PRIVATE SAVINGS, GROWTH, DEPENDENCY RATIO AND FOREIGN CAPITAL: SOME ISSUES AND LESSONS FROM MALAYSIA

MARWAN ABDUL-MALIK THANOON* and AHMAD ZUBAIDI BAHARUMSHAH**

Abstract

This paper presents an empirical assessment of the determinants of private savings rate in Malaysia by focusing on the role of foreign savings and economic growth. The analysis, based on 40 years of observations, reveals that in the long-run per-capita income, dependency ratio, foreign savings (FDI), interest rate and taxes all have a significant effect on private savings rate. Causal inferences based on Toda and Yamamoto (1995) approach reveal that savings Granger cause economic growth and not vice-versa. In addition, we endorse the long-run causal relationship that runs from FDI to economic growth. We conclude that much of the recent slackness in short-run private savings is a consequence of the economic slow-down due to the Asian financial crisis and that, as the economic performance in Malaysia improves, both domestic and foreign savings are expected to increase.

Keywords: private savings rates; FDI, economic growth

JEL Classification: E21, C23

1. INTRODUCTION

The strategic role of savings in the process of economic development has received a great deal of attention in the theoretical and empirical terms. The conventional wisdom suggests that higher saving leads to higher investment, which in turn leads to higher economic growth. Indeed, a steady flow of saving is essential for sustained economic growth and intergenerational equity. Authors like Loayza *et al.* (2000a) believe that if economies, particu-

* Department of Economics, Faculty of Economics and Management, University of Mosul, Mosul P. Box 78, Iraq.

** Department of Economics, Faculty of Economics and Management, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor D. E., Malaysia.

larly the poorer ones, can be jump started by a hike in aggregate saving, it will set a virtuous cycle of saving and economic prosperity. The experience of Latin America in the 1980s clearly shows that low savings and high current account deficits can lead to adverse effects of reversals of capital flow. Meanwhile, it is also argued that national saving rates that match a country's investment rates reduce the risk that may be associated with sudden shifts in foreign capital.

The effect of foreign borrowing on the host country has recently received considerable attention in literature, but no clear consensus has emerged from this body of research (e.g., Cohen, 1993; Fry, 1994; Held and Uthoff, 1995; Loayza *et al.*, 2000b). The standard intertemporal models predict that shocks that temporarily increase capital inflows are unambiguously associated with a temporary decline in domestic savings. Unfortunately, empirical evidence on how domestic savings respond to foreign savings failed to yield consistent results. Edwards (1995), for example, found that a 1 percent increase in foreign saving is associated with 0.50 to 0.63% decline in domestic saving (compared to –0.40 to –0.45% as reported by Held and Uthoff, 1995). Loayza *et al.* (2000b) also found that foreign and domestic savings are indeed substitutes. They pointed out that an increase of 2.0% of gross private disposable income (GNDI) in foreign savings reduces private (and national) savings by about 1.0% of GNDI in the long run. Meanwhile, the study by Reinhart and Talvi (1998) concluded that long-run behavior of saving rates is driven by demographic factors, per capita GDP, and other economic factors that have little to do with fluctuation in foreign capital.

Studies on the determinants of private savings in developing countries have played an important role in past research. Surprisingly, a systematic analysis on this subject has not been conducted for the case of Malaysia. Notable exceptions are the works of Fry (1994), Jomo and Suew (1996) and Ariff and Cheen (2000). To the best of our knowledge, none of these authors have focused on the causal relationship between foreign and domestic savings. In addition, modeling strategies in these studies do not consider dynamics and no attempt has been made to differentiate between short-run and long-run parameters of the determinants of private savings. Besides, these studies are subject to methodological and data limitations. Specifically, the authors have neglected the problem of spurious regressions that may arise when statistical inferences are drawn from nonstationary time series data. It is now well-known that regressing one nonstationary series on another may yield spurious regression, which may in turn lead to erroneous policy conclusions.

The main objective of this paper is to identify the determinants of private

savings in Malaysia, a small open economy. In this study, the focus is on questions like: (a) What are short and long term impacts of economic growth on savings? (b) Do foreign savings displace domestic savings? If they do, do they crowd out domestic savings in a one-to-one fashion? (c) Which way does causality run, in the savings-growth nexus?

The inconclusive nature of findings on the one hand, and statistical problems associated by ignoring the nonstationary properties of the macroeconomic variables on the other hand, motivated us to reexamine the savings function in Malaysia. Malaysia provides an interesting case study because despite its high saving rates, it has also received sizable amounts of foreign capital (mainly FDI) since the late 1970s. Also, during the 1997-98 financial turmoil, the country experienced a sudden capital flow reversal like all the other neighboring countries. Capital shortage in the post-1997 period provides an opportunity to examine the relationship between domestic and foreign savings. The existing studies on private saving rates typically use time frames of 15-25 years, except for Attanasio *et al.* (2000) who used a 34-year time frame. Our study utilized time series over the 1960-2000 period, which is the longest time span considered in any previous study in the region. It's worth mentioning studies that used a shorter sample to exclude the post-crisis that may have affected consumption patterns. We believe that our results are more informative than those provided by earlier articles, because a broader range of variables is needed in such analysis.

The rest of the paper is structured as follows: Section 2 sets up a baseline model utilized in both the short and long run analysis; Section 3 describes the methodology of the paper including general-to-specific testing, long run equilibrium and short run error correction equations for saving behavior. Section 3 also includes a brief review of the literature on saving behavior. Empirical results are reported in Section 4. Main conclusions are drawn in section 5.

2. BRIEF LITERATURE AND THE MODEL

Comprehensive surveys by Deaton (1995) and Schmidt-Hebbel *et al.* (1996) suggest that literature on the behavior of savings has been somewhat fragmented; macro studies tend to focus on one, or at the most, two aspects of the problem. Because of its many policy dimensions and vast theoretical complexity, no single model has been able to deal with every dimension of saving issues in developing countries. This fragmentation is also evident, although to a lesser extent, in empirical literature on the host subject.

Recent literature has raised concerns about the deleterious effects of flows of capital on recipient countries (Fry, 1994; Cohen, 1993). Specifically, FDI displaced domestic savings. A fall in savings rate due to foreign capital inflows can be harmful to the host country since a reduction in domestic savings could lead to an increase on the dependency of foreign capital. In contrast Jomo (1998), in his assessment of the financial crisis, argued that the opening up of financial markets and the quasi-peg to the dollar encouraged the inflow of foreign savings to supplement the already high domestic savings rate. What followed eventually led to asset price inflation and excessive unhedged borrowing from abroad. Hence, even if short term capital inflows temporarily supplement domestic saving, their reversal can create severe disturbances on the functioning of an economy.

Using data on Asian and Latin American countries, Edwards (1995) found that demographics, public savings, growth per capita income, and foreign savings are important in the savings function. His study established that domestic and foreign savings were substitutes. Edwards (1995) further showed that lower growth, higher dependency ratios and a far slower degree in financial deepening accounted for the lower saving rates observed in Latin America. In a related work, Faruqee and Husain (1995) came to the same conclusion on the importance of demographic factors, in explaining the trend in the saving rates in the Asian countries. They also argued that, to a lesser extent, financial deepening and forced savings, in the form of compulsory pension plans, contributed to the high saving rates in Asian countries.

Held and Uthoff (1995) investigated saving behavior from the perspective of the Latin nations by including per capita income, inflation, growth, dependency ratio, terms of trade and foreign savings in the model. Two important conclusions emerged from this study: first, demographics play an important role in explaining saving behavior, hence supporting the life-cycle hypothesis. Second, foreign and domestic savings are substitutes, implying that the influx of foreign investments cause domestic saving to fall, a result that is in line with Edwards' (1995) findings.

Other studies used panel data. Drawing from a panel of the Latin America and the Asian countries, Reinhart and Talvi (1998) found statistical data supporting a negative relationship between domestic and foreign savings, in 20 out of 24 countries. Edwards (1996) extended his work by looking at private and public savings from a panel consisting of 36 countries during the 1970-92 period. The analysis was based on a vector of life-cycle factors, monetary and fiscal variables, external indicators, and political variables. He highlighted the following conclusions: (i) Per capita income growth is an im-

portant determinant for both private and government savings; (ii) High foreign savings is associated with lower domestic savings; (iii) The level of financial development is an important determinant of private saving. Following this, Schmidt-Hebbel and Serven (2000) estimated savings function that included growth rate of GNP, per capita income, dependency ratio and income distribution. They showed that savings ratio increases with the income levels and GNP growth rate, while dependency ratio has a negative effect on national saving rates.

In this study, we specify the reduced form equation for private savings rate (PS) based on three conditions: life-cycle theory, availability of data and whether the variable fits well in the model in statistical terms. The following base line model was estimated:

$$PS_t = \alpha_0 + \alpha_1 PC_t + \alpha_2 GRO_t + \alpha_3 DEP_t + \alpha_4 INT_t + \alpha_5 TAX_t + \alpha_6 FDI_t + \mu_t \quad (1)$$

where *PC* is per capita income, *GRO* is economic growth, *DEP* is dependency ratio (population younger than 15 years, plus the population over 65 years old as the percentage of working-age population), *INT* is the real interest rate, *TAX* is tax rate and *FDI* is foreign direct investment. The error term, μ_t is to capture the unobserved effects and as usual, it is assumed to have zero mean and constant variance. Finally, α's are long-run parameters of the model to be estimated. All the variables, with the exception of interest rate, are expressed in natural logarithm. The specification represents the long-run savings function and following the trend in the current literature, we have extended the life-cycle model to include variables like FDI, taxes and inflation.

3. METHODOLOGY

To test for cointegration among the macroeconomic variables we followed the procedure developed by Johansen (1988) and Johansen and Juselius (1990), because this particular method is claimed to be superior to the regression based Engle and Granger procedure. The Johansen-Juselius method sets out a maximum likelihood procedure for the estimation and determination of the presence of cointegrating vectors in the VAR system. Suppose the vector of *p*-variables, $Z_t = (Z_{1t}, \ldots, Z_{pt})'$, is generated by the *k*-order vector autoregressive process with Gaussian errors:

$$Z_t = A_1 Z_{t-1} + \ldots + A_k Z_{t-k} + \mu + \varepsilon_t, \; t=1, \ldots, T \quad (3)$$

where Z_t is a px1 vector of *I(1)* variables, the A's are estimable parameters, ε_1, … , ε_T are iid *Np (0, Σ)* and μ is a vector of constants. Since we want to distin-

guish between stationarity by linear combinations, by differencing this process, it may be written in error correction form as:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \ldots + \Gamma_{k-1} \Delta Z_{t-k+1} + \Pi Z_{t-k} + \mu + \varepsilon_t, \; t=1, \ldots, T \qquad (4)$$

The matrix Π contains information about the long run relationship between the variables in the vector. Information about the number of cointegrating vectors is found in the rank of Π. Specifically, the rank of Π determines how many linear combinations of Z_t are stationary. In the case where $0<\text{rank}\,(\pi)= r<p$, Π can be factored as $\alpha\beta'$ (or $\Pi = \alpha\beta'$) where α and β are both $p\times r$ matrices. The Johansen method suggests two statistics to check for cointegrating vectors: trace and maximum eigenvalue tests. Since the method is now widely used in the literature, a description of the specific details of the test is omitted here. To conclude, the model is estimated using a two–step procedure. The first step involves estimating the long run equilibrium relationship among levels of variables. In the second step, the first differential of variables and lagged residuals from the long run equation are used to estimate a short run error correction equation, which model the short run dynamics.

Although cointegration implies the presence of Granger causality, it does not necessarily identify the direction of causality between variables. This temporal Granger causality can be captured through the vector error correction model (VECM) derived from the long run cointegrating vectors. Engle and Granger (1987) and Toda and Phillips (1994) demonstrate that in the presence of cointegration, then the standard VAR(p) representation in the first difference is misspecified.[1] They suggest the use of VECM in empirical tests of Granger causality. However, the alternative methods for testing of non-causality such as error correction model (ECM) and VECM are cumbersome and sensitive to the values of nuisance parameters in finite samples and therefore, 'the virtues of simplicity and ease of application have been largely lost' (Rambaldi and Doran, 1996 p. 3). Toda and Yamamoto (1995) developed an alternative lag augmented VAR approach for testing *Granger non-causality*. In this approach, causal inferences are to be conducted in the level VARs, which may contain integrated processes but do not rely upon integration and cointegration properties of any or all the variables. It also guaran-

[1] Instead, they suggest a vector error correction representation of the relationship as follows: $\Delta Z_t = a + \sum_{i=1}^{p} A_1 - \Delta Z_{t-1} - d\,(\alpha' Z_{t-1}) + v_t$, where Z_t is $n \times 1$ column vector of macroeconomic variables, Δ is a difference operator, a is $n \times 1$ column vector of constant terms, p is the lag length, d is $n \times r$ matrix of coefficients, v is a n x 1 disturbances vector and $E(v_t\, v_t') = \Omega$.

tees the asymptotic distribution of the MWALD statistics even when cointegration exists. This is an attractive approach and is therefore adopted in this study.

The procedure offers a simple formulation and is convenient to apply because it permits linear as well as non-linear tests of restrictions. Moreover, it has a normal standard limiting chi-square distribution and the usual lag selection procedures can be applied 'so long as the order of integration of the process does not exceed the true lag length of the model' (Toda and Yamamoto, 1995 pp. 225), i.e. if there is no cointegration and /or the stability and rank conditions are not satisfied. The MWALD statistics is valid whether the series is *I(0), I(1)* or *I(2),* non cointegrated or cointegrated of an arbitrary order (see. Rambaldi and Doran, 1996). In essence, this procedure circumvents some of the pre-test biases that practitioners may be confronted with involving unit root and cointegration pre-testing. Toda and Yamamoto (1995) have proven that in the integrated and cointegrated systems, the WALD test for restrictions on the parameters of a VAR(k) has an asymptotic χ^2 distribution with m degree of freedom, where m is the number of restrictions when a VAR ($k + d_{max}$) is estimated. Here, d_{max} is the maximum order of integration suspected to occur in the system. What is required for the Toda-Yamamoto approach is to determine d_{max} to add the lag length of this d_{max} to the true lag length (k), and to estimate the level VAR. Then the hypothesis can be performed using the Wald test. These restrictions would then imply long run causal inference since, unlike ordinary difference VARs, the formulation involves only variables appearing in their levels.

4 DATA AND EMPIRICAL RESULTS

The bulk of the data comes from South East Asian Central Banks Financial Statistics, Key Indicators of Developing Asian and Pacific Countries and World Bank (World Table and World Debt Table). Financial variables such as taxes and interest rate are complied from Bank Negara Malaysia and *International Financial Statistics* of the International Monetary Fund. Annual data from 1960 to 2000 was employed in the analysis. All variables, apart from interest rate (which appears as fractions) are in natural logarithms so that the first difference yields the growth rates. We opted for annual data rather than quarterly data because some key variables were not readily available on quarterly basis for the sample period under investigation. The consumer price index (CPI) was used to calculate real interest rate.

Unit Root Tests and Cointegration Tests

We applied the standard augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to test for nonstationarity of the variables under investigation. Special attention was given to lag-length selection in conducting the unit root tests. For this reason, we relied on the general-to-specific elimination procedure recommended by Campbell and Perron (1991) to identify the optimal lag structure for the unit root test. All in all, the ADF and PP statistics failed to reject the null hypothesis of a unit root for all the variables in levels. This hypothesis, however, is easily rejected for the first-differences by both testing procedures at conventional significance levels. These results (not reported) indicate that all the variables are stationary in their first-differences, and should appear in this form in the vector autoregressive (VAR) model.

Given the presence of unit root in each of the variables under investigation, we proceeded with the cointegration approach developed by Johansen (1988) and its extension in Johansen and Juselius (1990) to the system of eight *I(1)* variables: *PS, GRO, INT, TAX, PC, DEP, INF* and *FDI*. Before applying the cointegration tests, a two-order lag VAR system was chosen in accordance with the data. In addition, a battery of diagnostic tests was conducted to ensure that the model was adequately specified. As shown in Table 1, the model easily passed the diagnostic tests.[2]

Both the trace and maximum eigenvalues (λ-max) statistics form the Johansen tests (not reported) revealed the presence of a unique vector among the system of seven variables at 0.05 level of statistical significance. To determine whether all the variables belonged to the cointegrating space, we also applied the log-likelihood ratio (LR) test for the exclusion of each variable in the cointegrating space, as discussed in Johansen and Juselius (1990 p. 195). By and large, the LR tests suggested that that the null hypothesis of restricting the coefficients of all the variables to zero is easily rejected at the 5 percent significance level, except for only one variable - the inflation rate.[3] It's worth mentioning that inflation is not a serious problem in Malaysia. Thus, the long-run private savings rate in Malaysia is determined by variables like FDI and interest rate, besides other important determinants like income level, tax rate, economic growth, and dependency ratio. From a statistical perspective, the results from the exclusion test allow further reduction in the VAR model (a model without inflation rate).

[2] Because of the limited number of observations, an upper limit of two lags was originally considered based on Akaike Information Criteria (AIC). Residuals of each equation in the VAR system were tested for serial correlation with the Bruesch-Pagan (BG) LM test for the chosen lag length; no evidence of autocorrelation was detected.

[3] These results are not presented here but are available from the authors upon request.

Results of the cointegration tests based on seven *I(1)* variables are displayed in Table 1. The λ-max and trace statistics of Johansen-Juselius test revealed that the null hypothesis of no cointegration (r=0) is easily rejected at the 5% significance level in the system of seven variables: X= [*PS, GRO, INT, TAX, PC, DEP* and *FDI*]. As shown in Table 3, the cointegration test based on λ-max statistic rejected the hypothesis of one versus two cointegrating vectors. The trace statistic also hints towards two vectors. However, when the LR tests were adjusted for degree of freedom, the results revealed that a unique cointegrating vector emerged in the system of seven variables.[4] In addition, we found that the eigenvalue (λ-max) associated with the first vector is dominant over those corresponding to the other vectors, thereby confirming that a unique and stable long run relationship among the seven variables in the system exists.

Table 1. Johansen and Juselius Cointegration Tests

Variables: PS GRO FDI PC DEP INT TAX					
Tests		**λ-max**		**Trace**	
H_0	**H_a**	**C.V.**	**k = 2**	**C.V.**	**K = 2**
r = 0	=1	96.45**	46.47	209.48**	132.45
r ≤ 1	=2	48.27**	40.53	113.03**	102.56
r ≤ 2	=3	22.21	34.40	64.75	75.98
r ≤ 3	=4	18.15	28.27	42.54	53.48
r ≤ 4	=5	11.91	22.04	24.39	34.87
r ≤ 5	=6	10.17	15.87	12.49	20.18
r ≤ 6	=7	2.32	9.16	2.32	9.16
Diagnostic checking of the unrestricted VAR model					
Q(3)	**Q(6)**	**LM**	**ARCH**	**HET**	**RESET**
0.286	2.54	0.732	0.092	3.56	3.12
(0.982)	(0.99)	(0.431)	(0.12)	(0.03)	(0.162)

Notes: The denotation: PS= Private saving; GRO= Growth rate of GNP; PC= Per-capita income; FDI= Foreign direct investment; DEP= Dependency ratio; INT= Interest rate; Tax= Tax. The Johansen maximum likelihood cointegration procedure is applied to the seven-variable system [PS, GRO, FDI, PC, DEP, INT, TAX]. The double (**) and single (*) asterisks denote statistical significance at the 5 percent and 10 percent levels respectively (See Osterwald-Lenum, 1992; Table 1*, 1). C.V. denotes the critical value and *k* is the optimal lag length used in the VAR model based on Akaike information criteria (AIC).

[4] In small samples, the trace and λ-max statistics can only be used as a guide and usually yield more vectors if the degree of freedom correction factor is ignored. This issue of finite sample bias is addressed by the use of the Reinsel-Ahn corrected likelihood ratio test statistics. However, work by Johansen (1995) and Doornik and Hendry (1994) pointed out that it is yet unclear whether this is the preferred correction (Reinsel and Ahn., 1992).

The coefficients of the retained variables are all individually significant in the long run function, except for economic growth (GRO). It is worth mentioning that the results appear to be unaffected by the dropping of the growth variable. To account for the effect of possible break during the 1997-98 financial crisis periods, we re-estimated the VAR model using data that started in 1960 and ended in 1997. The results (not reported) were qualitatively similar to those reported in Table 1. Thus, the long run relationship between savings and its determinants appears to be robust and is unaffected by the crisis.[5]

Despite the relatively short lag-length selected for the VAR model, tests results revealed that the estimated equations did not suffer from any serial correlation (Breusch-Godfrey, BG). Neither was the model misspecified nor the choice of functional forms incorrect (RESET); the normality of the residual could not be rejected. Furthermore, also the residuals were found to be homoskedastic and free from the ARCH effects. Again, all these tests indicate the robustness of the specification of the model adopted in this study.

Upon normalizing the private saving rate, we obtained the estimated long run parameters of the long run savings function. The estimated parameters appear in Table 2 and the numbers below the estimated parameters are the asymptotic standard errors. Accordingly, we found that dependency ratio, tax, and (real) interest rate contributed negatively to long run savings rate. The long run coefficients of these variables are statistically significant at 5% level or better. We note that theory predicts the relationship between income levels and saving rates to be positive.[6] Most studies found that income level carries a positive sign but not all showed the variable to be significant. In this study, we observed that not only the income variable carries a positive (0.475) and is statistically significant. This means that the higher the income levels *ceteris paribus,* the higher the saving rates. The positive correlation between private savings rates and income level, might explain why savings have been high in Malaysia in the past three decades. Economic growth exerts a positive influence on private savings but is not significant in the cointegrating relationship. This finding, however, contradicts the evidence presented in Carroll and Weil (1994) and Edwards (1996), to name a few.

Theory predicts an ambiguous relationship between real interest rates and private savings. Savings respond positively or negatively to changes in interest rates, depending on the relative strength of substitution and wealth

[5] These results are available from the first author upon request.

[6] See the article by Loayza *et al.* (2000a,b) on the expected sign of the determinants of private savings.

Table 2. Long-run Private Savings

PS	GRO	FDI	PC	DEP	INT	TAX	CONSTANT
-1.000	0.094	0.442	0.475	-1.355	-0.734	-1.771	7.425
	(0.59)	(0.100)**	(0.108)**	(0.528)**	(0.173)**	(0.731)**	(2.113)**

Notes: See Table 1 for the definitions of the variables. The estimated coefficients were obtained by normalizing private savings (PS=-1). Numbers in parentheses are the asymptotic standard errors.

effect. Results reported in Table 2 reveal that the interest variable carries a negative sign and is statistically significant at conventional significance levels, meaning that a higher real interest rate leads to lower saving rates. This strong negative association between savings and interest rate is also documented in Loayza *et al.* (2000b). In contrast, it contradicts earlier studies by Edward (1996) and Masson et al (1998) that have found interest rate has positive.

The evidence found in this study seems to support the hypothesis that foreign capital, as measured by FDI, supplements private savings. In fact, our results suggest that a 1% increase in foreign savings is associated with 0.4% increase in private savings, all other things being equal. We view the complementary relation between domestic and foreign savings as noteworthy since most studies have reported that foreign savings crowded out domestic savings (or investment).[7] From a policy perspective, this suggests that capital control can be counterproductive since the flow that is discouraged would have a negative impact on economic progress.[8]

Private savings is negatively and significantly affected by dependency ratio. A striking point about our findings is that the magnitude of the coefficient is large relative to other determinants and therefore, we may conclude that in the long run, it will have a significant impact on domestic saving, given the expected changes in the demographic patterns of the country. The estimated coefficient suggests that a 1 percentage point increase in dependency ratio reduces private savings by 1.4%. It is worth mentioning that this variable is likely to be an indicator of liquidity constraints. This may be due to the fact that the young (or the retired) are likely to be more constrained in their liquidity, suggesting that the higher the percentage of this population is, the

[7] This finding is in sharp contrast with the results reported earlier in Edwards (1995, 0.5-0.63), Held and Uthoff (1995, -0.4 to 0.5) and Schmidt-Hebbel *et al.* (2000, -0.2) based on panel data.

[8] Some authors have suggested that FDI contributes positively to growth only when a sufficient absorptive capacity of the advanced technology is available in the host country.

greater is the liquidity constraint and the lower is the savings rate. This evidence is in line with that reported in Edwards (1996), Masson *et al.* (1998) and Loayza *et al.* (2000a) and hence supports Modigliani's life-cycle hypothesis.[9]

The Short-Run Dynamic Error-Correction Model

The information revealed from the above analysis allowed us to model the error correction model (ECM). To yield a parsimonious model, we progressively eliminated variables that were insignificant, guided by the usual *t*-statistic. The results of the ECM along with important test statistics are summarized in Table 3. The coefficient of the error-correction term was negative (-0.63) and statistically significant. It suggests that 63% of the previous year's discrepancy between the actual and the equilibrium private savings are corrected each year.

Table 3. Results from Error-Correction Model

ΔPS_t=	0.12+	0.11GRO_t	–	0.28ΔFDI_t	–	0.44ΔDEP_t	–	0.37ΔINT_{t-2}	–	0.31ΔTAX_t	–	0.63EC_{t-1}
	(0.90)	(0.03)**		-(0.01)**		-(0.24)		-(0.04)**		(0.021)**		-(0.021)**

$\bar{R}^2$ = 0.48, S.E = 0.21, LR =7.22, D.W. = 2.1.

Notes: See Table 1 for the definitions of the variables. Numbers in parentheses are the asymptotic standard errors.

We noted that all the retained variables yielded theoretically plausible signs and the parameters were statistically significant. The coefficient of the GRO variable carried the expected positive and was significant in the short run equation, meaning that short-run movements in economic growth have a positive impact on savings. This is in accord with our expectations and is similar to those reported by earlier studies (Edwards, 1996). The coefficient on taxes was found to be significant at the 5% significance level and was negatively signed, implying that a tax cut policy may be used to mobilize private savings in the short run. Tax hikes reduce consumption and hence increase private savings. This observation tallies with that of Cárdenas and Escobar (1998) and Morande (1998), among others.

[9] A number of caveats with the results should be highlighted. First, as emphasized in Toda and Phillips (1994), these tests and the estimation procedure employed in this study suffer from lack of power in a small sample such as ours. Hence, it is worth keeping in mind that the results reported might be influenced by the shortness of the available time series. Second, the determinants might contain an expanded list of variables. The task of incorporating all these factors in a savings equation was complicated by the unavailability of sufficient long time series data.

The coefficient on interest rate bore a negative sign, and was statistically significant at conventional levels. This implies that the interest rate matters and plays an important role in determining private savings both in the short as well as in the long term. We viewed the negative sign on interest rate as a suggestion that the income effect outweighs the substitution effect. This result is contrary to the McKinnon-Shaw hypothesis but is in accord with other empirical studies that found a negative relationship between interest rate and saving rate.[10]

Demographic factors and rapid population growth can present a serious obstacle to private savings and hence capital accumulation. In this vein, the rapidly growing population rate of 2.5% and high birth rates of 3.5-4.5% in Malaysia would result in high dependency ratios. The advent of large numbers of young people in turn would lead to increased consumption. The added burden of dependants would further reduce the available invisible resources. The result of this analysis has shown that dependency ratio retards private savings. A noteworthy observation of the results in the ECM is the role of FDI in the short run equation. Indeed, our results suggest that inflows of FDI temporarily displaced private savings. This result confirms the findings found in Fry (1994), Schmidt-Hebbel et al (1992) and Nurhan, (1999) among others.

Granger-Causality Tests

A unique feature of this study is the fact that we proceeded with the Granger causality test using a multivariable framework proposed by Toda and Yamamoto (1995) to provide some insight on the long-term causal relationship among the variables in the saving functions. For this purpose, the optimal lag length for the VAR model was determined using AIC. The results of our preliminary investigation show that lag length of two periods is the optimal lag length. The empirical results are of the causal relation and are presented in Table 4.

It is worth to point out several interesting results revealed in Table 4. First, there is a unidirectional short-run causal effect running from interest rate (INT) and FDI to private saving rate (PS), implying that changes in interest rate and FDI inflow affect savings rates. Second, we found that the causal link between dependency ratio (DEP) and PS is not a direct one. There is evi-

[10] The essential message of the McKinnon-Shaw thesis is that a lower negative real rate of interest discourages savings and hence redials the availability of loanable funds, constrains investment, and in turn lowers the rate of economic growth.

Table 4. Granger Non-Causality Test Results Based on Toda-Yamamoto Approach

Dependent Variable	PS	GRO	PC	DEP	INT	TAX	FDI
	χ^2-statistics						
PS	—	0.028 (0.959)	0.011 (0.978)	1.027 (0.499)	0.693 (0.081)**	0.678 (0.143)	0.396 (0.073)**
GRO	0.169 (0.079)**	—	0.342 (0.003)**	1.196 (0.026)**	0.068 (0.648)	0.004 (0.985)	0.235 (0.001)**
PC	0.366 (0.408)	0.762 (0.409)	—	4.270 (0.128)	0.852 (0.233)	0.073 (0.939)	0.123 (0.775)
DEP	0.022 (0.381)	0.139 (0.012)**	0.011 (0.787)	—	0.091 (0.006)**	0.004 (0.995)	0.003 (0.908)
INT	0.141 (0.347)	0.147 (0.643)	0.453 (0.054)**	1.337 (0.165)	—	0.087 (0.786)	0.394 (0.001)**
TAX	0.036 (0.729)	0.040 (0.851)	0.658 (0.000)**	1.122 (0.076)**	0.195 (0.237)	—	0.249 (0.007)**
FDI	0.022 (0.951)	1.342 (0.097)**	0.956 (0.081)**	0.356 (0.879)	0.418 (0.466)	0.342 (0.673)	—

Notes: The number in the table indicates the Wald statistic and figure in parenthesis is the p-value.
The double asterisk (**) indicates that the null hypothesis of Granger non-causality is rejected at the 10% level.

dence, however, that the link between the two variables is indirect running from PS→ GRO→ DEP and FDI→ PS→ GRO→ DEP. Third, private saving Granger causes economic growth and not vice versa. Hence, a unidirectional relationship exists between private saving and economic growth. Savings drive growth through the saving-investment link (Levine and Renelt, 1992). This result, however contradicts the point made by Carroll and Weil (1994), who suggest growth drives savings. Nevertheless, our results appear to support the view that the reason for high growth rates experienced by ASEAN economies is due to their high saving rates. The high domestic savings lead to higher capital formation, which in turn leads to high growth rates.

Third, a causal relationship emerged between FDI and economic growth and it runs from FDI→GRO and vice versa (feedback relationship). This finding is noteworthy as it shows the contribution of FDI to the growth process of Malaysia. In addition, the result tends to suggest that the influx of FDI is due to Malaysia's economic progress.

5. CONCLUSIONS AND POLICY IMPLICATIONS

The present article seeks to identify the main factors that have contributed to the remarkable high saving rates in Malaysia. We applied the Johansen cointegration procedure to find that the ratio has a long run relationship with income level, dependency ratio, FDI, taxes and interest rate. Specifically, the analysis revealed that private savings is positively related to income level and FDI but negatively associated with interest rate, tax rate (policy variables) and dependency ratio. In fact these broad ranges of factors have a long lasting effect on private savings. We observed that dependency ratio has a major impact while interest rate has a relatively smaller influence on savings.

An analysis based on an error correction model revealed that private savings adjusted to correct disequilibrium among the variables under investigation. Economic growth affects savings but its influence appears to be only temporary. Additionally, the causality tests showed the existence of a unidirectional causal relationship in the savings-growth nexus and a feedback causal relationship between FDI and economic growth. By and large, the statistical evidence in this paper supports the life-cycle and FDI-led growth hypotheses in Malaysia.

Why are saving rates so high in Malaysia? The trends in FDI inflows, which have been shown to influence savings, mimic the trends in savings in Malaysia. The positive correlation observed between private savings and FDI is indeed a robust empirical finding. In addition, we found that the income level contributed positively to saving rates. Our results also showed that economic growth contributed positively to private savings but the relationship somewhat disappeared in the long run.

We found that private savings Granger cause growth and not the other way round, as Carroll and Weil (1994) suggested. Thus, the most obvious policy implication of this study is that policies that promote savings will have a positive effect on capital accumulation, which in turn leads to economic growth. This finding has important implications for Malaysia whose saving rates have stagnated in the post-1997 crisis. Our results also indicate that fiscal policy may be used to mobilize savings: a tax cut can also be used to increase private savings. This supports the view that a tax rate that postpones consumption and the shifting of the tax base from income to consumption (consumption tax) will encourage domestic savings. Hence, Malaysia's effort to harmonize tax rates in the region in the past few years, has contributed positively to the savings ratio.

An external factor that negatively affects private savings is foreign sav-

ings (FDI). It appears to be significant (negative) in the short run equation, suggesting that a transitory change in FDI displaced private savings. Besides, the estimated coefficient was smaller than one (-0.28), indicating that an increase in foreign savings crowds out private domestic savings in a less than one-to-one fashion. Hence, the crowding effect is only partial, implying that foreign savings (FDI) raise domestic investment. Meanwhile, we observed that FDI is positively correlated to the long run savings rate. Accordingly, our results suggest that a one percent increase in FDI will increase private savings by 0.40 percent. Hence, contrary to popular view, we showed that foreign capital inflows complement domestic savings in the long run, but substitute domestic private savings in the short run. Even more striking is the detection of a causal link that runs from FDI to economic growth. One possible explanation for this important finding is that we used FDI, rather than current account, to measure the effect of foreign capital inflows on private savings. From a policy perspective, these observations suggest that it may be unwise for Malaysia to impose capital controls. Indeed, the last type of capital control a country like Malaysia should want to adopt, is control of FDI. Besides, our results illustrate that the short term impact of some of the determinants (growth, foreign savings etc.) may differ from the long run.

Finally, we showed that a drop in the dependency ratio is associated with an increase in private savings rates, thereby supporting the life-cycle hypothesis. From a policy perspective, increasing the retirement age might increase national savings.

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Résumé

Cet article présente une évaluation empirique des déterminants du taux d'épargne privée en Malaisie en se concentrant sur le rôle de l'épargne étrangère et la croissance économique. L'analyse, basée sur 40 ans d'observations, démontre que sur le long terme, le revenu individuel, le *dependency ratio*, les épargnes étrangères, le taux d'intérêt et la taxation ont tous des effets significatifs sur le taux d'épargne privée. En plus, il démontre que l'épargne dans le long-terme cause la croissance économique; de même, l'investissement étranger a le même effet. Par conséquent, il explique la relation de court-terme entre les épargnes plus faibles et la croissance économiques avec la crise financière Asiatique.