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PRIVATE SAVING IN INDIA AND MALAYSIA COMPARED: THE ROLE OF FINANCIAL LIBERALIZATION AND EXPECTED PENSION BENEFITS

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Abstract:
In this paper, we provide a comparative account of the evolution of private saving in India and Malaysia, and analyze how policy changes in the financial sectors and pension systems help explain differences in their saving performance. Using the ARDL bounds estimation procedure, we find a fairly robust long-run relationship between private saving and its determinants in both countries. Consistent with the predictions made in the life cycle model, our results indicate that higher income growth stimulates private saving and an increase in age dependency retards private saving. The results provide some support for the hypothesis that financial liberalization results in lower private saving in both countries. The evidence also indicates that expected pension benefits tend to stimulate private saving in India, but that the reverse is found in Malaysia.

Keywords: private savings; pension saving; financial liberalization; India; Malaysia.

JEL classification: C22; O16; O53

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1. Introduction

Saving is widely regarded as a key vehicle for promoting long-run economic growth (Aghion *et al.*, 2006). Higher saving increases funds available for investment projects, which can be translated into capital accumulation and economic growth. In order to encourage saving, financial sector policies should be geared to providing more incentives to save. Therefore, McKinnon (1973) and Shaw (1973) called for financial liberalization, which refers to the process of eliminating or significantly alleviating financial system distortions, in order to encourage savers by increasing their net real returns. While the basic objective of financial reform is to improve the extent and efficiency of the financial system, which in principle may lead to higher saving, the impact of financial liberalization cannot be determined *a priori* since financial deregulation also eases borrowing constraints and may therefore reduce the incentive to save (see Bayoumi, 1993; Jappelli and Pagano, 1994).

It is also important to understand how savers respond to guaranteed retirement income. This is because the future welfare of retired individuals depends on whether the retirement income, accumulated in provident and pension funds, is being offset by lower saving or savers use these funds as a base for building a sufficient level of retirement income. Through the ability to provide income during retirement, the presence of a sound social security framework effectively weakens the precautionary motive for saving, since savers may perceive that they will receive high pension benefits at the point of retirement. However, the extended life cycle model of Feldstein (1974) postulates that social security could increase saving by inducing early retirement. This expands the span of retirement years and therefore increases the need for more saving during an individual's working life in order to achieve a targeted level of retirement income. Hence, an increase in the perceived benefits of pension saving could, in principle, increase or decrease individuals' desire to accumulate financial assets.

While both the role of financial liberalization (see, e.g., Bayoumi, 1993; Bandiera *et al.*, 2000; Hermes and Lensink, 2005) and expected pension benefits (see, e.g., Munnell, 1976; Edwards, 1996; Dayal-Ghulati and Thinmann, 1997) in determining saving have been actively debated in the literature, little effort has been made to simultaneously analyze the impacts of financial liberalization and pension benefits on private saving under an integrated framework. There is also a lack of comparative analysis

of private saving behavior for developing countries. This study aims to enrich the existing literature by providing further evidence on how financial sector reforms and expected pension benefits affect the evolution of private saving, drawing on the experience of two fast growing economies in Asia.

Several interesting features emerge from a comparative analysis of the economies of India and Malaysia. Both are high growth, developing economies with huge accumulations of private saving. They have inherited British common law and therefore have similar legal traditions. As regards demographic transition, both are experiencing a falling trend in age dependency due to falls in the elderly age groups compared to the working population. Furthermore, both India and Malaysia have relatively good databases based on the standards of developing countries, providing an added incentive for this research. One area of difference is that Malaysia was one of several economies severely hit by the 1997 Asian financial crisis, whereas the economy of India was largely unaffected.

In terms of financial sector reforms, Malaysia initiated a series of financial liberalization programs in 1978, whereas India launched its reforms much later, in 1991. Surprisingly, the financial liberalization path pursued in both countries is remarkably similar despite their different starting points. They have both followed the conventional recommendations of a gradual reform approach for interest rate liberalization and reserve and liquidity requirements reduction.[1] Quite apart from these liberalization measures, significant directed credit controls favoring certain priority sectors in the economy have continued to remain in place. Despite their financial systems still being partially restricted, India and Malaysia have achieved significant improvements in their financial sector development. In India, the ratio of private credit to GDP has increased from 9 percent in 1960 to 45 percent in 2005. During the same period, the ratio in Malaysia increased significantly from 7 percent to 117 percent. Malaysia.

The presence of a broad-based Employees' Provident Fund (EPF) scheme marks an important feature of the Malaysian financial system.[2] This statutory fund was established with the objective of providing members with a retirement plan. Since its inception in 1951, the EPF has been a very powerful vehicle in mobilizing compulsory savings. The fund is instrumental in generating resources to

[1] See Sen and Vaidya (1999) and Ang (2008) for a comprehensive account of the process of financial liberalization in India and Malaysia, respectively.

[2] The EPF is a publicly managed pension fund that operates under a fully funded Pay-As-You-Go (PAYG) scheme with a defined contribution plan. Contributors get back their contributions plus accumulated returns at the point of retirement. The pension benefits take the form of one lump sum payment or a series of periodic payments. Under this scheme, both employees and employers are required to contribute to the provident fund to help provide for employees retirement benefits. Currently, the scheme requires a mandatory contribution of 12 percent of an employee's income by the employer and 11 percent by the employee. The government does not contribute, unless it is an employer. Some partial withdrawals are allowed for education, housing and medical expenses, before contributors reach the retirement age of 55.

finance public investment projects at low cost, which is influential in ensuring the long-term success of the Malaysian economy (Ang, 2008).

Unlike Malaysia where almost all formal sector employees are covered by the EPF, pension coverage in India is rather poor as only about 13 percent of the work force are currently covered by social security programs - the Employee Provident Fund (EPF) and the Employment Pension Scheme (EPS). These schemes are applicable to workers in the organized private sector, and participation is mandatory for firms with more than 20 employees and for workers below a specified income level. Moreover, the investment options of these schemes have been regulated by the Indian government, and have historically yielded low returns (Gillingham and Kanda, 2001).

There is no mandatory retirement saving program for the self-employed and for informal and unorganized sectors of the economy, though they can join the state-administered Public Provident Fund, where the rates of return to investment are broadly similar to the EPF. However, less than one percent of the working population have accounts in the Public Provident Fund, indicating that the vast majority of those in the unorganized sector have not taken recourse to a pension scheme of any type. For government employees, there is a non-contributory pay as you go pension plan – the Civil Service Pension System (CSPS) – which covers a workforce of over 12 million. The high dependency ratio of the CSPS, has raised concern that the scheme will become an increasing burden on the budget.[3] In our study, we will assess whether the 'forced saving' nature of the pension systems in India and Malaysia had any effect on voluntary saving by the private sector.

2. Empirical Specification and Construction of Variables

The specification of the private saving function in Eq. (1) draws upon the life cycle model. The model is modified accordingly to consider the effects of financial liberalization and expected pension benefits, as well as other structural features observed in the economies of India and Malaysia. Private saving (PRS_t) in this study refers to voluntary saving in the private sector. It is the sum of household and corporate savings excluding EPF and EPS contributions.

$$PRS_t = \beta_0 + \beta_1 GRO_t + \beta_2 AGE_t + \beta_3 RI_t + \beta_4 AGR_t + \beta_5 FL_t + \beta_6 PEN_t + \varepsilon_t \qquad (1)$$

[3] A series of pension reforms was undertaken in India recently due to increasing government pension liabilities over the last decade, with the government launching a New Pension System (NPS) in 2004, where all central government employees were shifted to a defined contribution plan from the non-contributory pay as you go system, and non-government workers, including those in the unorganized private sector, being eligible to join the NPS (Poirson, 2007). However, these changes have occurred towards the end of our study period, and would not be captured in the empirical results we present later in the paper.

In the life cycle setting, the two key determinants of saving are income growth and age structure. Income growth encourages saving whereas higher age dependency in the population tends to reduce saving (Modigliani and Brumberg, 1954). Since our dependent variable is private saving (rather than total saving), the growth variable considered here is the growth rate of private income (GRO_t). Age dependency (AGE_t) is measured by the number of young (with ages 0-14) and old (with ages 65 and above) dependents to working-age population (with ages 15-64).

With regard to financial factors, the key policy instrument implied by the life cycle model is the real interest rates (RI_t). But how real interest rates affect saving is unclear in the model since the response of saving to a change in real interest rates depends upon the relative magnitude of the substitution and income effects. We also include the share of agriculture in total output (AGR_t) in the private saving specification in order to capture changes in the structure of the economy (see Muhleisen, 1997; Loayza and Shankar, 2000). When the economy moves away from subsistence agriculture towards advanced service orientated activities, credit facilities may become more readily and cheaply available, reducing the desire to save. However, agricultural households may have a larger marginal propensity to consume compared to non-agriculture households. Thus, the effect of the share of agriculture in total GDP is ambiguous (Athukorala and Sen, 2002).

Obtaining a precise measure of financial liberalization (FL_t) is a difficult task (Hermes and Lensink, 2005). Following the approach advanced by Demetriades and Luintel (1997) and Ang and McKibbin (2007), we address this issue by using an index which considers the joint impact of various financial sector policies (including statutory reserve requirements, directed credit programs, capital liquidity requirements and interest rate controls) imposed on the Indian and Malaysian financial systems, respectively.

In principle, these financial policy variables can be used individually in the empirical specification in order to assess the effectiveness of each policy. However, this may give rise to some econometric problems due to the small samples used in this study. Moreover, the underlying policy variables may be highly correlated since the central banks may jointly impose some of these controls. One solution to these problems is to reduce the number of policy variables to just one summary measure, reflecting their joint influence. The use of this summary measure allows us to investigate whether the process of financial liberalization contributes to more or less mobilization of saving.

Since we want to summarize the financial policy variables to obtain an overall measure of financial liberalization, the method of principal component analysis seems to be a natural choice. It is a systematic and sophisticated way of examining the patterns of relationship among the variables, with the objective of summarizing the information content of several observed variables into just one principal component or a handful of representative principal components. The method involves computing the linear combinations of the original variables that capture their maximum variance. These components can capture a large proportion of the variance in the original variables and can therefore serve the same purpose as the full set of original variables, but in a much more succinct manner. Therefore, given its conciseness, this approach sufficiently deals with the problems of multicollinearity and over-parameterization.

We consider both the cash reserve ratio and the statutory liquidity requirement to capture the effect of mandatory reserve and liquidity requirements for India. The former requires banks to hold part of their deposits in the form of cash balances at the central banks whereas the latter imposes a requirement for banks to keep a share of their assets in government securities at below-market interest rates. For Malaysia, this effect is measured by the statutory reserve and liquidity ratio requirements for commercial banks.

With regard to the extent of directed credit programs, this is measured by the priority sector target lending rate of the native Malay community for Malaysia.[4] Hence, it is a *de jure* measure that reflects the strength of directed credit controls designed to repress the financial system in Malaysia. However, such a measure is not available for India on a consistent and reliable basis. Therefore, we adopt the approach of Park (1994) by using a *de facto* measure, which involves measuring the share of actual directed credit in total credit. Following the approach of Demetriades and Luintel (1997), the extent of directed credit programs is then measured by 0, 1, 2 and 3 when the programs cover zero percent, up to 20 percent, 21-40 percent, and more than 40 percent, respectively, of total bank credit.

To capture the influence of interest rate restraints, we collect a number of interest rate repressionist policies imposed on the Indian and Malaysian financial systems. Specifically, we collect six series of interest rate repressionist policies for each country. For India, these include a fixed deposit rate, a deposit rate ceiling, a deposit rate floor, a fixed lending rate, a lending rate ceiling and a lending rate floor (see Demetriades and Luintel, 1997). The construction of this index for Malaysia involves a

[4] Although priority loans are also extended to other sectors such as agriculture, manufacturing, small and medium size enterprises and individuals (for housing loans), the Malay community is the largest beneficiary group under this program (Haggard, 2004). We focus only on the latter since data for target lending rate to other priority sectors are not available on a consistent basis.

maximum lending rate for priority sectors, a policy intervention rate, a minimum lending rate, a maximum lending rate, a minimum deposit rate and a maximum deposit rate (see Ang and McKibbin, 2007). These policy controls are translated into dummy variables which take the value of 1 if a control is present and 0 otherwise.

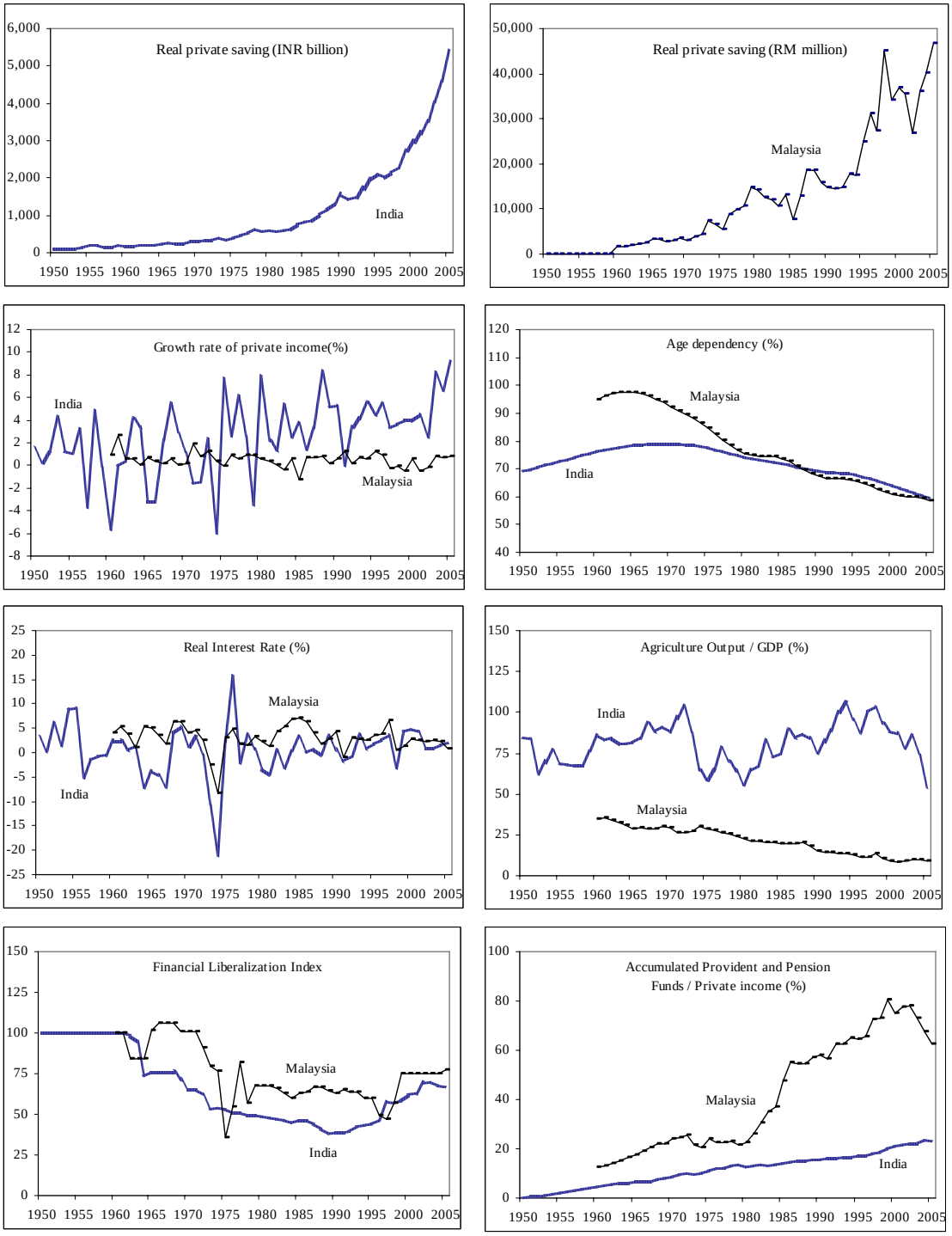
The results of the principal component analysis are presented in the appendix. Specifically, we use eigenvalues as the weights to summarize the principal components into an index. The resulting indices for both India and Malaysia are positively and significantly correlated with all underlying variables for both countries, providing some evidence that they are reasonable indicators for the extent of financial repression. The inverse of these indices can be interpreted as representing the extent of financial liberalization.

We use the cumulative contributions of the EPF relative to private income to measure expected benefits of pension saving (PEN_t). For India, both EPF and EPS contributions are considered whereas only the EPF is used for Malaysia due to unavailability of data. It is a stock variable of provident funds with adjustment for withdrawals. The above specifications also include two dummy variables to account for the impact of the oil crisis in 1978 and the Asian financial crisis that hit Malaysia in 1997. For India, the empirical analysis includes a dummy variable to account for the 1991 balance of payments crisis. Except for GRO_t and RI_t, which are measured in percentages, all variables are measured in natural logarithms.

The data for India are directly obtained or compiled from the National Accounts Statistics of the Government of India, the Annual Reports and Reports on Currency and Finance of the Reserve Bank of India. For Malaysia, the data are collected from the Economic Report of the Ministry of Finance, and the Annual Reports and Monthly Statistical Bulletin of the Central Bank of Malaysia.

Figure 1 provides the evolution of the key variables relevant to the analysis of private saving. As is evident, both India and Malaysia have achieved significant improvements in private saving performance during the period 1960-2005, with average growth rates of 8 percent and 10 percent, respectively. PRS_t in Malaysia experienced a sharp fall after the Asian financial crisis, but the series rebounded within a short period of time. There is considerable difference in terms of private income growth India has had substantial fluctuations whilst Malaysia's income growth rate has remained practically stationary.

Figure 1: Evolution of private saving and other key variables



Sources: data for India were obtained from Government of India and the Reserve Bank of India; data for Malaysia were compiled from the Central Bank of Malaysia and Department of Statistics.

Age structure is a key determinant of saving according to the life cycle hypothesis. Both India and Malaysia show a similar pattern of development in their demographic structures in recent years, although the ratio was much higher in Malaysia in the 1960s. Interestingly, the pattern of change in real interest rates appears quite similar in both countries particularly after the 1970s, although the rate in India is subject to greater fluctuations.

In terms of the share of agriculture output, their experience has been quite diverse. The structure of the Malaysian economy has changed significantly over time in that its economy has become less reliant on subsistence agriculture activities. However, the economy of India has remained heavily dependent on the agriculture sector. The ratio of agriculture output to total output shows considerable fluctuations in India.

It is interesting to note that the financial liberalization indices coincide rather well with the policy changes that took place in India and Malaysia during the period under investigation. In Malaysia, the index begins to move downwards from 1971 onwards mainly due to an increase in the statutory reserve ratio. 1975 saw a plunge in the index, coinciding with the implementation of directed credit programs. The major reform in interest rate policy occurred in late 1978 when the central bank allowed banks to determine their own interest rates. During the 1997 Asian financial crisis, several controls were introduced to deal with the problems faced by the economy. These controls were gradually removed after the crisis.

In India, there were few repressionist policies imposed on the financial system in the 1950s. The government gradually imposed more controls over the banking sector by raising the statutory liquidity ratio from 25 percent in 1960 to 38.5 percent in 1991. The financial sector in India was liberalized in 1991 as part of broader economic reforms. The objective was to provide a greater role for markets in price determination and resource allocation (see Sen and Vaidya, 1999; Hanson, 2001; Pentecost and Moore, 2006). The cash reserve rate increased from 2 percent to 15 percent during the period 1960-1991. Consequently interest rates were gradually liberalized and the statutory liquidity ratio was also reduced. However, the extent of directed credit control has remained more or less unchanged.

In Malaysia, the proxy for expected pension benefits exhibits a rapid increase over time whereas India shows a steady rise in the ratio, with an average of only 4.1 percent over the period 1960-2005. Malaysia has undergone vast changes in accumulated pension saving since the Asian financial crisis. There was a protracted decline in the ratio due to a reduction in the contribution of the EPF since the

crisis. Hence, the differences in the expected pension benefits in these two countries appear to be quite stark.

3. Estimation Techniques and Results

3.1 Integration and cointegration analyses

Annual data covering the period 1950-2005 for India and 1960-2005 for Malaysia are used in the estimation of the private saving equation. As the first step, we examine the unit root properties of the variables. Two conventional unit root tests are used to assess the order of integration of the variables - the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The results, which are available upon request, indicate that all variables are either *I*(0) or *I*(1).

The key objective of our empirical estimation is to examine the existence of a long-run private saving equation and to provide estimates of the long-run relationship and the short-run dynamics for the equation. The cointegration test draws upon the Autoregressive Distributed Lag (ARDL) bounds approach of Pesaran *et al.* (2001), which involves performing a simple *F*-test on the following ARDL model:

$$\Delta PRS_t = a_0 + b_0 PRS_{t-1} + \sum_{j=1}^{k} b_j DET_{j,t-1} + \sum_{i=1}^{p} c_{0i} \Delta PRS_{t-i} + \sum_{i=0}^{p} \sum_{j=1}^{k} c_{ji} \Delta DET_{j,t-i} + u_t \quad (2)$$

where p is the lag length and DET_t is a vector of k determinants of PRS_t. The above equation can be estimated by OLS since Pesaran and Shin (1998) have shown that the OLS estimators of the short-run parameters are consistent, and the ARDL based estimators of the long-run coefficients are super-consistent in small sample sizes. Hence, valid inferences on the long-run parameters can be made using standard normal asymptotic theory. The main advantage of this approach is that it can be applied to the model regardless of whether the underlying variables are *I*(0) or *I*(1).

The testing procedure involves two stages. In the first stage, the existence of the long-run relationship between the variables is tested. Specifically, an *F*-test for the joint significance of coefficients on lagged levels terms of the ARDL model ($H_0 : b_0 = b_1 = ... = b_k = 0$) is performed. The test for cointegration is provided by two asymptotic critical value bounds when the independent variables are either *I*(0) or *I*(1). The lower bound assumes all the independent variables are *I*(0), and the upper bound assumes they are *I*(1). If the test statistics exceed their respective upper critical values, the null

is rejected and we can conclude that a long-run relationship exists. The second stage of the procedure is to derive the long-run estimates using the underlying ARDL model.

In view of the small sample, a maximum lag length of two is used in the estimation. The results in Table 1 indicate that the null hypothesis of no cointegration is rejected at the five percent level of significance when the lag length is chosen to be one for India. For Malaysia, the evidence of cointegration is found at the five percent level irrespective of the lag length chosen. Hence, these results support the existence of a long-run relationship between private saving and its determinants in both countries. We also report the Schwarz's Bayesian Information Criteria (SBC) to pin down the optimal lag length. This model selection criterion suggests that the use of a more parsimonious lag structure is preferred for both countries. We will therefore use only one lag in the remaining analyses.

Table 1: ARDL bounds tests for the existence of a long-run relationship

	India (1950-2005)		Malaysia (1960-2005)	
	$p=1$	$p=2$	$p=1$	$p=2$
F-test statistics	4.821**	1.699	4.193**	3.627**
SBC	-1.088	-0.913	-0.077	0.075

Notes: p is the optimal lag length for the ARDL model. The test statistics of the bounds tests are compared against the critical values reported in Pesaran et al. (2001). The 10%, 5% and 1% critical value bounds for the F-test are (2.12, 3.23), (2.45, 3.61) and (3.15, 4.93), respectively.

3.2 Long-run and short-run estimates

The long-run parameters can be estimated using the underlying ARDL model.[5] To obtain the short-run results, the error-correction term (ECT) is obtained by rearranging the long-run terms. The general-to-specific modeling approach is then adopted to derive a satisfactory short-run dynamic model. This involves testing down the general model by successively eliminating statistically insignificant regressors and imposing data acceptable restrictions on the parameters to obtain the final parsimonious dynamic equation.

[5] The private saving equation is also estimated using the DOLS procedure of Stock and Watson (1993). The results are almost indistinguishable and therefore not reported here to conserve space.

Table 2: ARDL estimate of the private saving equation

	India (1950-2005)		Malaysia (1960-2005)	
	Coefficient	*p*-value	Coefficient	*p*-value
A. The long-run relationship (Dep. = lnPRS_t)				
Intercept	33.385***	0.000	32.850***	0.000
GRO_t	0.017***	0.001	0.102**	0.032
lnAGE_t	-4.177***	0.000	-4.398***	0.000
RI_t	0.013***	0.005	-0.023**	0.050
lnAGR_t	-1.701***	0.000	-1.171***	0.001
lnFL_t	-0.521***	0.000	-0.476***	0.010
lnPEN_t	0.432***	0.000	-0.699***	0.000
B. The short-run dynamic model (Dep. =ΔlnPRS_t)				
Intercept	0.055***	0.001	0.118***	0.008
ECT_{t-1}	-0.644***	0.000	-0.443***	0.001
ΔGRO_t	0.011***	0.008	0.118***	0.000
ΔlnAGE_t			-22.201***	0.002
ΔRI_t	0.007***	0.002		
ΔlnAGR_t	-0.939***	0.010		
ΔlnPEN_t			-0.825**	0.019
ΔlnPRS_{t-1}	0.241*	0.052		
C. Diagnostic checks	Test-statistic	*p*-value	Test-statistic	*p*-value
χ^2_{NORMAL}	1.701	0.427	4.474	0.789
$\chi^2_{SERIAL}(1)$	0.784	0.376	0.384	0.535
$\chi^2_{SERIAL}(2)$	1.228	0.541	0.476	0.787
χ^2_{ARCH}	0.536	0.464	0.567	0.451
χ^2_{WHITE}	10.077	0.609	4.525	0.921
χ^2_{RESET}	1.225	0.268	0.266	0.605

Notes: $\chi^2_{NORMAL}(2)$ refers to the Jarque-Bera statistic of the test for normal residuals, $\chi^2_{SERIAL}(1)$ and $\chi^2_{SERIAL}(2)$ are the Breusch-Godfrey LM test statistics for no first and second order serial correlation, respectively, χ^2_{WHITE} denotes the White's test statistic to test for homoskedastic errors, with degrees of freedom equal to the number of slope coefficients, $\chi^2_{ARCH}(1)$ is the Engle's test statistic for no autoregressive conditional heteroskedasticity, and $\chi^2_{RESET}(1)$ is the Ramsey's test statistic for no functional misspecification. *, ** and *** indicate 10%, 5% and 1% level of significance, respectively.

In general, all variables are found to be statistically significant at the conventional level both in the long-run and short-run. All dummy variables, which capture the effects of different crises in India and Malaysia, are found to be statistically insignificant, and therefore dropped from the estimation. In the short-run dynamic model, the coefficients associated with ECT_{t-1}, which measure the speed of adjustment back to the long-run equilibrium value, are statistically significant at the one percent level and correctly signed (negative). Its statistical significance provides further evidence against no cointegration between private saving and its determinants. For India, the economy takes about 1.5 years to achieve long-run equilibrium when there is a deviation from equilibrium. Although the restoration to equilibrium takes slightly longer for Malaysia, it is still less than 2.5 years.

The evidence suggests that private saving rises with the growth rate of per capita private income. However, the semi-elasticity of private saving with respect to income growth is found to be rather small in both countries. Specifically, a one percentage point rise in the rate of growth of per capita private income leads to a 0.017 percentage point rise in private saving in India, and a 0.102 percentage point rise in private saving in Malaysia. These movements are also found to be statistically significant in the short run.

The coefficients on age dependency ratio are found to have the expected (negative) sign, and to be statistically significant at the one percent level in both countries. This suggests that the private sector tends to save less with the increase in dependent population relative to working population, providing some support for the view that demographic factors are crucial in explaining the variations in saving across time, as suggested by the life cycle model. Age structure of the population is found to have a similar short-run effect only in Malaysia.

As regards monetary policy, a one percentage point increase in real interest rates leads to only a 0.013 percentage point increase in private saving in India. However, the interest rate effect is found to be negative in Malaysia, with a negative semi-elasticity of 0.023. In India, short-run fluctuations in real interest rates have a small positive effect on the evolution of private saving, consistent with the long-run results. However, such an effect is not found in Malaysia. By and large, consistent with the results of Ogaki *et al.* (1996), responsiveness of private saving to real interest rates is found to be small in developing countries since a significant share of income is devoted to subsistence consumption.

The share of agricultural output is found to have large negative effects on private saving behavior in both countries. Specifically, the long-run elasticity is found to be 1.701 and 1.171 in India and Malaysia, respectively. The finding of a negative effect of the share of agricultural output is consistent

with the results of Muhleisen (1997) for the Indian experience. However, the short-run effect is found to be statistically significant only in India, where the economy relies heavily on agricultural activities. It exerts a negative influence on saving, consistent with the long-run result.

Financial liberalization is found to have played a negative role in the process of private saving accumulation in both countries. This result is consistent with the cross-country findings of Bandiera *et al.* (2000) and Hermes and Lensink (2005) that financial liberalization is more closely associated with a fall in saving. The long-run elasticities derived from the coefficients of financial liberalization suggest that a one percentage point increase in the index of financial liberalization yields a 0.521 percentage point reduction in private saving for India. Thus, contrary to the findings of Muhleisen (1997), the evidence in this paper suggests that financial liberalization exerts a negative influence on private saving in India. The negative effect is found to be slightly lower in Malaysia at 0.476. However, unlike its long-run counterpart, financial liberalization does not seem to have played a direct role in the determination of private saving in the short run.

The finding that financial liberalization has led to a fall in private saving in India is interesting as there were no significant easing of directed credit programs in India as part of the reforms. However, there was a significant reduction in mandatory requirements for banks to invest in government bonds since the early 1990s. Our evidence suggests that the increased loanable funds available to the private sector may have relaxed borrowing constraints to households for consumption needs, leading to a decline in their savings.

In Malaysia, the extent of directed credit controls has increased significantly over the years since the inception of the program in 1975. Households and firms that do not benefit from the programs may have tended to save more. As such, financial liberalization may result in lower saving in the private sector. Furthermore, as Stiglitz (1994) argues, financial repression such as interest rate restraints may lead to higher financial saving in the presence of good governance in the financial systems. When depositors perceive restrictions as policies aimed at enhancing the stability of the financial system, they may well be more willing to keep their savings in the form of bank deposits. In the case of Malaysia, this finding may also be due to the presence of a sound central bank, which has enabled the repressionist policies to be carried out effectively and resulted in a favorable effect on saving in the private sector. As highlighted by Honohan and Stiglitz (2001), financial restraints are more likely to work well in environments with strong regulatory capacity.

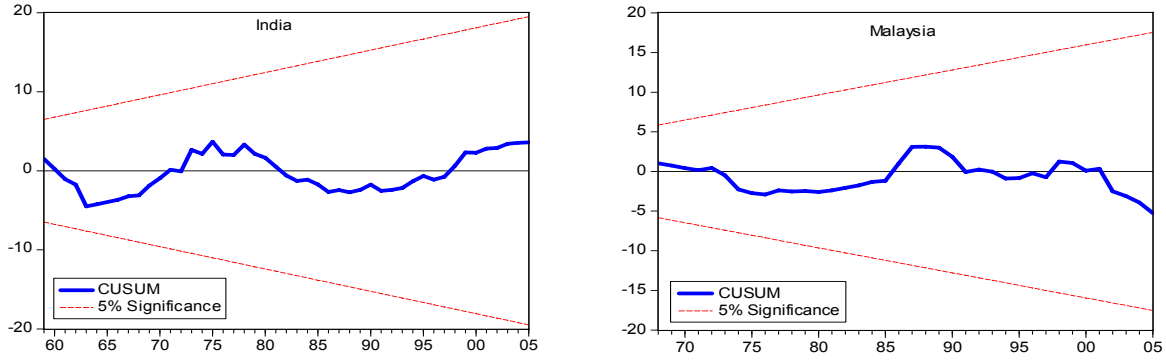
The expected benefits of pension coverage are found to have an undesirable effect on private saving in Malaysia. Its negative long-run elasticity is found to be 0.699. The results are compatible with the extended life cycle model that suggests that a well developed social security system discourages saving, and corroborate the cross-country findings of Munnell (1976), Edwards (1996) and Dayal-Ghulati and Thinmann (1997). In contrast, a large positive effect of expected pension benefits is found for India, with a positive long-run elasticity of 0.432. This may be explained by the mandatory nature of the pension system in India in the period under consideration, and the fact that much of the pension funds were invested in low return government bonds. If we assume that households have target post-retirement income in mind, an increase in mandatory contributions to the EPF seems to have led to a higher rate of voluntary saving by households to meet their target post-retirement income.

While our results indicate that the perceived benefit of the EPF and EPS schemes in India are positive, it is not clear what this implies for policy. A move to the payment of market returns on pension plans along with an improvement of the coverage of social security programs may have a negative effect on private saving in India, as has been found for Malaysia and other countries. In contrast, the EPF system is well-developed with an extensive coverage in Malaysia and hence its presence is likely to crowd out voluntary private saving. In terms of the short-run dynamics, we can see that in first-differenced form, the variable $\Delta \ln PEN_t$ has the sign consistent with its long-run estimate in Malaysia. However, we do not find such a short-run effect in India.

3.3 Robustness checks

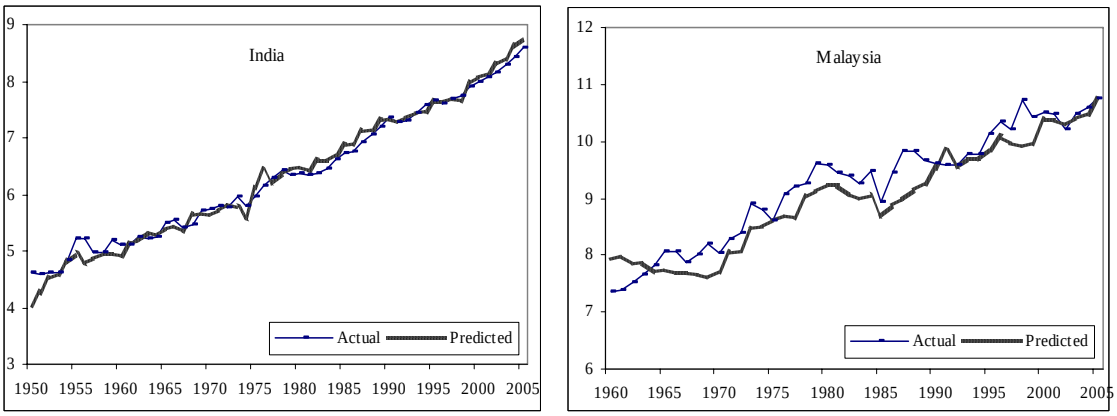
In order to test the robustness of the results, all estimations are subject to various diagnostic tests. The regression specifications fit remarkably well and pass the diagnostic tests against normality (χ^2_{NORMAL}), first and second order serial correlation (χ^2_{SERIAL}), autoregressive conditional heteroskedasticity (χ^2_{ARCH}), White's heteroskedasticity (χ^2_{WHITE}), and Ramsey's functional specification (χ^2_{RESET}), at the five percent level for both countries.

Figure 2: Plots of CUSUM recursive residuals



Structural stability of the equations is examined using the cumulative sum (CUSUM) tests on the recursive residuals. This test is able to detect systematic changes in the regression coefficients. Figure 2 shows that the CUSUM statistics lie within the five percent confidence interval bands, suggesting no evidence of structural instability in the residuals of the private saving equation. Figure 3 shows the actual and predicted level of private saving. Predicted lnPRS_t is the long-run (static) equilibrium level of private saving, which is constructed based on the long-run coefficients reported earlier. It is apparent from the diagrams that the predicted lnPRS_t series track the actual lnPRS_t series very closely over time.

Figure 3: Actual and predicted level of private saving (in logarithms)



4. Concluding Remarks

In this paper, we examined the effects of financial liberalization and expected pension benefits on the evolution of private saving in India and Malaysia during the last few decades. The theoretical framework was derived from the life cycle model with appropriate modifications. The model was then

tested using the Autoregressive Distributed Lag procedure developed by Pesaran *et al.* (2001). A long-run steady-state relationship was found between private saving and its determinants for both countries.

This study differs from the extant literature in several important aspects. First, the empirical analysis is carried out in an integrated framework by considering the joint impact of financial liberalization and expected pension benefits on private saving. Second, unlike the existing literature which focuses on either cross-country analysis or country case studies, we adopt a comparative perspective in analyzing the saving behavior of two fast growing economies in the developing world. Third, a financial liberalization index covering several dimensions in the financial systems is developed for India and Malaysia. Hence, financial liberalization in this study is treated as a process rather than several single events, as assumed in many prior studies.

Several implications for our understanding of the determinants of private saving in developing countries emerge from the analysis of this paper. Firstly, the results are by and large consistent with the predictions of the life cycle model that income growth has a positive effect on private saving. This suggests that the relationship between private saving and economic growth is likely to be bi-directional: faster economic growth leads to increased private saving, which in turn is expected to lead to higher economic growth.

Secondly, an interesting finding that emerges from this analysis is that financial liberalization has a negative impact on saving performance in the private sector, implying that the relaxation of financial restraints imposed on the financial systems has a detrimental effect on growth in the economies of India and Malaysia. Hence, the results suggest that financial liberalization, while having possible efficiency-enhancing effects, may have an undesirable consequence in that it could lead to a decline in private saving. Finally, compulsory saving in the form of provident and pension funds appears to encourage private saving in India, but the reverse is found in Malaysia. This seems to suggest that the effect of compulsory saving on voluntary saving may be non-linear, and that for countries such as India, which is in its early stages of economic development with low per capita incomes and a weak social security system, compulsory and voluntary saving may well be complements, and not substitutes as predicted by the life-cycle theory.

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Appendix: Principal component analysis

Table A1: The financial liberalization index for India

	Principal component								
	1	2	3	4	5	6	7	8	9
Eigenvalues	4.14	1.95	1.10	0.64	0.45	0.41	0.18	0.10	0.03
% of variance	0.46	0.22	0.12	0.07	0.05	0.05	0.02	0.01	0.00
Cumulative %	0.46	0.68	0.80	0.87	0.92	0.97	0.99	1.00	1.00
	Eigenvector								
Variable	1	2	3	4	5	6	7	8	9
CRR_t	0.37	-0.30	0.23	0.14	-0.39	0.44	0.42	0.34	0.25
SLR_t	0.45	0.17	0.14	0.08	-0.23	0.16	-0.04	-0.37	-0.72
DCP_t	0.38	-0.06	-0.12	0.59	0.02	-0.56	0.17	-0.27	0.26
FDR_t	0.40	-0.12	-0.42	-0.17	0.17	-0.26	-0.07	0.64	-0.31
DRC_t	0.40	0.25	0.19	-0.29	-0.31	-0.11	-0.62	0.02	0.42
DRF_t	0.21	0.54	-0.20	-0.47	0.09	-0.02	0.58	-0.16	0.18
FLR_t	0.18	-0.26	0.71	-0.28	0.48	-0.26	0.13	-0.01	-0.05
LRC_t	0.08	0.58	0.20	0.46	0.45	0.29	-0.10	0.32	0.04
LRF_t	0.32	-0.34	-0.34	-0.07	0.48	0.48	-0.20	-0.36	0.20

Notes: CRR_t = cash reserve ratio, SLR_t = statutory liquidity ratio, DCP_t = directed credit programs, FDR_t = fixed deposit dummy, DRC_t = deposit rate ceiling dummy, DRF_t = deposit rate floor dummy, FLR_t = fixed lending dummy, LRC_t = lending rate ceiling and LRF_t = lending rate floor.

Table A2: The financial liberalization index for Malaysia

	Principal component								
	1	2	3	4	5	6	7	8	9
Eigenvalues	4.43	1.83	0.93	0.62	0.53	0.27	0.19	0.14	0.06
% of variance	0.49	0.20	0.10	0.07	0.06	0.03	0.02	0.02	0.01
Cumulative %	0.49	0.70	0.80	0.87	0.93	0.96	0.98	0.99	1.00
	Eigenvector								
Variable	1	2	3	4	5	6	7	8	9
SRR_t	0.10	-0.57	-0.22	0.03	0.72	-0.29	0.01	-0.06	0.05
CLR_t	-0.35	-0.38	0.25	0.21	-0.02	0.28	0.33	0.66	0.06
PSL_t	0.41	-0.02	0.07	0.27	0.20	0.64	-0.54	0.09	0.08
PSR_t	0.40	-0.07	0.23	0.45	-0.27	-0.43	0.04	0.05	0.56
PIR_t	0.34	0.36	-0.33	-0.32	0.22	0.21	0.47	0.26	0.41
MIL_t	-0.37	0.13	0.53	-0.10	0.33	0.18	0.06	-0.43	0.47
MAL_t	0.28	0.36	0.56	-0.02	0.36	-0.26	0.07	0.28	-0.43
MID_t	-0.23	0.39	-0.30	0.75	0.22	0.03	0.23	-0.13	-0.12
MAD_t	-0.39	0.31	-0.18	-0.08	0.15	-0.30	-0.57	0.45	0.29

Notes: SRR_t = statutory reserve ratio, CLR_t = commercial bank liquidity ratio, PSL_t = priority sector (native Malays community) lending target rate, PSR_t = maximum lending rate for priority sector, PIR_t = policy intervention rate, MIL_t = minimum lending rate, MAL_t = maximum lending rate, MID_t = minimum deposit rate and MAL_t = maximum deposit rate.