THE DETERMINANTS OF PRIVATE SAVING IN INDIA

Prema-chandra Athukorala
Research School of Pacific and Asian Studies
The Australian National University

Kunal Sen
School of Development Studies
University of East Anglia

Abstract: This paper examines the determinants of private saving in the process of economic development, in the light of the Indian experience during the period 1954 - 1998. The methodology involves the estimation of a saving rate function derived within the life cycle framework while paying attention to the structural characteristics of a developing economy. It is found that the saving rate rises with both the level and the rate of growth of disposable income and the magnitude of the impact of the former is smaller than that of the latter. 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, suggesting that public policy can influence the national saving rate. Among the other variables considered, the spread of banking facilities in the economy and the rate of inflation seem to have a positive impact and changes in the external terms of trade and migrant remittances a negative impact on private saving.

Keywords: India, saving rate, financial intermediation, macroeconomic policy

JEL Classification: D1, O11, O53

Forthcoming in *Economic Development and Cultural Change*

December 2001

THE DETERMINANTS OF PRIVATE SAVING IN INDIA*

In recent years, there has been an outpouring of empirical work on the determinants of saving both in developed and developing countries. This has been prompted by the widespread concern over falling saving rates in the major OECD countries and the growing divergence in saving and investment rates between countries of the developing world, and the renewed emphasis on the role of investment in economic growth triggered by the new growth literature. There is, however, a growing concern about the lopsided nature of the existing empirical evidence on the determinants of saving, particularly for developing countries.[1]

Given the nature of data availability, saving behaviour 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, cross-country 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 financial factors on the growth process. Second, given vast differences among countries with respect to the nature and quality of data, cross-country comparison is fraught with danger.[2] 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 cross-country regression are unlikely to yield sensible results.

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, 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 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 the period 1954 to 1998. The framework for our analysis is derived from the life-cycle model that has been the standard theory for the explanation of changes in private saving over time and across countries. The attractiveness of the life cycle model for our analysis lies both in its elegant formulation of the effect of growth and the interest rate on saving, and the flexibility provided for incorporating other relevant theoretical considerations to form an integrated analytical framework, without changing the basic structure of the model.

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.[3] Secondly, 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.[4] Finally, saving performance has figured prominently in the policy debate in India in the post-independence period and in particular, following the structural adjustment reforms initiated in 1991.[5] But there is no hard empirical evidence to inform this policy debate.

The rest of the paper is divided into five sections. Section I provides an overview of India's saving behaviour, comparing it with other developing countries, in order to place the ensuing analysis in context. Section II contains the analytical framework, drawing on the life-cycle model of saving and consumption, and a discussion of the model to be used in the empirical analysis. Sections III and IV discuss the estimation procedure and presents the results respectively. Section V concludes.

I. AN OVERVIEW OF SAVING BEHAVIOUR IN INDIA

There has been a consistent increase in the national saving rate in India through the post-independence period, though with considerable fluctuations from year to year (Figure 1). The national saving rate increased from about 10 percent in the early 1950s to 17 percent in the early 1970s and then to over 25 percent 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 rate, with public savings showing a decline from the early eighties onwards. The private saving rate increased from 8.6 percent in 1950-55 to 17.3 percent in 1970-75 and then to 24.2 per cent 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 (16.7 percent) 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 percent) 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 following 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 like 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.

Insert Figure 1 about here

Insert Table 1 about here

II. THE ANALYTICAL FRAMEWORK

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

The Life-Cycle Model[6]

In the life cycle model, accumulation for retirement is the prime motive for saving. The model is built around the consumption/saving behaviour of a representative agent who is assumed to maximise 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 labour 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 behaviour is crucially determined by one's stage in the life cycle. Individuals smoothen consumption over their life-times, and are consequently, net savers during their working years and dis-savers during retirement.[7]

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 life-cycle model 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. However, 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. If they borrow enough, then at sufficiently high rates of economic growth, their lifetime wealth will be high enough relative to that of their elders so that further increases in the rate of growth will decrease the aggregate saving rate. 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.[8]

The age structure of the population can be treated as uniquely related to population growth, *GPOP*, under the assumption of 'balanced population growth'.[9] This is because an increase in 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. As already noted, in the simple two-period formulation of the life cycle model, an increase in

population growth rate increases the number of active workers (savers) relative to the number of the retired (dis-savers), and therefore increases the aggregate saving rate. This formulation ignores childhood dependency: it assumes that 'workers spring from the womb, tools in hand, and immediately begin to accumulating wealth for their retirement'.[10] 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. However, if the household is a net lender, 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.[11] The underlying reasoning is the following. In the typical developing economy where portfolio choices are rather limited, the saving process tends to be highly *money intensive*. Given this peculiarity of saving behaviour, 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 a household's dependence on current income sources, because households can draw on accumulated assets to maintain their consumption levels.

Extensions and Modifications

The empirical application of the basic life-cycle model raises a number of issues. The first issue is 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. However, the validity of this premise is greatly in doubt for low-income countries such as India. As Modigliani 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.[12]

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.

A second consideration relates to the hypothesis of perfect capital markets on which the link between income growth and saving rate is based. Households can

effectively smooth consumption over the lifetime only if they can freely borrow and lend within the limits of their lifetime budget constraint (they can borrow against their future income). However, if the households are liquidity constrained[13] (that is, they are unable to borrow freely against future income), saving behaviour could well be linked to current income rather than to lifetime income.[14] In addition, when faced with a borrowing constraint, households are forced to save more at present in order to undertake lumpy (indivisible) expenditure plans in the future. In other words, a borrowing constraint can 'in fact convert a negative saver into a positive saver'.[15] For instance, with little or no consumer credit available, consumers are forced to save the full amount if they want to make 'large' purchases such as consumer durables or undertake future investment projects. Interestingly, these considerations also suggest that, following financial liberalisation, the national saving rate of a country can decline as households move from being credit constrained under the financially repressed regime to smooth their consumption under the liberalised regime.[16] For these reasons we include total institutional lending to the household sector relative to private disposable income (*BOR*) as an additional determinant of the saving rate.

A third issue relates to the role of inflation in determining saving. In the standard life-cycle model 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 behaviour and the absence of the real balance effect of inflation. There are, however, good reasons for doubting the validity of these assumptions. First, 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.[17] Second, 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. For these considerations, we include the inflation rate (*INF*) as an additional explanatory variable.[18]

The fourth issue relates to the effect on saving behaviour 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 is rested on the Harberger-Laursen-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.[19] This hypothesis is based on the Keynesian consumption function that assumes myopic expectations on the part of consumers. However, when we assume forward-looking, consumption smoothing behaviour on the part of private agents in the face of volatile and unpredictable income, the 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.[20] 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.[21]

The fifth issue stems from the debate on the possible impact of the fiscal policy stance on national saving rate.[22] 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[23] postulates that a government issue of bonds to finance its dissaving 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 behaviour. If either or both of these assumptions do not hold, then private and public saving may not be perfect substitutes. Moreover, when governments resort to deficit financing as a means of shifting funds from consumption to particular types of investment, such as infrastructure development that the private sector is unlike to undertake, the return to, and the volume of, private saving may increase.

The sixth 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.[24] Population per bank branch declined persistently from

over 90 thousand in the mid-1950s to around 14 thousand in the early 1990s. This would have contributed to an increase in saving in the economy, 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 has put it remarks, "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". [25] Thus, a negative relationship can be assumed between population per bank branch (bank density), *BDN*, and household financial saving. However, 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 asset portfolio. Thus, the expected sign of this relationship in the private saving function is ambiguous.

Two more explanatory variables are chosen in the light of the debate on the determination of domestic saving in India. These are inward remittances by expatriate Indians relative to income (*TRN*), and the share of agriculture in GDP (*AGS*). 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.[26] 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 effects on the saving behaviour of other households as well, resulting in a negative effect on the domestic saving rate. However, data relating to the remittance utilization patterns of migrant households for India and some other labour 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.[27] Thus, *a priori*, it is not possible to state whether a higher inflow of remittances will lead to higher or lower saving.

In the debate on the causes of the rapid increase in the saving rate in India in the second half of the 1970s (the high saving phase of the Indian economy), one of the underlying causes considered was the significant decline in the share of agriculture in total GDP.[28] This view was based on the hypothesis that agricultural households have a greater marginal propensity to consume compared to non-agricultural (mostly urban) households; a hypothesis which has not yet been supported by firm statistical evidence. In fact, the permanent income hypothesis (which postulates a higher marginal propensity to save out of transitory income) would lead one to expect that the marginal propensity to save to be higher for agricultural households than for non-agricultural households. Thus the sign of *AGS* in the regression estimates can go either way.

A final issue stems from the finding of recent empirical studies that consumption does not adjust immediately in response to current 'news' about lifetime resources.[29] The relatively slow adjustment of consumption to changes in expected future income implies that habits play an important part in determining consumption and that the consumer's past consumption influences the utility yielded by present consumption. In this paper, we appropriately allow for such habit formation in saving behaviour by the inclusion of appropriate lags of the dependent variable in regression estimation.

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, BOR, INF, TOT, SPB,

BDN, TRN, AGS] (1)

where *SPRV* is 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 - 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,
BOR (-)	Total lending to household sector by domestic financial institutions as a ratio of GNDI,
INF (+)	The rate of inflation,

TOT (+ or -) Equals PX/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,

AGS (+ or -) Share of agriculture in total GDP,

The theory of saving behaviour developed in this section focused first on a representative agent and then extended the analysis to the national level using the household as the point of focus. Thus, it could be argued from a theoretical standpoint that the most appropriate dependent variable for empirical analysis is household saving, and *not* private saving (which comprises both household and corporate saving). However, the conventional view on this is that, because households own business firms, household saving behaviour basically determines private saving. Thus, if firms save more, households may save less, because they will regard the firms as doing the saving for them (that is, in their expenditure decisions, households 'pierce the corporate veil').[30] This view justifies the use of private saving rate as the dependent variable of our analysis.

III. DATA AND THE ESTIMATION PROCEDURE

Equation (1) is estimated using annual data over the over the sample period from 1954 to 1998. Data sources and the methods of data transformation adopted are discussed in the Appendix.

We begin the estimation process by testing the time series properties of the data using the augmented Dickey-Fuller (ADF) test. The test results (presented in Table 1) suggests that the variables do not have the same order of integration; *SPRV*, *GPOP*, *W*, *PCY*, *BOR*, *SPB*, *TRN*, and *BDN* are found to be integrated of order one (I(1)) while *GY*, *RID*, *INF* and *AGS* belong to the I(0) category. Given the presence of both stationary and non-stationary variables, we use the general to specific modeling procedure, which aims to minimising the possibility of estimating spurious relations while retaining long-run information.

Inset Table 2 about here

The essence of the general-to-specific modeling procedure 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.[31]

Under this procedure, estimation starts with an over-parameterized autoregressive distributed lag (ADL) specification of an appropriate lag order:

$$Y_t = \alpha + \sum_{i=1}^{m} A_i Y_{t-i} + \sum_{i=0}^{m} B_i X_{t-i} + \mu_t \qquad (2)$$

where α is a vector of constants, Y_t is a (n x 1) vector of endogenous variables, X_t is a (k x 1) vector of explanatory variables, and A_i and B_i are (n x n) and (n x k) matrices of parameters.

Equation (2) can be reparameterised in terms of differences and lagged levels so as to separate the short-run and long-run multipliers of the system as follows:

$$\Delta Y_t = \alpha + \sum_{i=1}^{m-1} A^*_i \Delta Y_{t-i} + \sum_{i=0}^{m-1} B^*_i \Delta X_{t-i} + C_0 Y_{t-m} + C_1 X_{t-m} + \mu_t$$

where (3)

$$C_0 = -\left(I - \sum_{i=1}^{m} A_i \right) \quad C_1 = \left(\sum_{i=1}^{m} B_i \right)$$

and where the long-run multipliers of the system are given by $C_0^{-1}C_1$. Equation (3), which is known as the error-correction modeling (ECM) representation of the model, constitutes the "maintained hypothesis" of the specification search.

The estimation procedure involves first estimating the unrestricted equation (3) 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 general ADL equation at two periods. This is the established practice in modeling with annual data.

IV. RESULTS

Table 3 reports the final parsimonious estimated equation, together with a set of commonly used diagnostic statistics and long-run elasticities 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 4.

Insert Table 3 about here

Insert Table 4 about here

Note that four variables in the original specification (*GPOP*, *W*, *BOR*, and *AGS*) 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 one-percent level (in terms of the standard F test) and performs well by the relevant diagnostic tests. In terms of the Chow test for parameter stability conducted by splitting the total sample period into 1955-1979 and 1980-1998 there is no evidence of parameter instability. On re-estimating for the sub-period 1955-1990, all equations pass the Chow test of out-of-sample forecasting ability (Chow's prediction failure test) for the post reform period (1991-

98). Apart from these tests, a residual correlogram of up to six years was estimated for each equation, with no evidence of significant serial correlation

The result for the *RID* variable suggests that the real rate of return on bank deposits has a statistically significant positive effect on saving behaviour in India. A one percent 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 behaviour is highly intensive in money and near-money assets, the direct incentive effect of high real interest rates on saving behaviour ('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 life-cycle model, 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 percent level. An increase in the growth rate by one percent leads to a long-run increase in the saving rate by 0.15 percent. However, other variables suggested by the life-cycle model – *GPOP* and *W* – do not seem to be important in explaining private saving rate in India.[32]

We find that the Keynesian 'absolute income hypothesis' holds for saving behaviour in India – the coefficient for *PCY* is positive, and statistically significant at the one percent level. A one percent increase in per capita income seems to bring about 0.09 percent 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 cross-country results of Modigliani, Loayza *et al*. and Hussein and Thirlwall.[33]

Among the remaining variables, *BDN* stands out to be a highly significant variable in explaining variations in the private saving rate. A 10 percent decline in bank density seems to increase the private saving rate by 0.4 percentage point. 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. 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 one percent 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.[34] However, there are 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.[35] 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.[36]

We also find that macroeconomic uncertainty, as captured by the inflation rate (*INF*), has a positive effect on the private saving rate. This provides support for the precautionary motive for saving, which argues that individuals save more in the face of increased uncertainty in the economic environment.[37] The coefficient on *TRN* is negative, but attains significance only at the 10-percent level, providing some, albeit weak, statistical support for the view that migrant remittances hinder domestic saving performance is weak at best.

The result for *SPB* points to a significant substitutability between public and private saving in the Indian context.[38] However, there is no support for full Ricardian

equivalence, which predicts full counterbalancing of public saving by private dis-saving. Specifically, an increase in public saving by one percent is associated with 0.64 percentage point decline in the private saving rate at steady state. Thus, in the Indian context policies geared to improvement in public saving has the potential to bring about a substantial net increase in total domestic saving.[39]

As noted, *AGS* failed to attain statistical significance in all saving functions. Thus, there is no empirical support for the view that the decline in the share of agriculture in domestic production (and the accompanying increased urbanisation of the economy) has contributed to the growth in private saving. Furthermore, the lack of significance of *BOR* seems to indicate that borrowing constraints have not had a significant effect on the private saving rate in the Indian context.[40]

Explaining Saving Behavior

Combining the regression estimates for the private saving function with an analysis of the behaviour of the key explanatory variables allow us to understand the reasons for the rapid rise in the national saving rate in India since the mid-fifties. Plots of per capita income, the real interest rate on bank deposits, the inflation rate, the terms of trade, remittances and bank density are provided in Figures 2, 3, 4, 5, 6 and 7 respectively. It is clear that the figures that the relative importance of the key explanatory variables in explaining changes in the saving rate has differed from period to period. Thus, the increase in the saving rate in the 1970s in the face of stagnant real incomes and negative real interest rates could be attributed to the phenomenal increase in bank branches

amongst the population. One possible reason for the fall in the saving rate in the early 1980s appears to be the sharp rise in the terms of trade during this period. The subsequent recovery of the saving rate followed by significant growth in the 1990s can be explained by the rapid growth in per capita income and the improvement in the real interest rate on bank deposits.

Insert Figure 2 about here

Insert Figure 3 about here

Insert Figure 4 about here

Insert Figure 5 about here

Insert Figure 6 about here

Insert Figure 7 about here

V. CONCLUSIONS

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.

In Section I we observed that among the developing countries of similar income status, India has continued to maintain a relatively higher propensity to save. Our regression results help understand this superior saving performance. While general economic performance (measured in terms of both income growth and the level of per capital income) has been significant determinants of saving performance, the Indian economy seems to have managed to maintain the saving rate at a level beyond what is permitted by economic performance alone though a progressively important role played by financial intermediation. Throughout the period under study up to 1991, the nominal interest rate was an administered price, changed at infrequent intervals. However, there were 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 reduction in bank density in the country.

Data Appendix

The data series used in this study have been directly obtained or compiled from the following publications:(1) Central Statistical Organisation (CSO), *National Accounts Statistics*, Delhi (various issues); (2) Government of India (1995), *Economic Survey 1994-95*, Delhi: Ministry of Finance; and (3) Reserve Bank of India, *Monthly Bulletin* and *Report on Currency and Banking* , Delhi (various issues).

In the selection and transformation of most of the data series, we have simply followed established practice in this field of research. However, the choice of data series on the real interest rate and the inflation rate need some explanation.

The interest rate (*i)* used is the one-year deposit rate (minimum) and the one year lending rate of the State Bank of India. The rate of inflation (л) is measured using the GDP deflator. The real interest rate (RID) is measured as,

$$RDR = ln[(1 + i)/(1 + л)]$$

Following Loayza *et al.* 2000 (see Note 18*),* in constructing *RID* series we measured л as the average of current and one-period ahead (the average forward and backward) inflation rates. 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, but the estimates based on the former (which in our view is also the conceptually preferable measure) generally yielded statistically superior results in terms of the overall fit of the saving function, its other statistical properties and the significance of the coefficient of *RID*. These are the results reported in the paper.

Ideally, the deposit rate series should have been constructed as weighted averages of rates relating to deposits of different term structures using relative shares of respective deposits. Unfortunately, information on the maturity structure of deposits is not readily available. However, as most of the key series move in tandem, presumably the choice of a particular series over the preferred weighted average does not make significant difference in empirical analysis.

Gross national disposable income is measured as the sum of gross national income at factor cost and net unrequited transfers and deflated by the *GDP* deflator to derive real per capita disposable income (*PCY*). 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 are measured as ratio of gross national disposable income.

All data series are on the basis of the Indian fiscal year, 1 April in the given (stated) year to 31 March of the next year (that is, the twelve-month period from 1 April 1998 to 31 March 1999 is stated here as '1998').

Notes

* The authors are grateful to an anonymous referee and the Editor of this journal for helpful comments and suggestions.

1 For recent surveys of this literature, see Angus Deaton, **"**Saving in developing countries: theory and review**"**, *Proceedings of the World Bank Annual Conference on Development Economics* (Washington DC: World Bank, 1989): 61-108; H.D. Gibson and E. Tsakalotos (1994), "The scope and limits of financial liberalisation in developing countries: a critical survey", *Journal of Development Studies*, 30 (1994): 578-628; Maxwell Fry, "Financial Development in Asia: Some Analytical Issues, *Asian-Pacific Economic Literature*, 9(1995): 40-57; and Norman Loayza, Klaus Schmidt-Hebbel and Luis Serven, *Saving in the World: Stylized Facts* (Washington DC.: World Bank, 1998).

2. Deaton (Note 1); Robert M. Solow, "Perspectives on Growth Theory", *Journal of Economic Perspectives*, 8(1) (1994): 45-54; T.N. Srinivasan, "Data Base for development Analysis: An Overview", *Journal of Development Economics*, 44 (1994): 3-27.

3. For a critical assessment of the database for development analysis in developing countries, with emphasis on India, see Srinivasan (Note 2).

4. Jagdish Bhagwati, *India in Transition: Freeing the Economy* (Clarendon Press, Oxford, 1993); Vijay Joshi and Ian M.D. Little, *India's Economic Reforms 1991-2001* (Clarendon Press, Oxford, 1996); Kunal Sen and Rajendra R. Vaidya, *The Process of Financial Liberalization in India* (Oxford University Press, 1997).

5. Prema-chandra Athukorala and Kunal Sen, "Economic reforms and the rate of saving in India: some observations", *Economic and Political Weekly*, 30 (1995): 2184-90; EPWRF (Economic and Political Weekly Research Foundation), "Economic reforms and rate of saving", *Economic and Political Weekly*, 30 (1995): 1021-1041.

6. For details on the life-cycle model and its advantages over other approaches, see Franco Modigliani, "The Life Cycle Hypothesis of Saving and Inter-country Differences in the Saving Ratio", in W.A. Eltis, M. F. Scott and J.N. Wolfe (eds.) *Induction, Growth and Trade* (Oxford: Clarendon Press, 1970): 197-225; Franco Modigliani, "Life Cycle, Individual Thrift, and the Wealth of Nations", *American Economic Review*, 76 (1986): 297-313; and Mark Gersovitz, "Saving and Development", in Hollis B. Chenery and T.N. Srinivasan (eds.), *Handbook of Development Economics*, Volume 1 (Amsterdam: North Holland, 1988): 381-424.

7. See Modigliani 1986 (Note 6).

8. Angus Deaton and Christina H. Paxson "Growth and Saving Among Individuals and Households", *The Review of Economics and Statistics*, 82 (2000): 212-225.

9. Modigliani, 1986 (Note 6).

10. Angus Deaton, *Understanding Consumption* (Oxford: Clarendon Press, 1992).

11 Ronald I. McKinnon, *Money and Capital in Economic Development*, (Washington DC.: Brooking Institute, 1973) and Edward Shaw, *Financial Deepening in Economic Development* (Oxford: Oxford University Press,1973).

12 Franco Modigliani, “Recent Declines in the Savings Rate: A Life Cycle Perspective”, in M. Baldassarri, L. Paganetto and E.S. Phelps (eds.), *World Saving, Prosperity and Growth* (London: Macmillan, 1993): 249-286.

13 Liquidity constraint may arise from a number of market imperfections such as the under-developed nature of the financial system, inability of borrowers to come up with acceptable collaterals, and various government interventions, including restrictions on consumer credit imposed by the government as part of its saving promotion campaign (Joseph E. Stiglitz and Marilou Uy, ‘Financial Markets, Public Policy, and the East Asian Miracle’, *World Bank Research Observer*, 11(1996): 249-76.

14. Angus Deaton, “Saving and Liquidity Constraints”, *Econometrica*, 59 (1991): 1221-1448.

15. Gersovitz (Note 6); Liang-Yn Liu and Wing They Woo, “Saving Behaviour Under Imperfect capital Markets and the Current Account Consequences”, *The Economic Journal*, 104 (1994): 512-527.

16 On these grounds, some analysts such as Stiglitz and Uy (Note 14) have identified financial restraint (mainly constraints on consumer credit and the discouragement of the development of mortgage markets) as a possibly reason for high saving rates in East Asian countries, and Korea and Taiwan in particular.

17 Deaton 1989 (Note 1) and M. Kimball, “Precautionary Saving in the Small and the Large”, *Econometrica*, 58 (1990): 53-73.

18 Previous studies that have included the inflation rate as an additional explanatory variable in the determinants of saving on similar grounds include Angus Deaton, “Involuntary Saving through Unanticipated Inflation”, *American Economic Review*, 67(5) (1977), 899-910; Stanley Fischer, “The Role of Macroeconomic Factors in Economic Growth”, *Journal of Monetary Economics*, 32(3) (1993), 484-512, and Norman Loayza, Klaus Schmidt-Hebble, and Luis Serven, “What Drives Private Saving around the World?” *The Review of Economics and Statistics*, 82 (2000), 165-181.

19 Arnold Harberger, "Currency Depreciation, Income and the Balance of Trade", *Journal of Political Economy*, 58(1950): 47-60 and S. Laursen and L. Allen Metzler, "Flexible Exchange Rates and the Theory of Employment", *Review of Economics and Statistics*, 32 (1950):281-299.

20 Maurice Obstfeld, "Aggregate Spending and the Terms of Trade: Is there a Laursen-Metzler Effect?", *Quarterly Journal of Economics*, 97 (1982): 251-270; Jacob A. Frankel, A. Razin, *Fiscal Policies and the World Economy*, 2nd edn., (Cambridge, Mass.,MIT Press, 1992); Jonathan Ostry. and Carmen Reinhart, "Private Saving and Terms of Trade Shocks", *IMF Staff Papers*, 39 (1992), 495-517; and L. Svensson and A. Razin "The Terms of Trade and the Current Account: the Harberger-Laursen-Metzler Effect", *Journal of Political Economy*, 91 (1982): 97-125.

21 In theory, terms of trade changes are already a part of real GDP. However, in practice 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 such as those due to changes in the terms of trade. Thus changes in *TOT* can be expected to have an additional effect to that of changes in GDP on savings. On this point see, Peter Ady, “Growth

models for developing countries", in Alex Cairncross and M. Puri (eds), *Employment, Income Distribution and Development Strategy: Problems of the Developing Countries* (Macmillan, London, 1976): 106-119.

22 Victorio Corbo and Klaus Schmidt-Hebbel , "Public Policies and Saving in Developing Countries", *Journal of Development Economics*, 36 (1991): 89-115 and N. Loayza, K. Schmidt-Hebbel and L. Serven (2000) (listed in Note 18).

23 Robert J. Barro, "Are Government Bonds Net Worth?" *Journal of Political Economy*, 82 (1974): 1095-1117.

24 For details, see Sen and Vaidya (Note 4).

25 W. Arthur Lewis, *Theory of Economic Growth* (Allen and Unwin, London, 1995).

26. For details on trends and patterns of labour out-migration from India, see Deepak Nayyar, *Migration, Remittances and Capital Flows: The Indian Experience* (Delhi and Oxford: Oxford University Press, 1994).

27 For a survey of the relevant literature, see Prema-chandra Athukorala "Use of Migrant Remittances in Development: Lessons from the Asian Experience", *Journal of International Development*, 4 (1992): 511-529.

28 RBI (Reserve Bank of India), *Capital Formation and Saving in India, 1950-51 to 1979-80*, (Bombay, RBI, 1982); Mihir Rakshit, "On assessment and interpretation of saving-investment estimates in India", *Economic and Political Weekly*, Annual Number (1983): 53-776; and Vijay

Joshi and Ian. M.D. Little (1994), *India: Macroeconomics and Political Economy, 1964-1991* (Delhi and Oxford, Oxford University Press, 1994).

29 See Chris H. Carroll and David N. Weil, "Saving and Growth: A Reinterpretation", *Carnegie-Rochester Conference Series on Public Policy*, 40 (1994): 133-192; and Deaton and Paxson (n.8 above).

30 Modigliani 1970 (Note 6).

31 See David F. Hendry, *Dynamic Econometrics* (Oxford: Oxfrod University Press, 1996); and David F. Hendry, Adrian Pagan and J.Denis Sargan, "Dynamic Specification", in Z. Griliches and M.D. Intriligator (eds.). *Handbook of Econometrics*, Vol. 2, (Amsterdam: North-Holland, 1985).

32 It should be noted that the lack of significance of *GPOP* may reflect measurement problems; annual population estimate is considered on 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.

33 Modigliani 1993 (Note 12); Loayza *et al*. 2000 (Note 18); and K. Ahmed Hussein and A.P. Thirlwall, "Explaining Differences in the Domestic Savings Ratio Across Countries: A Panel Data Study", *Journal of Development Studies*, 36 (1999): 31-52.

34 The value of total trade (imports + exports) as a share of GDP increased from about 8 per cent in the early 1960s to 16 per cent 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 percent in 1998.

35 For details, see Joshi and Little (Note 4), Chapters 1 and 11 and the works cited therein.

36 We re-estimated the saving function by leaving out *TOT* and performed variable deletion tests to see the sensitivity of the results to this variable deletion. The results are as follows:

$$\Delta SPRV_t = \underset{}{-0.12} + \underset{(1.42)}{0.08\,GY_t} + \underset{(1.29)}{0.04\,PCY_{t-1}} + \underset{(1.42)}{0.22\,RID_{t-1}} + \underset{(3.68)^{***}}{0.23\,INF_t} - \underset{(3.06)^{***}}{0.34\,\Delta SPB_t} - \underset{(1.22)}{0.30\,SPB_{t-1}} - \underset{(1.36)}{0.78\,TRN_{t-1}} - \underset{(1.75)^{*}}{0.01\,BDN_{t-1}} - \underset{(1.98)^{*}}{0.01\,CRD} - \underset{(1.52)^{*}}{0.38\,SPRV_{t-1}} \quad (2.91)^{***}$$

Joint test of zero restriction on the coefficients of ΔTOT_t and TOT_{t-1}:

Lagrange multiplier statistics	$\chi^2(2) = 16.38$
Likelihood ratio statistics	$\chi^2(2) = 20.48$
F statistics	$F(2,31) = 9.19$

The zero restriction on the coefficients of ΔTOT_t and TOT_t is overwhelmingly rejected by all three tests reported here, suggesting that the terms of trade is an important explicator of saving behaviour in India. In qualitative terms, the results for the other variables also remain basically unchanged.

37. 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.

38 As an anonymous referee has correctly pointed out, measured private saving (*SPRV*) and public saving (*SPB*) may be jointly determined, leading to a simultaneity bias in the estimated coefficient of *SPB* when OLS is used in estimating the saving function. The point here is that in response to inflation households keep adding to their nominal cash balances in order to keep their real cash balances constant and such 'forced' saving yield seigniorage to the government. This in turn permits the government to increase expenditure over revenue. Thus *SPRV* and *SPB* could well be negatively correlated, resulting in contemporaneous correlation of the latter and the error term in the saving function. In the Indian case, there is, however, no evidence of this possibility; the null-hypothesis of no simultaneity is overwhelmingly supported by the Wu-Hausman test on endogeneity of the error term in our regression specification.

39. This finding is consistent with the cross-country results of Corbo and Schmidt-Hebbel (1991) (see note 22), and Loayza *et al.* .(2000) (listed in note 18).

40. As the variable measuring borrowing constraints (total household financial liabilities relative to income), 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 OLS and instrumenting *BOR* and *GY* by their lags, with no change in the results.

Table 1: National Saving Rates, India and Selected Developing Countries, 1960-1998

Countries	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-98
South Asia							
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	---	---	---	1.5	1.9	2.9	6.3
East Asia							
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
Latin America							
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, *World Tables Database* and Republic of China, Council for Planning and Development, *Taiwan Statistical Data Book* (various issues)(for Taiwan)
NOTE**:** --- Data not available.

Table 2: Tests for Unit Roots[1]

Data series	ADF test of H_0:I(1) versus H_1:I(0)[2]
SPRV	-3.02 (1)
GY	-5.69 (0)[3]
GPOP	-0.07 (2)
RID	-4.41 (0)[3]
W	-2.59 (0)
PCY	0.48 (0)
BOR	-3.02 (0)
INF	-4.26(0)[3]
TOT	-2.70 (0)[3]
SPB	-1.92 (0)
TRN	-2.17 (0)
AGS	-4.88 (0)[3]
BDN	-0.74 (1)

Notes:

(1) Except in the cases of GY, GPOP, RID, INF and TOT, all the tests were conducted `with trend' to allow for the possibility that, for most economic time-series, the usual competing alternative to the presence of a unit root is a deterministic linear trend. The critical value at the 5% level is 3.52.

(2) Figures in parentheses indicate the order of augmentation required to obtain residual whiteness.

(3) Rejection of null hypothesis.

Table 3: Determinants of the Private Saving Rate in India: Regression results[1]

$$\Delta SPRV_t = 0.13 + \underset{(2.39)^{**}}{0.11 GY_t} + \underset{(1.90)^{**}}{0.07 PCY_{t-1}} + \underset{(3.11)^{***}}{0.15 RID_{t-1}} + \underset{(2.83)^{***}}{0.28 INF_t} - \underset{(4.33)^{***}}{0.03 \Delta TOT_t} - \underset{(1.70)^{**}}{0.08 TOT_{t-1}} - \underset{(4.14)^{***}}{0.46 \Delta SPB_t} - \underset{(1.95)^{**}}{0.49 SPB_{t-1}} - \underset{(3.70)^{***}}{0.54 TRN_{t-1}} - \underset{(1.36)^{*}}{0.03 BDN_{t-1}} - \underset{(4.14)^{***}}{0.02 CRD} - \underset{(2.98)^{***}}{0.76 SPRV_{t-1}}$$

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

$$LM1 - \chi^2(1) = 1.42 \qquad LM2 - \chi^2(1) = 1.89 \qquad ARCH - \chi^2(1) = 0.04$$

$$RESET - \chi^2(1) = 0.06 \qquad JBN - \chi^2(2) = 0.28$$

Elasticity of the saving rate (*SPRV*) with respect to explanatory variables[2]:

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)***

NOTES**:**

1. *GY*, *PCY*, *BDN*, *RID* and *INF* are expressed in natural logarithms (ln (1 + x) for the last two variables). Other variables except CRD are expressed as ratios of GNDI. The t-ratios of regression coefficients are given in brackets. Approximate critical values for the *t*-ratios are as follows: 10 percent = 1.31 (*), 5 percent = 1.69 (**) and 1 percent = 2.44 (***). 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.

.

2. Estimated from the long-run (steady-state) solution to the model. The t-ratios are given in brackets.

Table 4: Summary Data on Variables Used in Econometric Analysis

Variables	1955-59	1960-69	1970-79	1980-84	1985-90	1991-98
Dependent Variable						
SPRV (%)	10.0	10.7	15.1	15.6	19.2	22.8
Explanatory Variables[1]						
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

SOURCE AND METHOD: See *Data Appendix*.

NOTE**:** 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 sub-period.

Figure 1: National, Private and Public Saving Rates in India

Note: GNS = gross national saving; SPRV=private saving; and SPB = public saving.

Source: Central Statistical Organisation (CSO), India, *National Accounts Statistics*, various issues.

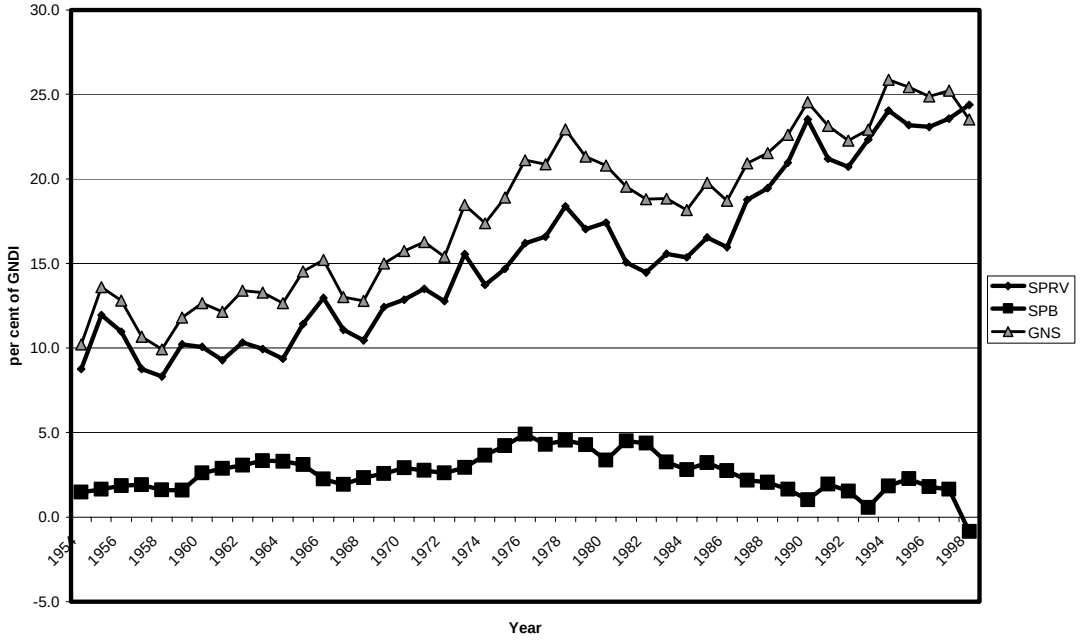
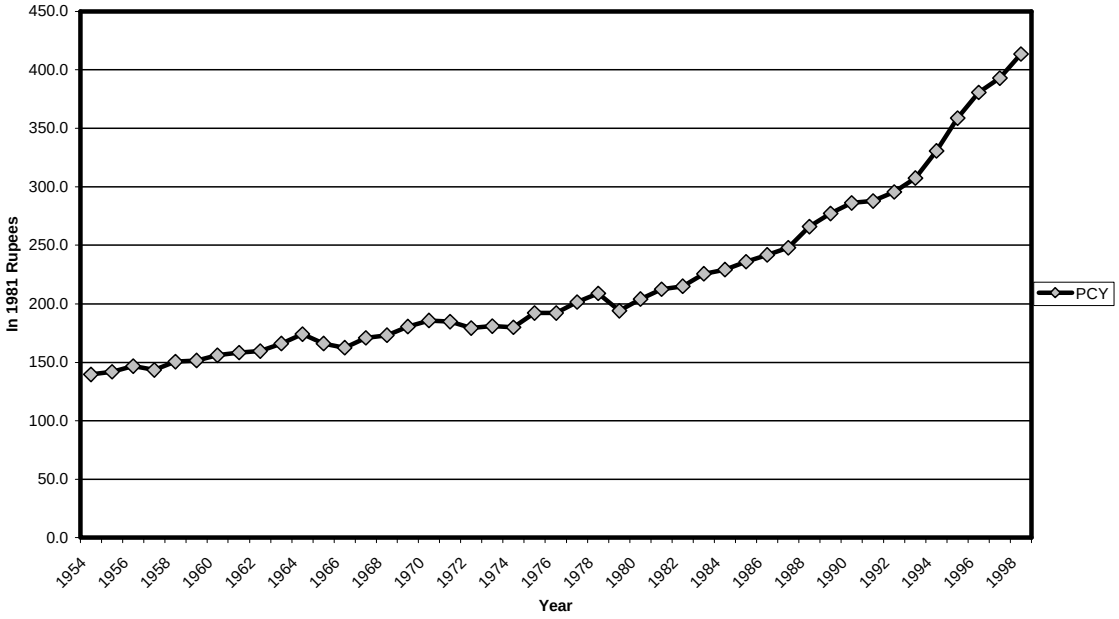
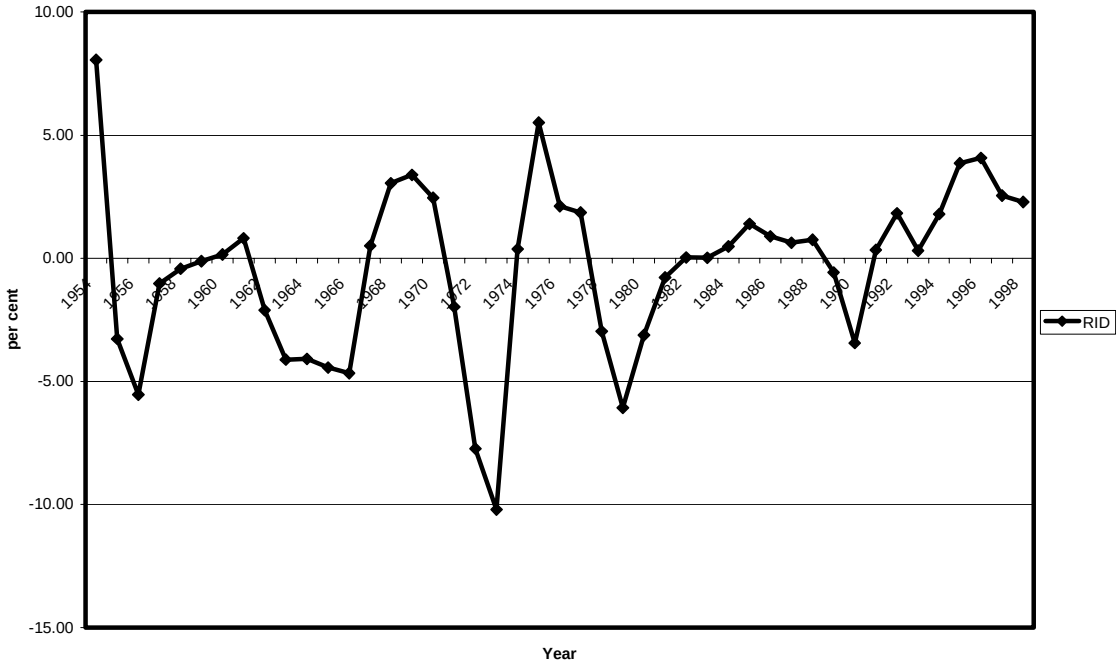


Figure 2: Per Capita Gross National Disposable Income (*PCY*)



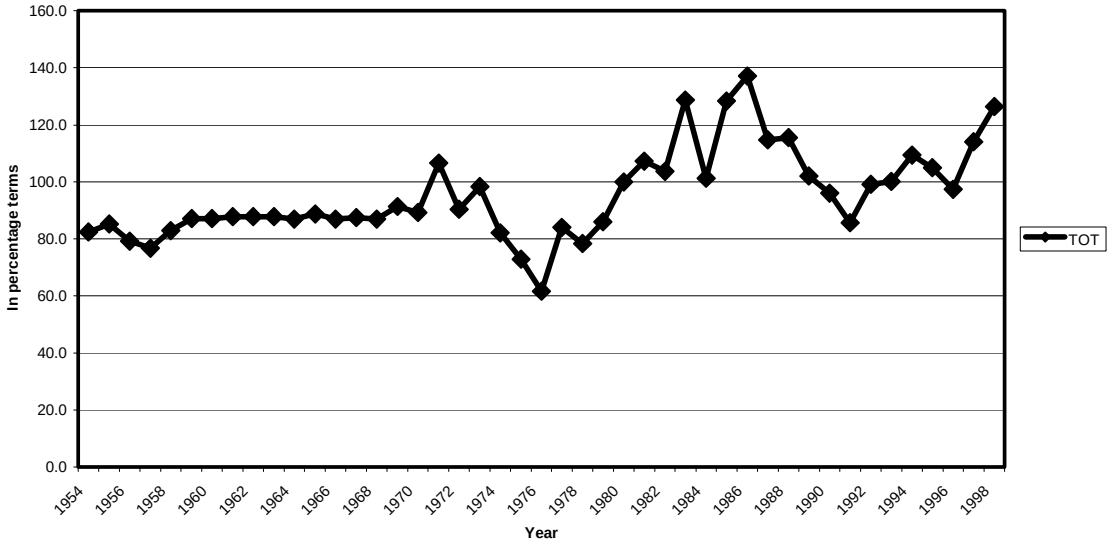
Source: authors' calculations, from CSO, *National Accounts Statistics*, various issues.

Figure 3: The Real Interest Rate on Bank Deposits (RID)



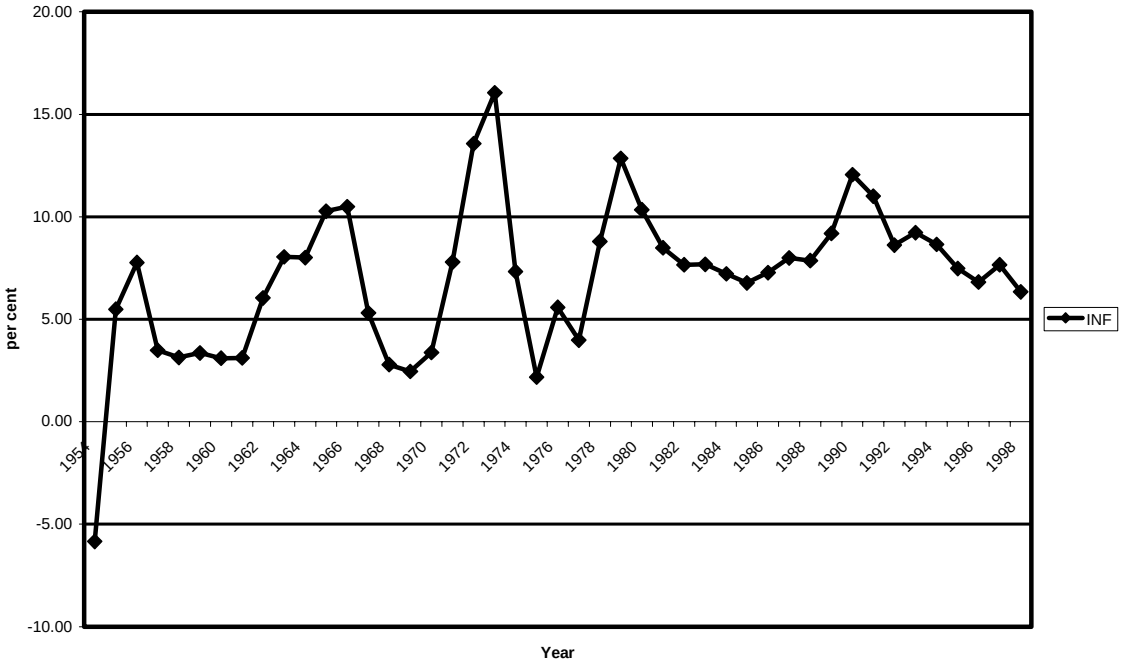
SOURCE**:** authors' calculations, from Reserve Bank of India (RBI), *Reports on Currency and Finance*, various issues.

Figure 4: Terms of Trade (TOT)



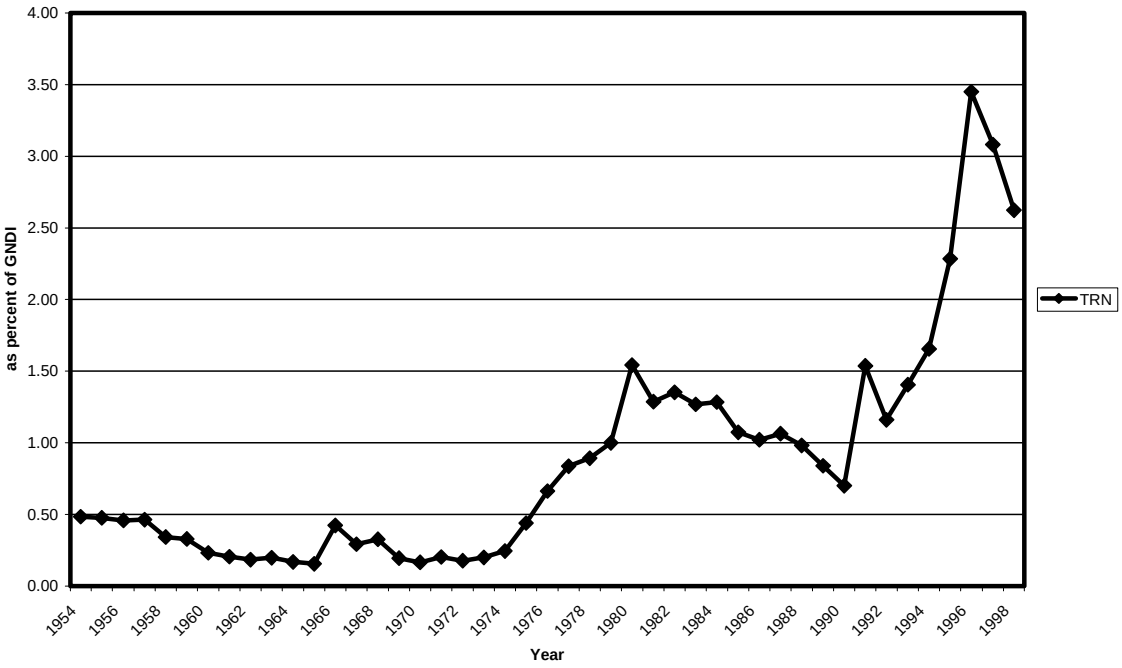
SOURCE: authors' calculations, from IMF, *International Financial Statistics Yearbook*, various issues.

Figure 5: Inflation Rate (INF)



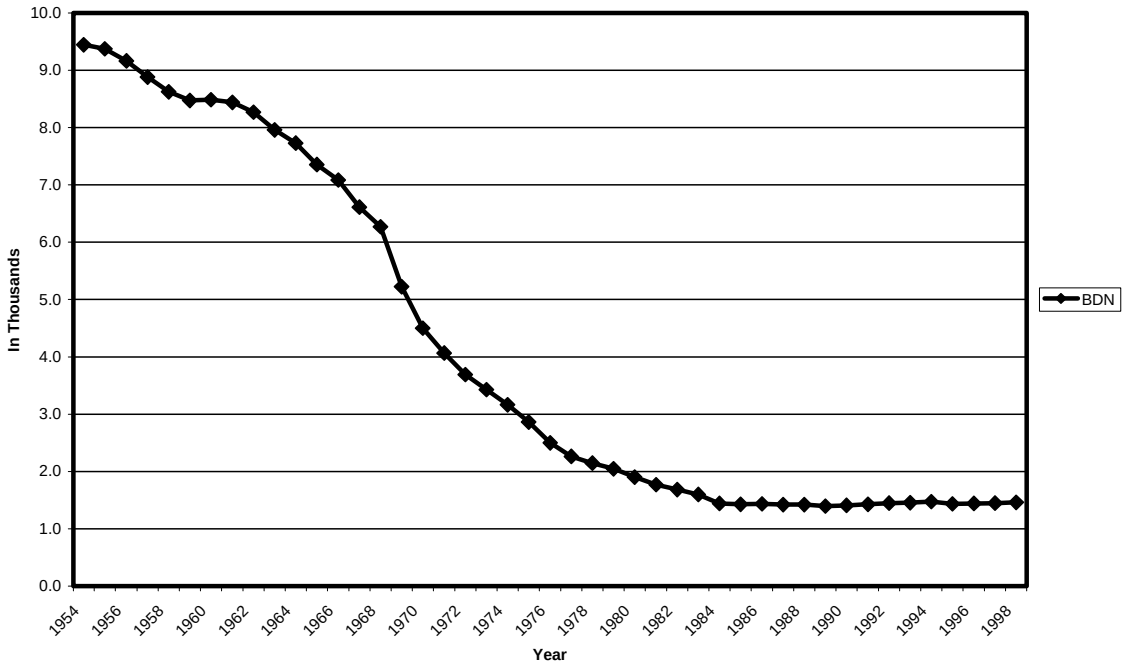
Source: authors' calculations, from Government of India, *Economic Survey*, various issues.

Figure 6: Net Current Private Transfers (TRN)



SOURCE**:** authors' calculations, from Reserve Bank of India, *Reports on Currency and Finance*, various issues.

Figure 7:Bank Density (BDN)



SOURCE: authors' calculations, from Reserve Bank of India, *Reports on Currency and Finance*, various issues.