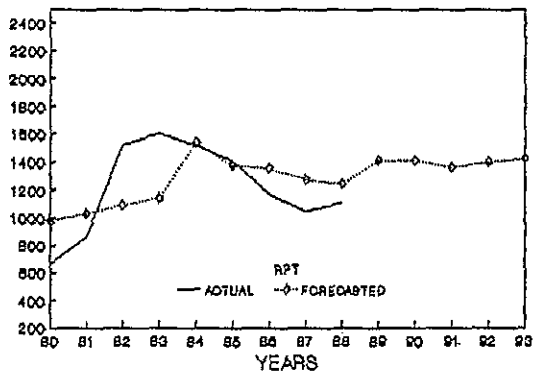
RIMP: IMPORT DUTIES



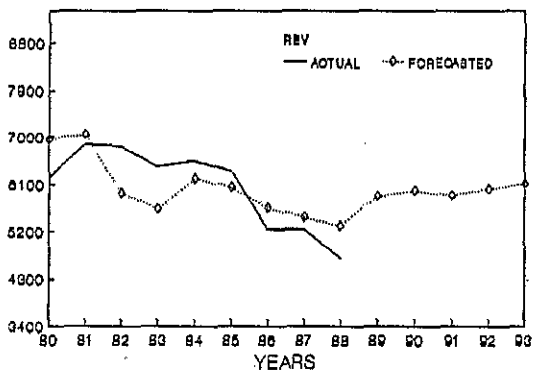
ROR: OTHER REVENUE



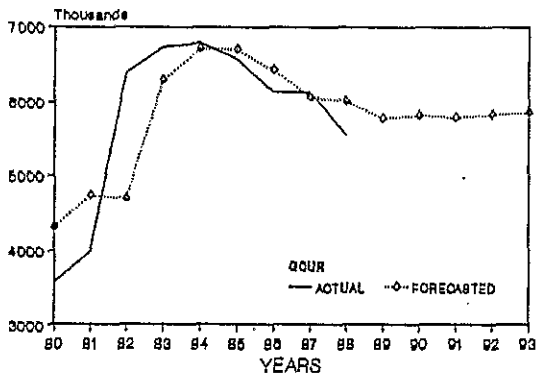
RPT: PERSONAL INCOME TAXES



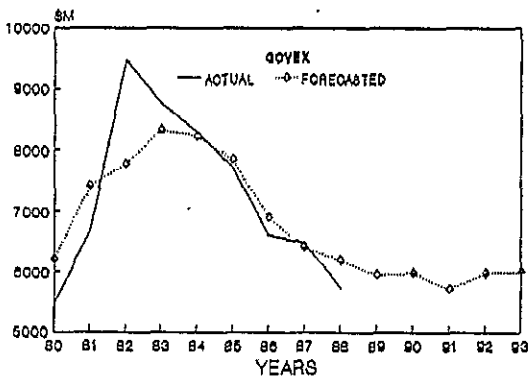
REV: GOVERNMENT REVENUE



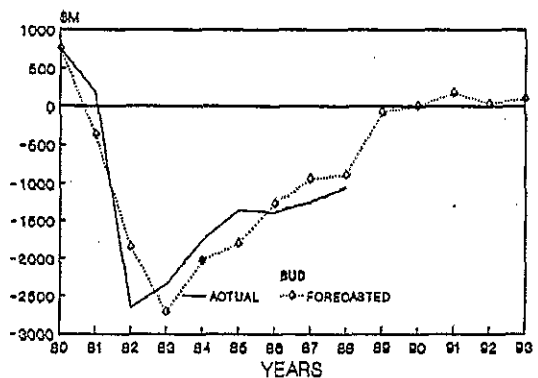
GCUR: GOV'T CURRENT EXPENDITURE



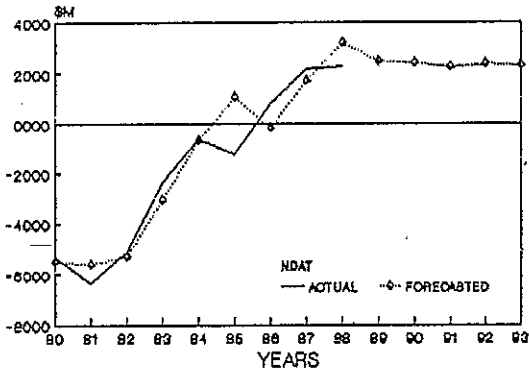
GOVEX: GOVERNMENT EXPENDITURE



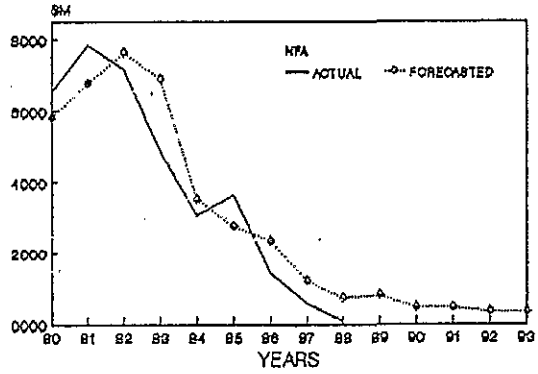
BUD: GOVERNMENT BUDGET BALANCE



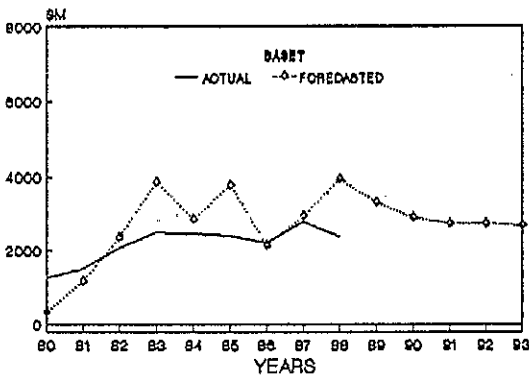
NDAT:CENTRAL BANK NET DOMESTIC ASSETS



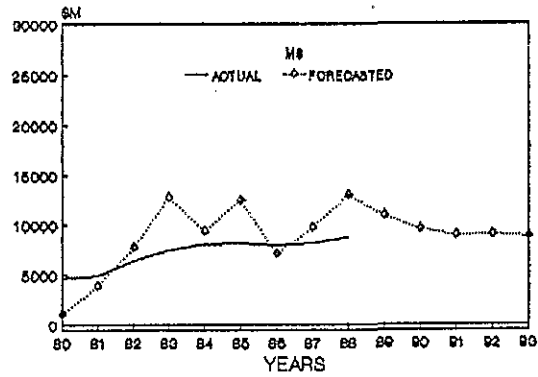
NFA:CENTRAL BANK NET FOREIGN ASSETS



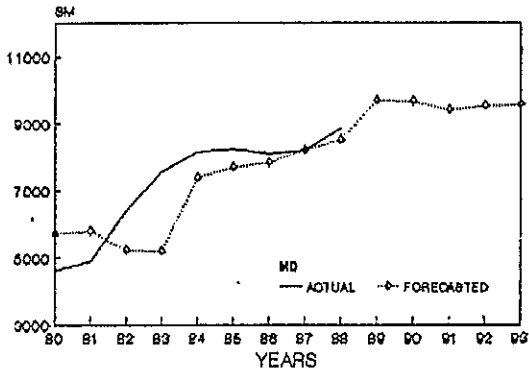
BASET: MONETARY BASE



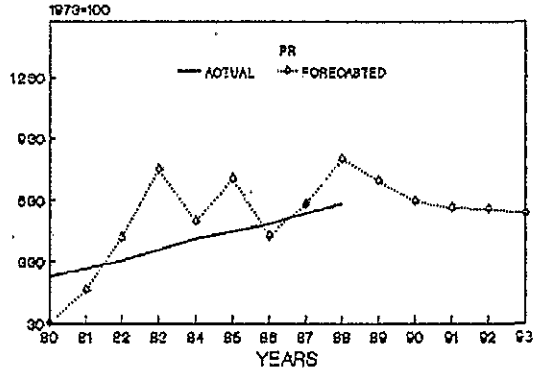
MS: MONEY SUPPLY



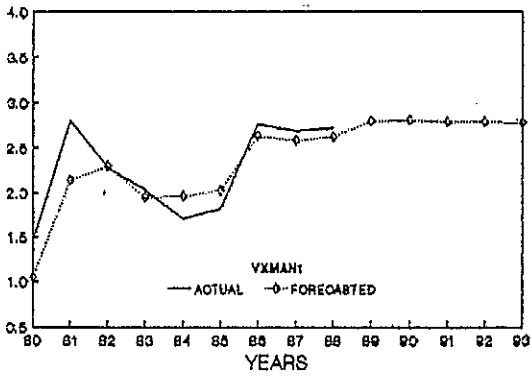
MD: MONEY DEMAND



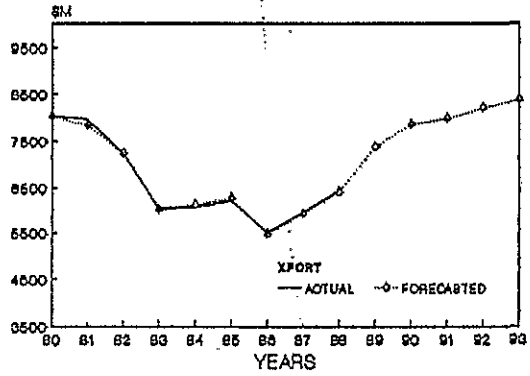
PR: PRICE LEVEL



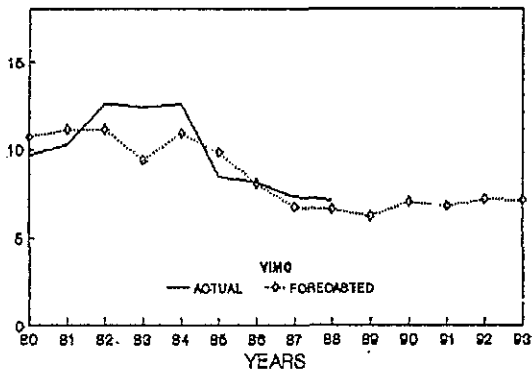
VXMAN1: VOLUME OF MANUFACTURED EXPORTS



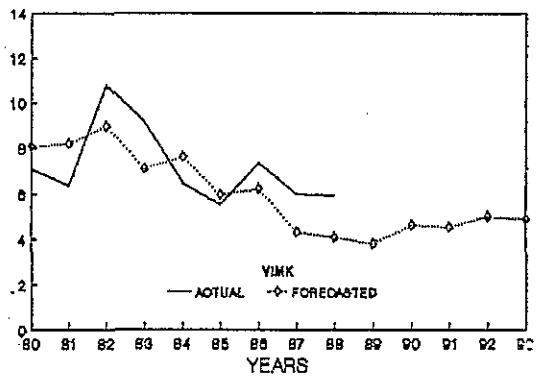
XPORT: VALUE OF TOTAL EXPORTS



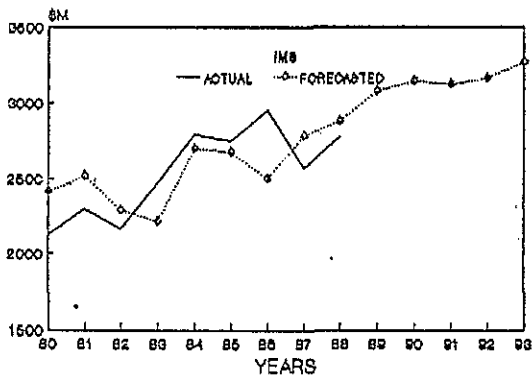
VIMC: VOLUME OF CONSUMER IMPORTS



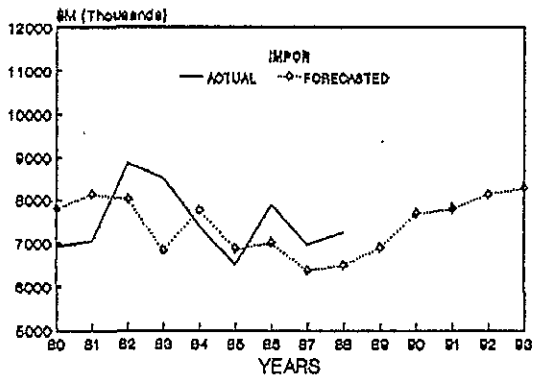
VIMK: VOLUME OF INTERMEDIATE IMPORTS



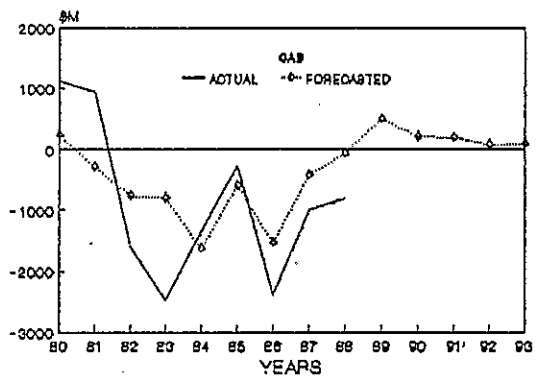
IMS: IMPORTS OF SERVICES



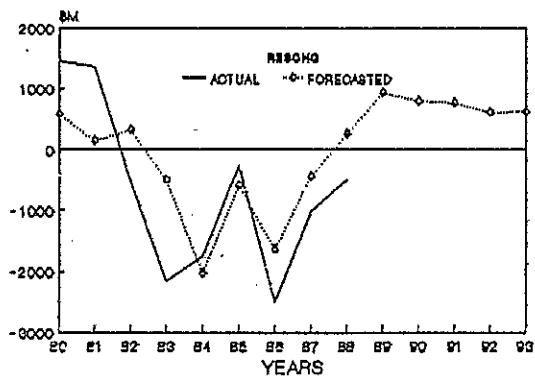
IMPOR: VALUE OF TOTAL IMPORTS



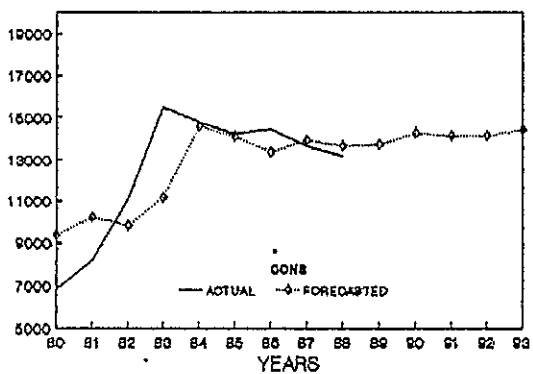
CAB:CURRENT ACCOUNT BALANCE



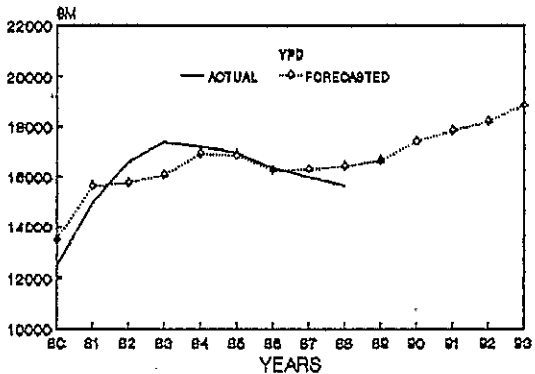
RESCHG:CHANGE IN FOREIGN RESERVES



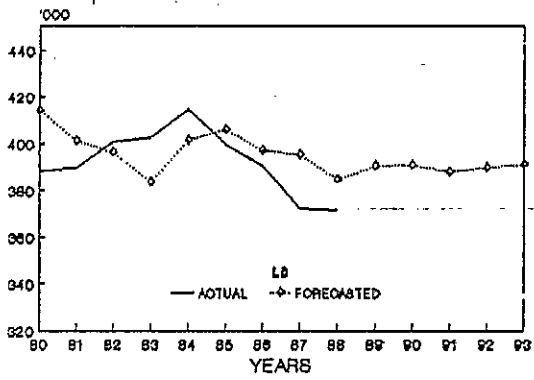
CONS:PRIVATE CONSUMPTION



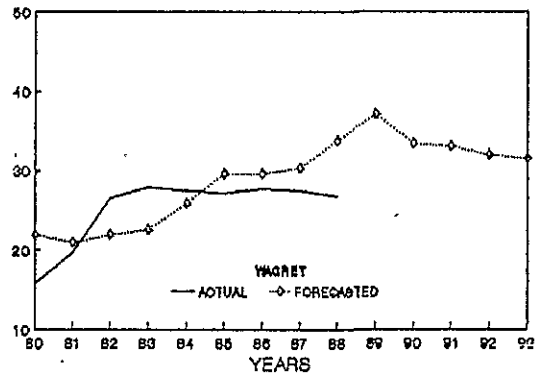
YPD:PERMANENT DISPOSABLE INCOME



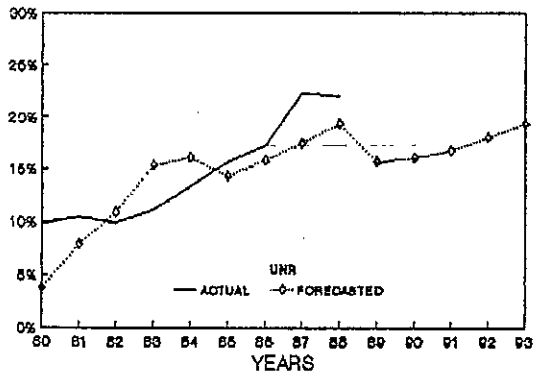
LD: LABOR DEMAND



WAGRET: WAGE RATE



UNR: UNEMPLOYMENT RATE



GDP: GROSS DOMESTIC PRODUCT

