TESTING THE RATIONAL EXPECTATIONS-PERMANENT INCOME HYPOTHESIS FOR LATIN AMERICAN AND CARIBBEAN COUNTRIES

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INTRODUCTION

This paper aims to provide further evidence on the empirical applicability of the rational expectations - permanent income hypothesis (hereafter REPIH) within the context of less developing countries (LDCs). It expands upon a similar study done by the authors for the Caribbean region (see Craigwell and Rock (1990)) by including data for several Latin American countries.

Stabilising the macroeconomy is widely accepted as a legitimate and on - going function of government. Yet the REPIH casts serious doubts on the efficacy of short-run stabilisation policies, for example, temporary income tax cuts, which operate *via* changes in consumption. In fact, the hypothesis suggests that any policy aimed at influencing the time path of current income would affect current consumption only to the extent that it signals changes in permanent income. Further, only *new* information about taxes and other policy instruments can affect permanent income (Hall (1978)). The REPIH thus denies the empirical relevance of the Keynesian multiplier and challenges the conventional view which assumes that consumers are largely passive agents in the policy game, responding to policy induced changes in current income with only a slight lag. Hence, if the REPIH holds as a decent first approximation of reality, then little hope is held out for the success of such (systematic) stabilisation efforts. If on the other hand the REPIH does not offer an accurate enough description of consumer behaviour, say, because a large enough segment of the population is constrained by imperfect capital markets, then under some circumstances, systematic (short-run) stabilisation policy which operates *via* consumption can be effective whether such policies are anticipated or not; government can manipulate aggregate demand even in a world of essentially rational, forward-looking individuals (see Hayashi (1982)). Identification of any factors which cause the data not to accord with the empirical predictions of the REPIH may offer valuable insights into the possible scope for policy action available to government.

This paper investigates the empirical relevance of the permanent income - life cycle hypothesis under rational expectations within the context of the developing economies of the Caribbean and Latin American regions. Section II of the paper notes some of the common objections to the permanent income hypothesis within the context of LDCs and provides a brief assessment of the empirical success of the hypothesis. In Section III, the empirical methodology is presented. The empirical tests and results - based on data for seven economies of the Latin American and Caribbean regions - are reported in Section IV.

Finally, conclusions are made.

II. ASSESSMENT OF THE REPIH

The permanent income hypothesis was formally introduced into the literature by Milton Friedman in his seminal paper of 1957. Friedman showed that current consumption could not be considered as simply a positive function of contemporaneous income: current consumption depended not only on current income but also on future income as embedded in the notion of permanent income. Friedman's pioneering work was expanded upon by Hall (1978) who combined the theory of rational expectations with the permanent income - life cycle theory of intertemporal optimisation of consumption to derive strikingly simple and testable predictions of the permanent income hypothesis. Specifically, by making the following set of assumptions: (i) the representative agent maximises an intertemporal utility function subject to a lifelong budget constraint; (ii) capital markets are perfect; (iii) expectations are rationally formed; (iv) the real rate of interest is constant over the life cycle and (v) the utility function is quadratic or the change in marginal utility from one period to another is small, he derived that consumption follows a random walk with drift. Hall's initial work has opened up the way for the rigorous empirical validation of the REPIH; much of this empirical work has been done for the USA and European economies. While the REPIH has come to be generally accepted as providing a theoretically sound explanation of rational, intertemporal consumer behaviour in a market economy, results of real world tests of the hypothesis have been mixed with the weight of the evidence seemingly against the hypothesis[1]. Hall (1978), although reporting results largely favourable to the REPIH, noted the predictive significance of stock prices contrary to the REPIH's predictions. Flavin (1981) reported a statistically and quantitatively significant rejection of the Hall model when she allowed Hall's test procedure to depend on the properties of the income process. Since then, the Hall model has been extended to include such 'realistic' assumptions as stochastic interest rates - Mankiw (1981), Shapiro (1984); non-separability of consumption and leisure - Mankiw *et al* (1985); substitutability between private consumption expenditure and government expenditure - Bean (1986). These studies, however, all report rejection of the strict overidentifying restrictions of the REPIH model although some evidence to support the basic notion of rational, intertemporal optimising behaviour by consumers was found (See Bean (1986)). Hall and Miskin (1982) and Hayashi (1985), using panel and cross sectional USA data respectively, while finding evidence consistent with some REPIH behaviour, reported evidence of a significant fraction of liquidity constrained households contrary to the basic assumptions of the REPIH. Similar rejections of the REPIH were reported for the UK economy by Daly and Hadjimatheou (1981) and Muellbauer (1983), but Bilson (1981) could not reject the hypothesis for the UK or the Federal Republic of Germany.

The limited work on the REPIH in LDCs has also tended to reject the hypothesis. Lahiri (1989) finds evidence to contradict the hypothesis using time series data for eight Asian economies while Zuehlke and Payne (1989), using data for eight LDCs representing a broad spectrum of economic structures, also report rejection of the REPIH. Rossi (1988), while not explicitly setting out to test the REPIH in his study of 49 LDCs using pooled data, can be interpreted as providing evidence against the null hypothesis of REPIH as can Haque and Montiel (1989).

Given the limited empirical work done on the REPIH in LDCs most of the objections to the hypothesis have been conducted at the theoretical level. It is often argued that capital market imperfections offer a compelling reason for non-applicability of the REPIH to LDCs. Capital markets in LDCs tend to be embryonic and highly fractured and there may be significant liquidity constraints, for example, due to asymmetric information about creditworthiness which would result in lenders denying loans to prospective borrowers simply on the basis of such observable characteristics as income or collateral[2]. Such individuals are likely to be constrained by current income and assets rather than by life cycle wealth in their consumption decisions. Constrained individuals would react strongly to even transient changes in income contrary to what the REPIH predicts[3]. That this characterisation of consumption behaviour is considered as accurate within the context of LDCs can be easily inferred from Rossi (1988); *inter alia*. However plausible this scenario may be, nevertheless, whether or not a significant fraction of the population is able to smooth out consumption in the face of (negative) transitory income is an empirical (sample-specific) issue. It is also argued that rational expectations demands an unrealistic amount of information on the part of consumers concerning the structure of the economy. While it is accepted that strictly speaking, rational expectations is consistent with any size forecast error as long as such errors are orthogonal, it is sometimes argued that the informational requirements for an agent in developing (highly open and informationally unsophisticated) economies may be sufficiently high that the agent cannot avoid making serially dependent forecast errors due to plain ignorance of the stochastic processes generating key domestic and foreign variables. The above arguments could be so formulated as to suggest that the behaviour of consumers in LDCs would be 'excessively' sensitive to current income; one is of course wary of postulating that a consumer in a LDC is necessarily less rational than his developed country counterpart given that they operate with different information sets.

This study attempts to provide hard evidence with which to evaluate both the hypothesis and such objections and to thus contribute to the empirical Latin American and Caribbean consumption literature.

III. THE EMPIRICAL FRAMEWORK

The framework used to evaluate the validity of the REPIH in this paper is that developed by Hall (1978) and Flavin (1981)[4]. Essentially, it allows the REPIH to be tested *via* the restrictions which the hypothesis imposes on the consumption function and it involves the estimation of both a consumption function and a set of auxiliary equations for forecasting income and other variables which enter the consumption function in anticipated and unanticipated form. While the generality of the assumptions underlying the Hall-Flavin approach may be queried, as Campbell (1987, p.1252) argues, the resulting model provides "a simple and tractable representation of the forward-looking consumption behaviour postulated by the PIH and .... may approximate optimal consumption behaviour under more general conditions".

The empirical specifications are presented below:

$$H_t = B\Gamma_{t-1} + v_t \qquad (1)$$

$$\Delta c_t = \beta_0 + \beta_1 c_{t-1} + \beta_2 y^e_t + \beta_2^* y_t^u + w_t^e \theta + w_t^u \theta^* + e_t \qquad (2)$$

where H_t is a vector containing y_t and z_t as elements; y_t is the logarithm of income and z_t contains such variables as real interest rates (r_t), real government spending (g_t) - also in log form - and the rate of inflation (π_t). w_t is a subset of z_t and c_t is the logarithm of private consumption. x_t^e refers to the expected form of a variable while x_t^u represents the unexpected or 'surprise' component. Δ is the difference operator and v_t and e_t are classical error terms. Γ_{t-1} contains (two) lags on consumption, income and variables found in z_t. Expected and unexpected variables in Equation (2) are proxied by the OLS fitted and residual series, respectively, derived from Equation (1). After substitution of fitted and residual values into the consumption function, Equation (2), this too is run using OLS. For generated variables to conform to the notion of rational expectations and genuine 'news' as relevant, it is essential that the auxiliary equations exhibit a high degree of predictive power and no significant correlation in the residuals. The two-step procedure outlined above has several well-known advantages over 'system' procedures: (i) it reduces contamination of the estimated parameters in the structural equation (Equation 2) due to misspecification errors in the forecasting equations; (ii) it is simpler computationally and (iii) it has the decided advantage, essential in small samples as used in this study, of conserving degrees of freedom. These are the standard arguments for favouring limited information over full information estimation methods.

However, as emphasised by Pagan (1984) and in Hoffman *et al* (1984), there are some problems associated with the conventional

application of the two-step procedure. Difficulties arise, in particular, due to the non-spherical nature of the disturbance series, e_t, which is attributable to the fact that e_t is a convolution of the true disturbance term in Equation (1) and additional random terms arising from the errors made in using OLS fitted and residual series to approximate expected and 'surprise' terms respectively. The standard Ordinary Least Squares estimate of the variance-covariance matrix of parameters tends to understate the true variance. Hence the test statistics in conventional two-step procedures are biased upward, causing a tendency to conclude erroneously that a statistically significant relationship exists. This paper incorporates the correction, suggested by Pagan (1984), for the presence of the generated regressors in the model; Pagan showed that while the standard errors of the coefficients of the 'surprise' variables are correct; standard errors for the coefficients of the expected terms have to be obtained from a Two Stage Least Squares (TSLS) regression that ignores the decomposition of variables into expected and 'surprise' terms and uses the Vector Autoregression (VAR) as the first stage[5].

Returning to the actual test of the REPIH, Flavin (1981) showed that under the REPIH (with $\theta = 0$) only lagged consumption and unexpected income (and other 'news' signalling revisions in permanent income) should be useful as predictors of current consumption. While not specifically identifying the source of the rejection, significance of expected income is interpreted as evidence contradicting the null hypothesis of REPIH. However, rejection of the hypothesis that $\beta_2 = 0$ is normally interpreted in the literature as evidence of the existence of liquidity constraints and this is the interpretation adopted in this study (see also Bean (1986))[6].

Tests of the REPIH have often implicitly imposed the restriction that $\theta = 0$ in Equation (2) - for example, see Zuehlke and Payne (1989)). In particular, the real interest rate is often omitted although modern macroeconomics has again emphasised the issue of intertemporal substitution. This approach implies the view that consumption is not very sensitive to changes in the rate of return. However, while there is some evidence to support the view that interest rate sensitivity is apt to be reduced in the presence of liquidity constraints and that such constraints may be pervasive in LDCs, the question of liquidity constraints and significant responsiveness of consumption to interest rate changes is an empirical, sample-specific issue that ideally should be tested for. Government spending can also enter the consumption function if economic agents maximise a utility function in which effective consumption is the argument where effective consumption is defined as a weighted index of private consumption and public expenditures. It should thus be noted that significance of expected real interest rates and/or government spending in Equation (2) will not constitute evidence against the REPIH and are included to avoid possible misspecification due to imposing zero

restrictions on the vector of parameters, θ.

IV. DATA AND EMPIRICAL FINDINGS

The data employed in this study were obtained from Central Bank reports and publications of Statistical Offices, as well as the International Financial Statistics of the IMF. Data used are annual observations of gross domestic product (GDP), private consumption expenditure and government spending, all in *per capita* terms and deflated by a consumer price index. A real interest rate variable, defined as the nominal rate plus one minus the rate of inflation, is also constructed. This interest rate variable should represent the rate on a free-traded asset to satisfy the REPIH assumptions. In several cases, however, only one interest rate series was available, so that while deposit rates are used for Guyana and Trinidad and Tobago, a treasury bill rate is employed in the case of Jamaica. Only a discount rate was available for the other countries (Costa Rica, Brasil, Peru and Guatemala) and this is used. If the different domestic interest rates move in tandem, then the choice of a particular rate is relatively unimportant.

Ideally, tests of the REPIH should be done using flow consumption - expenditure on non-durables plus service flows from the existing stock of durables - rather than total consumption expenditures. As in practice it is very difficult, if not nigh impossible, to correctly determine service flows from durables, most researchers in developed countries have compromised by using expenditures on non-durables alone to proxy flow consumption although this approach is flawed when durables and non-durables are non-separable in utility. However, the published data in LDCs generally do not allow such a breakdown; researchers in LDCs have therefore been forced to work with total consumption expenditures. Some comfort can however be taken in the finding that at least for the USA, where the vast majority of the empirical work on the REPIH has taken place, the empirical rejection of the REPIH does not seem to hinge crucially on the precise measure of consumption.

The basic permanent income - life cycle hypothesis theory suggests that consumption depends on current wealth and on current and future expected labour income. However, where separate series on wealth are unavailable, a broader measure based on total income rather than just labour income (which is usually unavailable, anyway) may be preferable as such a measure would encompass an estimate of both wealth and income. Disposable income series were available only for Trinidad and Tobago; to enhance comparability of results we use GDP as our income construct. Initial investigations using the Trinidad and Tobago data would imply that the choice makes no fundamental difference to the results. In any case, the unadjusted GDP variable does have some advantages. Bilson (1981) argues that undistributed corporate profits are a useful substitute for stock price indices as signals of future

income growth. As GDP includes undistributed corporate profits, it may be a more appropriate measure than disposable income in the absence of wealth measures (see also Zuehlke and Payne (1989)).

The Vector Autoregressions used to generate expected and 'surprise' terms (Equation (1)) are in themselves of no real importance beyond their use in generating rational expected and 'surprise' series and are not reported here[7]. However, given the central nature of generated variables to the estimation of the structural (consumption) equation, we briefly discuss the behaviour of the VARs. Generally, the VARs are well fitted (high $\bar{R}^2$), exhibit no significant serial correlation and satisfy structural stability requirements (within-sample predictive accuracy tests). Ensuring that the outcomes of the VAR estimations met these requirements for representing rational expectations and forecast errors, however, meant that the lag structure and the elements of the VARs varied somewhat across the different countries.

The results of the estimation of the consumption function are reported below. Two different formulations of the consumption function are used: (i) a formulation (the 'simple' function) restricting θ and θ^* to zero; (ii) an extended version involving expected and 'surprise' terms on government spending and real interest rates[8]. It is informative to see whether the usual habit of excluding these additional variables significantly affect the expected income coefficient. Results for the consumption function, for the Caribbean and Latin America are summarised below in Table 1 and Table 2, respectively[9,10]. Equations are free of serial correlation and are structurally stable; moreover, these equations satisfy a host of diagnostic tests including tests for heteroscedasticity, normality and functional form misspecification.

As expected under the REPIH, current unexpected income is significant at conventional levels in almost all cases, although there seems to be some interaction between 'surprises' on income and other variables. In contradiction to the REPIH, however current expected income is statistically significant for all countries. Lagged consumption is however not significant for Brasil, Costa Rica and Guatemala although it is significantly negative for the other countries. The coefficient values on expected income for the different countries range from 0.52 to approximately 1 (in the extended formulation) and do not change significantly across the two specifications, although they decline marginally in the extended model in all cases. The relationship between growth in consumption and the expected real interest rate is positive for Peru, Costa Rica and Jamaica but negative in the cases of Trinidad and Tobago and Brasil. It is, however, only significant for Peru and Jamaica[11,12]. The expected government variable is only significant in the case of Guyana and Brasil, but with opposite signs. In the case of Guyana, the sign is negative implying substitutability between private spending and government expenditures; complementarity is implied for Brasil. Finally, the

REPIH would suggest that consumers react asymmetrically to expected and unexpected events. However, F- tests of restrictions suggest that actual income (our variable of focus) could be used instead of the decomposition of income into y^e_t and y^u_t for all countries studied.

CONCLUSION

The statistical evidence presented herein is rather consistent in its rejection of the pure REPIH model: the expected income variable is highly significant in every case and coefficient values change only marginally across the different formulations. These results hint at the presence of binding liquidity constraints in Caribbean and Latin American economies. The presence of such constraints, if exploitable by government policy, would imply a stronger role for government fiscal and credit policies than admitted by the REPIH. The finding that expected income is significant is hardly surprising given the fractured nature of capital market in LDCs and replicates the findings of Rossi (1988), Lahiri (1989), Zuehlke and Payne (1989) and Haque and Montiel (1989) who all report evidence supportive of the existence of pervasive liquidity constraints in LDCs.

The data do not reject the use of actual income in the consumption function, lending some validity to the use of a Keynesian - type consumption function as argued by Forde (1987) for the case of Trinidad and Tobago. However, the results, taken as a whole, would suggest that additional variables such as real interest rates and government spending may be included in a more general explanation of consumption behaviour in LDCs. In any event, conditional on the data set used herein, our findings would tend to suggest that the polar form of the REPIH does not fit Latin American or Caribbean data well and that liquidity constraints are pervasive in these countries.

FOOTNOTES

1. See King (1985) and Deaton (1986) for comprehensive surveys of recent empirical work on the REPIH.

2. For example, in a study of commercial banking practices in the Eastern Caribbean, McClean (1975) finds that individuals are often screened by banks on the basis of such observable characteristics as capital ownership, collateral and class (income).

3. However, see Foley and Hellwig (1975) who show that this result does not necessarily obtain in the uncertainty case.

4. The theoretical restrictions of Hall (1978) and Flavin (1981) are obtained from a microeconomic model of consumption choice that makes no country - specific assumptions beyond those tested under the REPIH null hypothesis. Thus their methodological framework may be applied without revision to LDCs.

5. To identify the system formed by Equation (1) and Equation (2), we must assume that cov $(e_t, v_t)=0$. That is, that transitory consumption, e_t, is orthogonal to 'surprises' in income and other included variables, v_t. It should also be noted that the 'surprise' consumption function, Equation (2), is observationally equivalent to a model regressing Δc_t on (past consumption), current income and w_t variables with simultaneity affecting y_t and w_t variables. A system with both simultaneity and 'surprises' is therefore unidentifiable; the reader, like the author must choose one interpretation or the other - 'surprises' or simultaneity. The 'surprise' interpretation is adopted in this paper as is common in the empirical consumption literature (e.g, Bean (1986); Blinder and Deaton (1985); and Rossi (1988)). Readers preferring the simultaneity interpretation can disregard the coefficients of the 'surprise' terms in Equation (2) and view the other coefficients as TSLS estimates of Equation (2) where the elements of Γ_{t-1} are used as the instruments in the first stage.

6. Significance of c_{t-1} is also considered as evidence against the REPIH. c_{t-1} may be thought of as reflecting habit formation.

   That is to say, the individual parameters of the VARs are unimportant as the VARs are not structural equations and are used solely to provide rational forecasts and errors. The lag structure and composition of the VAR is therefore of secondary importance.

8. While additional regressors could be tried in a search for 'correct' or more general consumption function for LDCs, we generally include only real interest rates and government spending as these are the additional variables normally highlighted in the literature (see Rossi (1988)).

9. The observation period for the estimation of the consumption equation was 1963-86 for Guyana, 1964-86 for Jamaica and 1968-87 for Trinidad and Tobago. Inclusion of r_t for Guyana worsened the results appreciably. Given that the nominal rate of interest has been kept fixed in Guyana for long periods we included the rate of inflation as a separate element of the VAR. While it helped significantly in the prediction equations, inclusion of the inflation variable in Equation (2) induced structural break and is thus omitted.

10. The observation period for the estimation of the consumption was 1965-87 for Costa Rica, 1966-85 for Brasil, 1963-84 for Peru and 1964-86 for Guatemala. Note that Dickey-Fuller tests were used to determine whether the level or first difference forms of variables should be used. Consequently, levels were used for all variables for Guyana, Jamaica and Trinidad and Tobago and Peru. For the other countries, while r_t is in levels, g_t and y_t are in first difference form in accord with the underlying time series properties of the data. In any case, examination showed that the results were rather invariant with the choice of levels or first differences.

11. There is some theoretical justification for expecting reduced interest rate sensitivity of consumption when liquidity constraints are strong (Jackman and Sutton (1982)). Interestingly enough, the two countries for which interest rates were significant (Peru and Jamaica) while implying the highest rate of response to changes in interest rate concomitantly exhibited the lowest response to expected income changes.

12. Including the real interest rate in the VARs for Guatemala led to structural break in the forecasting equations and the interest rate equation itself behaved poorly. We tried using the nominal interest rate plus the rate of inflation initially, but again met with little success. Finally, only the inflation rate was used.

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TABLE 1

Consumption Function Estimates - Caribbean

	Jamaica		Guyana		Trinidad and Tobago	
	(1)	(2)	(1)	(2)	(1)	(2)
Constant	-0.45 (-2.87)	-0.31 (-2.08)	-0.19 (-0.90)	-0.44 (-2.15)	-0.48 (-5.39)	-0.82 (-0.41)
C_{t-1}	-0.76 (-3.67)	-0.54 (-3.37)	-0.61 (-2.04)	-0.54 (-2.07)	-0.62 (-6.55)	-0.69 (-2.98)
Y_t^e	0.65 (3.62)	0.52 (3.32)	0.70 (2.38)	0.65 (2.19)	1.02 (6.04)	0.92 (1.99)
r_t^e	-	0.39 (2.49)	-	-	-	-0.17 (-0.75)
g_t^e	-	-0.04 (-1.07)	-	-0.15 (-2.32)	-	0.04 (0.17)
Y_t^u	0.59 (1.62)	0.40 (1.20)	0.93 (4.46)	0.81 (3.91)	0.64 (2.12)	0.36 (0.77)
r_t^u	-	0.25 (0.52)	-	-	-	-0.10 (-0.47)
g_t^u	-	0.71 (2.18)	-	0.18 (1.20)	-	0.15 (0.84)
$\bar{R}^2$	0.46	0.68	0.52	0.64	0.70	0.69
F( )	5.39	7.60	9.14	9.10	16.08	6.97
RR[ ]	2.27	0.08	1.93	0.12	0.18	0.19
LM[ ]	2.82	2.82	1.05	0.48	0.03	0.23
NRM[ ]	1.07	0.53	0.35	2.20	1.32	0.12
HET[ ]	0.001	0.003	0.58	1.11	0.92	0.41
DW	1.16	1.91	1.42	1.86	2.05	2.10

NOTE: (1) refers to the simple model and (2) to the extended model. RR[F(1, k+1)] is Ramsey's Reset test using the square of the fitted values, LM[F(1,k+1)] is a Lagrange Multiplier test of residual

TABLE 2

Consumption Function Estimates - Latin America[10]

	Peru		Brasil		Guatemala		Costa Rica	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Constant	-0.40 (-1.58)	0.04 (0.17)	0.06 (0.47)	0.11 (1.01)	0.04 (0.54)	0.12 (1.42)	-0.006 (-0.55)	-0.005 (-0.47)
c_{t-1}	-0.64 (-5.71)	-0.40 (-3.94)	0.01 (0.55)	0.02 (1.08)	0.02 (0.54)	0.05 (1.37)	-0.03 (-0.88)	-0.04 (-1.08)
y_t^e	0.59 (3.37)	0.50 (2.44)	1.13 (15.94)	1.03 (6.96)	0.77 (5.84)	0.69 (4.93)	0.84 (6.31)	0.69 (4.15)
r_t^e	-	0.30 (2.34)	-	-0.05 (-1.80)	-	-	-	0.09 (1.15)
g_t^e	-	-0.03 (-0.30)	-	0.15 (1.77)	-	0.05 (1.44)	-	0.06 (0.60)
π_t^e	-	-	-	-	-	-0.09 (-1.68)	-	-
y_t^u	1.01 (8.79)	0.90 (3.45)	1.08 (4.16)	0.97 (3.05)	0.47 (3.56)	0.47 (3.40)	0.21 (0.40)	0.56 (0.88)
r_t^u	-	0.15 (0.74)	-	0.02 (0.40)	-	-	-	0.60 (1.39)

serial correlation, F(k-1, T-k) is the F-test for the overall significance of the regression, NRM[CHI-Sq (2)] is the Bera - Jarque test of normality of the residuals, HET[F(1,T-2)] is a test of heteroscedasticity while D.W is the Durbin - Watson "d" statistic. k is the number of regressors, including the constant. The standard errors of the expected variables have been derived from a TSLS regression in line with the Pagan (1984) critique.

Table 2 Cont'd

$\exists_t^u$	-	0.007 (0.03)	-	0.11 (0.66)	-	0.05 (0.78)	-	-0.47 (-0.79)
π_t^e	-	-	-	-	-	-0.02 (-0.21)	-	-
$\bar{R}^2$	0.84	0.91	0.93	0.95	0.71	0.73	0.67	0.67
F( )	37.08	29.63	89.34	51.62	18.89	9.36	16.10	7.45
RR[ ]	0.08	0.60	4.02	1.73	1.74	0.47	0.08	0.03
LM[ ]	5.56[a]	1.27	1.30	1.10	2.07	3.36	0.40	0.007
NRM[ ]	1.97	0.88	1.31	0.12	1.23	1.66	0.51	0.70
HET[ ]	0.01	1.64	0.17	0.13	0.41	2.38	0.17	0.63
DW	1.02	1.41	2.33	2.44	2.33	2.48	1.58	1.87

NOTE: [a] represents serial correlation, (1) refers to the simple model and (2) refers to the extended model. RR[F(1, k+1)] is Ramsey's Reset test using the square of the fitted values, LM[F(1,k+1)] is a Lagrange Multiplier test of residual serial correlation, F(k-1, T-k) is the F-test for the overall significance of the regression, NRM[CHI-Sq (2)] is the Bera - Jarque test of normality of the residuals, HET [F(1,T-2)] is a test of heteroscedasticity while D.W is the Durbin - Watson "d" statistic. k is the number of regressors, including the constant. The standard errors of the expected variables