



# The Determinants of Private Saving in India

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**Summary.** — This paper examines the determinants of private saving in the process of economic development, in the light of the Indian experience. It is found that the saving rate rises with both the level and the rate of growth of disposable income. The real interest rate on bank deposits has a significant positive impact, but the magnitude of the impact is modest. Public saving seems to crowd out private saving, but less than proportionately. Furthermore, the spread of banking facilities in the economy and the inflation rate have a positive impact and changes in the external terms of trade a negative impact on private saving.

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*Key words* — Asia, India, saving rate, financial intermediation, macroeconomic policy

## 1. INTRODUCTION

The vast empirical literature on the determinants of economic growth has consistently found a significant positive effect of the investment rate on the latter. At the same time, crosscountry studies on the relationship between saving and investment show that, against the popular perception of the globalization of capital, domestic investment is fundamentally determined by domestic saving. These two “stylized facts” together suggest that a sufficiently high rate of national saving is a crucial determinant of economic growth.

In recent years, there has been a growing concern about the lopsided nature of the existing empirical evidence on the determinants of saving, particularly for developing countries.<sup>1</sup> Given the nature of data availability, saving behavior in developing countries has predominantly been examined using multi-country cross-sectional data. There are two fundamental limitations that make results from cross-sectional analysis rather dubious. First, crosscountry regression analysis is based on the assumption of “homogeneity” in the observed relationship across countries. This is a very restrictive assumption. It is common knowledge that there are considerable variations among

developing countries in relation to various structural features and institutional aspects that have a direct bearing upon the impact of economic factors on the saving process. Second, given vast differences among countries with respect to the nature and quality of data, crosscountry comparison is fraught with danger (Deaton, 1989; Srinivasan, 1994). Not only the statistical procedures for measuring saving and investment but also the magnitude of errors in data in the implementation of these procedures vary significantly among countries. Thus, attempts to characterize the “average” developing country in terms of a crosscountry regression are unlikely to yield sensible results.<sup>2</sup>

These considerations point to the need for undertaking in-depth time-profile analysis of saving behavior in individual countries, by appropriately combining quantitative analysis with qualitative information on country-specific features of policy and performance, in order to build a sound empirical foundation for informing the policy debate. Unfortunately,

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systematic country studies of this nature are few and far between. The available country studies, in fact, point to significant variations in the magnitude of the interest elasticity and other relevant coefficient estimates among countries, suggesting that data should not be pooled without considerable caution.

The purpose of this paper is to examine the determinants of the private saving rate in India during 1954–98.<sup>3</sup> The framework for our analysis is derived from the life-cycle model (LCM) that has been the standard theory for the explanation of changes in private saving over time and across countries. India is a very appropriate case study of the subject at hand for the following reasons. First, the Indian saving and investment database is considered relatively good by developing country standards, and data are available on a comparable basis for a period of time adequate for systematic econometric investigation.<sup>4</sup> Second, India has also undergone significant policy transitions relating to the key variables relevant for the analysis, providing an appropriate setting for a historical analysis of the subject at hand (Bhagwati, 1993; Joshi & Little, 1994). Finally, saving performance has figured prominently in the policy debate in India in the post-independence period and in particular, following the economic reforms initiated in 1991 (Athukorala & Sen, 2002).

The rest of the paper is divided into five sections. Section 1 provides an overview of India's saving behavior, comparing it with other developing countries, in order to place the ensuing analysis in context. Section 2 contains the analytical framework, drawing on the

LCM of saving and consumption, and a discussion of the model to be used in the empirical analysis. Sections 3 and 4 discuss the data and estimation procedure and present the results respectively. Section 5 concludes.

## 2. AN OVERVIEW OF SAVING BEHAVIOR IN INDIA

There has been a consistent increase in the national saving rate in India throughout the post-independence period, though with considerable fluctuations from year to year (Figure 1). The national saving rate increased from about 10% in the early 1950s to 17% in the early 1970s and then to over 25% by the mid-1990s (note that national saving corresponds to the Indian national accounts concept of gross domestic saving, as the latter includes current transfers from Indian emigrants and net factor income from abroad). During this period, private saving has accounted for the lion's share of total domestic saving, with the share of public saving in total saving showing a decline from the early 1980s onward. The private saving rate increased from 8.6% in 1950–55 to 13.8% in 1970–75 and then to 22.8% in 1990–98. The annual increase in the private saving rate was much faster in the 1950s and 1960s compared to the period from the late 1960s to early 1980s. From then on, there has been a significant increase in the saving rate well into the 1990s.

In international perspective, India has had a high saving rate compared to many other countries, except those in East Asia (Table 1). Interestingly India's saving rate in the 1960s

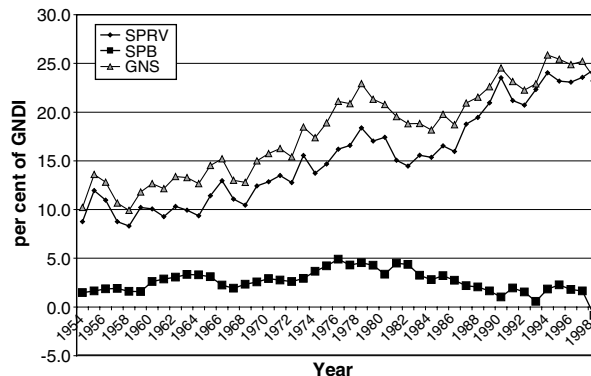


Figure 1. National, private and public saving rates in India. Note: GNS = gross national saving; SPRV = private saving; and SPB = public saving. Source: CSO, National accounts statistics (various issues).

Table 1. *National saving rates, India and selected developing countries, 1960–98 (%)*

| Countries            | 1960–64        | 1965–69 | 1970–74 | 1975–79 | 1980–84 | 1985–89 | 1990–98 |
|----------------------|----------------|---------|---------|---------|---------|---------|---------|
| <i>South Asia</i>    |                |         |         |         |         |         |         |
| India                | 14.3           | 15.0    | 17.4    | 20.8    | 19.3    | 20.8    | 24.2    |
| Pakistan             | 10.5           | 11.8    | 8.7     | 7.3     | 7.9     | 9.6     | 15.8    |
| Sri Lanka            | 11.9           | 10.4    | 13.5    | 13.8    | 13.7    | 11.9    | 14.6    |
| Bangladesh           | – <sup>a</sup> | –       | –       | 1.5     | 1.9     | 2.9     | 6.3     |
| <i>East Asia</i>     |                |         |         |         |         |         |         |
| Taiwan               | 21.2           | 22.2    | 30.5    | 31.8    | 32.0    | 36.0    | 28.2    |
| China                | –              | –       | –       | 32.6    | 34.3    | 35.2    | 39.5    |
| China: Hong Kong     | 20.9           | 25.8    | 29.3    | 32.3    | 31.7    | 35.0    | 34.1    |
| Singapore            | 4.3            | 14.9    | 24.0    | 33.2    | 42.7    | 41.0    | 23.6    |
| Korea, Rep of        | 4.4            | 13.0    | 17.5    | 25.3    | 26.9    | 35.6    | 35.9    |
| Thailand             | 16.4           | 21.3    | 22.6    | 21.9    | 23.8    | 29.1    | 35.6    |
| Indonesia            | 10.0           | 5.6     | 20.7    | 28.1    | 31.6    | 29.3    | 33.1    |
| Malaysia             | 23.8           | 24.4    | 26.9    | 32.5    | 31.6    | 34.6    | 35.7    |
| <i>Latin America</i> |                |         |         |         |         |         |         |
| Paraguay             | 12.6           | 12.8    | 15.8    | 21.6    | 18.8    | 20.6    | 12.0    |
| Venezuela            | 35.2           | 33.7    | 39.6    | 36.0    | 27.4    | 23.9    | 22.5    |
| Costa Rica           | 14.4           | 13.0    | 14.6    | 16.1    | 22.9    | 23.7    | 22.9    |
| Brazil               | 19.8           | 20.3    | 20.1    | 21.5    | 20.9    | 25.5    | 22.3    |
| Mexico               | 16.1           | 18.2    | 18.1    | 20.3    | 27.1    | 23.6    | 19.5    |
| Peru                 | 38.0           | 29.2    | 17.1    | 18.0    | 28.5    | 21.5    | 14.3    |
| Colombia             | 16.8           | 17.5    | 18.2    | 20.6    | 17.7    | 23.6    | 19.4    |
| Chile                | 15.2           | 20.0    | 16.3    | 17.3    | 14.3    | 25.3    | 28.4    |
| Dominican Rep        | 13.6           | 7.9     | 13.3    | 18.2    | 16.7    | 19.9    | 15.8    |
| Argentina            | 22.1           | 23.7    | 23.7    | 30.6    | 23.5    | 21.2    | 17.3    |
| Ecuador              | 10.9           | 12.3    | 18.8    | 23.0    | 23.6    | 20.0    | 22.7    |
| Jamaica              | 26.0           | 28.1    | 21.5    | 15.0    | 14.0    | 19.7    | 16.5    |
| Honduras             | 13.3           | 16.4    | 16.1    | 17.4    | 12.6    | 13.5    | 17.6    |
| El Salvador          | 12.4           | 11.0    | 14.3    | 18.8    | 8.2     | 5.7     | 3.3     |
| Panama               | 14.8           | 20.4    | –       | –       | –       | 12.3    | 22.6    |
| Uruguay              | 18.2           | 19.4    | 18.0    | 18.9    | 16.0    | 17.3    | 14.4    |
| Bolivia              | 10.7           | 19.1    | 26.2    | 23.0    | 14.0    | 6.8     | 7.8     |
| Guatemala            | 8.5            | 11.3    | 13.8    | 15.6    | 10.6    | 9.2     | 9.5     |
| Nicaragua            | 15.1           | 15.8    | 16.5    | 15.5    | 6.3     | 4.6     | –8.5    |
| Haiti                | 5.2            | 3.1     | 9.0     | 7.3     | 6.2     | 4.9     | –6.1    |

Source: Compiled from World Bank (various issues), world tables database and Republic of China (various issues), Council for Planning and Development, *Taiwan statistical data book* (for Taiwan).

<sup>a</sup> – denotes that data are not available.

(16.7%) was much higher than that of Korea, Taiwan and Singapore, and only slightly lower than that of Thailand and Malaysia. From about the early 1970s the increase in India's saving rate continued to lag behind that of all these "High Performing East Asian Economies" (HPEAs). By the mid-1990s, India's saving rate (22%) amounted to a little over a half of the average rate for the HPEAs. Among the South Asian countries, India's performance has continued to be impressive, apart from some notable catching-up by Sri Lanka fol-

lowing market-oriented policy reforms in the late 1970s. In Latin America, only two countries—Chile and Costa Rica—have maintained consistently superior saving records compared to India during this period. Countries such as Brazil, Peru, Argentina and Mexico which had higher saving rates than India in the 1960s, ended up with lower or comparable rates in the mid-1990s. In general, India's saving performance has been consistently superior to that of the overall Latin American record from after about the first oil shock in the early 1970s.

### 3. THE ANALYTICAL FRAMEWORK

This section begins with the basic, "stripped-down," version of the LCM, and considers modifications/extensions to reflect both recent developments in consumption theory and structural features that are prevalent in developing countries.

#### (a) *The life-cycle model*<sup>5</sup>

In the LCM, accumulation for retirement is the prime motive for saving. The model is built around the consumption/saving behavior of a representative agent who is assumed to maximize the present value of lifetime utility, subject to a budget constraint. The budget constraint is equal to the current net worth plus the present value of expected labor income over the remaining working life of the agent. Under the simplifying assumptions of perfect capital markets and perfect foresight of the agent about the "true" income-generation process, the model predicts that consumption in a particular period depends on expectations about lifetime income (*not* on the income in that period, as postulated by the Keynesian model). As income tends to fluctuate systematically over the course of a person's life, saving behavior is crucially determined by one's stage in the life-cycle. Individuals smooth consumption over their lifetimes, and are consequently, net savers during their working years and dis-savers during retirement (Modigliani, 1986).

When the model is extended to the national level, the major determinants of the saving rate (over time in a given country or across countries) are the rate of growth of per capita income, and the age structure of the population. With respect to the rate of growth of per capita income,  $GY$ , the simplest version of the LCM predicts that an increase in the latter will unambiguously increase the aggregate saving rate, because it increases the lifetime resources (and saving) of younger-age groups relative to older-age groups. But, when wealth is introduced in the LCM as an additional explanatory variable, the model yields ambiguous conclusions about the relationship between saving and growth. For example, young people may have low current income but high lifetime wealth, and may therefore borrow to finance current consumption. In this case, at sufficiently high rates of economic growth, the aggregate saving rate may decrease if the lifetime wealth of the young is high enough relative to that of their

elders. Whether higher growth increases or reduces the saving rate depends on whether the age profile of saving is negatively correlated with age, which is an empirical matter (Deaton & Paxson, 2000).

The age structure of the population can be treated as uniquely related to population growth,  $GPOP$ , under the assumption of "balanced population growth" (Modigliani, 1986). This is because an increase in the population growth rate caused by an increase in age-specific fertility rates increases the number of savers relative to the number of dis-savers. This implies that if all the individual households in two given economies have the same saving profile over their life-cycles, the economy with the faster population growth may show a higher aggregate saving rate.

Relaxation of the "balanced population growth" assumption complicates the postulated link between demographic factors and saving in the LCM model. In reality, an increase in the population growth rate increases the number of economically active individuals relative to the retired, but may be accompanied by an increase in the share of the young in the population. Because both the young and the retired (the "dependent generation") consume more than they can earn, the net effect on aggregate saving of population growth is theoretically ambiguous.

The other determinants of private saving suggested by the LCM are the real interest rate on bank deposits ( $RID$ ), and wealth ( $W$ ). The net effect of the interest rate on saving/consumption is unclear in the model. A higher interest rate increases the present price of consumption relative to the future price (the substitution effect), and thus provides an incentive to increase saving. If the household is a net lender, however the interest rate rise also raises lifetime income, and thus tends to increase consumption and decrease saving (the income effect). Thus saving responds positively to rises in the interest rate only if the substitution effect is stronger than the income effect. It could be argued that, for the typical developing economy the net impact of a change in real interest rate on saving is likely to be positive (McKinnon, 1973; Shaw, 1973). The underlying reasoning is the following. In the typical developing economy where there is no robust market for stocks and bonds, cash balances and quasi-monetary assets (mostly bank deposits) generally account for a greater proportion of household saving compared to that in devel-

oped countries. Moreover, in a context where self-financing and bank loans constitute the major source of investment funds, accumulation of financial saving is driven largely by the decision to invest (rather than by the desire to live on interest income). Given these peculiarities of saving behavior, plus the fact that the bulk of saving comes from small savers, the substitution effect generally tends to be much larger than the income effect of an interest rate change. Wealth is postulated to have a negative effect on household saving. Accumulated wealth lessens the dependence of households on current income sources, because households can draw on accumulated assets to maintain their consumption levels.

(b) *Extensions and modifications*

The empirical application of the basic LCM raises a number of issues. The first issue has to do with the key premise of the life-cycle hypothesis that the saving rate is related to the growth of per capita income, *not* the level of per capita income. The absence of a link between current saving and current income in the LCM theory of consumption is an implication of the assumption that individuals are forward-looking, and therefore base their saving decisions on lifetime income rather than current income. The validity of this premise is, however greatly in doubt for low-income countries such as India. As Modigliani (1993) himself has noted,

For at least that portion of the population that lives at, or near, the starvation level, may find it impossible or too burdensome to set aside resources now in order to provide for later consumption. People in that predicament may tend to live more from hand-to-mouth, skipping retirement or being supported by the extended family. It is thus conceivable that, for a sufficiently low value of per capita income, ... the saving-income ratio for given growth would ... tend to rise with income.

For these considerations, we use *both* the growth rate and the level of per capita income (GY and PCY, respectively) as explanatory variables in the saving function.<sup>6</sup>

A second issue relates to the role of inflation in determining saving. In the standard LCM the only impact of inflation on saving is through its role in determining real returns to saving (the real interest rate). This postulate is based on the implicit assumptions of inflation neutrality (the absence of money illusion) in saving behavior and the absence of the real

balance effect of inflation. There are, however, good reasons for doubting the validity of these assumptions. First, inflation could influence saving through its impact on real wealth. If consumers attempt to maintain a target level of wealth or liquid assets relative to income, saving will rise with inflation. Second, inflation brings about uncertainty in future income streams and can thus lead to higher saving on precautionary grounds. This may be particularly true for households in developing countries whose income prospects are much more uncertain than their counterparts in developed countries (Deaton, 1989; Kimball, 1990).<sup>7</sup> For these considerations, we include the inflation rate (INF) as an additional explanatory variable to capture its impact on the saving rate operating through the real balance effect over and above the role in determination of the real interest rate (RID).<sup>8</sup>

The third issue relates to the effect on saving behavior of changes in the external terms of trade (the ratio of an export price index to an import price index, popularly known as the terms of trade, TOT) The traditional explanation of the relationship between the terms of trade and private saving rests on the Harberger-Laurson-Metzler hypothesis according to which a deterioration in the terms of trade, that is, a reduction in the price of domestically produced goods relative to that of foreign goods, reduces real income and hence saving (Harberger, 1950; Laurson & Metzler, 1950). This hypothesis is based on the Keynesian theory of consumption that assumes myopic expectations on the part of consumers, and the postulated effect is already captured by the two income variables in our saving function (GY and PCY). But, when we assume forward-looking behavior on the part of private agents in the face of volatile and unpredictable changes in income, terms of trade changes could impact on saving though consumption smoothing, over and above the impact operating via the growth or the level of real income. This effect of terms of trade changes on private saving can go either way, depending on whether movements in TOT are perceived to be temporary or permanent (Obstfeld, 1982; Frankel & Razin, 1992; Svensson & Razin, 1982). A terms of trade deterioration that is perceived to be temporary may lead to an increase in absorption (that is, an increase in expenditure measured in terms of domestic goods) as consumers attempt to offset the decrease in purchasing power of domestic goods so as to keep

real expenditure constant. By contrast, a terms of trade deterioration that is perceived to permanent may induce domestic residents to increase their savings at the current period in order to sustain their real standard of living in the future.<sup>9</sup>

The fourth issue stems from the debate on the possible impact of the fiscal policy stance on national saving rate (Corbo & Schmidt-Hebbel, 1991; Loayza *et al.*, 2000). While the government can choose the level of its own savings directly, a change in this variable need not imply a one-for-one change in household or national saving. This is because private agents may respond in such a way as to offset the government action, at least to some extent. At the extreme case, the Ricardian equivalence proposition of Barro (1974) postulates that a government issue of bonds to finance its dis-saving results in an equal increase in private saving, because the private sector saves in anticipation of a future increase in taxes to service the bonds. The proposition assumes perfect capital markets and the absence of uncertainty impacting on saving behavior. If either or both of these assumptions do not hold, then private and public saving may not be perfect substitutes.

The fifth consideration relates to the role of financial intermediation in promoting saving in developing countries. A notable development in the Indian financial system following the nationalization of commercial banks in 1969 has been the rapid expansion of bank branches in the country (Sen & Vaidya, 1997). Population per bank branch declined persistently from over 90,000 in the mid-1950s to around 14,000 in the early 1990s. This would have contributed to increase in private saving rate though encouraging financial saving, both by improving the accessibility to banking facilities of the general public and by reducing the cost of banking transactions (through reduced transport cost). As Lewis (1955) has put it, "if they [savings institutions] are pushed right under the individual's nose ... people save more than if the nearest savings institution is some distance away."<sup>10</sup> Thus, a negative relationship can be assumed between population per bank branch (bank density), BDN, and household financial saving. But, whether increased financial intermediation itself significantly raises the overall propensity to save depends also on the degree of substitution between financial saving and other items in the household's asset portfolio. Thus, the expected

sign of this relationship in the private saving function is ambiguous.

One more explanatory variable is chosen in the light of the debate on the determination of domestic saving in India. This is the inward remittances by expatriate Indians relative to income (TRN). Since the mid-1970s, there has been a significant increase in inward remittances by expatriate Indians employed in the oil-rich Gulf countries in response to the oil boom and, more recently, in high-performing economies in East Asia.<sup>11</sup> It is generally asserted that most of remittance income is frittered away as wasteful consumption, and the demonstration effects of ostensible consumption by families of migrant workers also have a profound unfavorable effect on the saving behavior of other households as well, resulting in a negative effect on the domestic saving rate (Stalker, 1994, pp. 122–129). But, data relating to the remittance utilization patterns of migrant households for India and some other labor-exporting countries in the region suggest that the share of remittance income spent on consumption is much lower than the national average propensity to consume.<sup>12</sup> This is presumably because most migrants are "target savers" who seek temporary overseas employment (normally at a considerable cost in terms of agency fees and overseas travel) consider this as a lifetime opportunity to improve their economic status on return. Thus, *a priori*, it is not possible to state whether a higher inflow of remittances will lead to higher or lower saving.<sup>13</sup>

### (c) *The empirical model*

Based on the above discussion, the saving function for the ensuing empirical analysis can be specified as,

$$SPRV = f[GY, GPOP, RID, W, PCY, INF, TOT, SPB, BDN, TRN] \quad (1)$$

where SPRV is the private saving rate, defined as the ratio of household plus corporate saving to gross national disposable income (GNDI), which is GNP at factor cost plus unrequited current transfers from abroad. The independent variable (with the signs expected for the regression coefficients are given in parentheses) are,

GY (+ or –) Rate of growth of real per capita GNDI.

|               |  |
|---------------|--|
| GPOP (+ or -) | Rate of growth of the population.  |
| RID (+ or -)  | Equals $i - \text{INF}$ , where $i$ is the nominal interest rate on bank deposits and INF is the inflation rate.               |
| $W$ (-)       | Real wealth, proxied by the ratio of money stock (M3) to GNDI.   |
| PCY (+)       | Real per capita GNDI.  |
| INF (+)       | The rate of inflation.   |
| TOT (+ or -)  | Equals $\text{PX}/\text{PM}$ , where PX and PM are the price of exports and imports, respectively (both in domestic currency). |
| SPB (+ or -)  | Public saving as a ratio of GNDI.  |
| BDN (+ or -)  | Population per bank branch ("bank density").   |
| TRN (+ or -)  | Remittances by Indian expatriates relative to GNDI.  |

#### 4. DATA AND ESTIMATION

Eqn. (1) is estimated using annual data for 1954–98. The data series have been directly obtained or compiled from the Central Statistical Organisation (CSO), National accounts statistics, (various issues); Government of India, Economic Survey (various issues) and Reserve Bank of India, Monthly bulletin and Report on Currency and Banking (various issues).

To construct RID, we use the one-year deposit rate (minimum) and the one-year lending rate of the State Bank of India. The rate of inflation ( $\pi$ ) is measured using the GDP deflator. Thus, the real interest rate (RID) is measured as,

$$\text{RID} = \ln[(1 + i)/(1 + \pi)]$$

Following Loayza *et al.* (2000), in constructing RID series we measured  $\pi$  as the average of current and one-period ahead (the average forward and backward) inflation rates.<sup>14</sup>

The data series on per capita disposable income (PCY), bank density (BDN) and the terms of trade (TOT) are measured in natural logarithms. All other variables (except GY and INF) are measured as ratio of gross national disposable income.

The estimation technique we use is the general to specific modeling procedure, which aims to minimizing the possibility of estimating

spurious relations while retaining long-run information.<sup>15</sup> The essence of this technique is to embed the relationship being investigated within a sufficiently complex dynamic specification, including lagged dependent and independent variables so that a parsimonious specification of the model can be uncovered. A major advantage of this method is that it yields an equation with first-differenced (and hence stationary) dependent variable, which, unlike a simple first-differenced equation, also appropriately retains long-run information embodied in the data (Hendry, 1996).

The estimation procedure involves first estimating equation (1) in an unrestricted form and then progressively simplifying it by restricting statistically insignificant coefficients to zero and reformulating the lag patterns where appropriate in terms of levels and differences to achieve orthogonality. To be acceptable, the final equation must satisfy various diagnostic testing procedures. In applying this estimation procedure, we set the initial lag length on all variables in the unrestricted equation at two periods. This is the established practice in modeling with annual data.

#### 5. RESULTS

Table 2 reports the final parsimonious estimated equation, together with a set of commonly used diagnostic statistics and long-run coefficients relating to the key explanatory variables. To facilitate the interpretation of the results, a summary of the variables used in the regressions is presented in Table 3.

Note that two variables in the original specification (GPOP and  $W$ ) have been dropped from the final estimated equation; these variables had statistically insignificant coefficients in all experimental runs and their deletion was supported by the standard variable deletion  $F$  test (both individually and jointly). An additional variable, which we call *the crisis dummy* (CRD) (which takes value 1 for 1991 and 1992 and zero for the other years), has been added to account for the 'unexplained' dip in the saving rate during the balance of payments crisis in the early 1990s.

The estimated saving function is statistically significant at the 1% level (in terms of the standard  $F$  test) and performs well by the relevant diagnostic tests. The result for the RID variable suggests that the real rate of return on bank deposits has a statistically significant

Table 2. *Determinants of the private saving rate in india: regression results*<sup>a</sup>

$$\Delta \text{SPRV}_t = 0.13 + 0.11 \text{GY}_t + 0.07 \text{PCY}_{t-1} + 0.15 \text{RID}_{t-1} + 0.28 \text{INF}_t - 0.03 \Delta \text{TOT}_t - 0.08 \text{TOT}_{t-1} - 0.46 \Delta \text{SPB}_t$$

(2.39)\*\*      (1.90)\*\*      (3.11)\*\*\*      (2.83)\*\*\*      (4.33)\*\*\*      (1.70)\*\*      (4.14)\*\*\*      (1.95)\*\*  
 - 0.49 \text{SPB}\_{t-1} - 0.54 \text{TRN}\_{t-1} - 0.03 \text{BDN}\_{t-1} - 0.02 \text{CRD} - 0.76 \text{SPRV}\_{t-1}

(3.70)\*\*\*      (1.36)\*      (4.14)\*\*\*      (2.98)\*\*\*      (5.37)\*\*\*

$$\bar{R}^2 = 0.65 \quad F(12, 31) = 7.47^{***} \quad \text{SE} = 0.01$$

$$\text{LM1} - \chi^2(1) = 1.42 \quad \text{LM2} - \chi^2(1) = 1.89 \quad \text{ARCH} - \chi^2(1) = 0.04$$

$$\text{RESET} - \chi^2(1) = 0.06 \quad \text{JBN} - \chi^2(2) = 0.28$$

*Long-run response of the saving rate (SPRV) with respect to explanatory variables:*<sup>b</sup>

|                          |                 |
|--------------------------|-----------------|
| Income growth (GY)       | 0.14 (4.05)**   |
| Per capita income (PCY)  | 0.09 (1.91)*    |
| Real interest rate (RID) | 0.20 (2.17)*    |
| Inflation (INF)          | 0.36 (3.74)**   |
| Terms of trade (TOT)     | -0.10 (5.51)*** |
| Public saving (SPB)      | -0.64 (3.71)**  |
| Remittances (TRN)        | -0.71 (1.26)    |
| Bank density (BDN)       | -0.04 (5.10)*** |

<sup>a</sup>BDN, PCY, TOT and RID are expressed in natural logarithms ( $\ln(1+x)$  for the last variable). Other variables (except CRD, GY, and INF) are expressed as ratios of GNDI. The  $t$ -ratios of regression coefficients are given in brackets. The test statistics are: LM = Lagrange multiplier test of residual serial correlation; ARCH = Engle's autoregressive conditional heteroscedasticity test. RESET = Ramsey test for functional form misspecification; JBN = Jarque-Bera test for the normality of residuals.

<sup>b</sup>Estimated from the long-run (steady-state) solution to the model. The  $t$ -ratios are given in brackets.

\*Approximate critical value for  $t$ -ratios: 10% = 1.31.

\*\*Approximate critical value for  $t$ -ratios: 5% = 1.69.

\*\*\*Approximate critical value for  $t$ -ratios: 1% = 2.44.

Table 3. *Summary data on variables used in econometric analysis*<sup>a</sup>

| Variables                    | 1955-59 | 1960-69 | 1970-79 | 1980-84 | 1985-90 | 1991-98 |
|------------------------------|---------|---------|---------|---------|---------|---------|
| <i>Dependent variable</i>    |         |         |         |         |         |         |
| SPRV (%)                     | 10.0    | 10.7    | 15.1    | 15.6    | 19.2    | 22.8    |
| <i>Explanatory variables</i> |         |         |         |         |         |         |
| GY (%)                       | 3.7     | 4.0     | 3.1     | 5.6     | 6.0     | 6.8     |
| RID (%)                      | -1.6    | -1.4    | -1.4    | -1.1    | 0.5     | 1.6     |
| PCY (ln)                     | 3.17    | 2.22    | 3.28    | 3.34    | 3.41    | 3.51    |
| INF (%)                      | 4.2     | 6.3     | 8.1     | 9.0     | 8.3     | 8.5     |
| TOT (ln)                     | 1.92    | 1.94    | 1.93    | 2.03    | 2.06    | 3.01    |
| SPB (%)                      | 1.71    | 2.73    | 3.71    | 3.65    | 2.14    | 1.7     |
| TRN (%)                      | 0.4     | 0.2     | 0.5     | 1.3     | 0.9     | 1.8     |
| BDN (ln)                     | 2.94    | 2.37    | 2.49    | 2.23    | 2.15    | 2.17    |

<sup>a</sup>The original series of PCY is in constant (1981) Indian rupees and that of BDN is in thousands. Figures reported are annual averages for the given subperiod. ln denotes natural logarithms.

positive effect on saving behavior in India. A 1% increase in RID is associated with a 0.20 percentage point increase in the private saving rate. This finding is consistent with the McKinnon-Shaw proposition that, in an economy where the saving behavior is highly intensive in

money and near-money assets, the direct incentive effect of high real interest rates on saving behavior ("income effect") generally overwhelms the substitution of other assets for financial assets in response in face of such interest rate changes ("substitution effect").

As is postulated by the LCM, the income growth variable (GY) is an important determinant of the private saving rate—the coefficient on GY is positively signed and attains statistical significance at the 5% level.<sup>16</sup> An increase in the growth rate by one percentage point leads to a long-run increase in the saving rate by 0.15 percentage points. But, other variables suggested by the LCM—GPOP and  $W$ —do not seem to be important in explaining private saving rate in India.<sup>17</sup>

We find that the Keynesian “absolute income hypothesis” holds for saving behavior in India—the coefficient for PCY is positive, and statistically significant at the 1% level. A 1% increase in per capita income seems to bring about a 0.09 percentage point increase in the private saving rate. Thus the Indian experience provides support for the argument that, for countries in the initial stages of development, the level of income is an important determinant of the capacity to save. In this respect, our results are consistent with the crosscountry results of Modigliani (1993), Hussein and Thirlwall (1999) and Loayza *et al.* (2000).<sup>18</sup>

Among the remaining variables, BDN stands out to be a highly significant variable in explaining variations in the private saving rate. A 10% decline in population per bank branch seems to increase the private saving rate by 0.4 percentage points. This result supports the view that the expansion of banking facilities since the 1970s seems to have contributed significantly to improvements in saving propensity in the economy by encouraging financial saving. In India the direct positive role of bank branch expansion on saving propensity seems to have been far greater in magnitude than the resultant compositional shift in saving (that is, increase in financial savings in the form of bank deposits at the expense of the accumulation of other assets).

The results for TOT point to a strong negative relationship between the terms of trade change and the private saving rate suggesting that private agents increase saving when faced with lower future real incomes as a result of terms of trade deterioration. Private agents in India seems to consider terms of trade deterioration as a *permanent (negative) shock* and their attempts to smooth consumption in face of such perceived shocks lead to an *increase* in domestic saving. An 1% deterioration in the terms of trade brings about 0.3 percentage point increase in the private saving rate in the short run, with a long-run (steady state) effect

of 0.10 percentage point. At first blush, this significant (negative) relationship between TOT and the saving rate is surprising for a country like India whose dependence on foreign trade (as conventionally measured by the trade-GDP ratio) is rather low.<sup>19</sup> There are however, strong reasons to believe that the *actual* trade dependence of the Indian economy (and hence the possible impact of TOT changes on the economy) would have been much greater than what is suggested by this conventional measure. As an outcome of the strong commitment to an import-substitution strategy, throughout most of the period under study India’s imports remained concentrated in critical developmental inputs, in particular, petroleum, fertilizer and various inputs to domestic industry for which there were virtually no domestic substitutes.<sup>20</sup> Given this delicate form of import dependence, the performance of the economy was extremely vulnerable to import compression at times of terms of trade shocks.

We also find that the inflation rate (INF) has a positive effect on the private saving rate over and above its effect operating through real return to saving (as captured by RID). This provides support for the hypothesis that when faced with inflation, consumers attempt to maintain a target real wealth relative to income by reducing consumption.<sup>21</sup> The coefficient on TRN is negative, but attains significance only at the 10% level, providing some, albeit weak, statistical support for the view that migrant remittances hinder domestic saving performance.<sup>22</sup>

The result for SPB points to a significant substitutability between public and private saving in the Indian context. There is however, no support for full Ricardian equivalence, which predicts full counterbalancing of public saving by private dis-saving. Specifically, an increase in public saving by 1% is associated with 0.64 percentage point decline in the private saving rate at steady state. Our finding is consistent with those of many recent studies which have consistently found the Ricardian equivalence hypothesis to be of limited value in explaining saving behavior (Corbo & Schmidt-Hebbel, 1991; Edwards, 1996; Liu & Woo, 1994).

## 6. CONCLUSIONS

This paper has investigated the determinants of private saving in a developing country, using

India as a case study. The econometric evidence reported in this paper point to the real interest rate, growth and the level of per capita income, spread of banking facilities, and the rate of inflation as statistically significant positive influences on domestic saving. Terms of trade changes and inward remittances by expatriate Indians seem to have a negative impact on the saving rate. There is also a clear role for fiscal policy in increasing total saving in the economy, with the private sector considering public saving as an imperfect substitute for its own saving. The result relating to the inflation rate needs to be qualified by referring to the fact that India has throughout been a *low inflation* country. What the result seems to suggest is that *mild* inflation is conducive for private saving.

We began this paper by noting two important features of India's post-independence saving performance compared to the general developing-country experience. First, India has slipped in her international ranking in saving performance over the years compared high-performing economies in East Asia. Second, despite this slippage, India's saving performance has continued to remain superior to that of not only other low-income countries (the income category to which India belongs) but also most middle income countries. Our results help understand both these features.

We have found strong statistical support for the hypothesis that both the change in the rate of income growth and change in income levels are powerful explicators of changes in the private saving rate. Thus, it is clear that differences in saving performance between India and the East Asian high-performing countries is simply a reflection of difference in overall growth performance.<sup>23</sup> Interestingly, India seems to have managed to maintain the saving rate at a level beyond what is permitted by economic performance alone through its long-term commitment to a macroeconomic policy stance that is conducive for financial deepening. Throughout the period under study, the nominal interest rate was an administered price, changed at infrequent intervals. There were, however no persistent adverse movement in real deposit rates; macroeconomic policy had an anti-inflationary stance and sharply negative real deposit rates were not allowed to persist for long. At the same time, and perhaps more importantly, the spread of banking facilities played a useful supplementary role in increasing private (and hence total) saving through a persistent improvement in bank density in the country. The combined effect of these favorable factors seems to have overwhelmed the mild crowding out effect of fiscal performance on private saving.

## NOTES

1. For useful surveys of this literature, see Deaton (1989), Gibson and Tsakalotos (1994) and Fry (1995).
2. The first criticism of cross-sectional studies does not apply to panel data studies which allow appropriately allow for country-specific (fixed effects) while capturing possible "within country changes" over time. But, the second criticism applies to both cross-sectional and panel data studies. In fact, the estimation process becomes even more sensitive to measurement errors under the panel data approach compared to cross-sectional approach; once fixed effects are netted out, the data tend to emphasize measurement errors embodied in time-series information within countries (Barro, 1998, p. 36).
3. Private saving is defined to be the sum of financial and nonfinancial savings of the corporate and household sectors.
4. For a critical assessment of the database for development analysis in developing countries, with emphasis on India, see Srinivasan (1994).
5. For details on the LCM and its advantages over other approaches, see Modigliani (1970, 1986) and Gersovitz (1988).
6. Other studies that have used a similar model specification include Modigliani (1993) and Hussein and Thirlwall (1999). Using cross-sectional regression methods in their analyses of saving behavior in developing countries, both studies find that increase in the *level* of national income enhances saving over and above the effect of income growth.
7. Another reason why inflation is not neutral in its impact on saving behavior is that the inflation rate is more difficult to predict in the long run than in the short run. As a consequence, any variation in the inflation rate

will have a magnified effect on the discounted present value of consumption, leading risk-averse economic agents to curtail current consumption in the face of higher variance of the inflation rate.

8. Previous studies that have included the inflation rate as an additional explanatory variable (together with the real interest rate) in the determinants of saving on similar grounds include Deaton (1977), Fischer (1993) and Loayza, Schmidt-Hebbel, and Serven (2000).

9. Even if we continue to assume that consumers are myopic, there is still a strong argument for the inclusion of the terms of trade as an explanatory variable of saving behavior grounded in measurement issues (Ady, 1976, p. 110). As noted, in theory, terms of trade changes are already a part of real income. In practice however, the price deflators used in national accounting generally allow only for changes in the general level of prices and fail to capture price structural effects on the level and growth of real income due to changes in the terms of trade. Thus, changes in the terms of trade can be expected to have an additional effect over that of changes in *measured* income on saving.

10. See also McKinnon (1973, p. 60).

11. For details on trends and patterns of labor migration from India, see Nayyar (1994).

12. For a survey of the relevant literature, see Athukorala (1992).

13. Note that remittances are a part of PCY. TRN is included here as an additional explanatory variable to test whether, for the reasons discussed above, remittances have a differential impact on saving compared to other incomes. Thus the expected sign of the regression coefficient on TRN can be positive or negative.

14. In experimental runs we also used alternative RID series constructed using one-period lagged inflation rates. The results were found to be remarkably invariant to the use of the two alternative measures.

15. The modern co-integration techniques are not applicable here because the set of variables used here are a mixture of stationary and nonstationary variables (unit-root test results are available from the authors on request). In any case, it is now widely acknowledged (based on Monte Carlo studies comparing various approaches to estimating long-run relations) that the general to specific procedure is as good as, if not more appropriate than, various co-integration techniques as an alternative estimation procedure in dealing with small

data samples even when all data series under consideration are nonstationary (Inder, 1993; Pagan, 1995).

16. As the growth rate of output and the private saving rate may be simultaneously determined, we re-estimated the saving function using two-stage least squares instead of ordinary least squares (OLS) and instrumenting GY by its lags, with no change in the results.

17. It should be noted that the lack of significance of GPOP may reflect measurement problems; annual population estimate is considered one of the weakest links in the Indian national data system. In the case of  $W$  too, money stock as a ratio of income may be a poor proxy variable to measure total private wealth.

18. It is possible to argue that the relationship between per capita income and private saving is nonlinear, with the saving rate increasing at a decreasing rate as income increases (Thirlwall, 1974). To capture this, we introduced the square of per capita income along with the per capita income term. But, the  $t$ -ratio on the squared per capita income term was 0.68, indicating the absence of such a nonlinear relationship in the Indian context.

19. The value of total trade (imports + exports) as a share of GDP increased from about 8% in the early 1960s to 16% in the late 1970s and remained around that level well into the early 1990s. Following the economic reforms initiated in 1991, this ratio increased slowly but persistently, reaching 23% in 1998.

20. For details, see Joshi and Little (1994), Chapters 1 and 11 and the works cited therein.

21. Note that INF is part of RID. So whether the results for the two variables are susceptible to the problem of multicollinearity is a legitimate concern in assessing our results. Fortunately, there is no evidence of estimation bias arising from multicollinearity under the particular parameterization of variables used in our saving function; the correlation coefficient between  $INF_t$  and  $RID_{t-1}$  being only 0.32.

22. At first sight, the estimated coefficient ( $-0.71$ ) on TRN looks too high, but it is consistent with the low numerical value of the TRN series; which has varied in the range of 0.2–1.8% of GNP (Table 3) during the period under study.

23. The average growth rate of real per capita GDP of India for 1961–98 was 2.3%, as compared to a figure of 6.2% for the high-performing East Asian countries for the same period.

## REFERENCES

- Ady, P. (1976). Growth models for developing countries. In A. Cairncross & M. Puri (Eds.), *Employment, income distribution and development strategy: problems of the developing countries* (pp. 106–119). London: Macmillan.
- Athukorala, P. (1992). Use of migrant remittances in development: lessons from the Asian experience. *Journal of International Development*, 4, 511–529.
- Athukorala, P., & Sen, K. (2002). *Saving, investment and growth in India*. Delhi: Oxford University Press.
- Barro, R. J. (1974). Are government bonds net worth? *Journal of Political Economy*, 82, 1095–1117.
- Barro, R. J. (1998). *Determinants of economic growth: A cross-country empirical study*. Cambridge, MA: MIT Press.
- Bhagwati, J. (1993). *India in transition: freeing the economy*. Oxford: Clarendon Press.
- Central Statistical Organisation (CSO), India. (various issues) *National accounts statistics*, Delhi: CSO.
- Corbo, V., & Schmidt-Hebbel, K. (1991). Public policies and saving in developing countries. *Journal of Development Economics*, 36, 89–115.
- Deaton, A. (1977). Involuntary saving through unanticipated inflation. *American Economic Review*, 67(5), 899–910.
- Deaton, A. (1989). Saving in developing countries: theory and review. In *Proceedings of the World Bank Annual Conference on Development Economics* (pp. 61–108). Washington, DC: World Bank.
- Deaton, A., & Paxson, C. H. (2000). Growth and saving among individuals and households. *The Review of Economics and Statistics*, 82, 212–225.
- Edwards, S. (1996). Why are Latin America's savings rates so low? An international comparative analysis. *Journal of Development Economics*, 51, 5–44.
- Fischer, S. (1993). The role of macroeconomic factors in economic growth. *Journal of Monetary Economics*, 32, 484–512.
- Frankel, J., & Razin, A. (1992). *Fiscal policies and the world economy*. Cambridge, MA: MIT Press.
- Fry, M. (1995). Financial development in Asia: some analytical issues. *Asian-Pacific Economic Literature*, 9, 40–57.
- Gersovitz, M. (1988). Saving and development. In H. B. Chenery & T. N. Srinivasan (Eds.), *Handbook of development economics* (Vol. 1). Amsterdam: North Holland.
- Gibson, H., & Tsakalotos, E. (1994). The scope and limits of financial liberalisation in developing countries: a critical survey. *Journal of Development Studies*, 30, 578–628.
- Government of India (various issues). *Economic Survey*. Delhi: Ministry of Finance.
- Harberger, A. (1950). Currency depreciation, income and the balance of trade. *Journal of Political Economy*, 58, 47–60.
- Hendry, D. F. (1996). *Dynamic econometrics*. Oxford: Oxford University Press.
- Hussein, K. A., & Thirlwall, A. P. (1999). Explaining differences in the domestic savings ratio across countries: A panel data study. *Journal of Development Studies*, 36, 31–52.
- Inder, B. (1993). Estimating long-run relationships in economics: A comparison of different approaches. *Journal of Econometrics*, 57, 53–68.
- Joshi, V., & Little, I. M. D. (1994). *India: macroeconomics and political economy, 1964–1991*. Delhi: Oxford University Press.
- Kimball, M. (1990). Precautionary saving in the small and the large. *Econometrica*, 58, 53–73.
- Laursen, S., & Metzler, L. A. (1950). Flexible exchange rates and the theory of employment. *Review of Economics and Statistics*, 32, 281–299.
- Lewis, W. A. (1955). *Theory of economic growth*. London: Allen and Unwin.
- Liu, L.-Y., & Woo, W. T. (1994). Saving behaviour under imperfect capital markets and the current account consequences. *The Economic Journal*, 104, 512–527.
- Loayza, N., Schmidt-Hebbel, K., & Servén, L. (2000). What drives private saving around the world? *The Review of Economics and Statistics*, 82, 165–181.
- McKinnon, R. I. (1973). *Money and capital in economic development*. Washington, DC: The Brookings Institute.
- Modigliani, F. (1970). The life cycle hypothesis of saving and inter-country differences in the saving ratio. In W. A. Eltis, M. F. Scott, & J. N. Wolfe (Eds.), *Induction, growth and trade* (pp. 197–225). Oxford: Clarendon Press.
- Modigliani, F. (1986). Life cycle, individual thrift, and the wealth of nations. *American Economic Review*, 76, 297–313.
- Modigliani, F. (1993). Recent declines in the savings rate: a life cycle perspective. In M. Baldassarri, L. Paganetto, & E. S. Phelps (Eds.), *World saving, prosperity and growth* (pp. 249–286). London: Macmillan.
- Nayyar, D. (1994). *Migration remittances and capital flows: the Indian experience*. Delhi: Oxford University Press.
- Obstfeld, M. (1982). Aggregate spending and the terms of trade: is there a Laursen–Metzler effect? *Quarterly Journal of Economics*, 97, 251–270.
- Pagan, A. (1995). The three econometric methodologies: An update. In L. Oxley, D. A. R. George, C. J. Roberts, & S. Sayer (Eds.), *Surveys in econometrics* (pp. 30–41). Oxford: Basil Blackwell.
- Republic of China, Council for Planning and Development (various issues). *Taiwan statistical data book*, Taipei: CPD.
- Reserve Bank of India (various issues). *Monthly bulletin*, Delhi.
- Reserve Bank of India (various issues). *Report on Currency and Banking*. Delhi.
- Sen, K., & Vaidya, R. R. (1997). *The process of financial liberalization in India*. Delhi: Oxford University Press.
- Shaw, E. (1973). *Financial deepening in economic development*. Oxford: Oxford University Press.

- Srinivasan, T. N. (1994). Data base for development analysis: an overview. *Journal of Development Economics*, 44, 3–27.
- Stalker, P. (1994). *The work of strangers: a survey of international labour migration*. Geneva: International Labour Office.
- Svensson, L., & Razin, A. (1982). The terms of trade and the current account: the Harberger–Laursen–Metzler effect. *Journal of Political Economy*, 91, 97–125.
- Thirlwall, A. P. (1974). *Inflation, saving and growth in developing Countries*. London: Macmillan.
- World Bank (various issues). *The world tables database*.