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FINANCING DECISIONS, RATIONAL EXPECTATIONS, AND
THE "CROWDING OUT" EFFECT: THE CASE OF THE PHILIPPINES

by

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ABSTRACT

This study is an empirical test of the validity of the traditional "crowding out" effect versus the Ricardian Equivalence Theorem in the case of a developing country, the Philippines. The assumption of rationality of expectations, and a generalized least squares procedure with cross-equation constraints are used. The data are monthly, covering the period January 1981 to December 1986. The results show that financing decisions matter and a significant "crowding out" effect exists and is discernible in the case of short-term Treasury bill rates. Furthermore, it does not arise because of irrationality on the part of the public but perhaps because of certain structural features in developing countries which allow bonds to add to net wealth.

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The large current and expected deficits (relative to GNP) in western countries have given rise to a renewed interest in macro-economic public finance. Topics such as the effects of large deficits and their means of finance pervade the journals. Open economy issues, such as export "crowding out" have become equally important in as much as budget deficits, such as those in the United States, have, until recently, been accompanied by massive capital inflows and real exchange rate appreciation.

For developing countries, the manageability of budget deficits is stressed in the literature as a prerequisite for the success of the liberalization programs. As developing countries proceed with liberalization schemes in their financial and trade affairs, it is important to bear in mind that the outcome of such schemes will be impinged by the size and persistence of budget deficits and the manner in which they are financed.

There has been a revival of the invariance proposition with respect to the manner of financing government expenditure in the

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macro rational expectations literature [e.g. Barro (1974)]. Specifically, this neutrality proposition holds that the presence of intergenerational transfers allows the public to equate the current value of the bonds with the present value of future tax liabilities generated by the bonds. The implication of this is that the distinction between tax and bond financing is irrelevant. In contrast, traditional theory holds that the issue of bonds raises net wealth which in turn raises consumption and interest rates, "crowding out" private investment. Indeed, numerous empirical studies have examined the degree of "crowding out". In addition, monetization of government debt is looked upon as mitigating the effects on real interest rates and hence, the "crowding out" effect. Friedman, for example, posits that the expansionary effects of government spending arise from the expansion in the money supply used to finance such expenditures.^{1/}

In general, therefore, the government can finance its deficit by issuing bonds (which implies future taxes) or levying taxes. Both methods of finance are within the realm of fiscal policy. Equally important, however, is the proposition of bonds that end up in the hands of the public. This lies within the realm of monetary policy. Kochin (1974, p.388), however views

^{1/}
It has been recognized in the literature that even a bond-financed increase in government spending will have to be monetized at some point. This is because the interest payments on the bonds increase the size of the deficit over time. Pure bond financing of the deficit is infeasible because of its inherent instability.

money financing of the deficit as a form of excise tax on existing money balances if printing money leads to an increase in the price level. Money financing of the deficit can also be looked upon as increasing the demand debt of the government to be financed by a rise in the future rate of excise taxation on bank balances.

If money is neutral, as in the rational expectations paradigm, then there is no long-run relationship between money growth and real variables. Money is not only irrelevant from the point of view of financing deficits, but monetary policy is ineffective.

The validity of the different perspectives on the financing of budget deficits and specifically, whether "crowding out" exists, can be tested empirically. Note however, that in the case of developing countries, the measure of "crowding out" will depend on whether financial markets have been liberalized or not. Under a regime with ceilings on interest rates, the degree of "crowding out" is partly captured by the degree to which private sector demand for credit is unsatisfied as a result of government borrowing but of course, excess demand for credit may exist even without government debt financing. Under a regime of liberalized financial markets, the degree of "crowding out" may be measured by the degree to which interest rates rise in response to the financing of the deficit rather than other market factors which raise interest rates. While numerous empirical studies of the "crowding out" effect exist for developed countries, there is a dearth of literature for developing countries.

Review of Related Literature

Early Keynesian analysis posits that the non-distortionary changes in fiscal policy have direct demand effects on consumption via the changes in current disposable income induced by them. This effect is modified somewhat by the subsequent monetary effects arising from higher incomes which raise interest rates. An important caveat is that the manner in which the public reacts to the changes in policy has implications on the potency of policy.

It is the latter caveat which has given rise to the revival of the Ricardian equivalence proposition [See Bailey (1971), Kochin (1974), Miller and Upton (1974), and Tanner (1979)]. The Ricardian equivalence proposition asserts that the public responds in the same manner to a change in taxes and a change in the government deficit. A tax cut would increase the government deficit and households perceive the future tax liabilities implicit in the deficit. Thus, they would save an amount equal to the present value of interest payments needed to service the debt. Contrary to Keynesian predictions, therefore, there would be no effect on aggregate demand. Barro (1974) posits that the utility of today's generation depends indirectly on the utility of future generations as these generations overlap. Today's taxpayers will, therefore, not consume at the even

occurred.)

Many of the early empirical studies use a life-cycle model to test whether government debt is perceived to add to net wealth. Feldstein (1982), and Yawitz and Meyer (1976) find support for the proposition that government debt constitutes part of net wealth as there is no evidence that consumers discount future taxes at all. Tanner (1979), Kormendi (1983), Aschauer (1985), and Seater and Mariano (1985) find evidence to the contrary.

Feldstein (1982) is skeptical about the Ricardian equivalence proposition and what he calls the ex-ante "crowding out" effect. He argues that changes in government expenditure would have no effect on aggregate demand only if an equal concurrent change in private saving were induced. Even if a change in private saving were to occur, there is no reason to believe that it would necessarily occur concurrently. It is also possible that an increase in government spending in one year may signal higher spending in future years and hence, higher taxes to finance such spending. A rise in current taxes may also signal a rise in future taxes. In either case, the effect on consumption depends not so much on the present fiscal policy but on the signals regarding future policy which current policy conveys. In Feldstein's view, the Ricardian equivalence proposition focuses entirely on future tax liabilities needed to service debt. He points out that current fiscal policy has implications for the future course of fiscal policy independent of debt service obligations. The potency of fiscal policy need not be negated as

it would be in the case of the Ricardian equivalence proposition. Like Feldstein, Remolona (1985) is also skeptical about the significance of the Ricardian equivalence proposition, especially in LDCs. LDCs generally have fragmented or non-existent capital markets. The government can also offer debt more efficiently and hence, create net wealth. Also, the neutrality result would not hold since taxes tend to be distortionary and there would be substitution effects from taxes needed to service the debt.

Recent studies on the public's perception of whether financing government expenditures leads to changes in the public's net wealth have been applied to financial markets assumed to be characterized by market efficiency. These include studies by Plosser (1982), Huang (1986), and Evans (1987).

Plosser (1982) finds that innovations in government purchases are negatively related to excess nominal returns on U.S. treasury bills, implying that these innovations are associated with nominal interest rates. However, he cannot determine whether this is due to an increase in expected inflation or an increase in the real rate of interest. While this is the case, he also finds that using debt for taxes or base money for taxes has no bearing on interest rate movements. < What this means is that the public perceives that the government merely trades current taxes for future taxes when there is a shift from tax finance to deficit finance. > Furthermore, the monetization of government debt does not mitigate the "crowding out" effect.

Huang (1986) modifies Plosser's study by using real returns instead of excess nominal returns in order to test the neutrality proposition, since the latter does not rule out an effect on nominal returns but does rule out an impact on real returns. His results are consistent with the Ricardian equivalence proposition. The public correctly perceives that the increase in the budget deficit entails future tax liabilities and they respond by saving more. Evans (1987) also finds no evidence to support the thesis that past, present or future budget deficits in the U.S. lead to higher ex-post real rates.

Empirical Methodology

The assumption of rational expectations or market efficiency is used to investigate the impact of financing decisions on interest rates. The interest rates used in the study are various T-bill rates. There is a well-organized secondary market for Treasury bills which justifies using tests of market efficiency in this particular market. The specification and methodology closely follow those in related studies by Plosser (1982), Mishkin (1983), Huang (1986), and Evans (1987).

Tradional theory suggests that ceteris paribus

- (1) balanced budget increases in government spending raises nominal interest rates
- (2) increases in debt issued by the Treasury held by private sector raise nominal interest rate via a "crowding out" effect
- (3) increases in monetized debt lower nominal interest rates initially via a liquidity effect, or until expectations of

inflation reverse this downward movement in interest rates via the Fisher effect.

A simple equation characteristic of tests of traditional theory is the following:

$$i_t = a_{1t} G_t + a_{2t} PD_t + a_{3t} M_t + a_{4t} Z_t \quad (1)$$

where i_t is the nominal interest rate at the end of one period on one-period bonds; G_t , PD_t , and M_t are measures of government spending, privately-held debt, and monetized debt, respectively; Z_t is a vector of other variables including lags of G , PD , and M ; the a_s are coefficients to be estimated.

Applying the expectations operator $E(\cdot / I_{t-1})$ to both sides of (1), where I_{t-1} is the information available at $t-1$, given the assumption of market efficiency, and subtracting the resulting equation from (1) yields

$$UI_t = b_{1t} UG_t + b_{2t} UPD_t + b_{3t} UM_t + V_t \quad (2)$$

where $UI_t = i_t - E(i_t / I_{t-1})$

$$UG_t = G_t - E(G_t / I_{t-1})$$

$$UPD_t = PD_t - E(PD_t / I_{t-1})$$

$$V_t = a_{4t} Z_t - E(a_{4t} Z_t / I_{t-1})$$

V_t is assumed to be uncorrelated with the regressors and with G_t , PD_t , and M_t contemporaneously. If V_t is not uncorrelated with past or future values of G_t , PD_t , and M_t , then (2) will not be a true reduced form and the b_s will not be consistent.

In order to estimate (2), it is necessary to obtain measures of the unanticipated components of nominal interest rates, government spending, privately held debt, and monetized debt. Because the forward market in the Philippines does not exist except for forward cover, first differences of the nominal interest rate are used to proxy for the unanticipated component of nominal interest rate movements. In other words, $E(i_t / I_{t-1}) = i_{t-1}$, meaning that the interest rate series follows a random walk. This assumption is not rejected empirically.^{3/}

For the financing variables, linear forecasting equations including lags of the particular variables in question, the other financing variables, and other relevant variables are used. The F-test is utilized to determine which variables and their lags are jointly significant at the 5% level and hence, are to be retained.

^{3/} When i is regressed on 1 lag of itself, the coefficient on the lag is not significantly different from 1.

$$TB91 = 0.982 + 0.944 TB91(-1) \\ (1.181) \quad (22.901)$$

See also graphs.

$$X_t = Z_{t-1} \gamma + U_t \quad (3)$$

where X_t is the particular financing variable in question

Z_{t-1} is a vector of variables used to forecast X_t available at time $t-1$

γ is a vector of coefficients

U_t is a serially-uncorrelated error term

Since there are three financing variables, there will be three forecasting equations following the specification in (3).

$$GE_t = Z_{t-1} \gamma^G + U_t^G \quad (3a)$$

$$PD_t = Z_{t-1} \gamma^{PD} + U_t^{PD} \quad (3b)$$

$$M_t = Z_{t-1} \gamma^M + U_t^M \quad (3c)$$

The superscripts indicate the particular financing variable concerned. (3a), (3b), and (3c) are then estimated jointly with the following version of (2):

$$\begin{aligned} i_t - i_{t-1} = & b_0 + \sum_{i=0}^n \beta_i^G [GE - Z_{t-1} \gamma^G] \\ & + \sum_{i=0}^n \beta_i^{PD} [PD - Z_{t-1} \gamma^{PD}] \\ & + \sum_{i=0}^n \beta_i^M [M - Z_{t-1} \gamma^M] + \epsilon_t \end{aligned} \quad (4)$$

where the γ 's in (4) are constrained to be equal to the corresponding γ 's in (3a), (3b), and (3c). ^{4/} ε_t is assumed to be uncorrelated with the regressors in (4) in order to identify the β 's and obtain consistent estimates of them. ε_t is modelled as a first-order autoregressive process i.e.,

$$\varepsilon_t = \varepsilon_{t-1} + \eta_t.$$

Following Plosser (1982), the three policy variables are the log of the monetized debt, the log of privately held debt, and the log of government expenditures. The optimal linear forecast of a policy variable, X_t is defined as:

$$E(X_t / I_{t-1})$$

^{4/} Tests of the validity of these constraints are to be conducted by estimating (3a), (3b), (3c), and (4) with and without the constraints. The test statistic is constructed in the following manner:

$$2n \log [SSR^c / SSR^u]$$

where n is the number of observations
 SSR^c is the sum of squared residuals of the constrained system
 SSR^u is the sum of squared residuals of the unconstrained system

The test statistic is distributed as a $\chi^2(q)$ where q is the number of constraints.

The validity of the constraints not only indicates whether market participants form their expectations consistently with the known economic structure but also indicates the appropriateness of the model specified. A rejection of the constraints, therefore, could be due to the failure of one or both of these.

where I is the available information set on which the forecast is conditioned on. The innovation in X_t is defined as the difference between actual X_t and the optimal linear forecast of X_t .

Experimentation with uniform lags of 5 and 10 lags of different sets of explanatory variables in the forecasting equations indicates at least two potentially appropriate forecasting equations. The error term in each of the three policy forecasting equations is assumed to be serially uncorrelated.

In the first set of forecasting equations, uniform lags of 5 for each of the following regressors are used: log of government expenditures, log of monetized debt, log of privately-held debt, interest rate, log of the exchange rate, and the growth rate of the industrial production index. If the monetary authorities intervene in the foreign exchange market, as they allegedly do in the Philippines, the exchange rate could be useful in predicting the money supply. Industrial production, as a proxy for GNP which is not on a monthly basis, could be useful in predicting future taxes and money demand.

In the second set of forecasting equations, each variable is regressed against uniform lags of 10 of the three policy variables.

The results of the F-test are available upon request from the author.

The data are monthly, covering the period January 1981 to December 1986. A description of the data is contained in appendix A.

Empirical Results

Traditional theory predicts that the coefficients on government spending and privately-held debt should be significantly positive. The coefficient on money should be significantly negative.

On the other hand, Ricardian Equivalence Theory posits that government bonds do not add to the net wealth of the private sector and nominal interest rates are independent of the manner in which government spending is financed. This implies that the coefficients on unanticipated privately-held debt and unanticipated money should not be significantly different from zero. This theory, while precluding any effect of the manner of financing government spending on nominal interest rates, does not preclude the possibility that innovations in government spending may affect nominal interest rates.

Table I presents the results of the joint estimation of (3a), (3b), (3c), and (4) in which the forecasting equations for the policy variables use 5 lags each of logs of the policy variables, the interest rate, the exchange rate, and the growth rate of the production index.

The last column in Table I shows the effect of a positive innovation in government spending financed by taxes, as the innovation in government spending is orthogonal to innovations in monetized debt and privately-held debt. The innovation in government spending is significantly positively related to nominal interest rate movements. This means that balanced budget increases in government spending are associated with increase in interest rates.

There are two ways in which the increase in nominal interest rates could occur: one is via an increase in the rate of inflation and the other is via an increase in the real interest rate. The correlation between the innovations in government spending and monetized debt is negative (-0.40) and seems to indicate that an increase in expected inflation is an unlikely channel. The alternative channel, in which the output effects of government spending purchase arise from changes in real rates of interest, might be worth exploring.

The second to the last column in Table I shows the effect of a surprise substitution of debt for taxes on nominal interest rates. The coefficient on the innovation in privately-held debt is significantly positive. This finding is consistent with the "crowding out" effect. It is inconsistent with Ricardian equivalence. Again, the positive effect of privately-held debt could occur via an inflation channel of a real interest rate channel.

The coefficient on the log of monetized debt shows the

effect of a fall in taxes financed by debt issue matched by an open market purchase. The coefficient is negative, as predicted by traditional theory, but it is not statistically significant.

The likelihood ratio tests indicate that the validity of the cross equation constraints cannot be rejected.^{5/} Although ρ , the first-order autocorrelation coefficient is significant, and ARIMA check of the residuals indicates that there is no significant serial correlation left.

Since the logs of the policy variables may be non-stationary, the estimation in Table I was repeated using growth rates, i.e., first differences of logs. The results are similar to those obtained in Table I and are not reported separately.

Further Tests

Following Huang(1986), the dependent variable is specified in real terms to test for the neutrality proposition subscribed to by the rational expectations school. The dependent variable is specified as the ex-post real rate of interest, i.e.,

$$(i_t - \text{inflation rate}_t) - (i_{t-1} - \text{inflation rate}_{t-1})$$

the inflation rate is measured using the monthly CPI index calculated on a year-to-year basis. If the neutrality proposition holds, none of the innovations in the policy

^{5/} The results of the likelihood ratio tests are found in Appendix B.

variables should have a statistically-significant effect on movements in ex-post real rates.

The results using the 91-day ex-post real rate as the dependent variable are shown in Table II. Only innovations in privately-held government debt are significantly positive. This indicates that some financing decisions have non-neutral effects. It also strengthens the earlier finding of a significant crowding out effect. None of the other policy variables are statistically significant. The sign on coefficient of monetized debt is inconsistent with that hypothesized by traditional theory.

The equations in Table I were re-estimated using the 360-day Treasury Bill rate instead of the 91-day rate to ascertain whether the "crowding out" result is discernible for bills with longer maturity. The results are shown in Table III. None of the coefficients of the policy variables are statistically significant. These results imply that the "crowding out" effect is a short-lived phenomenon. An ARIMA check of the residuals indicates the absence of significant serial correlation. However, the appropriateness of the model is questionable as the likelihood ratio test statistic is negative.

The results using the 360-day ex-post real rate as the dependent variable are shown in Table IV. Again, none of the coefficients are statistically significant and no significant "crowding out" effect exists. This result, however, may be due to certain structural features in developing countries, such as a high rate of time preference, which could obscure the finding of

a significant "crowding out" effect for longer-term bonds.

When the alternative forecasting equation with 10 lags of each of the policy variables is used, as shown in Table IV, the results are very different from those in Tables I and II. There is no statistically significant "crowding out" effect. The coefficient on innovations in government expenditures is likewise insignificant and of the wrong sign based on traditional theory and Ricardian equivalence theory. These results, shown in Table V, could be due to a misspecification of the forecasting equations. If the forecasting equations are misspecified, this will tend to bias the coefficients of the r.h.s. policy variables toward zero. The forecasting equations used here do not include the exchange rate as an explanatory variable. If it is true that the monetary authorities tend to fix the exchange rate, then omitting this variable may result in misspecification. The positive coefficient on monetized debt is spurious since it implies that innovations in money are quickly translated to expectations of inflation, yet the correlation between innovations in government spending and monetized debt is quite small (0.005). The likelihood ratio test statistic is negative, indicating that the model used may be inappropriate.

Summary and Conclusions

This study is an attempt to determine the validity of the traditional "crowding out" effect versus the Ricardian Equivalence Theorem in the case of a developing country, the Philippines. The traditional "crowding out" effect is premised on the notion

that the public views the issuance of bonds to finance the deficit as part of net wealth. As net wealth and therefore consumption rise, interest rates also rise. Under a regime where interest rates are free of ceilings, the "crowding out" effect may be measured by the degree to which interest rates rise as a direct result of the financing decisions of the authorities. The Ricardian Equivalence Theorem on the other hand, implies that the public realizes that bond issuance implies future taxation and hence, bonds do not add to net wealth. Financing decisions do not matter.

The assumption of rationality of expectations, or market efficiency, in the treasury bill market is used in the empirical tests. The forecasting equations and interest rate equation are estimated jointly with cross-equation constraints.

The results indicate that there is a significant "crowding out" effect when the first difference of the 91-day Treasury Bill rate is the dependent variable, regardless of whether the interest rate is specified in nominal or real terms. Innovations in government spending also raise nominal interest rates and there are indications that this is due to changes in inter-temporal rates of substitution rather than an increase in the expected rate of inflation. There is no support for the proposition that debt monetization mitigates the "crowding out" effect. The validity of the cross equation 'rationality' constraints cannot be rejected. The residuals are white noise.

While a significant "crowding out" effect exists, it is apparently a short-lived phenomenon. Using the first difference of the 360-day Treasury Bill rate as the dependent variable, no statistically significant "crowding out" effect is found. However, the absence of a discernible "crowding out" effect on a lower-term security may be because of certain structural features present in developing economies. One such feature is the high rate of time preference. These tends to be very little lending or borrowing on a long-term basis. The earlier results confirming the presence of "crowding out" is not invariant with respect to the specification of the policy forecasting equations, although this may be because the alternative forecasting equations are inappropriate.

In general, the results indicate that unlike the findings of numerous studies for developed countries, the "crowding out" effect is not irrelevant for some developing countries although it is apparently a short-lived phenomenon. Furthermore, the "crowding out" effect does not seem to arise because of irrationality on the part of the public as the cross-equation constraints cannot be rejected in most cases. The government can in fact create net wealth not only because of certain structural features present in developing countries such as fragmented capital markets etc., but also because the government may act in a manner in which it disregards its budget constraint, continuously financing spending by issuing bonds which it keeps rolling over. The public sees the absence of expected tax liabilities normally associated with debt issue as well as the

postponement or absence of the day of reckoning. Nevertheless, further research efforts should be directed at discovering how government issuance of bonds adds to net wealth in the case of the Philippines or other developing countries.

In general, the evidence indicates that the findings of numerous studies for developed countries, the "crowding out" effect, is not irrelevant for some developing countries although it is apparently a short-lived phenomenon. Furthermore, the "crowding out" effect does not seem to arise because of irrationality on the part of the public as the cross-equation constraint cannot be rejected in most cases. The government can in fact create net wealth not only because of certain structural factors present in developing countries such as fragmented capital markets etc., but also because the government may not in a manner in which it disregards the budget constraint. continuously increasing spending by issuing bonds which it keeps rolling over. The public sees the absence of expected tax liabilities normally associated with debt issue as well as the

TABLE I

Results of the Joint Estimation of the Forecasting Equations and the Interest Rate Equation: January 1981-December 1986

Dependent Variable		First Differences of the Nominal 91-Day Treasury Bill Rate		
Forecasting Equations include:		5 Lags each of the logs of monetized debt, government expenditures, privately-held debt, nominal exchange rate, growth rate of the index of industrial production, and 91-day Treasury Bill rate		
Constant	ρ	Innovations in the		
		Log of Monetized Debt	Log of Privately-Held Debt	Log of Government Expenditures
11.184	0.92	-1.173	18.432	0.65
(8.853)	(0.129)	(1.941)	(6.370)	(0.281)

NOTE: In this and in succeeding Tables, the asymptotic standard errors are in parenthesis. * indicates significance at the 5% level. ** indicates significance at the 1% level. ρ is the first-order autocorrelation coefficient.

TABLE II

Results of the Joint Estimation of the Forecasting Equations and the Interest Rate Equation: January 1981-December 1986

Dependent Variable

First Differences of the ex-post
Real Rate of Interest using the
91-Day Treasury Bill Rate

Forecasting Equations

See Table I

Constant	ρ	Innovation in the		
		Log of Monetized Debt	Log of Privately- Held Debt	Log of Government Expenditures
9.621	0.895	0.519	34.411	0.526
(9.660)	(0.204)	(2.407)	(12.113)	(0.378)

NOTE: See Note in Table I.

TABLE III

Result of the Joint Estimation of the Forecasting Equations and
the Interest Rate Equation: January 1981-December 1986

Dependent Variable		First Differences of the Nominal 360-Day Treasury Bill Rate		
Forecasting Equations		See Table I		
Constant	ρ	Innovation in the Log of Monetized Debt	Log of Privately- Held Debt	Log of Government Expenditures
2.511	0.463	1.066	5.997	0.180
(6.277)	(0.761)	(5.210)	(12.324)	(0.362)

NOTE: See Note in Table I.

TABLE IV

Result of the Joint Estimation of the Forecasting Equations and
the Interest Rate Equation: January 1981-December 1986

Dependent Variable		First Differences of the Ex-Post Real Rate of Interest Using the 360-Day Treasury Bill Rate		
Forecasting Equations		See Table I		
Constant	ρ	Innovation in the		
		Log of Monetized Debt	Log of Privately- Held Debt	Log of Government Expenditures
2.339	0.392	-0.540	1.669	0.172
(5.413)	(0.694)	(4.987)	(15.316)	(0.311)

NOTE: See Note in Table I. The estimates did not converge despite the use of a tuning option in the computer procedure.

TABLE V

Result of the Joint Estimation of the Forecasting Equations and the Interest Rate Equation: January 1981-December 1986

Dependent Variable		First Differences of the Nominal 91-day Treasury Bill Rate		
Forecasting Equations		10 lags of the growth rate of monetized debt, privately-held debt, and government expenditures		
Constant	ρ	Innovation in the Log of Monetized Debt	Innovation in the Log of Privately-Held Debt	Innovation in the Log of Government Expenditures
-0.060	-0.020	31.866	2.853	-6.270
(1.145)	(0.443)	(13.602)	(2.912)	(4.629)

NOTE: See Note in Table I.

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APPENDIX A
LIST OF VARIABLES

VARIABLE	DESCRIPTION	PERIOD	UNIT	SOURCE
CB	Holding of Outstanding Gov't Securities -- by the Central Bank	1981-1986 (monthly)	million P	Central Bank
REQRES	Required Reserves -- Deposit Money Banks, Thrift Banks, Special- ized Gov't Banks	1981-1986 (monthly)	million P	Central Bank
DOM	Holdings of Outstanding Gov't Securities -- by domestic sector (Commercial Banks, Savings and Other Banks, Trust Banks, Semi-Gov't Entities, Private)	1981-1986 (monthly)	million P	Central Bank
POR	Holdings of Outstanding Gov't Securities -- by the foreign sector	1981-1986 (monthly)	million P	Central Bank
TREES	Reserve-Eligible Secu- rities -- Deposit Money Banks, Thrift Banks, Spe- cialized Gov't Banks	1981-1986 (monthly)	million P	Central Bank
MC	Money Creation = CB - REQRES	1981-1986 (monthly)		generated
PD	Publicly-held Debt = (DOM + POR) - TREES	1981-1986 (monthly)		generated
GE	Government Expenditures	1981-1986 (monthly)	million P	Bureau of the Treasury
TD91m	91-day Treasury Bill Rates (nominal, end-of-month)	1981-1986 (monthly)	per cent/ annum	Central Bank
TD360n	360-day Treasury Bill Rates (nominal, average)/ ²	1981-1986 (monthly)	per cent/ annum	Central Bank
ER	Exchange Rate (end-of-month)	1981-1986 (monthly)	P/US\$	Far Eastern Economic Review

Appendix A

VARIABLE	DESCRIPTION	PERIOD	UNIT	SOURCE
PRODN	Index of the Value of Output	1981-1986 (monthly)	1985-100	Industry Trends (WEDA)
CPI	Consumer Price Index	1981-1986 (monthly)	1978-100	Central Bank

Note: All data are for the end of the month.

/^ Point-in-time data for the 360-day T-Bill rate are not available.

Appendix B

Results of the Likelihood Ratio Tests on the Validity of the Cross-Equation Constraints

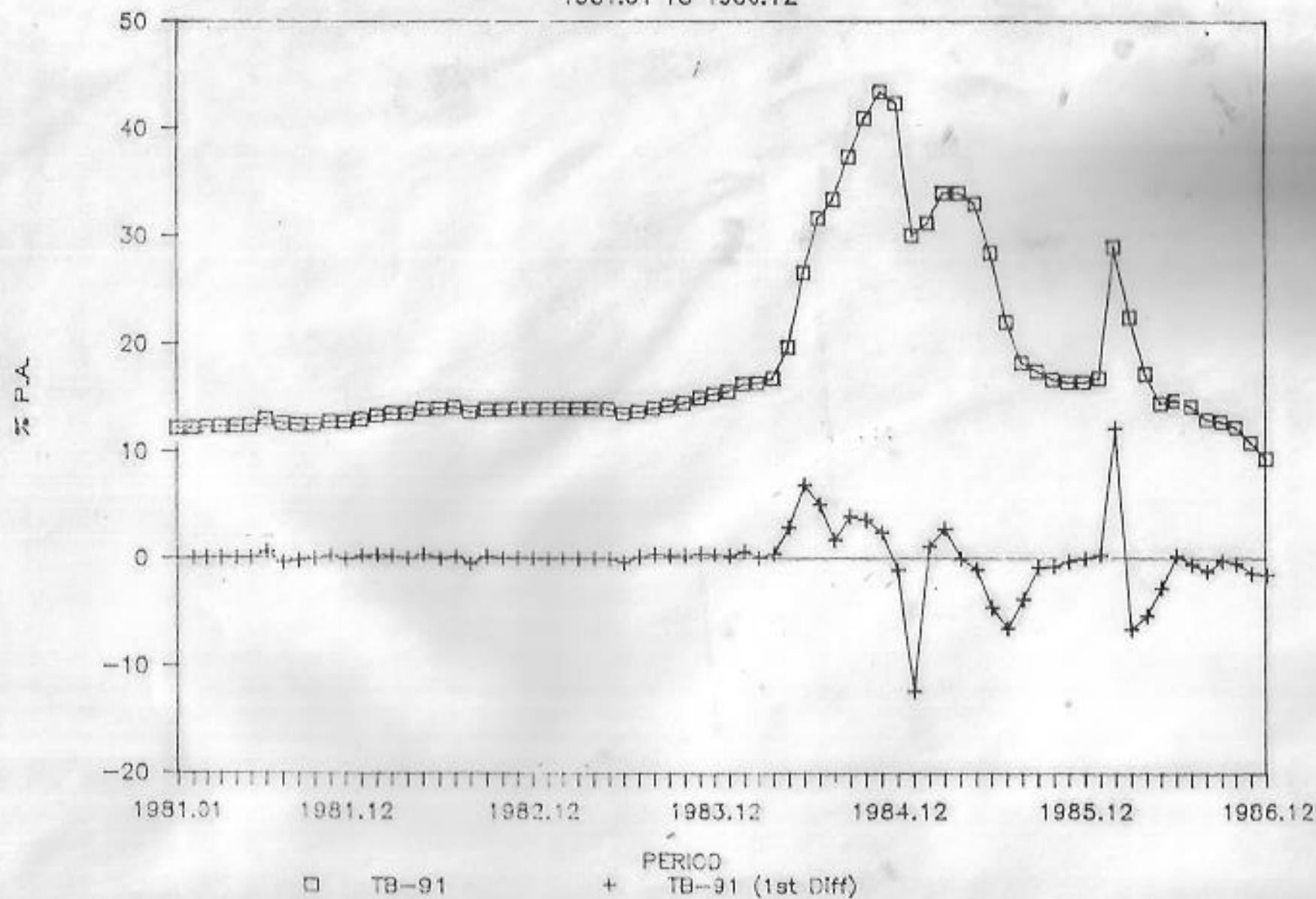
Table I	:	Likelihood ratio statistic:	$\chi^2(93) = 2.82927528$
		Marginal significance level:	0.010719
Table II	:	Likelihood ratio statistic:	$\chi^2(93) = 0.752412528$
		Marginal significance level:	0.010719
Table III	:	Likelihood ratio statistic:	$\chi^2(93) = *$
Table IV	:	Likelihood ratio statistic:	$\chi^2(93) = 0.200342304$
		Marginal significance level	0.010719
Table V	:	Likelihood ratio statistic:	$\chi^2(93) = *$

NOTE: Marginal significance level is the probability of getting that value of the likelihood ratio statistic or higher under the null hypothesis.

* The χ^2 statistic was negative.

91-DAY TREASURY BILL RATE

1981.01 TO 1986.12



360-DAY TREASURY BILL RATE

1981.01 TO 1986.12

