Chapter: 4

Dynamics of Inter-Relationship between Saving and Macro Economic Variables

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Saving is an important macro-level policy variable. It is a central variable among the key macroeconomic indicators used in the analyses of economic performance and the national policy debate. Saving is not in isolation. It is an interactive variable that shares dynamic relationship with other equally important macro variables of the economic system. It influences a variety of macro variables and in turn gets influenced by them.

The Indian economy has been characterized by dynamic changes at the macroeconomic front, in terms of the growth and development in the producing sectors of the economy, the structural changes in the economy, movements in the rate of inflation, the changing structure of interest rates, the country's international finance status, direction of foreign trade, rising budget and fiscal deficits, disturbing demographic indicators like population explosion, dependency burden and per capita income growth, and so on. All these factors, constituting the domestic macroeconomic environment, play an important role in influencing and determining the savings kitty in the country. There is a need to study their inter-dependencies and inter-relationships and analyse their impact on the economy, with an objective of formulating economic policies.

Given the close nexus of savings, capital accumulation and economic growth, the need to understand the determinants of saving rate and macro economic variable interactions of savings can hardly be overemphasized.

The *first section [4.1]* of the chapter deals with the relationship between saving and important macro economic variables of the economic system. A large number of theoretical and empirical studies weaving the macro variables-savings relationship have been discussed in this part of the chapter. The *second section [4.2]* presents the statement of hypotheses on the nature of relationship between each one of the

selected macro economic variables and saving, and the methodological specifications. The *last section [4.3]* of the chapter involves the testing of hypotheses using appropriate methodologies, estimation of the model and discussion on the empirical results.

4.1 Theoretical Background and Literature Review

The study tries to uncover the various theories and empirical evidences behind the relationships shared by savings with other macro economic variables of the economic system. A study on the relationship between savings and macro variables is important not only to understand the saving dynamics and assess the impact of one variable on another, but it is equally important for policy prescription. An interesting yet alarming fact that surfaces from the widespread theories based on savings and macro variable relationships is that, majority of the macro variables share both a positive and a negative relationship with savings.

The macro economic variables have been broadly classified into five groups, as:

1. Monetary Sector Variables
2. Fiscal Sector Variables
3. External Sector Variables
4. Real Sector Variables
5. Demographic Variables

The theoretical relationships and empirical findings on each of the important variables with savings as reviewed for the literature have been discussed below.

4.1.1 Monetary Sector Variables

The role of monetary variables in influencing savings has been widely discussed in the literature. Saving itself is a monetary variable and is the main source of finance for the producing sectors of the economy. It plays an important role in determining the national income of a country through its influence on investment and capital formation.

The rate of inflation and the rate of interest are two very important monetary sector variables identified to be enjoying important relationship with savings.

a. Rate of Inflation and Saving

Keynes described inflation as a *"form of taxation which public find hard to evade and even the weakest government can enforce when it can enforce nothing else."* Inflation is therefore considered as a tax on money holdings.

A substantial body of literature is devoted to the nature of relationship between savings and the rate of inflation. However, there seems to be no agreement on the nature of this relationship. There is a controversy as to whether inflation promotes savings or discourages savings. A large number of studies support a positive effect of inflation rate on savings. These are Diwan [1968], Juster and Wachtel [1972], Thirwall [1974], Deaton [1977], Boskin [1978], Howard [1978], Shiba [1979], Horioka [1986] and Montgomery [1986]. The negative impact of the rate of inflation on saving has been supported by Yang [1964], Branson and Klevorick [1969] Mckinnon [1973], Howrey and Hymans [1978], Gylfason [1981] and Lahiri [1989].

➢ *Positive Relationship*

The positive influence of inflation on savings is mainly explained by the macroeconomic disequilibrium theory and effects like the uncertainty effect of inflation, the wealth effect, the income redistribution effect and the price-confusion effect.

The *macroeconomic disequilibrium* theory states that: given the imperfect flexibility of prices, a rise in prices would lead to an excess demand for goods for stocking for future use. An excess demand for a good also creates a spillover demand for substitute goods. Future consumption is a substitute for present consumption and if present consumption is postponed, the present savings will rise.

One of the most convincing theory on inflation-saving relationship was proposed by Juster and Wachtel [1972], known famously as the *uncertainty effect of inflation.*

Their argument was that high and varying rates of inflation make it even more difficult to forecast future inflation. This leads to uncertainty regarding the future streams of real income. Thereby, inflation depresses consumer confidence and the risk-averse consumers will protect themselves against future instability by increasing their precautionary savings.

Inflation also tends to increase savings if consumers are assumed to maintain a target ratio of wealth to income. This is the *wealth effect of inflation* on savings. Inflation leads to erosion of the real value of financial assets and if consumers try to recoup the desired ratio of wealth to income, their consumption falls and saving increases.

Another explanation in favour of the positive impact of inflation on savings is in terms of the *income redistribution effect.* Inflation brings about a change in the income distribution between different groups of savers having different propensities to save. Inflation can redistribute income from the creditor to the debtor, from the employee to the employer, from retired people to young workers, from the personal sector to the corporate sector of the economy, and from the private sector to the government sector. Depending upon the difference in the saving propensities of the groups, savings will increase if income redistribution takes place in favour of the high saving groups. For instance, if the saving propensity of the personal sector is less than that of the corporate sector, and that of the private sector is less than that of the government sector, the saving ratio will rise.

According to Thirwall [1974], the saving ratio increases with inflation only up to a certain point. If inflation increases beyond a reasonable limit, savings may be adversely affected. In the face of severe inflation, people may start economizing on cash holdings for transaction purposes and voluntary savings may be expected to fall. A point comes when decline in voluntary savings begins to outweigh any favourable effect of inflation on savings.

Deaton [1977] in his pioneering work explained the positive impact of inflation on savings through the *price-confusion effect.* It is the unexpected rate of inflation that influences savings. When actual inflation exceeds the expected rate of inflation, consumers are taken by surprise and being unaware of the fact, they arrive at the

conclusion that goods are relatively more expensive to other relevant goods. It is only after a detail inspection and survey of relative prices of a complete range of goods that they realise that there has actually been an increase in absolute prices. But since search takes time and consumers are under a 'mass illusion' of relative price changes in goods, each consumer will tend to postpone purchases. As a result, real consumption falls and if real income is maintained, the saving ratio rises.

➢ ***Negative Relationship***

Besides the above mentioned positive effects of inflation on savings, several theories have also been advanced in favour of an adverse impact of inflation on savings. Inflation will have a negative effect on savings if consumers try to resist cuts into real consumption. As real income is held constant, if consumers strive to maintain their real consumption, a rise in inflation will reduce real savings.

Mckinnon [1973] explains the negative relationship between inflation and savings as the *conduit effect of money.* Mckinnon's hypothesis states that in developing economies where capital markets are highly imperfect and the volume of investment is too bulky, the burden of capital investments rests on individuals. In such economies, money and physical capital are complementary. The return on money goes down with inflation, and so do savings and investment. Hence, the demand for money and savings in developing countries are complementary. Another reason for the downward impact of inflation on savings in such economies is that the real rate of interest falls with inflation.

The administered rates of interest on deposits fail to adjust appropriately in response to inflation. This leads to financial repression in the economy causing anticipated inflation to depress savings by reducing the real rate of return. It is interesting to note that the effect of inflation on savings in a developing economy is quite different from that in a developed economy. In developed economies, the effect of anticipated inflation is weak when the nominal rate of interest adjusts to maintain the equilibrium rate of interest.

Inflationary expectations bring about a substitution of nominal assets by real assets, including consumer durables. It leads to a 'flight from currency' as it becomes too expensive to hold money, with the effect that the pattern of purchases starts tilting in favour of consumer durables. Thus, during inflationary expectations, consumption expenditure increases and measured savings fall. However, it is often viewed that this kind of *substitution effect of inflation* influences only the composition of the stock of savings and not saving or consumption itself. Hence, it works to influence a shift from nominal to real asset holdings.

There are studies which have also explained the effect of anticipated and unanticipated inflation on savings.

The effect of anticipated inflation on savings is largely indeterminate. Traditional economic theory suggests that a fully anticipated rate of inflation has no effect on real economic behaviour in the long-run. In the short-run, anticipated inflation may depress savings and durable purchases, and increase the purchase of non-durables and services [Juster and Wachtel, 1972]. On the other hand, it is also believed that anticipated inflation leads to a rise in savings. Anticipated inflation brings about a switchover from nominal to real assets such as consumer durables. Those consumers who can afford will make expenditures on consumer durables as housing, and since expenditure on housing is recorded as part of savings, the expectation effect of a rise in prices is to increase savings [Diwan, 1968].

The impact of unanticipated inflation on savings is usually positive. Empirical evidence also associates the positive saving effects largely with unanticipated inflation. Only in certain rare cases, unexpected inflation was found to influence savings negatively.

Despite the varying theories on the effects of inflation on savings, that is, whether positive or negative impact of inflation on savings, the nature of relationship between inflation and savings depends upon a host of interrelated factors such as the extent of inflation, composition of consumption [durables and non-durables], composition of savings [physical and financial assets], changes in expectations,

changes in distribution of income between savers and non-savers and changes in interest rates.

b. Rate of Interest and Saving

Rate of interest is an important monetary variable influencing savings. As changes in interest rates are likely to affect the volume and composition of savings, saving decisions are largely dependent upon the level and changes in the rate of interest. The rate of interest influences savings through the direct and indirect impact of changes in the interest rate.

➢ *Direct Impact*

The direct impact of a change in the real rate of return on savings can be felt in two ways, via the income and substitution effects. The direction of the *income effect* depends on whether the individual is a net lender or a net borrower. A net lender will benefit from upward changes in interest rates as it will raise his lifetime income. A net lender receives more in investment income than he has to pay to service his debt. Therefore, by increasing the net investment income, higher interest rates encourage present consumption and reduce savings needed to finance future consumption. If present consumption and future consumption are normal goods, it is possible for a higher interest rate to cause present consumption to rise, while the smaller amounts of savings will nevertheless grow to larger amounts of future consumption. Therefore, it is possible to save less now and consume more, both in the present and in the future. The income effect of a change in real interest rate on savings is thus negative for net lenders [net savers].

The *substitution effect* of interest rate on savings is positive. An increase in the real rate of interest induces individuals to postpone their consumption and increase savings. A substitution of current consumption in favour of current savings takes place as there is an increase in the present price of consumption relative to the future price of consumption. Savings will respond positively to rises in the interest rate only if the substitution effect is stronger than the income effect.

In developing economies, the net impact of interest rate on savings may be positive as the substitution effect is expected to outweigh the income effect. This kind of expectation is based on two reasons. One is that, in these economies, the saving process is highly money intensive due to lack of portfolio choices or saving instruments to save in. Second, the main source of savings is the small savers who tend to be more affected by the substitution effect rather than the income effect of an interest rate change.

The net direct effect of a change in the rate of interest on savings behaviour is however ambiguous as it is cumulative of the income and substitution effects, which are acting in opposite directions. The strengths of these two effects together determine the sign and magnitude of the interest elasticity of saving.

➢ ***Indirect Impact***

The indirect effect of the real rate of return on savings can be understood in terms of the *revaluation effect* or *wealth effect.* A higher real interest rate results in a fall in non-human wealth, mostly through a decline in the real value of financial assets on which the interest rate is fixed for several years in advance and through lower equity prices since the income flows of equities typically do not rise proportionately with the real interest rate. A higher real interest rate also results in lower human wealth[1], by reducing the present value of the future streams of labour income. Like substitution effect, the revaluation effect too is positive as it curbs current consumption and encourages saving so as to maintain the real value of assets [Berube and Cote, 2000].

The usual presumption is that the total effect of change in the real interest rate on savings is positive. However, as the final effect depends on each of the three effects on savings [income effect, substitution effect and revaluation effect], the direction of influence of rate of return on savings cannot be determined a priori.

The empirical evidence on the effect of interest rate on savings is a little sketchy. There is no consensus on the nature of relationship between the two variables. A large number of studies support a positive relationship between the rate of interest

and savings whereas there are others who support a negative impact of interest rate on savings.

➢ ***Positive Relationship***

A substantial group of economists stood in favour of the proposition that there is a positive and significant relationship between interest rate and savings. One of the earliest was Wright [1969], followed by Gupta [1970], Heien [1972], Juster and Wachtel [1972], Boskin [1978], Gylfason [1981], Summers [1981], Mankiw et. al [1985], Moore [1986], Makin [1987], Barro [1992] and Stein and Song [1998]. They provide evidence in favour of a positive interest rate elasticity of savings. The interest elasticity of savings was found to be in the range of 0.2 to 4.5. For developed nations, the elasticity estimates were quite high ranging from 0.4 to as high as 4.5 whereas it was on the lower end for the less-developed countries. A few of the studies like Gylfason [1981], Barro [1992] and Stein and Song [1998] arrived at elasticity estimates approaching the mark of 1.0 and even higher at over 1.5. Possibly, the high interest elasticity of savings coincided with the post-reform period.

The role of financial development and reforms in influencing savings cannot definitely be undermined. As Mckinnon [1973] and Shaw [1973] also pointed out that financial liberalization raises interest rates to their market levels. This provides incentive for savers to increase their financial savings in banks because the reward to their savings, that is positive interest rates, will be high.

➢ ***Negative Relationship***

A number of economists like Denison [1958], Blinder [1975], Howrey and Hymans [1978], Evans [1983], Friend and Housbrouck [1983] and Beach, Broadway and Bruce [1988] were unconvinced with the positive hypothesis between savings and the rate of interest. They supported the case for little or no interest rate elasticity for saving. Fry [1978], one of the pioneers in dealing with interest sensitivity of savings, reported a significant influence of interest rate on savings. Shoven [1984] was right behind debating that the interest elasticity of saving was "one of the most important

behavioural parameters affecting the economy" and that higher elasticity estimates for interest rate and savings had gained greater audience in the community of researchers. But Giovannini [1983, 1985] opposed Fry's findings, after obtaining results revealing an insignificant elasticity value for interest rate-savings relationship. His line of thought was further strengthened by similar outcomes from Ravallion and Sen [1986] and Lahiri [1989].

Studies that supported the case for a negative relationship between interest rate and savings were Williamson [1968], Evans [1983], Friend and Hasbrouck [1983], Loayza, Lopez, Schmidt-Hebbel and Serven [1998], Loayza and Shankar [1998] and Rodrik [1998]. According to Williamson [1968], as household savings is a function of business investment plans, higher interest rates by discouraging investment, would also discourage savings.

An Indian study by Krishnamurty, Krishnaswamy and Sharma [1987] arrived at results which indicate that "a 1.0 percent increase in real interest rate could raise the saving rate by 0.1 percent", implying a significant and positive effect of real interest rate on saving for India. However, Ogaki, Ostry and Reinhart [1996] argued that the sensitivity of savings to real interest rate depends upon a country's level of wealth. The poorer the country and the closer it is to only being able to support a subsistence level of consumption, the less savings will respond to changes in interest rates. According to the estimates of this study, the interest rate elasticity of saving in India was among the lowest in the developing world. Another effort by Muhleisen [1997] aimed towards testing the effect of interest rate on saving, failed to trace any significant relationship between the two.

Among the available literature, either there is evidence of only a negligible effect of interest rate on savings, or they are unable to reach a common consensus. Despite disagreements among researchers, the centre of the debate has moved towards "higher and positive estimates of interest elasticity of saving."

4.1.2 Fiscal Sector Variables

A frequent theme of policy discussion is the effects of fiscal policy on aggregate demand. The impact of fiscal policy on aggregate demand depends on the responses of private saving to changes in fiscal stance. Government deficits resulting from increase in government spending can have substantial effect on the economy by influencing the level of aggregate demand. The perils of public debt and deficits are popularly known as a major cause of recessions, unemployment, inflation, high interest rates, trade deficits, gyrations in the dollar, and virtually any other unsatisfactory aspect of economic performance. Debt, therefore is a serious problem requiring discipline, tough legislation, and national bullet-biting. However, government deficits are not the only way in which fiscal policy affects aggregate demand. Changes in tax rates that provide incentives and disincentives to different kinds of spending have been and continue to be as important.

Private consumption-saving behaviour has important consequences for the effectiveness of fiscal policy. As such, government influences private savings by exercising two of its very powerful fiscal actions: 'government spending' and 'tax imposition.' Hence, the relationship between fiscal sector variables such as budget deficit and tax vis-à-vis savings has become a centre piece of macroeconomic policy studies.

a. Budget Deficit and Saving

A common macroeconomic feature characterizing industrial and developing countries is the growth and persistence of government deficits. The relationship between budget deficit and saving activity is one of the most controversial issues in public economics.

The difference between government receipts and government expenditures, called as the government budget surplus is government saving. When the surplus is negative, there is a budget deficit or, government dissavings. As government saving is part of national saving, a budget deficit lowers national saving unless savings by individuals and private sector increases. The nature of relationship between public and private

savings invites a host of conflicting remarks from theoretical as well as empirical literature.

There are two major interpretations of the relationship between government saving and private saving. The first is the *conventional view* which assumes that a fall in government saving is the result of tax cut or a bond-financed increase in government spending. As government spending increases, myopic households who care solely about the present resort to higher consumption, thereby reducing private savings. This is because they shift their burden from present to future generations. Hence, a decline in government savings is accompanied with a decline in private savings; and together they lead to a decline in national savings.

Government expenditure is financed either by means of taxes in the current period, or by incurring debt. Debt implies higher future taxes with present value equal to the value of debt. Therefore, rational and far-sighted individuals will realize that a rise in government spending today must be paid for either now or later. As such, their aggregate wealth and consumption remains the same, and they will save more in anticipation of future tax liabilities. The increase in private savings fully compensates the fall in government savings, and the national saving remains unaltered. The aggregate effect of government deficit on the real economy is zero. Therefore, given the present value of taxes, the timing of the tax is of no consequence.

The second is the *Keynesian view*. It suggests that a higher temporary government dissaving encourages private sector consumption. In the presence of underutilized production capacity in the economy, an increase in aggregate demand stokes higher income through the operation of the multiplier effect. Hence, private sector income and savings will increase.

To what extent the rise in private savings will offset the initial decline in government savings is however ambiguous.

b. Taxation and Saving

Taxation is the biggest source of public revenue. Tax is a kind of money of which it is the legal duty of every citizen of a country to pay honestly. It may be levied on income, property, at the time of purchasing a commodity and even while availing services. Tax is a compulsory payment to the government by tax-payer without any expectation of some specified return. Modern taxation policy though aims at the fulfilment of the objectives of social welfare such as reducing inequalities in income and wealth, serving high level of employment as well as promoting economic stability with growth. Tax is an important tool in the development of the economy. It affects the overall structure of the whole economy. Taxation is not only difficult but hard to achieve. Edmund Burke rightly emphasized, *"It is difficult to tax and to please as it is hard to love and to be wise."* Taxes can be classified on the basis of form, nature, essence, volume and method of taxation. The most popular distinction of tax is between the forms of taxes as direct and indirect taxes.

Taxation in its various forms, affects the ability and willingness of an individual to work, save and invest. These effects vary, depending on the base of the tax, the rate structure of tax and the level of the tax burden. Several studies have shown that the structure of taxation can have a major influence on the real sector and hence tax policy can be an important tool for promoting savings, capital formation and economic growth. Despite the mass acceptance of tax influence on savings, the tax-saving relationship has often been an ignored area of research. Not much literature is available in this regard.

The tax policy appears to have a dual impact on savings, more importantly private savings. The more generally accepted view is that tax tends to reduce savings. There are others who believe that tax related government policies and incentives influence savings positively.

Theory states that higher taxes may decrease savings through various channels. One such factor through which tax can exert a downward pressure on savings is the nominal income. The tax base is typically the nominal income, which even under moderate inflation often means high taxation in real terms. As such, the after tax

income is too low to encourage savings. Another route through which tax can depress savings is the disposable income. A rise in tax rate reduces the disposable income and hence savings, if subsistence consumption is maintained. Particularly, if the disposable income falls during the middle-age or working years when both the tendency and capacity to accumulate savings is strong, there will be an overall large downward impact on savings. Taxes will lead to a fall in savings when additional consumption smoothing provided by pension systems creates disincentives for private savings.

Another explanation is that if taxes are used to finance social security benefits for masses, such as insurance against the loss of income, the uncertainty about future income is lesser and so is savings. In economies which follow the progressive taxation method, the tax axe falls more severely on the 'rich' than the 'poor'. This results into a higher loss in income for the rich as compared to the poor. The latter with a lower marginal propensity to save will definitely bring about an appreciable decline in savings [Krajewski and Mackiewicz, 2005-07].

Quite differently, the positive effect of tax on savings is felt through tax incentives and tax shelters offered by the government. There are various tax incentives proposed in the fiscal policies from time to time in order to enhance savings. For instance, governments provide tax shelters for encouraging savings. Although tax holidays may enhance private savings, they tend to reduce government revenue and thus the overall savings may or may not rise. Besides, tax exemptions may not generate new private savings if individuals switch from other kinds of savings to tax-exempt savings. Nonetheless, tax incentives provided by lower-tax countries have often resulted in a more efficient use of productive resources by shifting resources from unproductive sectors to productive sectors. This will have the impact of increasing savings in the long-run.

A study by Carroll and Summers [1987] suggests that tax-deferred saving vehicles can generate new savings. It is not because of the deferral of taxes, but rather because the increased availability and intensive promotion of such vehicles may have made consumers more aware of the benefits of saving and reshaped their attitudes towards saving for retirement. This idea was reinforced with the results of

Poterba, Venti and Wise [1996] which confirmed that tax-deferred retirement vehicles do create new savings that would not have been otherwise possible.

Although the tax-saving nexus has not been subject to intensive empirical scrutiny, majority of the studies have arrived at an inverse relationship between tax and savings. Only one study by Houthakker [1960] engaging international time series data, found the influence of direct taxes on savings to be unpredictable. The studies supporting the hypothesis of a negative impact of tax on savings are Williamson [1968, 1969], Taylor [1971], Corbo and Schmidt-Hebbel [1991], Kerr and Monsingh [1998], Monsingh [1998] and Tanzi and Zee [1998].

For a sample of Asian countries, Williamson [1968, 1969] found a significant negative effect of direct taxes on savings, in the long-run. The empirical evidence by Corbo and Schmidt-Hebbel [1991] suggests that tax increases is not the most efficient way of raising national savings due to its large negative effect on private savings. The extent to which private savings would be pushed down by a hike in taxes is almost 48 to 65 percent, across countries. Tanzi and Zee [1998] found that in OECD countries, a high average tax rate affects the household saving rate negatively and significantly. This effect was found to be particularly strong in case of income taxation.

The other studies like Kerr and Monsingh [1998] and Monsingh [1998] found an inverse relationship between direct tax per capita and savings per capita and hence with capital formation. The results revealed that a 1.0 percent change in direct tax per capita causes a 0.4 percent decline in the savings per capita in India. These studies also show that there is a significant relationship between the tax-mix variable and savings and capital formation. Therefore, tax-mix and tax policy can promote growth by increasing the rate of savings in the economy. Tax on expenditure would discourage consumption and promote capital formation.

4.1.3 External Sector Variables

External sector is the foreign sector of a country constituting a basket of economic measures such as exports, terms of trade, balance of payments, current and capital accounts, foreign direct investment, portfolio investment, external debt, etc.

In the context of globalisation and the world becoming one family, it becomes even more important to see the impact of the external sector of the economy on the domestic savings. Various important issues demand attention at this front. *What is the role of exports in savings orientation? Does terms-of-trade deterioration really reduce savings?* The foreign capital resources flowing into the country constitute foreign savings which may be used to fill the gap between saving and investment or to support consumption. Either way, it is important to know *whether foreign savings will substitute or complement domestic savings?*

a. Export Orientation and Saving

Exports often produce highly concentrated incomes in most countries, and particularly so in the case of primary exports, which has a large element of rent. Export orientation plays an important role in influencing savings. Conventionally, the relationship between exports and savings was examined by Maizels [1968] and Lee [1971]. Their hypothesis states that increased export orientation augments the saving rate in a developing economy. An increase in the ratio of exports to GNP would increase savings in two ways. On one hand, with increase in exports, government revenue from export taxes increases and hence government savings; while on the other, private savings may increase because exporters have a relatively high propensity to save. These are the *direct effects* of exports on savings. The former is referred to as the 'tax effect' of exports on savings.

Moreover, a sustained growth in exports might lead to a rise in the marginal saving propensities in the other sectors too, by providing increasing profitable investment opportunities for those who are willing to save more out of current incomes. In addition, countries with higher rates of export tend to face less of a foreign exchange

constraint on investment and therefore tend to provide more of an incentive to savings [Papanek, 1973].

Maizels [1968] argued that exports may also have *indirect effects* on savings by bringing about changes in income. Increases in exports may significantly influence domestic savings, resulting from a more efficient resource allocation induced by increased trade opportunities; or from the foreign trade multiplier effect; or from the educative effects of trade. However, Maizels was mainly concerned with the 'direct effects' of exports on savings.

Maizels [1968] tested his hypothesis using annual data from 11 member nations [including India] of the Overseas Sterling Area from early 1950s to early 1960s. His results confirmed a positive relationship between exports and savings in many primary-exporting countries and LDCs. Later, Lee [1971] tried to test Maizels' hypothesis for a larger number of countries over the time period 1950-1967. He was convinced with Maizels' results that the level of domestic savings in most countries tends to vary systematically with exports. He found the response of savings to exports to be significant both in case of developed and less-developed nations, except for those countries which had relatively low exports to income ratio.

A pioneer study on exports-savings relationship by Papanek [1973], indicates a high correlation between savings and both primary exports and other exports, the coefficient being much higher for the latter. However, as primary exports accounted for a larger share in GDP, he gave more importance to the impact of primary exports on savings. Lahiri [1989] found that export orientation did not affect private savings in at least five of the eight countries in his sample, although lending some support to the case for Indonesia and Thailand. Malaysia was the only country in the sample that experienced an adverse impact of increased export orientation on private savings.

Another study by Rodrik [1998] supported a significant negative relationship between exports-GNP ratio and private savings. These results indicate towards the possibility that exporters may not have a higher propensity to save relative to others

in every country or that the Maizels-Lee hypothesis may be sensitive to the pattern of ownership of export industries.

b. Terms of Trade and Saving

When trade takes place between two open economies, certain goods are offered for sale by both the countries. The physical exchange ratio at which goods are exchanged for one another between these countries is termed as 'terms-of-trade'. It is also expressed as the relationship between the prices of exports and prices of imports. A terms-of-trade deterioration is perceived as a fall in the price of domestically produced goods relative to that of foreign goods. As against it, an improvement in terms-of-trade refers to a rise in price of domestically produced goods in relation to the price of foreign goods.

The traditional explanation of the terms-of-trade and savings relationship is credited to Harberger [1950] and Lauren and Metzler [1950]. They predicted that a positive change in the terms-of-trade would increase real income, and given a constant marginal propensity to consume of less than one, it would cause a rise in savings and an improvement in trade balance. The *Harberger-Laursen-Metzler [HLM] effect* therefore implies an increase in savings with a terms-of-trade improvement and a fall in savings with a terms-of-trade deterioration. This hypothesis is based on the Keynesian consumption function that assumes myopic expectations on the part of the consumers.

The conventional wisdom by Harberger, Laursen and Metzler was challenged by Sachs [1981] who contended that the HLM effect depends on the duration of the shock to terms-of-trade. The HLM effect holds true only if the shock is temporary. A transitory improvement in terms-of-trade causes only a transitory increase in income, which should lead to higher savings rather than higher consumption, thus confirming the direction of the HLM effect. But if the shock is permanent, the effect of terms-of-trade changes on savings would be ambiguous. Movements in terms-of-trade may have little or no effect on savings if households quickly adjust consumption to changes in income, or it may force domestic residents to increase savings in the current period in order to sustain their future standard of living.

Obstfeld [1982] completely opposed the HLM effect. In his opinion, when an economy suffers from a terms-of-trade deterioration, the real wealth is lowered. To converge to the target level of wealth, it must increase savings. Therefore, a worsening of terms-of-trade would result in increased savings, and improvement rather than deterioration in the current account.

In the short-run therefore, there may exist a positive relationship between terms-of-trade and savings, but the long-run effect is theoretically not clear as it may depend on the perceived persistence of the shock and/or the importance of the wealth effect in consumption decisions.

Economic theory as well as empirical evidence on the nature of relationship between terms-of-trade and savings is ambiguous. Majority of the empirical studies suggest a significant and positive effect of terms-of-trade changes on savings. These are Lahiri [1989], Masson et. al [1995], Dayal-Gulati and Thimann [1997], Loayza et. al [1998], Plies and Reinhart [1998] and Rodrik [1998]. Plies and Reinhart [1998] stated that countries with least diversified export structure and greatest primary commodity exposure are the most influenced by terms-of-trade developments. Athukorala and Sen [2001] found that in India, private agents consider terms-of-trade deterioration as a permanent negative shock and their attempts to smooth consumption in the face of such perceived shocks lead to an increase in domestic savings. This lends support to the negative impact of terms-of-trade on savings even in the long-run. The negative relationship between terms-of-trade and savings was also supported by Obstfeld [1982] and Macklem [1990].

c. *Foreign Capital Inflow and Saving*

Saving has arisen as a policy issue in the context of the macroeconomic response of savings to large capital inflows. Countries started relying heavily on foreign capital to bridge the gap between domestic saving and domestic investment, in order to accelerate economic growth. This led to a burst of research endeavours in this area. The central idea behind the ongoing research is to determine whether foreign capital inflows and domestic savings are complements or substitutes. There is a controversy

over the effect of foreign capital inflows on domestic savings both at theoretical and empirical levels.

The earlier economists supported the *complementary hypothesis.* On the basis of the assumption that foreign capital are exactly additive to domestic savings, they formulated their hypothesis that foreign capital inflows into a country will boost the domestic savings. This contention was however revised by the traditional economists. They follow the *substitution hypothesis.* According to them, inflows of foreign capital in the country would slacken domestic savings. Foreign capital receipts in the country are used in part to finance consumption and only a part of it is available for augmenting investment.

Some of the economists have taken an extreme stand to the conventional view of a positive relationship between domestic savings and foreign capital inflows. They see almost no increase in investment and no increase in economic growth from foreign resources.

The end use of foreign savings is very crucial in determining whether foreign resource inflows will increase domestic savings or reduce them. If the receiving country wipes away the foreign capital for consumption purposes, it will not contribute towards accelerating economic growth. But if the inflows are invested, it will encourage mobilization of domestic savings and the two will together push up economic growth.

The earliest empirical effort towards exploring the foreign capital inflow-domestic saving relationship was made by Haavelmo [1963]. In his pioneer work, Haavelmo proposed that domestic savings are inversely related to foreign capital inflows. Domestic investors are replaced by foreign investors which causes a reduction in internal savings. He justified the substitution hypothesis on the basis that a large portion of foreign resources go towards satisfying consumption requirements rather than investment. Several attempts have been made at applying statistical methods to establish the inverse relationship between foreign capital inflow and domestic saving. The most usual practice followed has been one of regressing domestic saving

rate on foreign capital inflow-to-GDP ratio. It takes the form of the following equation:

$$S/Y = \alpha + \beta F/Y$$

Where S is defined as domestic saving, Y as gross domestic product and F is usually defined as the current account deficit. β shows the marginal impact of foreign capital imports on the domestic saving rate. If β is negative and not equal to zero, it implies that a fraction of foreign capital inflow is used for consumption and not investment.

The framework used by the traditional studies for examining the relationship between foreign capital inflow and domestic saving suffers from certain serious flaws. These studies have not specified the saving function appropriately. Therefore, the results may be against a priori. Besides, they also assume a causal relationship between domestic saving and foreign capital inflow. This relationship may however be more incidental than causal and the estimated impact may capture the effects of variables not explicitly included in the model, which gives an illusion of causal behaviour [Morisset, 1989].

Foreign capital coming into the country is measured in various forms. The most popular definition of capital imports is current account deficit. The other measures are net foreign capital inflows, foreign direct investment, foreign aid in the form of loans and grants and foreign private investment. It is important as to which measure of foreign capital inflow is used while examining the effects of foreign resource inflows on domestic savings. Majority of the studies [Rahman (1968), Gupta (1970) and Weisskopf (1972), among others] have examined the role of foreign capital inflow by taking it as an aggregate. The composition of foreign capital matters equally. This is because the individual influence of the components gets submerged in the total impact of foreign capital inflow on domestic saving.

The components of foreign capital inflow lack homogeneity. Foreign capital inflow and its disaggregated components influence domestic savings differently. Studies have shown an inverse relationship between total resource inflow and saving rate but the impact of capital inflows at disaggregated levels [such as loans, grants, and foreign direct investment] on saving rate show different magnitude and signs.

Similarly, impact of foreign capital inflow on components of saving rate [such as public, private, household, and corporate] also has different magnitude and signs. Studies by Papanek [1973] and Gupta [1975] suggest the use of various components alongwith total resource inflow while determining its influence on domestic saving.

Among the components of foreign capital inflow, foreign direct investment is supposed to be a very significant and sizeable component of foreign capital inflow because foreign direct investment mainly goes towards financing investment. In the Indian case too, foreign direct investment has not only boomed but its composition and type has undergone major changes in the post-reform period. Bajpai and Sachs [2000] have in fact advised the policy makers in India to throw open the doors to foreign direct investment which will bring "huge advantages with little or no downside."

Another important component of foreign capital inflow is foreign aid. Foreign aid is such a significant portion of foreign capital that it is often considered synonymous with total resource inflow.

The conflict among economists on whether foreign capital inflows replace or supplement domestic savings remains unresolved as the opinions are polarized in opposite directions. Studies like Gupta [1970] and Rodrik [1998] refute the substitution stand taken by many economists. They are supporters of the conventional wisdom. They found inflows of foreign capital to be additive to home savings. Nonetheless, the substitution relationship gets support from numerous studies dating back even prior to the seventies. These are Leff [1968], Rahman [1968], Chenery and Eckstein [1970], Griffin [1970], Griffin and Enos [1970], Landau [1971], Papanek [1972, 1973], Weisskopf [1972], Wasow [1979] and Gersovitz [1982]. Some recent work in this direction has been done by Joseph [1997], Reinhart and Talvi [1997] and Plies and Reinhart [1998].

According to Griffin [1970], the impact of foreign resource inflows can be felt by different section of savers in different ways. Foreign capital inflows would reduce public savings by stimulating a change in the composition of government expenditure in favour of public consumption, or a reduction in tax revenues.

Secondly, it would reduce private savings by increasing easy availability of credit for investment which dampens the incentive to save. Lastly, increasing use of foreign resources depress the overall domestic savings by encouraging consumption of importables and exportables. With increase in foreign exchange on account of increase in capital imports, there is a tendency for exports to decline and consumption of essential export commodities to rise.

Grinols and Bhagwati [1976] found only a mild negative impact of capital inflows on domestic saving. Their concern is mainly towards the harmful effects of foreign capital inflow on the aid receiving country. The latter may become less self-reliant with increasing dependence on foreign resources. However, they are optimistic that it is quite possible that a growing country receiving foreign aid may be able to quickly eliminate the negative impact of foreign capital inflow on internal savings. This is keeping in view the positive effects of inflows on the levels of investment and income in the aid receiving country. Therefore, it becomes difficult to state whether foreign aid would be beneficial or harmful to the aid receiving country.

Although there is a strong conflict between the views of the two factions of economists, the one supporting the substitution relationship and the other the complementary link between foreign capital inflow and savings, the more commonly accepted proposition is that of a 'substitute relationship' between foreign capital inflow and domestic savings.

4.1.4 Real Sector Variable

The most important real sector variable is none other than income or the rate of growth in income which measures the actual contribution to economy's productive activity. It has a direct impact on the economic image of the country. Econometric studies on the determinants of saving rates often suggest that the behaviour of saving is closely related to an economy's rate of growth. In fact, economic growth is the most powerful determinant of saving in the long-run.

The link between saving and economic growth is not a direct one, but operates through the effects of investment on growth. Countries that manage to increase their

saving rate, and therefore investment, will experience increase in their rate of growth. The strong link between saving and domestic investment need not be taken as an obvious one because domestic investment can also be financed by foreign savings. One interpretation of the long-run relationship between national saving and domestic investment is that over the long-run international capital flows are limited, and thus a sustained rise in the rate of domestic investment requires a sustained rise in the rate of national saving. Moreover, too much dependence on external savings exposes the economy to volatile foreign capital flows and makes the country vulnerable to macroeconomic crisis. Therefore, saving is an important force for growth as well as economic stability.

Growth in turn provides incentives for saving. An increase in economic growth motivates people to save by increasing the propensity to save.

The close association between saving and growth does not establish the causal link between the two. The issue of causation between saving and economic growth is nevertheless crucial, not simply for understanding the whole process of saving-growth dynamics but for the design of policy.

Studies have generally focussed on the causal relationship between saving and economic growth. The literature is divided on the issue of saving-growth relationship. A large group of economists support the causal chain as running from saving to growth. Some of them are Lewis [1955], Bacha [1990], Otani and Villanueva [1990], De Gregorio [1992], Levine and Renelt [1992], Japelli and Pagano [1994], Andersson [1999], Sethi [1999] and Kreickhaus [2002].

A major group of economists however suggest that it is high economic growth which leads to high savings, and not the other way around. They are Modigliani and Brumberg [1954, 1979], Houthakker [1960, 1965], Fei and Ranis [1964], Marglin [1976], Krishnamurty and Saibaba [1981], Bosworth [1993], Dekle [1993], Carroll and Weil [1994], Edwards [1995], Blomstrom, Lipsey and Zejan [1996], Gavin, Hausmann and Talvi [1997], Muhleisen [1997], Ray and Bose [1997], Loayza et. al [1998], Rodrik [1998], Attanasio et. al [2000], Carroll et. al [2000], Baharumshah et. al [2003] and Mohan [2006].

A detail literature review on the growth-saving relationship and theoretical as well as empirical analysis of the income-saving interactions has been dealt with in the preceding chapter on growth-saving causality.

Suffice to mention here that almost all the studies quoted in this chapter have invariably used the income as an explanatory variable with an a priori positive sign.

4.1.5 Demographic Variable: Life - Cycle Hypothesis

The basic demographic features of a country have a definite effect on the domestic savings of a country, analysed in the literature under the life-cycle theory of saving.

As per the *life-cycle hypothesis*, the age profile of earnings is generally *bell-shaped* but the age profile of consumption is *flat*. Hence, savings will be negative during early years, positive during productive years and again negative during retirement years, following a 'hump-shaped' pattern. The life-cycle theory of saving was first proposed by Fisher [1930] and later refined and given empirical content by Modigliani and Brumberg [1954] and Friedman [1957].

Over the individual's lifetime, his consumption is spread evenly, whereas his income is earned during pre-retirement years. Inter-temporal consumption is achieved by saving when income is high and dissaving when income is low, so that the net worth is never negative. Individuals tend to dissave [or borrow] when they are young, they accumulate majority of savings when middle-aged or in their working years, so as to build up a nest egg for retirement and then spend out of their accumulated savings in their twilight years. This leads to accumulation of highest asset holdings at the retirement age. During retirement, individuals dissave, drawing down their past savings and completely exhausting them by death.[2]

In the basic life-cycle model, the following assumptions are made:

i. The motivation for saving is providing for consumption during retirement years.

ii. Individuals are assumed to be far sighted who base their decisions on future events that are known with certainty.

iii. Capital markets are assumed to be perfect, so that individuals can borrow against their future income to finance current consumption.

One of the main contentions of the life-cycle model is that an individual's consumption is not affected by the timing of his income. In any one period, an individual's consumption is constrained only by one's lifetime resources.
The literature on the life-cycle hypothesis examines many forms of age-specific relationships affecting human behaviour. Still, very little is known about the relationships between demographic factors and savings. Various demographic variables have been identified like rate of growth in per capita income or productivity growth, age structure of the population, child dependency ratio, old dependency ratio, fertility, infant mortality, life expectancy, female and child labour force participation, family structure, extended family system, public policies such as social security programs, investment in health, nutrition and education, and many more.

In general, these demographic factors affect the saving rate of a nation in mainly three ways [Raut, 1992]. One, through their effects on the age structure; second, through their effects on age-specific individual savings behaviour; and third, through general equilibrium effects on the interest rate, wage rates and income distribution.

Of these, one important component that most economists are particularly concerned with is the effect of 'dependency' on aggregate savings. Dependency ratio is defined as the proportion of non-working population covering the young age bracket [0-14 years] and the older age group [65 years and above], to the total population. The obvious prediction of the life-cycle hypothesis would thus follow "that the higher the share of the very young and the very old [who dissave] in the population, the lower would be the saving rate."

According to Mensbrugghe [1972], higher dependency ratio tends to exert a downward force on household savings. The same is also true for government savings

because the extra dependency burden calls for increased expenditures towards social security aspects like health, education, and the volume of investment needed to raise the capital-labour ratio.

Dependency ratio is generally found to be higher in developing countries. In comparison, in developed countries, the proportion of young is lower due to low birth rates, and the proportion of elderly is higher because of high life expectancy. Yet, with the proportion of aged rising fast and the proportion of the young not falling fast enough in developed countries, the dependency ratio is expected to rise in the future, whereas it is likely to continuously fall in developing countries [Masson et al., 1995]. Voicing the economists' concern towards this issue, is the classic case of the United States, where national saving is expected to decline with the retirement of the post-world war II baby boom generation, starting around the year 2010.

Dependency rate exerts itself through two channels. First is the *direct effect of dependency rate*, which acts to reduce the saving rate, due to larger number of spenders than the earners. The other is the *indirect effect of population growth*, which leads to a decline in the per capita income and hence in the average propensity to save. Gupta [1975] found the cumulative impact of direct plus indirect effects to be much stronger than the direct effect alone. Therefore, there is an underestimation of the adverse impact of dependency rate on saving rate, to the extent that the indirect impact of dependency on saving is ignored.

Leff's [1969] work stands out as a pioneer among the studies on the impact of demographic variables on saving. He found statistically and quantitatively significant relationship between dependency ratios and aggregate saving ratios. In his view, high birth rate in developing nations is the main cause for the negative impact of dependency rates on saving rates.

Clark [1968] raised objections to Leff's opinion. He argued that population growth has a positive influence on savings and hence a larger family size does not reduce the average propensity to save. Leff's division of the sample of 74 countries into developed and developing nations came under attack from Adams [1971] and Gupta

[1971] but was eventually defended by Leff [1971] himself. His hypothesis of a negative influence from dependency ratio to saving rate has been supported by a string of economists led by Gupta [1971] who initially was highly critical of Leff's methodology and results. The others are Kelley [1973], Mikesell and Zinser [1973], Snyder [1974], Simon [1975], Singh [1975] and Muhleisen [1997].

In a micro-level investigation, Kelley [1972] found that the combined [direct plus indirect] effect of the first child on a family's saving rate is hardly noticeable, the second child gears up savings whereas the marginal influence of additional children would be negative on the saving ratio. Similar results were obtained by Espenshade [1975] too.

> A research paper by Hammer [1986] shows how financial institutions serve as a substitute for children as a country develops. In LDCs, children are viewed as a source of retirement support. With the development of financial and capital markets, child-bearing becomes less attractive, so long as the motive is achievable. As both are alternative means to the essential end of maintaining consumption in old age, birth rates might decline with rise in financial instruments in secured financial assets.

Loayza et. al [1998] found a positive and significant correlation between old-age dependency ratio and gross national saving rate, while a negative correlation with household saving. However, at sub-sample levels, correlations change in magnitude and direction for developing and industrial countries, and also across saving measures.

Covering 121 countries across the globe, Ram [1982] concluded that high rates of dependency in the population have little or insignificant adverse influence on savings in LDCs. Like Ram, Rodrik [1998] too was unable to trace any significant relationship between dependency rates and saving rate.

Studies by Kotlikoff [1984], Lahiri [1989] and Faruquee and Husain [1998] find age structure as important variable determining savings behaviour. It is observed that the ratio of working age population to total population, along with per-capita private

disposable income explain some of the changes in private savings in Asian countries. In a cross-country analysis, Lahiri [1989] concluded that the age-dependency ratio defined as the ratio of old to young shares a direct one-to-one relationship with the rate of growth of population [n]. The ratio decreases with increase in population growth. Growth in per capita income and lower dependency rates were found to stimulate private savings by making the young savers richer in wealth and in number than the older dissavers. This is particularly evident in countries like Korea and Singapore. For countries like India, Korea, Malaysia, Singapore and Sri Lanka, the study gives a clear idea about the nature of relationship between the two demographic variables and long-run private saving rate. A 1.0 percent increase in the rate of growth of per capita income was found to raise the private saving rate by 1.0 percent in the long run. On the other hand, a 1.0 percentage point decline in the dependency ratio increased the long-run private saving rate by 1.6 percentage points approximately.

In case of India, the short-run effect of changes in the age composition of population on private savings was found to be more important. Thailand was the only country where private savings was positively related to the age dependency ratio. Mueller [1976] and Modigliani and Sterling [1983] found higher population growth rate to depress the saving rate. Besides, Modigliani and Sterling also confirm a negative impact of dependency ratio on savings.

Although the results on the relationship shared between dependency rates and saving rates are mixed, majority of the studies confirm a negative association between the two variables.

4.2 Empirical Framework and Methodology

The theory and literature speak amply about the nature and magnitude of relationship between saving and macro variables of the economic system. The results obtained from the literature survey are varied and contrasting both for Indian as well as other foreign economies. It needs to be investigated whether the logic and arguments linking savings and macro variables are relevant in the Indian context or not.

The true relationship between saving and other macro variables in the Indian economy needs to be empirically tested and the important determinants of saving can be drawn from there.

The most important conclusion made by analysing the literature is that there seems to be no consensus reached on the nature of relationship between saving and macro economic variables. The empirical research findings differ on the issues such as, direction of relationship, model specification, definition of variables, time period and across country. None of the study in this area of research has incorporated all the macro variables, as discussed above, in one single empirical analysis.

In this section of the present chapter, we empirically examine the dynamics of inter-relationship between saving and macro economic variables.

The variables considered for analysis are:

1. Monetary Sector Variables
    a. Rate of Inflation
    b. Rate of Interest
2. Fiscal Sector Variables
    a. Budget Deficit
    b. Taxation
3. External Sector Variables
    a. Export Orientation
    b. Terms of Trade
    c. Foreign Capital Inflow
4. Real Sector Variable
    a. National Income
5. Demographic Variable
    a. Dependency Ratio

First, we have formed a set of hypotheses on the relationship between each of the macro variables and savings. Then in the next section [4.2.2], we have discussed the variable definitions and specifications along with the data source and time period. Section 4.2.3 elaborates on the methodology and techniques used to empirically examine the dynamics of inter-relationship between saving and macro economic variables.

4.2.1 Hypotheses

After critically examining the vast literature on the subject of saving interactions with other macro economic variables, we have formulated a set of hypotheses.

H1: Inflation has a negative impact on Gross Domestic Saving.

H2: Change in Rate of Interest brings about a positive change in Gross Domestic Saving.

H3: A rise in Budget Deficit has a negative impact on Gross Domestic Saving.

H4: Increase in Tax Revenue leads to fall in Gross Domestic Saving.

H5: Exports have a favourable impact on Gross Domestic Saving.

H6: Terms of Trade changes affect Gross Domestic Saving positively.

H7: Foreign Capital Inflow tends to substitute Gross Domestic Saving.

H8: National income shares a positive relationship with Gross Domestic Saving.

H9: An increase in Dependency Ratio has a depressing effect on Gross Domestic Saving.

➢ **Function**

The macro variable interactions of saving can be summarised in the following function -

$$S = f[II, INT, BD, TR, EXP, TOT, FCI, Y, DEP]$$

Where,

S	=	Gross Domestic Saving
Π	=	Inflation
INT	=	Rate of Interest
BD	=	Budget Deficit
TR	=	Tax Revenue
EXP	=	Exports
TOT	=	Terms of Trade
FCI	=	Foreign Capital Inflow
Y	=	National Income
DEP	=	Dependency Ratio

4.2.2 Variable Definitions and Specifications

1. *Saving [S]:* The study defines saving as Gross Domestic Saving [GDS] at current prices. Various specifications of saving have been used in the study. These are:

   - [S]
   - Log [S]
   - [ΔS]
   - [S/Y]
   - Log [S/Y]

2. *Inflation [WPI]:* Inflation has been defined as the Wholesale Price Index [WPI] of all commodities. The wholesale price index is measured as the average of weeks with the base year: 1981-82. Different specifications of WPI used in the study are:

   - [WPI]
   - Log [WPI]
   - [ΔWPI]

3. *Rate of Interest [INT]:* The measure of interest rate used in the study is the deposit rate of interest which has been defined as 1 to 3 years time deposit

rate of interest. Most of the Indian studies have chosen the deposit rate as the interest rate variable. For the six years period from 1996 to 2001, the deposit rate has been calculated as the deposit rates of five major public sector banks as at end of March. The various interest rates in India are highly correlated.

Two specifications of interest rate have been used in the present study:

- [INT]
- Log [INT]

4. *Fiscal Deficit [FD]:* Fiscal deficit is defined as the budgetary deficit plus market borrowings and other liabilities of the Government of India [net]. Fiscal deficit used in the present study has been specified:

   - [FD]
   - [FD/Y] - Fiscal Deficit as a percentage of Nominal National Income [Fiscal Deficit Rate]
   - Log [FD/Y]

5. *Tax Revenue [TR]:* Tax revenue is the Central Government's tax receipts which are net of the State's share and the amount assigned to National Calamity Contingency Fund [NCCF]. The specifications of tax revenue used in the study are:

   - [TR]
   - Log [TR]

6. *Exports [EXP]:* The total exports in the country is the sum total of oil and non-oil exports. In the present study, different specifications of exports have been used. These are:

   - [EXP]
   - [ΔEXP]
   - [EXP/Y] - Exports as a percentage of Nominal National Income [Export Rate]
   - Log [EXP]

7. *Terms of Trade [TOT]:* Terms of Trade is the ratio of price of exports to price of imports. The net terms of trade has been used in the study which is defined as Unit Value Index of Exports as a percentage of Unit Value Index of Imports [Base: 1978-79 = 100]. The specifications of terms of trade used in the study are:

- [TOT]
- Log [TOT]
- [ΔTOT]

8. *Current Account Balance [CAB]:* The current account includes 'visible' trade transactions on merchandise account, and invisibles which broadly cover payments for non-factor services; transfers of interest, profits and dividends currently earned on assets held abroad; and other transfers such as gifts and migrants' remittances. The specification of current account balance used in the study is:

- [CAB/Y] - Current Account Balance as a percentage of Nominal National Income

9. *Foreign Capital Inflow [FCI]:* Foreign Capital Inflow has been defined as the net of foreign capital inflows and foreign capital outflows in the country. In the present study, foreign capital inflow has been specified as:

- [FCI]
- [FCI/Y] - Foreign Capital Inflow as a percentage of Nominal National Income

10. *Dependency Ratio [DEP]:* The age dependency ratio has been defined as the ratio of dependents [0-14 years + 65 years and above] to working-age population [15-64 years]. Various specifications of dependency ratio have been used in the study. These are:

- [DEP]
- Log [DEP]
- [ΔDEP]

11. *National Income [Y]:* The income variable used in the present study has been defined as Gross Domestic Product [GDP] at current market prices [or, Nominal National Income]. Almost all studies using income as a variable define it as Gross Domestic Product [in nominal or real terms]. The specifications of income used in the study are:

- [Y]
- Log [Y]
- [ΔY]
- Log [ΔY]
- [ΔY/Y] - Growth Rate of National Income

4.2.3 Time Period and Data Source

The time period for the analysis undertaken ranges from 1970-71 to 2003-04. The time period taken for the study of savings and dependency ratio relationship is from 1970-71 to 2000-01 as the data for dependency ratio was unavailable for the last three years.

Data for all the variables used in the analysis have been compiled from various issues of the Handbook of Statistics on Indian Economy [RBI] except Foreign Capital Inflow and Dependency Ratio. Foreign capital inflow data has been obtained from the Centre for Monitoring Indian Economy [CMIE] reports while dependency ratio figures have been taken from the World Development Indicators [World Bank, 2004].

4.2.4 Estimation Techniques

The present study uses the cointegration approach to find out the empirical relationship between savings and macro economic variables. The cointegration approach has been preferred over usual regression analysis for the reason that the present study deals with time series macro variables. As macro variables in time series usually suffer from nonstationarity and provide spurious results while using regression analysis, to avoid this problem as well as to find out the existence of long-run relationship, the cointegration approach has been preferred.

The methodological details of tests for cointegration have already been discussed in Chapter 3. The basic steps followed in the present chapter for studying the long-run relationship between savings and macro variables are:

1. Unit Root Test
2. Cointegrating Regression
3. Cointegration Test
4. Multivariate Regressions - The Complete Model

1. Unit Root Test

Test of stationarity has been the first step in the macro variable analysis. Stationary test [unit root test] has to be conducted for all variables, dependent as well as independent variables from all sectors of the economy involved in the study. Time series analysis requires that the variables under consideration be stationary. The presence of unit roots in variable series confirms their nonstationarity. Therefore, unit root tests are carried out to find whether the variables are stationary and if not then at what level; which also determines the number of unit roots contained in the variable series.

In consistency and reasons with earlier chapter, in this chapter also we have used the Augmented Dickey-Fuller [ADF] test for unit root testing of time series variables. The ADF test equation chosen is one with a constant and one-period lag of the dependent variable. The ADF test confirms the order of integration of each nonstationary variable. Cointegration test can be carried out only for the pair of variables which are integrated of the same order. This is a pre-condition for cointegration.

2. Cointegrating Regression

Once we establish the order of integration of variables used in the analysis and form pairs of savings and macro variables with the same number of unit roots, we proceed to estimate linear 'Cointegrating Regressions' using the Ordinary Least Squares

method. These regressions are estimated for deriving the residual series for cointegration testing. This step is simply a transitory step in the analysis and is required only to arrive at the residuals. This step is followed by the actual test for cointegration.

3. Cointegration Test

The residual series obtained in the previous step is tested for unit roots. If the residual has a unit root lower than that of the variables under consideration, the variables are said to be cointegrated. We have employed the Augmented Engle-Granger [AEG] test [i.e. Residual based Unit Root Test] for cointegration testing of macro variables. This test is applied for detecting whether the residual series derived from the cointegrating regression is stationary or not. It is similar to the ADF test for unit root testing of time series. The ADF test equation is used for determining the order of integration of the residual series. The test equation takes a lag of one-period of the dependent residual variable and has no drift term since a constant is included in the cointegrating regression.

4. Multivariate Regressions - The Complete Model

On the basis of the cointegration results for saving and macro economic variables, we select the macro variables to be kept for the final analysis for estimating multivariate regressions between saving and macro variables. The macro variables that are found to share a stable long-run relationship with saving are chosen for running the final multivariate regressions whereas those which are not found to have a long-run relationship with saving are dropped from the analysis.

Multivariate regressions are estimated to arrive at the complete model for examining and understanding the dynamics of inter-relationship between saving and macro economic variables. The complete multivariate model is used for drawing inferences on saving and macro variables relationships and further for suggesting appropriate policy options for enhancing savings in India.

4.3 Empirical Results

This section presents and discusses the empirical results on the dynamics of inter-relationship between saving and macro economic variables following the methodologies and techniques as specified in the earlier section.

At the outset, the first section [4.3.1] presents the results on Unit Root Test applied to all the variables in the study to find out the level of stationarity. The pre-condition to find out the long-run relationships in the cointegration approach is that the variables should be integrated at the same level. So, this section reclassifies the various combinations of saving and macro economic variables as per the same level of integration.

The next section [4.3.2] presents the cointegrating regressions of all the pairs of saving and macro variables that have the same level of integration as summarised in the earlier section.

Based on the residual series derived from the cointegrating regressions, the cointegration test has been carried out for all the sets of variables as presented in Section 4.3.3.

Finally, the Section 4.3.4 presents the complete multivariate model, empirically explaining the dynamics of inter-relationship between saving and macro economic variables. This section also derives the important findings and policy inferences based on the analysis.

4.3.1 Unit Root Test

We first carried out Unit Root Test on all variables; both dependent and independent variables using the ADF test. The results of unit root test are presented in Table 1.

The ADF test results are reported in the next three columns under *ADF Test Statistic,* at level, first difference and second difference. The significance of ADF test statistic estimated for each variable is compared with the Mackinnon critical

values at 1%, 5% and 10% levels of significance. If the estimated ADF test statistic value exceeds the critical value, the hypothesis of a unit root is rejected. This process has been repeated by successive differencing of variables until they become stationary. In our case, all the variables become stationary at a maximum of second difference. The last column of the table gives the order of integration of each variable, which indicates the number of unit roots that each variable contains.

The important highlights of unit root test results are:

i. The unit root test results of various specifications of saving [S, ΔS, S/Y, Log (S), Log (S/Y)] reveal that when saving at level [S], which is second difference stationary [I(2)], is first differenced [ΔS], or converted into a ratio such as saving rate [S/Y] or expressed in logarithm [Log (S)], the order of integration or the number of unit roots it contains reduces by one, making these variables stationary at level one [I(1)]. However, converting the saving rate [S/Y] into logarithm [Log (S/Y)] does not change the level at which the saving rate [S/Y] is stationary.

ii. The similar kind of behaviour was also found to be in the case of all the other variables: monetary variables [WPI and INT], fiscal variables [FD and TR], external variables [EXP, TOT and CAB], real variable [Y] and demographic variable [DEP]. Also, the level of stationarity does not change while converting a ratio/rate variable in log.

iii. For national income, ΔY is first difference stationary, which is integrated of the order one. If we take the logarithm of ΔY [Log (ΔY)], it does not change the level at which ΔY is stationary [I(1)].

iv. It is important to note that among all the macro variables, FD and FCI are the only variables which contain the same number of unit roots [I(1)] even after being expressed as a ratio [FD/Y and FCI/Y].

v. Change in terms of trade [ΔTOT] and growth rate in national income [ΔY/Y] are the only two variables that are stationary at zero level [I(0)].

Table: 1 **Stationary Test - Unit Root Test**

ADF Test Equation with a Drift
Lag = 1
Time Period : 1970-71 to 2003-04

Variables		ADF Test Statistic@			Order of Integration
		Level	First Difference	Second Difference	
	Saving				
1.	S	4.66	0.35	-4.97*	I [2]
2.	Log S	-0.45	-4.76*	-	I [1]
3.	Δ S	0.35	-4.97*	-	I [1]
4.	S/Y	-0.68	-3.74*	-	I [1]
5.	Log S/Y	-1.09	-3.73*	-	I [1]
	Monetary Variables				
1.	WPI	2.17	-1.915	-6.36*	I [2]
2.	Log WPI	-1.64	-4.25*	-	I [1]
3.	ΔWPI	-1.915	-6.36*	-	I [1]
4.	INT	-1.18	-3.98*	-	I [1]
5.	Log INT	-1.56	-3.68*	-	I [1]
	Fiscal Variables				
1.	FD	0.03	-2.77***	-	I [1]
2.	FD/Y	-1.39	-4.90*	-	I [1]
3.	Log FD/Y	-1.28	-5.26*	-	I [1]
4.	TR	3.82	-2.515	-13.19*	I [2]
5.	Log TR	-1.23	-5.55*	-	I [1]
	External Variables				
1.	EXP	6.91	0.49	-6.52*	I [2]
2.	ΔEXP	0.49	-6.52*	-	I [1]
3.	EXP/Y	0.31	-2.79***	-	I [1]
4.	Log EXP/Y	-0.725	-2.81*	-	I [1]
5.	TOT	-2.61	-5.125*	-	I [1]
6.	Log TOT	-2.57	-4.87*	-	I [1]
7.	ΔTOT	-5.125*	-	-	I [0]
8.	CAB/Y	-1.18	-4.75*	-	I [1]
9.	FCI	1.83	-5.62*	-	I [1]
10.	FCI/Y	-2.32	-8.16*	-	I [1]
	Real Variable				
1.	Y	2.70	1.15	-3.125**	I [2]
2.	Log Y	-0.74	-4.24*	-	I [1]
3.	ΔY	1.15	-3.125**	-	I [1]
4.	Log ΔY	-1.09	-7.66*	-	I [1]
5.	ΔY/Y	-4.26*	-	-	I [0]
	Demographic Variable				
1.	DEP#	0.68	-2.19	-3.69*	I [2]
2.	Log DEP	1.16	-1.745	-3.70*	I [2]
3.	Δ DEP	-2.19	-3.69*	-	I [1]
		Mackinnon Critical Values : 1% = -3.657	5% = -2.959	10% = -2.618	

@ Significance is based on Mackinnon [1991] critical values for rejection of hypothesis of a unit root.

* = Significant at 1%, ** = Significant at 5%, *** = Significant at 10%

The data for age-dependency ratio has been taken for the period 1970-2000.
Mackinnon Critical Values for DEP:
1% = -3.696 5% = -2.975 10% = -2.627

On the basis of the unit root test, for further analysis, the pairs of alternative specifications of dependent and independent variables have been identified. The selection of variable pairs is based on the premise that both the variables must have the same order of integration. Also, wherever possible, the variables in log have been preferred for the purpose of finding out the elasticities.

Also, in the case of exports [EXP], instead of EXP, export as a percentage of national income [EXP/Y] has been preferred as it is a more commonly used variable and has been paired with S/Y and Log [S]. We have also paired ΔEXP [I(1)] with Log [S] [I(1)] to see the impact of change in exports in the country on the level of savings. The other pairs of saving and exports are in log forms. The same have been tested for cointegration.

National income [Y] which is second difference stationary [I(2)] can be paired only with S which is also stationary at level two [I(2)]. The S - Y pair has already been tested for cointegration under 'growth-saving causality' in Chapter 3 and was found to share a stable long-run relationship. Therefore, we have not taken this pair for further analysis in the present chapter.

As ΔTOT and ΔY/Y are stationary at zero level [I(0)], they cannot be paired with any of the saving specifications.

Based on the unit root tests, the following are the pairs of savings and macro variables selected which are to be tested for cointegration:

1.	S	-	WPI
2.	Log [S]	-	Log [WPI]
3.	Log [S/Y]	-	Log [WPI]
4.	S/Y	-	INT
5.	Log [S]	-	Log [INT]
6.	Log [S/Y]	-	Log [INT]

7.	S/Y	-	FD/Y
8.	Log [S]	-	Log [FD/Y]
9.	Log [S/Y]	-	Log [FD/Y]
10.	S	-	TR
11.	Log [S]	-	Log [TR]
12.	Log [S/Y]	-	Log [TR]
13.	S/Y	-	EXP/Y
14.	Log [S]	-	ΔEXP
15.	Log [S]	-	EXP/Y
16.	Log [S]	-	Log [EXP/Y]
17.	Log [S/Y]	-	Log [EXP/Y]
18.	ΔS	-	TOT
19.	S/Y	-	TOT
20.	Log [S]	-	Log [TOT]
21.	Log [S/Y]	-	Log [TOT]
22.	S/Y	-	CAB/Y
23.	Log [S]	-	CAB/Y
24.	Log [S/Y]	-	CAB/Y
25.	ΔS	-	FCI
26.	S/Y	-	FCI
27.	Log [S]	-	FCI/Y
28.	Log [S/Y]	-	FCI/Y
29.	Log [S]	-	Log [Y]
30.	Log [S/Y]	-	Log [Y]
31.	Log [S/Y]	-	Log [ΔY]
32.	S	-	DEP
33.	Log [S]	-	ΔDEP
34.	Log [S/Y]	-	ΔDEP

4.3.2 Cointegrating Regression

Table 2 presents the regression results for the sets of macro variables and savings to be tested for cointegration. These cointegrating regressions have been used to derive the residual series for further analysis. Hence, no specific inferences have been made from them.

The important observations that can be made from Table 2 are:

i. Except for dependency ratio [DEP], all other macro variables have a positive impact on savings.

ii. The t-values of the coefficients of explanatory variables are significant for all macro variables other than current account balance [CAB].

iii. Suffice to mention here that overall the R^2 and t - values are at significant level except in few cases. R^2 is extremely low and t - values are insignificant for INT, TOT and CAB. The adjusted R^2 values are negative for CAB and hence this variable has been dropped from the analysis.

iv. Current account balance [CAB] is not listed well in the cointegrating regressions. CAB reported insignificant t-values, very low R^2, negative $\overline{R}^2$, serial autocorrelation problem and poor model significance as indicated by the F-statistic. Moreover, it does not share a long-run relationship with savings. Hence, CAB has been dropped from the analysis. Foreign capital inflow is preferred as the measure of foreign capital resources in the country.

Table: 2 **Cointegration Regression Results**

Eqn. No.	*Dependent Variable*	*Independent Variable*	*Constant [t-value]*	*Coefficient [t-value]*	R^2	$\bar{R}^2$	*D-W*	*F statistic*
1.	S	WPI	-114110.03 [6.12]	1556.03 [18.56]	0.92	0.91	0.22	344.56
2.	Log S	Log WPI	0.85 [12.65]	1.87 [60.54]	0.99	0.99	0.68	3665.23
3.	Log S/Y	Log WPI	-1.105 [30.59]	0.19 [11.59]	0.81	0.80	0.79	134.51
4.	S/Y	INT	0.17 [6.79]	0.00 [1.585]	0.07	0.04	0.24	2.51
5.	Log S	Log INT	2.73 [3.09]	2.32 [2.42]	0.15	0.13	0.07	5.87
6.	Log S/Y	Log INT	-0.88 [8.39]	0.20 [1.80]	0.09	0.06	0.23	3.25
7.	S/Y	FD/Y	0.15 [11.98]	1.475 [4.52]	0.39	0.37	0.47	20.44
8.	Log S	Log FD/Y	8.36 [16.26]	2.36 [6.87]	0.59	0.58	0.32	47.18
9.	Log S/Y	Log FD/Y	-0.35 [5.03]	0.23 [4.97]	0.44	0.42	0.46	24.69
10.	S	TR	-21950.73 [4.40]	3.98 [56.26]	0.99	0.99	0.50	3165.013
11.	Log S	Log TR	-0.01 [0.14]	1.11 [82.89]	0.99	0.99	0.68	6870.81
12.	Log S/Y	Log TR	-1.19 [28.99]	0.115 [12.37]	0.83	0.82	0.76	153.13
13.	S/Y	EXP/Y	0.12 [15.63]	1.36 [11.30]	0.79	0.79	0.76	127.72
14.	Log S	Δ EXP	4.57 [52.71]	3.68E-05 [6.46]	0.57	0.56	1.11	41.77
15.	Log S	EXP/Y	3.26 [23.24]	26.00 [12.08]	0.82	0.81	0.27	146.01
16.	Log S	Log EXP/Y	9.53 [25.10]	3.78 [12.39]	0.83	0.82	0.29	153.55
17.	Log S/Y	Log EXP/Y	-0.16 [3.565]	0.43 [11.62]	0.81	0.80	0.78	135.03
18.	ΔS	TOT	-38806.92 [1.15]	521.50 [1.87]	0.10	0.07	0.68	3.49
19.	S/Y	TOT	0.15 [4.39]	0.00 [1.51]	0.07	0.04	0.23	2.29
20.	Log S	Log TOT	-2.59 [0.92]	3.59 [2.66]	0.18	0.16	0.13	7.07
21.	Log S/Y	Log TOT	-1.18 [3.42]	0.23 [1.41]	0.06	0.03	0.21	1.99
22.	S/Y	CAB/Y	0.21 [29.59]	0.38 [0.79]	0.02	-0.01	0.165	0.63
23.	Log S	CAB/Y	4.87 [36.04]	0.66 [0.07]	0.00	-0.03	0.01	0.005
24.	Log S/Y	CAB/Y	-0.685 [44.7]	1.05 [0.59]	0.01	-0.02	0.145	0.36
25.	ΔS	FCI	582.09 [0.15]	1.45 [9.45]	0.74	0.73	2.13	89.34
26.	S/Y	FCI	0.185 [40.76]	1.37E-06 [7.33]	0.63	0.61	0.65	53.73
27.	Log S	FCI/Y	4.11 [24.81]	47.76 [5.22]	0.46	0.44	0.94	27.24
28.	Log S/Y	FCI/Y	-0.76 [35.13]	4.36 [3.65]	0.29	0.27	0.84	13.31
29.	Log S	Log Y	-1.325 [23.75]	1.11 [111.38]	0.99	0.99	0.71	12406.25
30.	Log S/Y	Log Y	-1.325 [23.75]	0.11 [11.42]	0.80	0.79	0.71	130.52
31.	Log S/Y	Log ΔY	0.04 [0.185]	1.05 [25.04]	0.95	0.95	1.11	627.21
32.	S	DEP	2038355.0 [11.24]	-2672831.0 [3.19]	0.79	0.79	0.09	111.79
33.	Log S	Δ DEP	3.68 [10.14]	-214.54 [3.19]	0.27	0.24	0.15	10.24
34.	Log S/Y	Δ DEP	-0.83 [21.46]	-26.17 [3.64]	0.32	0.29	0.41	13.28

4.3.3 Cointegration Test

The third and the most important step in the analysis is the test for cointegration. The residual series derived from the cointegrating regressions estimated in the earlier step are tested for unit roots for determining long-run relationship between variables. The cointegration results are presented in Table 3. Table 3 exhibits the different combinations of saving and macro economic variables that are tested for cointegration.

Two tests of cointegration have been carried out. These are: Augmented Engle-Granger [AEG] test and Cointegrating Regression Durbin-Watson [CRDW] test. The final conclusion on cointegration is however based on the AEG test results alone. As discussed earlier under *'Tests for Cointegration'* in Chapter 3, the AEG test is the most widely used standard test of cointegration. The CRDW test is generally used for making only a quick estimate on cointegration. The CRDW test results have been given in Appendix II for reference.

Table 3 shows the dependent and independent variables along with their order of integration [level at which they are stationary] in the first three columns under 'Cointegrating Regression'. The cointegrating regressions have already been estimated for these pairs of variables in the previous step.

The second half of the table gives the outcomes of the Augmented Engle-Granger [AEG] test for cointegration. The AEG test employs the ADF test equation for determining stationarity of the residual variables derived from the respective cointegrating regression. The significance of the ADF test statistic is based on the Mackinnon critical values for rejection of hypothesis of a unit root.

The last column in the table presents the final results on the existence or absence of cointegration between the stated variable pairs.

The cointegration test results confirm a stable long-run relationship for the following sets of variables:

Inflation:	Log [S]	-	Log [WPI]
	Log [S/Y]	-	Log [WPI]
Fiscal Deficit:	S/Y	-	FD/Y
	Log [S]	-	Log [FD/Y]
	Log [S/Y]	-	Log [FD/Y]
Tax Revenue:	S	-	TR
	Log [S]	-	Log [TR]
	Log [S/Y]	-	Log [TR]
Exports:	S/Y	-	EXP/Y
	Log [S]	-	ΔEXP
	Log [S/Y]	-	Log [EXP/Y]
Terms of Trade:	Log [S]	-	Log [TOT]
	Log [S/Y]	-	Log [TOT]
Foreign Capital Inflow:	ΔS	-	FCI
	S/Y	-	FCI
	Log [S]	-	FCI/Y
	Log [S/Y]	-	FCI/Y
National Income:	Log [S]	-	Log [Y]
	Log [S/Y]	-	Log [Y]
	Log [S/Y]	-	Log [ΔY]
Dependency Ratio:	Log [S/Y]	-	ΔDEP

Two macro economic variables, rate of interest [INT] and current account balance [CAB] are not found to share a long-run relationship with savings for any of their variable specifications. These two variables have therefore been left out of further analysis.

Table: 3 **Cointegration Test**

Time Period: 1970-71 to 2003-04

	Cointegrating Regression			AEG Test#				
	Variables			*ADF Test Statistic for Residual@*				*Inference on Cointegration*
	Dependent	*Independent*	*Order of Integration*	*Level*	*First Difference*	*Second Difference*	*Order of Integration*	
Monetary Variables	S	WPI	I [2]	0.01	-0.35	-5.36*	I [2]	No Cointegration
	Log S	Log WPI	I [1]	-3.00	-	-	I [0]	Cointegration
	Log S/Y	Log WPI	I [1]	-2.69	-	-	I [0]	Cointegration
	S/Y	INT	I [1]	-6.40	-3.14*	-	I [1]	No Cointegration
	Log S	Log INT	I [1]	0.80	-2.80*	-	I [1]	No Cointegration
	Log S/Y	Log INT	I [1]	-0.63	-3.08*	-	I [1]	No Cointegration
Fiscal Variables	S/Y	FD/Y	I [1]	-1.83***	-	-	I [0]	Cointegration
	Log S	Log FD/Y	I [1]	-1.77***	-	-	I [0]	Cointegration
	Log S/Y	Log FD/Y	I [1]	-2.29**	-	-	I [0]	Cointegration
	S	TR	I [2]	-1.37	-3.54*	-	I [1]	Cointegration
	Log S	Log TR	I [1]	-2.10**	-	-	I [0]	Cointegration
	Log S/Y	Log TR	I [1]	-2.57**	-		I [0]	Cointegration
External Variables	S/Y	EXP/Y	I [1]	-2.37**	-	-	I [0]	Cointegration
	Log S	ΔEXP	I [1]	-2.27**	-	-	I [0]	Cointegration
	Log S	EXP/Y	I [1]	-1.40	-3.12*	-	I [1]	No Cointegration
	Log S	Log EXP/Y	I [1]	-1.43	-3.13*	-	I [1]	No Cointegration
	Log S/Y	Log EXP/Y	I [1]	-2.205**	-	-	I [0]	Cointegration
	ΔS	TOT	I [1]	-0.61	-4.79*	-	I [1]	No Cointegration
	S/Y	TOT	I [1]	-1.39	-3.49*	-	I [1]	No Cointegration
	Log S	Log TOT	I [1]	-1.97**	-	-	I [0]	Cointegration
	Log S/Y	Log TOT	I [1]	-1.68*	-	-	I [0]	Cointegration
	S/Y	CAB/Y	I [1]	-0.99	-3.49*	-	I [1]	No Cointegration
	Log S	CAB/Y	I [1]	-0.24	-0.82	-7.04*	I [2]	No Cointegration
	Log S/Y	CAB/Y	I [1]	-1.26	-3.32*	-	I [1]	No Cointegration
	ΔS	FCI	I [1]	-5.25*	-	-	I [0]	Cointegration
	S/Y	FCI	I [1]	-2.78*	-	-	I [0]	Cointegration
	Log S	FCI/Y	I [1]	-2.76*	-	-	I [0]	Cointegration
	Log S/Y	FCI/Y	I [1]	-2.85*	-	-	I [0]	Cointegration
Real Variable	Log S	Log Y	I [1]	-2.65*	-	-	I [0]	Cointegration
	Log S/Y	Log Y	I [1]	-2.65*	-	-	I [0]	Cointegration
	Log S/Y	Log ΔY	I [1]	-3.43*	-	-	I [0]	Cointegration
Demographic Variable	S	DEP$	I [2]	-0.64	-0.98	-3.78*	I [2]	No Cointegration
	Log S	ΔDEP	I [1]	-0.95	-3.70*	-	I [1]	No Cointegration
	Log S/Y	ΔDEP	I [1]	-1.92**	-	-	I [0]	Cointegration
				Mackinnon Critical Values : 1% = -2.637 5% = -1.952 10% = -1.621				

ADF test equation for unit root test of residual is without a constant and trend, and includes one-period lag of the dependent variable.
@ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.

* = Significant at 1%, ** = Significant at 5%, *** = Significant at 10%

$ Mackinnon Critical Values for DEP [the sample period taken for DEP analysis is 1970-2000]:
1% = -2.649 5% = -1.954 10% = -1.622

Based on the cointegration analysis, the study comes to the conclusion that saving shares a long-run relationship with all the macro variables identified in the study except the rate of interest [INT] and the current account balance [CAB]. The same have been omitted from the functions.

The following saving functions specify the long-run relationships as derived from Table 3.

f^n [1] S = f [TR]

f^n [2] Log [S] = f [Log (WPI), Log (FD/Y), Log (TR), ΔEXP, Log (TOT), FCI/Y, Log (Y)]

f^n [3] S/Y = f [FD/Y, EXP/Y, FCI]

f^n [4] Log [S/Y] = f [Log (WPI), Log (FD/Y), Log (TR), Log (EXP/Y), Log (TOT), FCI/Y, Log (Y), Log (ΔY), ΔDEP]

f^n [5] ΔS = f [FCI]

The f^n [2] and f^n [4] have been used for the multivariate analysis to suggest the model of dynamic relationship of saving with macro variables and also to find out the respective elasticities. These two functions incorporate all the macro economic variables in their respective specifications, including the variables specified in other functions. The f^n [4] of log [S/Y] includes two alternative specifications of income: log [Y] and log [ΔY]. These two have been alternatively used along with other variables. Hence, for final analysis, the following three functions have been selected:

f^n [a] Log [S] = f [Log (WPI), Log (FD/Y), Log (TR), ΔEXP, Log (TOT), FCI/Y, Log (Y)]

f^n [b] Log [S/Y] = f [Log (WPI), Log (FD/Y), Log (TR), Log (EXP/Y), Log (TOT), FCI/Y, Log (Y), ΔDEP]

f^n [c] Log [S/Y] = f [Log (WPI), Log (FD/Y), Log (TR), Log (EXP/Y), Log (TOT), FCI/Y, Log (ΔY), ΔDEP]

4.3.4 Multivariate Regressions: The Complete Model

The above mentioned functions [f^n [a], f^n [b] and f^n [c]] have been estimated using Ordinary Least Squares method. The best fit regression equation has eventually been

used as the final model to understand the dynamics of inter-relationship between saving and macro economic variables.

Table 4 presents the regression results of the estimation of the functions listed above.

Table: 4 **Multivariate Regressions**

Time Period: 1970-71 to 2000-01
Method: Ordinary Least Squares

	Coefficients of the estimated equations [t -values]		
	Dependent Variable		
#Equation No:	*1*	*2*	*3*
Independent Variables	**Log S**	**Log S/Y**	**Log S/Y**
Constant	-0.94 [3.37]	0.37 [1.00]	0.17 [0.55]
Log WPI	-0.125 [0.55]	0.00 [0.01]	-0.71 [3.82]
Log FD/Y	-0.055 [1.24]	0.08 [1.69]	0.13 [2.71]
Log TR	0.44 [2.99]	0.47 [3.76]	0.29 [3.49]
ΔEXP	4.11E-07 [0.62]	-	-
Log EXP/Y	-	0.37 [4.39]	0.44 [4.89]
Log TOT	-0.12 [1.29]	0.00 [0.01]	-0.21 [3.23]
FCI/Y	-1.12 [1.39]	-1.49 [2.28]	-1.18 [1.82]
Log Y	0.78 [3.99]	-0.46 [2.35]	-
Log ΔY	-	-	0.125 [2.71]
Δ DEP	-	-1.025 [0.25]	0.52 [0.135]
R^2	*0.99*	*0.92*	*0.93*
$\bar{R}^2$	*0.99*	*0.89*	*0.89*
D-W	*1.06**	*1.66^*	*2.13$*
F-statistic	*2302.90*	*30.58*	*32.83*

Equation 1 has been estimated for the time-period 1970-71 to 2003-04. Equation 2 and 3 have been estimated for the time-period 1970-71 to 2000-01 as data for dependency ratio [DEP] was available upto 2000-01 only.

* indicates that there is no decision of positive first-order serial correlation at 5 % level of significance.

^ indicates that there is no decision of positive first-order serial correlation at 5% level of significance.

$ signifies that there is no evidence of either positive or negative first-order serial correlation at 5 % level of significance.

The major findings of these regression results are:

i. Majority of the macro variables share the expected signs and statistically significant relationship with the saving variables.

ii. Based on the overall listing of the variables, significance of the coefficients [t-values], coefficient of determination [R^2] and Durbin-Watson autocorrelation statistic [D-W], Equation No: 3 [from Table 4] turns out to be the best fit equation and has been used for policy inferences.

The Complete Model

Log S/Y = 0.17 - 0.71 Log [WPI] + 0.13 Log [FD/Y] + 0.29 Log [TR] + 0.44 Log [EXP/Y]
[0.55] [3.82] [2.71] [3.49] [4.89]

- 0.21 Log [TOT] - 1.18 FCI/Y + 0.125 Log [ΔY] + 0.52 ΔDEP
[3.23] [1.82] [2.71] [0.135]

R-squared:	0.925956	*Mean dependent variable:*	-0.696558
Adjusted R-squared:	0.897749	*S.D. dependent variable:*	0.062622
S.E. of regression:	0.020024	*Akaike info criterion:*	-4.740408
Sum squared residual:	0.008420	*Schwarz criterion:*	-4.320049
Log likelihood:	80.10612	*F-statistic:*	32.82692
Durbin-Watson statistic:	1.658818	*Prob [F-statistic]:*	0.000000

The important observations made from the complete model are:

i. The macro variables - FD/Y, TR, EXP/Y, ΔY and ΔDEP share a positive and statistically significant relationship with S/Y. The t-value for ΔDEP is however weak.

ii. The macro variables that share a negative relationship with S/Y are - WPI, TOT and FCI/Y.

iii. The nature of relationship of the macro variables: WPI, EXP/Y, FCI/Y, ΔY and Δ DEP with S/Y are consistent with the hypothesised relationships, respectively.

iv. FD/Y, TR and TOT do not confirm to their a priori signs.

v. The coefficients generally have the expected signs and are statistically significant at 5 percent level of significance. The overall explanatory power of the equation as measured by $\bar{R}^2$ at 89.0 percent is good. R^2 value is very high at 94.0 percent. There is no indication of positive or negative first-order autocorrelation problem in the residual as D-W value is significant at 5% level of significance.

The Elasticities

The elasticities derived from the final equation refer to elasticity of saving rate with respect to:

Macro Economic Variables		Elasticity
Wholesale Price Index	[WPI]	-0.71
Fiscal Deficit as a percentage of National Income	[FD/Y]	0.13
Tax Revenue	[TR]	0.29
Exports as a percentage of National Income	[EXP/Y]	0.44
Terms-of-Trade	[TOT]	-0.21
Foreign Capital Inflow as a percentage of National Income	[FCI/Y]	-0.02
Change in National Income	[ΔY]	0.125

In an estimated regression equation in the case where dependent and independent variables are in log forms, the coefficient of independent variables indicates the constant elasticity with respect to the dependent variable. In our model, except in the case of FCI/Y and ΔDEP, all other variables are in log forms. In the case of FCI/Y, we have calculated the elasticity at its mean value.

Indian saving rate [S/Y] was found to be most sensitive to wholesale price index [WPI] with an elasticity of -0.71 followed by export rate [EXP/Y] with an elasticity of 0.44. The saving rate was found to be relatively inelastic to tax revenue [TR] and terms-of-trade [TOT]; whereas it was insensitive to the fiscal deficit rate [FD/Y], foreign capital inflow rate [FCI/Y] and change in national income [ΔY].

4.4 Conclusions, Inferences and Policy Options

The present chapter deals with the dynamics of inter-relationship between savings and macro economic variables. The chapter undertakes theoretical discussion as well as empirical testing of the relationship between savings and the following macro economic variables:

1. Monetary Sector Variables
    a. Rate of Inflation [WPI]
    b. Rate of Interest [INT]
2. Fiscal Sector Variables
    a. Budget Deficit [FD]
    b. Taxation [TR]
3. External Sector Variables
    a. Export Orientation [EXP]
    b. Terms of Trade [TOT]
    c. Foreign Capital Inflows [FCI]
4. Real Sector Variable
    a. National Income [Y]
5. Demographic Variable
    a. Dependency Ratio [DEP]

The literature on the nature of relationship between savings and macro economic variables reveals mixed views. There is no consensus on the impact of macro variables on savings. The vast literature on the inter-relationship between savings and macro variables is either in contradiction to each other or inconclusive.

The study empirically tests the relationship between macro economic variables and savings for the time period 1970-71 to 2003-04. For the empirical tests, the first step involved was to formulate a set of hypotheses on the nature of relationship between saving and macro economic variables. In the next step, cointegration approach was

used for examining the dynamics of inter-relationship between savings and macro economic variables. The estimation technique for cointegration approach involved the following steps:

1. Unit Root Test - Augmented Dickey-Fuller [ADF] test.

2. Cointegrating Regression - Estimation of the cointegrating regressions for the pairs of saving and macro economic variables, using the Ordinary Least Squares method. The cointegrating regressions are a transitory step for deriving the residual series for further analysis.

3. Cointegration Test - Augmented Engle-Granger [AEG] test for cointegration, applied to examine unit roots in the residuals.

4. Multivariate Regressions: The Complete Model - The macro economic variables that were found to share a stable long-run relationship with saving in the previous step were selected for the final analysis. Based on the cointegration analysis, a number of regressions were estimated between the macro variables and saving using the Ordinary Least Squares method.

On the basis of the functions estimated, the following final model was selected:

$$\text{Log } S/Y = \underset{[0.55]}{0.17} - \underset{[3.82]}{0.71}\ \text{Log [WPI]} + \underset{[2.71]}{0.13}\ \text{Log [FD/Y]} + \underset{[3.49]}{0.29}\ \text{Log [TR]} + \underset{[4.89]}{0.44}\ \text{Log [EXP/Y]}$$

$$- \underset{[3.23]}{0.21}\ \text{Log [TOT]} - \underset{[1.82]}{1.18}\ \text{FCI/Y} + \underset{[2.71]}{0.125}\ \text{Log [}\Delta\text{Y]} + \underset{[0.135]}{0.52}\ \Delta\text{DEP}$$

R-squared:	0.925956	*Adjusted R-squared:*	0.897749
Durbin-Watson statistic:	1.658818	*F-statistic:*	32.82692

The important observations made from the final model are:

i. The macro variables - FD/Y, TR, EXP/Y, ΔY and ΔDEP share a positive and largely a statistically significant relationship with the Gross Domestic Saving Rate [S/Y].

ii. The macro variables sharing a negative relationship with S/Y are - WPI, TOT and FCI/Y.

iii. The nature of relationship of the macro variables: WPI, EXP/Y, FCI/Y, ΔY and Δ DEP with S/Y are consistent with the hypothesised relationships, respectively.

iv. FD/Y, TR and TOT do not confirm to their a priori signs.

v. The coefficients are statistically significant at 5 percent level of significance. The overall explanatory power of the equation as measured by $\bar{R}^2$ at 89.0 percent is good. R^2 value is very high at 94.0 percent. There is no indication of positive or negative first-order autocorrelation problem as D-W value is significant at 5% level of significance.

Indian saving rate [S/Y] was found to be most sensitive to wholesale price index [WPI] with an elasticity of -0.71 followed by export rate [EXP/Y] with an elasticity of 0.44. The saving rate was found to be relatively inelastic to tax revenue [TR] and terms-of-trade [TOT]; whereas it was inelastic to the fiscal deficit rate [FD/Y], foreign capital inflow rate [FCI/Y] and change in national income [ΔY].

➢ Inferences and Policy Options

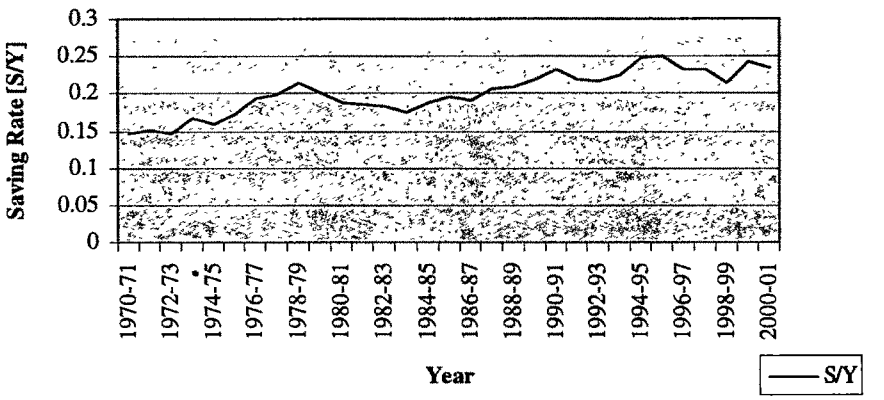
Based on our empirical results, we have carried out a discussion on the consistency of our results with other studies and also to explore policy options in the context of the past behaviour of the saving and macro variables based on the empirical results and elasticities.

Saving Rate [S/Y]

Saving Rate is defined as Gross Domestic Savings as a percentage of Nominal National Income. After trying out various alternative specifications of saving, the Saving Rate [S/Y] turned out to be the most suitable saving variable in our analysis which is in consistency with the majority of the empirical studies found in the literature.

Chart: 1

Gross Domestic Saving Rate



$$\text{Log [S/Y]} = -1.852 + 0.015\,T$$
$$[68.65] \quad [10.10]$$

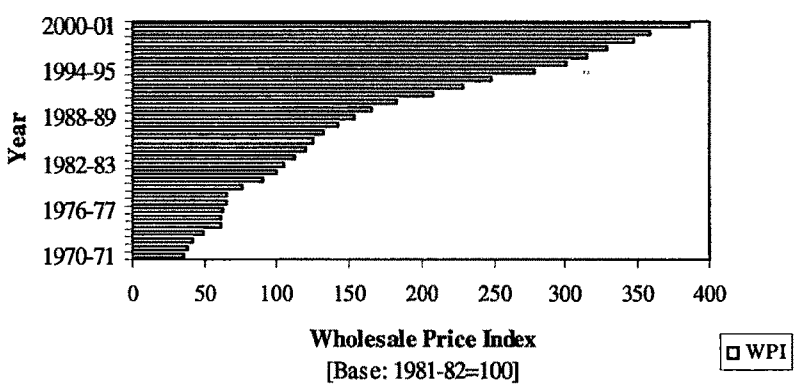
During the three decades period from 1970-71 to 2000-01, the saving rate in the country experienced an overall rising trend from 14.6 percent in 1970-71 to 23.5 percent in 2000-01. Though, the rise in saving rate has been accompanied with lots of ups and downs.

➢ Macro Variables: The Determinants of Indian Savings

1. Rate of Inflation

Chart: 2

Rate of Inflation



$$\text{Log [WPI]} = 3.569 + 0.079\,T$$
$$[152.83] \quad [62.48]$$

The wholesale price index has witnessed an overall increasing trend. It has been rising in a step-wise manner. The wholesale price index increased from 35.5 in 19970-71 to 385.8 in 2000-01.

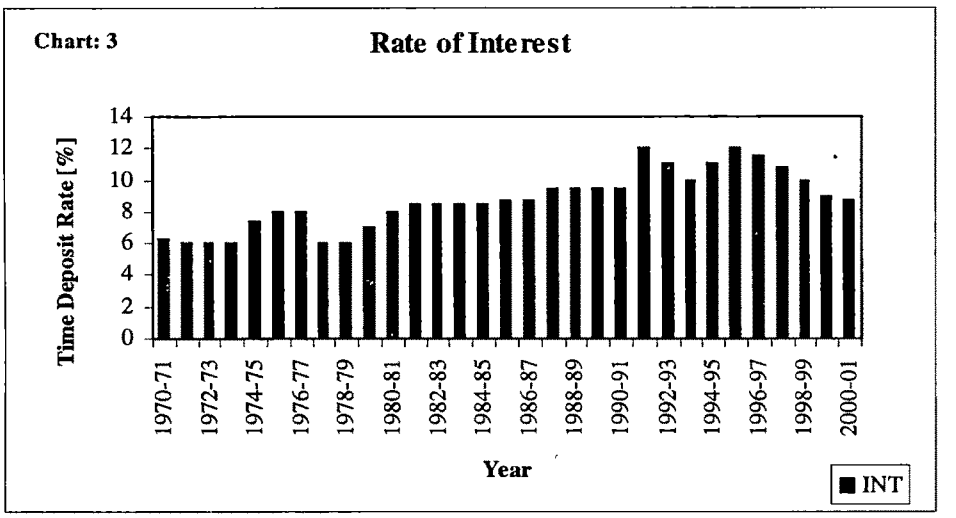
There are a large number of studies on the nature of relationship between saving and the rate of inflation, which suggest both a positive and negative relationship between inflation rate and saving. There is a controversy as to whether inflation promotes savings or discourages savings.

In our results, we have found a negative relationship between saving rate and inflation with a high elasticity of 0.71. The past behaviour of wholesale price index shows that it has been increasing over the years with a trend growth rate of 7.9 percent. A negative and high elasticity on one hand and a high trend growth of wholesale price index on the other has been resulting in depressing the saving rate in India substantially.

This negative impact of wholesale price index on saving is in consistency with the empirical results at large. The negative impact of the rate of inflation on savings has been supported by Yang [1964], Branson and Klevorick [1969] Mckinnon [1973], Howrey and Hymans [1978], Gylfason [1981] and Lahiri [1989].

The theoretical explanation to the negative saving-inflation relationship is explained by a negative income effect of inflation on savings. During inflation, if consumers resist cuts in their consumption, given the real income, the savings would be sacrificed.

2. Rate of Interest



Log [INT] = 1.823 + 0.020 T
[42.04] [8.46]

The interest rate has shown moderate fluctuations over the years. Overall, the rate of interest in India has increased in the last three decades doubling from 6.0 percent to 12.0 percent. In the recent past however, the interest rate has shipped to around 8.0 percent.

Rate of interest is an important monetary policy variable influencing savings. Researchers are varied in their opinion on the saving-interest rate relationship. There are some who suggest a positive impact of rate of interest on savings while some who confirm a negative influence of interest rate on savings. Also, there are some who support the case for little or no interest rate elasticity of savings.

There is a vast review of literature on the relationship of saving and interest rate which are largely inconclusive. Theoretically, the rate of interest and saving relationship is examined through the direct and indirect effects of interest rate on saving. The direct impact of a change in the real rate of return on saving is felt through the income and substitution effects. A higher interest rate discourages savings for a net lender by increasing his interest earnings. The income effect of a change in interest rate on saving is thus negative. In contrast, the substitution effect

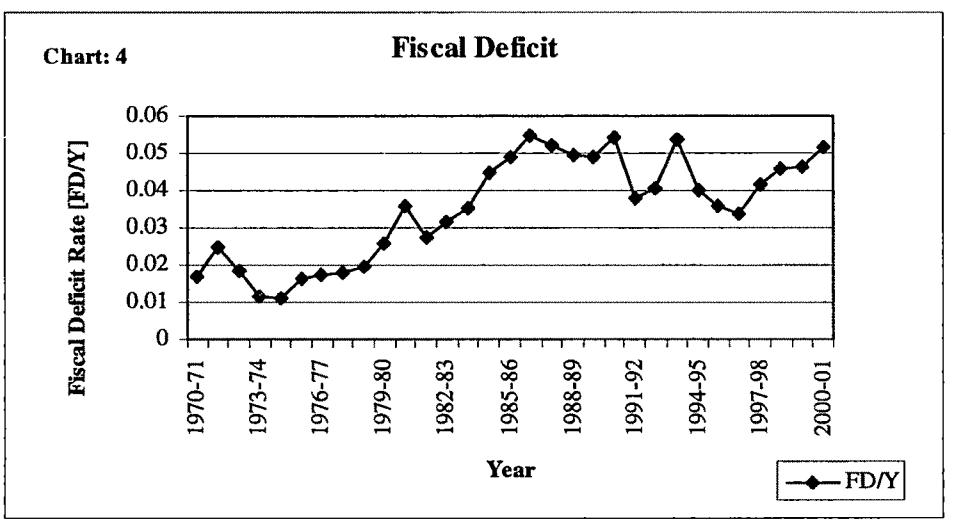
is positive. An increase in the real rate of interest induces people to postpone their consumption in favour of present savings.

The indirect impact of interest rate on savings is the wealth effect. A rise in interest rate reduces the real value of existing wealth. To maintain the real value of assets, people tend to reduce their current consumption and start saving more. The total effect of a change in the real interest rate on savings is however ambiguous as it depends on each of the three effects [income effect, substitution effect and wealth effect] on savings.

Among the available literature, there is evidence of only a negligible effect of interest rate on savings. Particularly, in low income countries, the response of savings to changes in interest rate was found to be very poor.

Interest rate does not share a long-run relationship with saving rate, hence we have excluded it from the final model in the study.

3. Fiscal Deficit



Log [FD/Y] = -4.108 + 0.041 T
[37.65] [6.96]

Fiscal deficit as a ratio of nominal national income has been increasing over the years with many fluctuations. From a low of nearly 1.0 percent in 1973-74, it has scaled to a height of almost 5.5 percent by 1986-87. The late nineties onwards, fiscal deficit rate exhibited a steadily rising trend. The trend growth rate of fiscal deficit has been 4.1 percent.

There are different views regarding the impact of budget deficit on private savings. The relationship is often viewed as one between government savings and private savings. According to the conventional view, a decline in government savings leads to a decline in private savings which cumulatively have a downward impact on national savings. On the contrary, the Keynesian view suggests that higher temporary government dissavings encourage private sector consumption. In the presence of underutilized production capital in the economy, an increase in aggregate demand stokes higher income through the operation of the multiplier effect. Hence, private sector income and savings will increase. However, the extent to which the rise in private savings will offset the decline in government savings is ambiguous.

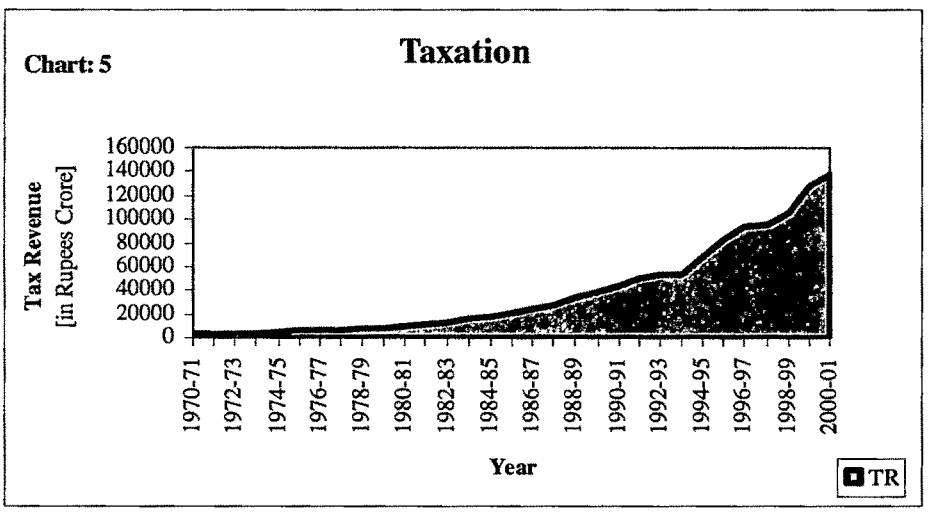
In our results, fiscal deficit rate [FD/Y] has been found to share a positive relationship with saving rate. The saving rate is inelastic to the fiscal deficit rate with an elasticity value of 0.13.

The indication of a positive relationship between fiscal deficit and saving in our analysis implies that a rise in government dissavings [fiscal deficit] has a positive impact on domestic savings which in the Indian case constitutes the savings of the private sector. This finding indicates the existence of Ricardian Equivalence in India with dissavings in the public sector being offset by savings in the private sector. The household sector currently contributes almost 85.0 percent of gross domestic

savings, the remaining being supplied by the private corporate sector as the public sector is a net negative saver.

Our finding of a positive impact of government deficit on saving gets support from the following studies such as Kochin [1974], Barro [1978], Tanner [1979], Kormendi [1983] and Seater and Mariano [1985].

4. Tax Revenue



Log [TR] = 7.785 + 0.134 T
[287.24] [90.43]

The behaviour of tax revenue receipts of the government over the past three decades shows an increasing trend in tax revenue collections. There has been a gradual and consistent rise in tax revenue from 1970-71 to 1992-93. Thereafter, there was a slight fall in tax revenue for one year, immediately followed by a sharp increase upto 1996-97. The increase in tax revenue receipts continued through the second half of the nineties with minor fluctuations, peaking at Rs. 136700 crores in 2000-01.

Studies on tax-savings relationship have arrived at diverse results with some supporting the negative impact of taxation on savings, others confirming the positive

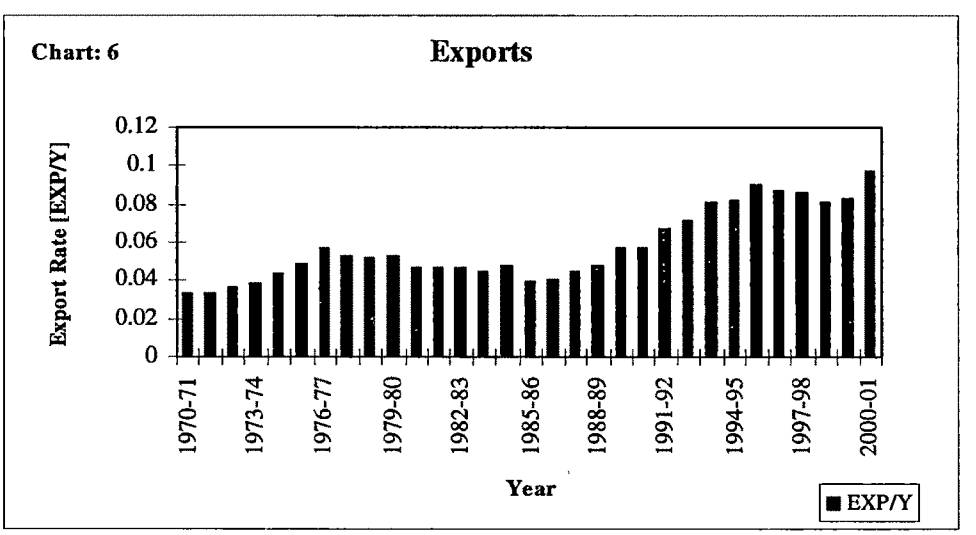
reaction of private savings to tax policies, and few others who find tax increases to be an inefficient means of raising savings.

In our results, tax revenue is found to have a positive impact on saving rate with an elasticity of 0.29. Tax revenue collections of the government of India have been increasing steadily and substantially over the years. The trend growth rate of tax revenue is very high at 13.4 percent.

Our results are in consistency with the studies by Carroll and Summers [1987] and Poterba, Venti and Wise [1996] which have also found a positive relationship between tax revenue and savings. The empirical evidence however largely supports the negative impact of tax on savings.

Theory states that the positive effect of tax on savings is felt through tax incentives and tax shelters offered by the government. The tax incentives provided by lower-tax countries have often resulted in a more efficient use of productive resources by shifting resources from unproductive sectors to productive sectors, thereby increasing savings in the long-run. Studies also suggest that a tax-mix and tax-policy can promote savings in the country such as 'expenditure tax' which would discourage consumption and promote capital formation. In the Indian case too, tax revenue sharing a positive relationship with saving rate and a growth rate of over 13.0 percent has been effective in raising the saving rate in the country.

5. Exports



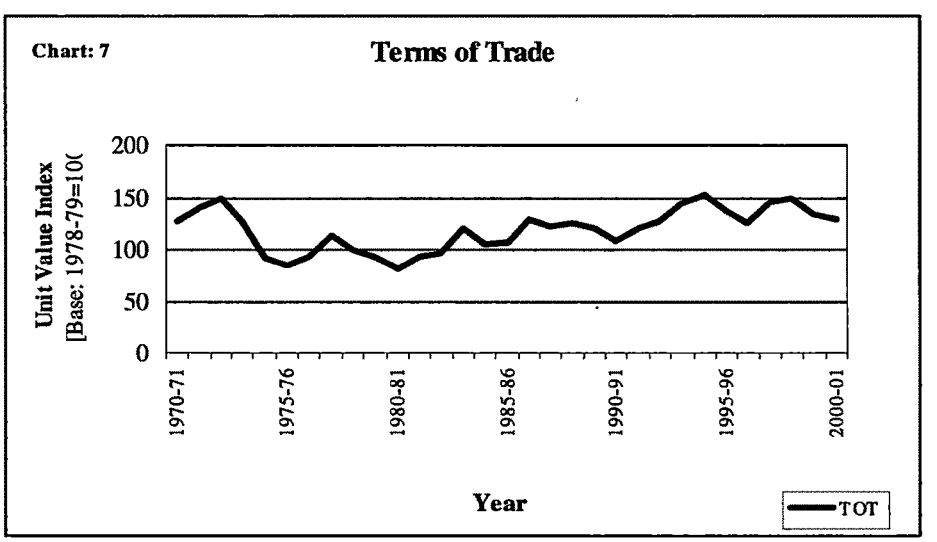
Log [EXP/Y] = -3.382 + 0.030 T
[56.24] [9.16]

Exports as a percentage of national income have been moving in waves. Rising, falling and then rising again with greater amplitude. The export rate shot up from a low of 3.4 percent in 1970.71 to the 10.0 percent mark in the history of the nation.

Our results confirm a positive relationship between export orientation and savings. The export rate elasticity of saving has been found to be 0.44. This result on export-saving relationship is consistent with that of the literature which has largely hypothesised a positive relationship between export orientation and savings. Maizels [1968], Lee [1971] and Papanek [1973] support the positive impact of exports on savings.

In case of India, export orientation has been augmenting the saving rates. This gets support from the theoretical explanation on the relationship between exports and savings which suggests a two-way impact of exports on savings. On one hand, export orientation augments government revenue from export taxes and hence government savings increase. On the other, an increase in exports may increase private savings, as exporters have a relatively higher propensity to save.

6. Terms of Trade



Log [TOT] = 4.620 + 0.009 T
[77.80] [2.82]

Terms-of-trade has experienced an upward rising trend with moderate fluctuations during the three decades. The movements in terms of trade have been uneven over the past three decades. The terms-of-trade has ranged from the lowest 80.8 to the highest 150.0 during the thirty years gap.

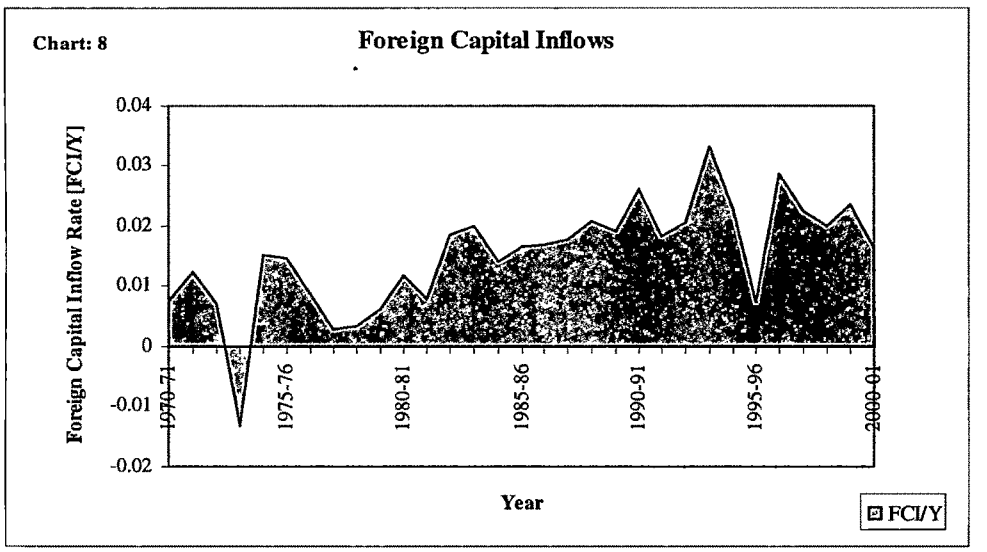
The literature is divided on the nature of relationship between terms-of-trade and saving. Some studies support a positive effect of terms-of-trade on saving while a few others found a negative relationship between them. Economic theory as well as empirical evidence on the nature of relationship between terms-of-trade and savings is ambiguous.

Our results confirm a negative impact of terms-of-trade on saving rate in India. Saving rate is found to share a weak elasticity of 0.21 with the terms-of-trade. After the mid-seventies, the terms-of-trade has experienced an overall rising rend with a trend growth rate of 0.9 percent only. With a very low elasticity between saving and terms-of-trade, along with a low growth rate of terms-of-trade, this variable turns out to be an insignificant determinant of saving rate in the country.

The negative relationship between terms-of-trade and saving rate arrived in the study is in confirmation with Obstfeld [1982], Macklem [1990], Sachs [1981] and Athukorala and Sen [2001] who also found a negative influence of terms-of-trade on savings. Majority of these studies have tried to see the impact of permanent shocks of terms-of-trade on savings.

As in our analysis, the theory too suggests a negative influence of terms-of-trade on savings. When an economy suffers a terms-of-trade deterioration, the real wealth is lowered. In order to converge to the target level of wealth, it must increase savings.

7. Foreign Capital Inflows



Log [FCI/Y] = -4.937 + 0.040 T
[26.56] [4.05]

Foreign capital inflows as a percentage of nominal national income witnessed wide oscillations over time. However, the overall trend in foreign capital inflow rate has been upward rising. The foreign capital inflow rate has tripled from the lowest of -1.3 percent to a high of 3.3 percent in the gap of 20 years from 1973-74 to 1993-94.

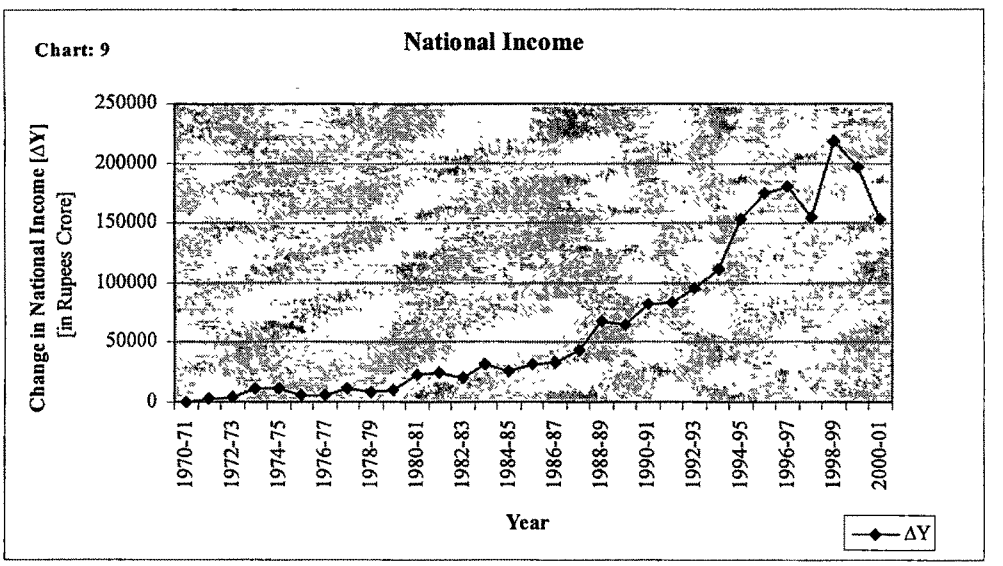
The relationship between foreign capital inflows and domestic savings has been strongly debated in the literature. There is an ongoing debate as to whether foreign capital inflows are complementary or substitute to domestic savings.

In our results, foreign capital inflow rate [FCI/Y] has a negative impact on the domestic saving rate [S/Y] with a low elasticity of 0.02. This negative relationship between foreign capital inflows and domestic savings indicates the relevance of a substitution hypothesis in case of India. According to the substitution hypothesis, an increase in foreign capital inflows depresses domestic savings in the country since

foreign capital receipts are used partly to finance consumption and only partly for increasing investment.

Our finding of an inverse relationship between foreign capital inflows and domestic savings gets support from a large group of economists such as Leff [1968], Rahman [1968], Chenery and Eckstein [1970], Griffin [1970], Griffin and Enos [1970], Landau [1971], Papanek [1972, 1973], Weisskopf [1972], Grinols and Bhagwati [1976], Wasow [1979], Gersovitz [1982], Joseph [1997], Reinhart and Talvi [1997] and Plies and Reinhart [1998].

8. National Income



$$\text{Log } [\Delta Y] = 8.197 + 0.139\ T$$
[73.23] [23.22]

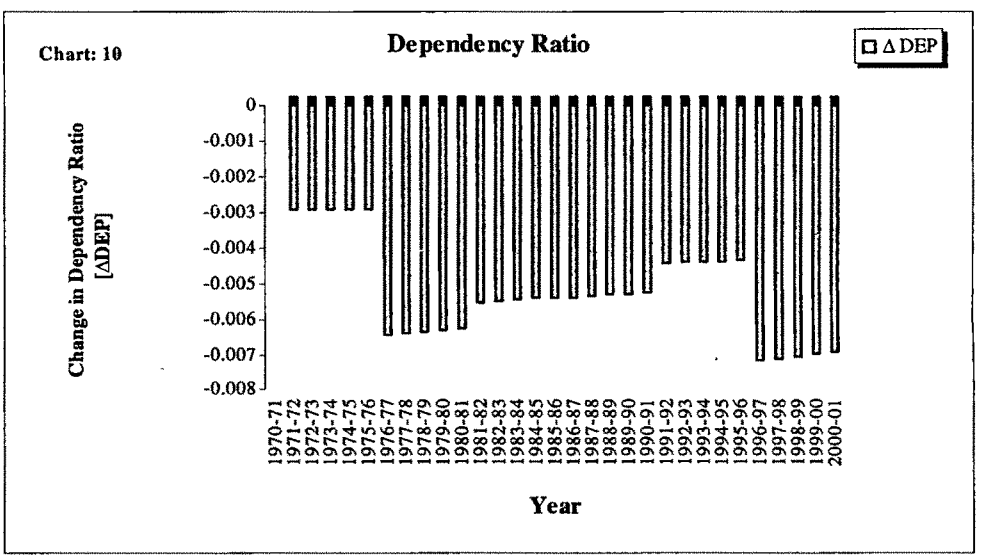
The change in income has been rising steadily with minor fluctuations throughout the three decades from 1970-71 to 2000-01. Change in income increased from almost 3300 crores of rupees in 1971-72 to nearly 180000 crores of rupees in 1996-97.

National Income is a prominent real sector variable influencing savings. The relationship between national income and saving has generally been discussed in

terms of the causal relationship between economic growth and saving. The economists are divided in their views on the growth-saving relationship. There are contradictory views with some supporting a causal chain from growth to saving while others suggesting a causal impact from saving to growth.

We found a positive impact of change in income on saving rate in India. The saving rate is inelastic to change in national income, as suggested by low saving-income elasticity of 0.13. Referring to the results of causality analysis for saving and national income, there too, the marginal propensity to save [MPS] was found to be quite low around 0.3.

9. Dependency Ratio



The dependency ratio defined as the ratio of total number of dependents to the total working population has fallen in case of India. The dependency ratio has fallen by greater magnitude in the second half of the 1970s and 1990s respectively. The biggest fall in dependency ratio was visible in 1996-97 by over 0.7.

The literature on the nature of relationship between dependency ratio and savings is inconclusive. A large group of economists support a negative influence of dependency rate on saving rate while some of them support a positive impact of dependency rate on saving rate. Some of the studies have been unable to trace any significant relationship between dependency rate and saving rate.

The dependency ratio [ΔDEP] defined as the ratio of total number of dependents [0-14 years + 65 years and above] to the total working population [15-64 years] shares a positive relationship with savings, implying thereby that the rising working population [falling dependency of population] has been enhancing the savings in India.

This result is in consistency with the studies supporting the notion that a fall in dependency ratio tends to increase the saving rate in the country. These studies are Leff [1969], Gupta [1971], Mensbrugghe [1972], Kelley [1973], Mikesell and Zinser [1973], Snyder [1974], Gupta [1975], Simon [1975], Singh [1975], Mueller [1976], Ram [1982], Modigliani and Sterling [1983], Lahiri [1989] and Muhleisen [1997].

In India, the dependency ratio has been falling with increasing magnitude over the years. In the recent years, the downward change in dependency ratio was over 0.7 percent. The fall in the proportion of dependents to the working population has been a major factor influencing the rise in saving rates in the country.

The results of the present study confirm the existence of the Life-Cycle Hypothesis in India. The life - cycle hypothesis predicts that "the higher the share of the very young and the very old [who dissave] in the population, the lower would be the saving rate." Therefore, dependency exerts a downward impact on saving rate.

This study empirically examines the relationship of gross domestic saving rate with ten important macro economic variables belonging to diverse sectors of the macro economic system.

Using the cointegration technique to find out the nature of long-run relationship between saving and these variables, the present study drops out two variables, namely current account balance [for insignificant statistical results] and rate of interest as it does not share a long-run relationship with saving rate.

The final model explaining the dynamics of inter-relationship between saving and macro economic variables includes eight macro economic variables. Out of these eight variables, five variables [fiscal deficit rate, tax revenue, export rate, change in national income and change in dependency ratio] share a positive relationship with the saving rate whereas three variables [wholesale price index, terms-of-trade and foreign capital inflow rate] share a negative relationship with saving rate.

The constant elasticity of saving rate has been high in case of wholesale price index and export rate, low in case of tax revenue and terms of trade, and inelastic in case of fiscal deficit rate, foreign capital inflow rate and change in national income.

In the context of the present economic environment with rising inflation, improving terms-of-trade and increasing foreign capital inflow are saving retarding whereas widening fiscal deficit, buoyancy in tax collections, rising export rate, high economic growth phase of the Indian economy and increasing proportion of working population are saving enhancing.

The empirical analysis in this chapter is macro in nature with the principle objective of finding out the inter-relationship of saving and macro economic variables from the macro economic perspective. The present study on Indian savings would be incomplete unless it further examines the instrument wise determinants of household savings, which is the largest contributor to the national pool of savings. This empirical issue has been discussed in the next chapter on the determinants of household savings.

Notes

1. The human wealth effect is an important element of Summers' [1981] work on interest elasticity estimates, wherein the interest elasticity of saving was estimated to be as high as 3.7. Supporting the indirect effect of interest rate on saving, summers confirms that higher rate of return reduces the present value of human wealth, thus discouraging consumption and encouraging savings.

2. Most empirical evidence does not support the prediction that individuals decumulate and exhaust their wealth during retirement. Rather, it appears that the saving rates of elderly households are not significantly lower than those of working-age households; that the elderly do not decumulate assets, or do so only slowly; and that elderly households transfer significant amounts of wealth to their offspring [Carroll and Summers (1991), Kotlikoff (1988), Weil (1994)].

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