

PRIVATE SAVING IN MALAYSIA: LONG-RUN DETERMINANTS AND SHORT-RUN DYNAMICS*

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1. Introduction

The recent literature on the endogenous growth theory once again focuses on the crucial role played by saving and investment in determining the long-run growth performance of economies. In the traditional neoclassical growth theory following the work of Solow, capital accumulation affects only the level of per capita output but not its rate of growth along the steady state path. In the endogenous growth models of Romer [1986] and Lucas [1988], the steady state growth is determined by technological progress that is embodied in fixed capital or accumulated through human capital formation. In these models, the source of technological change is endogenous in nature, arising from the response of agents to correct incentives to save and invest. The existence of externalities implies that factors that affect a country's saving and investment rate would not only influence the level of national output but also have a lasting impact on the economy's long run rate of growth.

The current Sixth Malaysia Plan, which spans the period 1991 to 1995, has singled out private investment as the main impetus to generate the targeted annual average growth rate of 7.5 percent. The key financing strategy of the Sixth Malaysia Plan is the maintenance of the national saving rate of 34.1 percent of GNP. With projected investment averaging 34.9 percent of GNP, the anticipated overall saving-investment gap of the economy is expected to be around -0.8 percent during the Plan period. Consequently, the decline in the national saving rate since 1989, due mainly to the decrease in private saving, has received considerable attention by policy makers. The national saving rate fell from an average high of 25.5 percent in 1987-88 to 16 percent by 1991.

The objective of this paper is to formulate an empirical model of private saving behaviour in an attempt to understand the long-run determinants and short-run dynamic adjustment of saving around its long-run trend. In Section 2, we discuss various potential determinants of private saving and consumption in order to serve as a guide in developing an eclectic empirical model. Section 3, represents our estimates of an error correction model of private consumption for Malaysia. Section 4 provides a summary of the findings and their implications.

*The views expressed in this paper are entirely of the authors and do not necessarily reflect those of the institutions to which the authors are affiliated.

2. Empirical Framework and Determinants of Consumption

The standard life cycle-permanent income model of consumption postulates an individual maximizing the present value of his life time utility, subject to an intertemporal budget constraint that is equal to the current net worth plus the present value of his labour income over the remaining working life.¹ The intertemporal optimization yields a solution in which the current consumption is a function of current non-human wealth and the present value of the expected future labour income.

One implication of the life cycle permanent income theories is that the ratio of consumption to income and the ratio of wealth to income remain constant along a given long-run growth path, but vary once the steady state growth changes.² An attractive empirical framework that reproduces the life-cycle consumption-income relationship in steady state is the error-correction model (ECM) that was introduced by Davidson et al (1978).

The original ECM focuses on the relationship between consumption and real disposable income:

$$\Delta C_t = \beta_0 + \beta_1 \Delta Y_t + \beta_2 (C_{t-1} - Y_{t-1}) + \varepsilon_t \quad (1)$$

where C_t and Y_t are natural logarithms of real consumption and real disposable income respectively. The equation indicates that the short-run changes in consumption, besides responding to contemporaneous movement in real income, also adjusts to the divergence in the long run, consumption-income relationship. The coefficient β_2 is the error-correction parameter which measures the speed at which the long run discrepancy between consumption and income is eliminated in each period through appropriate adjustment in current consumption.³

1. See Ando and Modigliani [1963] and Friedman [1957] for exposition of the life-cycle model and the permanent income hypothesis, respectively.

2. Blinder and Deaton [1985] discuss some of the empirical implications of the life-cycle permanent income model.

3. Besides being able to capture the stable long run consumption-income relationship and the short-term dynamics, the ECM modelling of time series relationship provides a solution to the 'spurious regression' problem without having to first difference the data which often results in eliminating valuable long run information contained in the level of the variables. The ECM approach is further reinforced by the recent development in the cointegration literature pioneered by Engle and Granger [1987]. The theory of cointegration has shown that if two non-stationary variables, say C_t and Y_t , are cointegrated, then there exists an error-correction form that links the short-run changes in C_t and Y_t , subject to the long run restriction imposed by the cointegrating relationship.

The steady state relationship between consumption and income can be derived from (1) by setting FORMULA

$$C = \frac{(1 - \beta_1)g - \beta_0}{\beta_2} \quad (2)$$

$$\text{Hence } C/Y = \exp \{ [(1 - \beta_1)g - \beta_0] / \beta_2 \} \quad (3)$$

Equation (3) indicates that the long run consumption-income ratio, and hence saving ratio remains constant so long as the steady state growth rate, g , is unchanged. The ratio rises as g increases so long as $\beta_2 > 0$ and $\beta_1 < 1$.

Recent works have attempted to modify the framework introduced by Davidson et al to incorporate the influence of other variables. Molana [1991], for example, has developed a life-cycle model which produces an error-correction relationship between consumption and wealth. His empirical findings indicate that the ECM based on the consumption-wealth relationship displays a long-run stability property superior to the ECM based on the consumption-income relationship.

The life-cycle model has been expanded to incorporate the effect of changes in age distribution of the population and labour force participation on aggregate consumption. According to the life-cycle model, the proportion of income saved varies over an individual's lifetime, with the individual dissaving when he is young and when he is old and accumulating wealth when he is in middle age. Hence changes in the proportion of young and old people in the population will influence the aggregate saving rate of the economy. Increasing labour force participation by females is likely to lower the saving ratio as the household income tends to rise proportionally more than the increase in saving [Graham 1987]. Two-income earner households need to have smaller precautionary saving, have greater access to consumer credit and are likely to substitute home-produced output for commercial goods and services [Sturm 1983].

Empirical evidence in the industrial economies indicates that changing age composition of the population has significantly reduced the aggregate saving rate. Montgomery [1986] estimated that increasing the population share of the 25 to 35 age group accounts for about one-quarter of the decline in the personal saving rate in the U. S., while Hendershott and Peak [1987] found that the rising share of the group aged 65 and older significantly decreased saving rate. Bovenberg and Evans [1990] found the rising share

of the group age over 65 to be the most important contributing factor in accounting for the decline in the U.S. personal saving rate from 1970-81. Summer and Carroll [1987], on the other hand, expressed scepticism about the ability of shifting income shares among different age groups in accounting for the large swing in the US saving rate. Graham [1987], using a pooled sample of 24 OECD economies found that both the female labour force participation rate and the ratio of population 14 years of age and under to the population age 15 to 64 are negatively correlated with the household saving rate.

For the developing countries, Lahiri [1989] found that the dependency ratio — those under age 15 and over 65 as a share of total population — have significant influence on saving in 7 out of 8 countries. Mason [1985] argued that the impact of dependency ratio on the saving rate depends on the economic growth of the country. Falling dependency ratio tends to reduce saving in slow-growing economies but raises saving in fast-growing economies. Mason as well as Collins [1991] found significant evidence to support the interaction effects between dependency and per capita income growth.

The influence of real interest rate on saving and consumption decisions has been a matter of considerable controversy, originating mainly from the potentially offsetting income and intertemporal substitution effects of a given change in real interest rate. Analytical multiperiod life-cycle models have failed to provide unambiguous predictions [Summer 1981, Evans 1983]. Empirical studies of the U.S. by Boskin [1978], Gylfason [1981], Bovenberg and Evans [1990], among others, have found significant positive interest rate elasticity of saving while Friend and Hasbrouck [1983], Blinder and Deaton [1985] and Montgomery [1986] found weak to significant effects.

For developing countries, the literature on the impact of financial liberalisation following the work of McKinnon and Shaw has emphasized a positive impact of real interest rate on saving. Fry [1988] found a positive effect of interest on saving although often the economic significance is quite small. Gupta [1987] found some significant positive effect on saving in Asian economies but not in Latin American Countries. Schmidt et al [1992], in a pooled sample of 10 developing countries at different levels of development, found that interest rates in general do not significantly impact on savings.

Movements in the international terms of trade can potentially affect the saving and consumption relationship in open economies. Malaysia is a highly open economy. The ratio of export and import of goods and services to GNP rose from 87 percent in 1970 to 182 percent in 1990. The terms-of-trade shocks affect savings through the wealth effect (by causing the revaluation of exports and imports) and the substitution effect induced by changes in the intra- and intertemporal relative price changes. The recent theoretical work

on the Laursen-Metzler-Harberger effect shows that the manner in which changes in the terms of trade impact on saving will depend on whether the movement is anticipated or unanticipated and whether the change is perceived by households to be permanent or transitory [Svensson and Razin 1983, Persson and Svensson 1985]. Existing evidence on the actual impact of terms of trade movement on saving depends on country specific experience. Lahiri [1989] found that changes in terms of trade have negative impact on three countries in his sample, including Malaysia. Fry [1986] using a pooled sample of 14 Asian countries found that terms of trade changes have only a weak effect on the savings ratio. The results of Craigwell and Rock [1992] indicate that terms of trade had no significant impact on consumption of the Caribbean countries.

3. Empirical Results

The consumption function is estimated using annual data over the period 1974-91. The consumption variable is the real private consumption expenditure while the disposable income variable is the real GDP net of income taxes. Ideally, the consumption data should include spending on non-durables and the service flows from the durables. Where reliable estimates of the latter series are not available, the standard approach is to exclude durables altogether from the measure of consumption. In Malaysia, where even the data on durable expenditure are not available, we are forced to rely on total private consumption expenditure. The use of GDP which includes income from accumulated capital like interest, dividends and rentals, is preferred to labour income in instances where a separate comprehensive measure of wealth is not available.

We first estimate a general dynamic distributed lag equation for personal consumption which makes allowance for both the short run (rate of change) and long run (level) impact of the potential determinants on the movement of consumption [Harvey 1990]. The objective here is to derive the long run multipliers of the determinants of consumption and saving. In estimating the dynamic equation, we started with the general distributed lag specification and then 'tested it down' to a more specific model by dropping statistically insignificant higher-order lags. The adequacy of the model is determined by employing a series of diagnostic tests of model misspecification.

The estimated model for aggregate consumption is:

$$\Delta \log C_t = -0.385 \log C_{t-1} + 0.403 \log W_{t-1} - 0.161 \Delta \log W_t$$

(1.798)
(2.093)
(1.084)

$$-0.013r_t + 0.773\log Y_t + 0.168DEP_t + 0.553\Delta DEP_t$$

(3.179) (1.966) (0.374) (0.313)

$$-0.482\log TT_t + 0.069\Delta \log TT_t$$

(1.157) (0.401)

$R^2 = 0.691$; $SEE = 0.035$; $DW = 2.134$; $LM(2) = 0.876$; $LB = 6.75$;
 $ARCH(2) = 0.637$; $JB = 0.806$; $HK = 1.801$; $RESET(2) = 0.918$.

where C is the real private consumption, Y is the real GDP net of income taxes, W is the proxy for real private wealth as measured by the end of period stock of M3 deposit deflated by the consumer price index,⁴ r is the ex post real interest rate defined as the weighted saving and 3-month deposit nominal interest rate less the actual percentage change in the consumer price index, TT is the terms of trade defined as the ratio of the unit value of export to the unit value of import, DEP is the population age dependency ratio. The figures in parentheses are t-statistics.

The regression residual diagnostic statistics include the Durbin-Watson statistics, DW ; the Lagrange multiplier test for second order AR process, $LM(2)$; the Ljung-Box Q statistic, LB ; the second-order autoregressive conditional heteroskedasticity test, $ARCH(2)$, the Bera-Jarque test for normality, JB ; and the Ramsey test of misspecification using the second order polynomial, $RESET(2)$.

The estimates indicate that both the long-term level and the short-run changes in the age-dependency and terms of trade do not affect aggregate saving and consumption. The non-significance of the age dependency variable, contrary to the evidence found in other countries, can be explained by the relatively small shift in the age dependency ratio during the sample period. The proportion of those who are less than, 15 years to the total population declined from 45 percent in 1970 to 37 percent in 1990, while the proportion of those above 65 percent rose from 3.2 percent in 1970 to 3.9 percent in 1990. The net impact of these demographic changes lowered the overall age dependency ratio marginally from 48 percent in 1970 to 41 percent in 1990.

The estimated coefficients indicate the significance of the basic life-cycle model variables — real income, wealth and real interest rate — in explaining consumption and

4. Data on other components of private wealth such as housing and non-liquid financial assets like equity and bonds are not available.

saving behaviour. The negative sign of the real interest rate coefficient suggests that the intertemporal substitution effect of interest rate changes dominate the income effect. We reestimated the consumption equation dropping the age dependency and terms of trade variables:

$$\Delta \log C_t = -0.373 \log C_{t-1} + 0.093 \log W_t + 0.477 \log \Delta W_t$$

(3.978) (3.129) (2.911)

$$-0.015 r_t + 0.261 \log Y_t$$

(4.779) (2.791)

$R^2 = 0.801$; $SEE = 0.032$; $DW = 1.927$; $LM(2) = 0.759$; $LB = 4.36$;
 $ARCH(2) = 0.373$; $JB = 1.072$; $HK = 1.039$; $RESET(2) = 0.480$.

Setting the difference terms to zero, we obtained the following steady state relationship between consumption, income, wealth and interest rate:

$$\log C = 0.700 \log Y + 0.251 \log W - 0.042r$$

The steady state coefficient indicates that a 1 percent increase in income would raise the long run consumption by 0.7 of a percent and a permanent increase in saving by 0.3 of a percent. A 1 percent increase in the real wealth raises the steady state level of consumption by 1/4 percentage point.

The relationship between the actual and the steady state consumption is indicated in Figure 1. The largest divergence between the long-run consumption relative to the actual consumption corresponds to the major recessions during the sample period: 1975 and 1985-86. During these recession years, long-run sustainable consumption fell below actual consumption. In response actual consumption declined sharply until it was brought in line with the long-run consumption. Similarly, during the period of economic recovery from 1987-1990, the steady state consumption rose above actual consumption, and actual spending surged to close the gap. This accounts for the sharp fall in the saving ratio noted in the introduction.

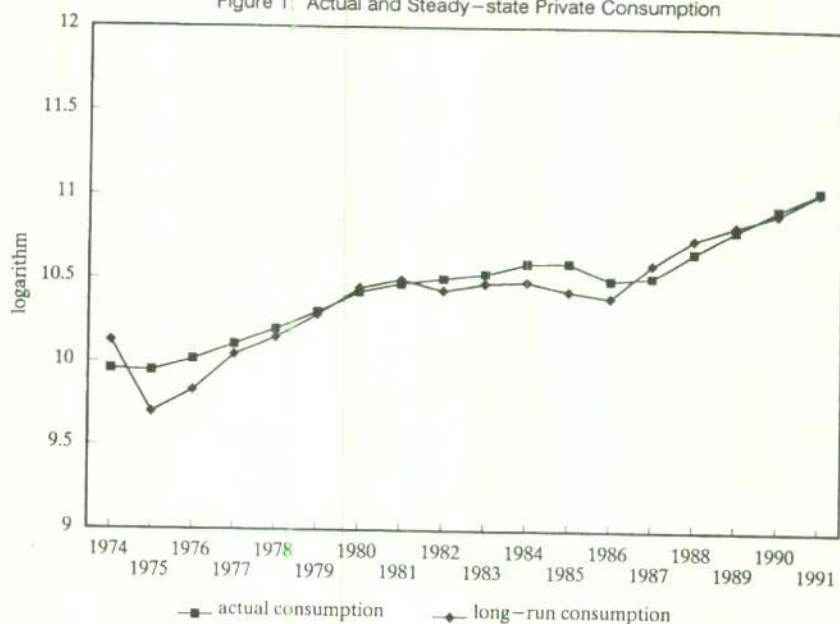
We next compute the divergence between the actual level of consumption observed each year with the steady state value generated from the above equation as an adjustment term in the ECM equation. The cointegration literature indicates that such an error-

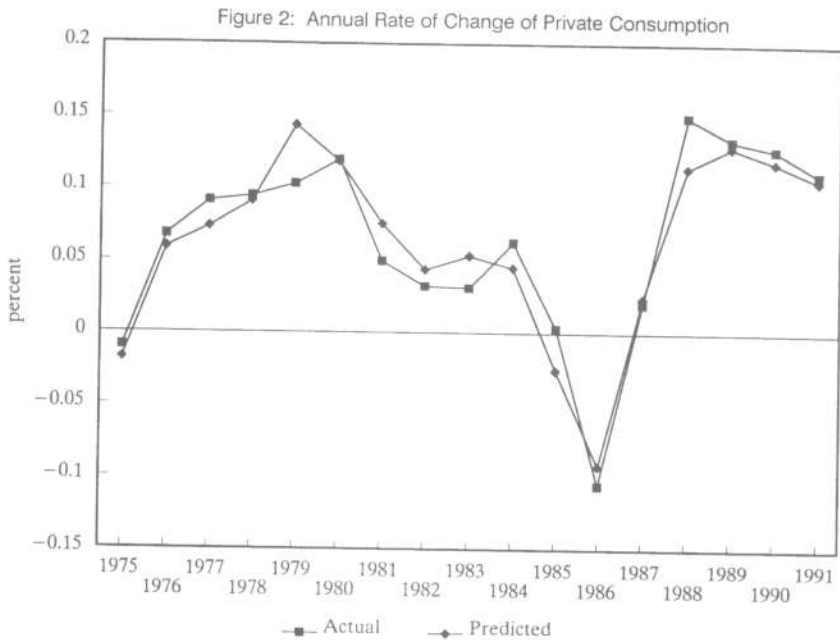
correction term should be stationary, i.e. integrated of order zero. We performed the augmented Dickey-Fuller unit root test on the error correction term. The computed test statistic (with a constant term) is -3.473 which allows us to reject the null hypothesis that the error correction variable contains unit root.

We estimated the following ECM for aggregate consumption:

$$\begin{aligned} \Delta \log C_t = & -0.368(\log C_{t-1} - C^*_{t-1}) + 0.252 \Delta \log C_{t-1} + 0.540 \log \Delta Y_t \\ & (3.978) \quad (1.667) \quad (4.892) \\ & + 0.126 \Delta \log W_t + 0.144 \Delta \log W_{t-1} - 0.007 \Delta r_t \\ & (1.326) \quad (1.891) \quad (2.056) \end{aligned}$$

Figure 1: Actual and Steady-state Private Consumption





$R^2 = 0.886$; SEE = 0.023; DW = 1.811; LM (2) = 0.096; LB = 1.62;
 ARCH (2) = 1.624; JB = 0.422; HK = 1.175; RESET (2) = 0.343,

where C^* is the fitted value generated from the derived long run consumption relationship. The error correction term comes out highly significant.⁵ The estimated error correction coefficient indicates that when the previous level of consumption is above or below the level of spending that is consistent with life-time resources, consumers will correct 37 percent of the discrepancy within a year. The reasons why consumers adjust only partially to the discrepancy between last year's consumption and the level of consumption that is consistent with lifetime resources can be attributed to the existence of adjustment costs.

5. Kremers, Ericsson and Dolado [1992] have shown that the test of cointegration based on the statistical significance of the error correction term is, in fact, more powerful than tests based on the residuals from the cointegrating relationship.

Such costs of adjustment may include financial costs, liquidity constraints or habitual consumption patterns.

The ability of the estimated equation to track the year-to-year rate of change in private consumption is indicated in Fig. 2. In general the estimated equation captures two sets of forces that drive the annual variation in consumption and saving. One is the changes in consumption that is driven by short run fluctuations in real income, real wealth and real interest rate which causes consumption spending to fluctuate around its steady state path. The other component originates from attempts by the consumers to adjust their current consumption in response to the deviation in the previous level of consumption from the level of spending that is warranted by the long term relationship between consumption, real income, real wealth and interest rate.

4. Conclusion and Implication

In this paper we modelled the aggregate consumption-saving behaviour as originating from two sources — the long-run component that is consistent with the life cycle permanent income theories that captures the trend in the aggregate consumption and the short-run component that drives consumption over the duration of a business cycle.

We find the presence of a stable long-run relationship between consumption, income, wealth and real interest rate. Consumers respond consistently and significantly to a discrepancy between previous period sustainable consumption and actual consumption. When aggregate consumption in the last period diverge from the level of consumption that is consistent with life-time resources, consumers respond in the current year by altering spending so as to bring consumption partially back in line with the long-run path.

The major implication of the empirical finding is that the saving rate in Malaysia appears to be stable. While stocks may cause the observed saving rate to fluctuate considerably, the "error-correction" mechanism will tend to bring saving eventually in line with underlying trends in income and wealth.

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Abstract

The paper attempts to explain the long run and cyclical behaviour of private saving in Malaysia during the period 1974-91 within an error-correction framework. Steady-state saving is found to be determined mainly by real income, wealth and real interest rate. While the dependency ratio and the external terms-of-trade do not impact significantly on saving, the year-to-year fluctuations in private saving is adequately modelled as an error-correction adjustment of consumption towards the steady-state level.