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Chapter: 5

Determinants of Household Savings

Households contribute a lion's share in gross domestic saving. Almost three-fourth of gross domestic saving comes from the household sector. Household sector savings are held in two forms. Household savings are held as physical saving assets and financial saving assets.

The household physical savings include construction, machinery, equipments including breeding stock, draught animals, dairy cattle, and the like and stocks held by individual firms and other institutions constituting the household sector.

Household financial savings are held in a variety of saving instruments such as: Currency [CUR], Deposits [DEP], Life Funds [LF], Shares and Debentures [HH_{sh}], Provident and Pension Funds [PF], Units of the Unit Trust of India [UTI] and Claims on Government Securities and Other Assets [Others].

The structure of household saving has undergone major changes over the planning period. It has witnessed a gradual substitution from physical saving assets to financial saving instruments.

The structural changes taking place in the Indian economy opened up inter-asset substitutability options for households which led to major changes in the composition of household financial saving. There has been a gradual and definite shift within the components of household financial saving. The composition of household financial savings has witnessed a shift from currency to deposits, to shares and debentures and then towards other saving assets such as claims on government securities and small saving assets.

This study undertakes an independent and in-depth analysis of determinants of each of the household saving instruments/components.

This study purports to identify the determinants of household saving and its components. Along with household saving, household financial saving and its

components have also been analysed for identifying the determinants of the same. The household financial saving components taken for the study of determinants are currency, demand deposits, time deposits, life funds and household investment in shares and debentures.

Three of the leading components of household saving in financial assets, namely currency with the public, demand deposits and time deposits are important policy variables. Firstly, they are the major constituents of saving. Secondly, they are important determinants of the value of money multiplier in a country. Thirdly, these three variables are the most important components of the money supply measurement.

On account of the importance of currency, demand deposits and time deposits, a large number of researches has been carried out on the behaviour and determinants of these variables from the demand for and supply of money view points also.

A very few studies have analysed the determinants for other components of household financial saving, namely life funds and household investment in shares and debentures.

The present chapter has been divided into five sections. The *first section [5.1]* presents the review of the vast literature on the determinants of household savings. The *second section [5.2]* provides the determinants of household savings in India, identified by this research study. A detailed outline of the methodology used for empirically estimating the household saving functions have been given in *section three [5.3]. Section four [5.4]* presents the empirical results and findings. The *last section [5.5]* concludes the chapter with a discussion on the empirical results and brings out, inferences and policy options.

5.1 Literature Review

An elaborate review of literature exists on the theoretical as well as empirical analysis of the determinants of household saving and its components. Various studies have developed macro econometric models for components of household financial saving for identifying the determinants of household financial saving

assets. The present chapter has reviewed the following studies: Mammen [1967], K.L. Gupta [1970], G.S. Gupta [1973], Ahluwalia [1979], Rao-Venkatachalam-Vasudevan [1981], Pandit [1984], Pani [1984], Chakrabarty [1987], Rangarajan and Arif [1990], Bose [1994], Jadhav [1994], Koğar [1995], Muradoglu and Taskin [1996], Callen and Thimann [1997], Cassino, Misich and Barry [1997], Ul Haque, Pesaran and Sharma [1999], Nakagawa and Shimizu [2000], Akinci [2003], Dirschmid and Glatzer [2004], Dasgupta and Gupta [2005], Halicioglu and Ugur [2005], Nair [2005] and Rao and Singh [2006].

The present section critically examines the earlier studies and literature on the determinants of household saving and its components.

Household Saving [HHS]

There are a large number of studies which have analysed the determinants of household savings. Some of the most referred studies on this aspect are Muradoglu and Taskin [1996], Callen and Thimann [1997], UL Haque and Sharma [1999], Dirschmid and Glatzer [2004] and Nair [2005].

All the studies have specified household saving as the Household Saving Rate. A summary of the determinants of household savings identified by various studies are given below:

Determinants of Household Saving Rate

1. Personal Disposable Income: Nair [2005]
2. Real Interest Rate: Muradoglu and Taskin [1996], Callen and Thimann [1997], Ul Haque, Pesaran and Sharma [1999], Dirschmid and Glatzer [2004] and Nair [2005]
3. Inflation Rate: Muradoglu and Taskin [1996], Callen and Thimann [1997], Ul Haque, Pesaran and Sharma [1999], Dirschmid and Glatzer [2004] and Nair [2005]
4. Young Dependency Ratio: Callen and Thimann [1997], Nair [2005]

5. Old Dependency Ratio: Callen and Thimann [1997], Nair [2005]
6. Overall Dependency Ratio: Muradoglu and Taskin [1996]
7. Financial Liberalization Index: Nair [2005]

There are some other determinants also which have been used in various studies.

Muradoglu and Taskin [1996] preferred other determinants such as trend per capita household income, trend per capita income, growth rate of trend per capita income, wealth to income ratio and foreign savings to income ratio in the household saving equation.

Callen and Thimann [1997] surveyed a large number of household saving determinants for 21 OECD countries for the time period 1975-1995. These are public saving rate, corporate saving rate, level of per capita income, growth rate of household disposable income, unemployment rate, tax ratio, government transfers, outstanding consumer debt ratio and outstanding credit cards per capita [proxies for financial deregulation].

Ul Haque, Pesaran and Sharma [1999] have taken GDP growth, wealth endowment, demographic trends and public finances as explanatory variables in combination with those stated above.

Dirschmid and Glatzer [2004] estimated the saving function for a long sample period from 1960 to 2002. They estimated the influence of additional variables such as growth rate of real disposable household income, social security expenditure and budget balance on household saving.

The study by Nair [2005] was found to be only one to analyse the impact of income variable on household savings.

Household Saving in Financial Assets [FA]

Household saving in financial assets [FA] refers to household financial savings net of financial liabilities.

There is only one study [Nakagawa and Shimizu, 2000] that estimated the household financial saving function. The dependent variable in this study was defined as Change in Ratio of Financial Asset.

Studies have mostly formulated models for major components of household financial saving. The focus has been mainly upon three financial assets: currency, demand deposits and time deposits. Only one study [Bose, 1994] has developed models for determinants of life funds and household investment in shares and debentures.

Determinants of Household Saving in Financial Assets

Nakagawa and Shimizu [2000] was the only study that examined the determinants of household financial saving. The time period of the study ranges from 1960 to 1998.

The determinants of household financial saving identified by the authors are:

1. Nominal Rate of Return on Assets
2. Rate of Return on Stocks
3. Change Rate in Annual Income
4. Ratio of the Elderly
5. Expected Inflation Rate

Currency [CUR]

Currency is the most liquid form of household financial saving. It is a flow item. Currency held by the public includes notes in circulation, rupee coins in circulation, small coins in circulation and cash with banks. It is obtained as a residual by deducting the amount of currency held by cooperatives [excluding cooperative banks], general insurance corporations and their subsidiaries, local authorities and port trusts from the total currency with the public. Currency, however, yields only

convenience but no income to the holder. The demand for currency is mainly to cater to the day-to-day needs of transactions apart from being necessitated by precautionary and speculative motives.

Various models have been developed for the determinants of currency. Currency has been defined in both nominal and real terms in the studies referred. The most commonly identified determinants of currency are income, rate of interest, lag of the dependent variable and time trend.

A large number of additional determinants of currency have also been examined. These are, namely expected rate of inflation, bank credit for food procurement, rate of change in prices in respect of sensitive commodities, inflow of foreign remittances, fiscal deficit, change in RBI's net foreign assets, government's total borrowings outside the RBI, number of commercial bank branches, non-human wealth and the lag of dependent variable, to name some of them.

The following specifications of currency have been observed from the literature reviewed:

1. Nominal Currency Held by the Public:	Mammen [1967], G.S. Gupta [1973], Bose [1994]
2. Nominal Incremental Currency:	Rao, Venkatachalam and Vasudevan [1981], Pani [1984]
3. Real Currency Held by the Public:	K.L. Gupta [1970], Ahluwalia [1979], Pandit [1984], Chakrabarty [1987], Bose [1994], Jadhav [1994]

Determinants of Currency

1. Income

Almost all the studies have taken national income as the variable influencing the demand for currency. Income has been taken as nominal income for currency functions in nominal terms while real income is used for functions in real terms.

i. Nominal Income:	Mammen [1967], G.S. Gupta [1973], Rao, Venkatachalam and Vasudevan [1981]

ii. Real Income: K. L. Gupta [1970]Ahluwalia [1979], Pandit [1984], Bose [1994], Jadhav [1994]

iii. Change in Real Income: Chakrabarty [1987]

2. Rate of Interest

One of the important determinants of currency is the rate of interest. Different measures of interest rate have been used.

i. Short-term deposit rate: Mammen [1967], Ahluwalia [1979], Pandit [1984]

ii. Time deposit rate: G.S. Gupta [1973], Rao, Venkatachalam and Vasudevan [1981], Bose [1994]

iii. Real call money rate: Jadhav [1994]

The study by K.L. Gupta [1970] has examined the influence of four different types of interest rates simultaneously on currency. These are short-term treasury bill rate, rate of return on private securities, time deposit rate and long-term government securities rate.

3. Number of Commercial Bank Branches: Bose [1994]

4. Expected Inflation Rate: Ahluwalia[1979], Pandit [1984]

5. Lag of Dependent Variable: K.L.Gupta[1970],Pandit [1984], Chakrabarty[1987],Bose[1994], Jadhav [1994]

Akinci [2003] developed a model for real currency holdings with price level, real private consumption expenditure, interest rate on government securities and nominal exchange rate as determinants of real currency. His analysis pertains to Turkey using quarterly data for 1987 Q1 to 2003 Q3.

Studies by Koğar [1995] and Cassino, Misich and Barry [1997] have investigated the demand for money determinants. Koğar [1995] estimated a model for real money balances with real income, inflation rate and rate of change of exchange rate as the determinants. On the other hand, Cassino, Misich and Barry [1997] analysed the

impact of price level, level of real output, interest rates and inflationary expectations [representing opportunity cost of holding money] on nominal money balances.

A study by Halicioglu and Ugur [2005] evaluated the determinants for real narrow money stock per capita taking real national income per capita, interest rate and nominal exchange rate as the determinants of demand for money.

Another study by Rao and Singh [2006] undertaken for the time period 1953-2003 for India, has examined the impact of real income, nominal time deposit rate and lag of dependent variable on real currency plus demand deposits. They have not taken the components of financial saving separately.

A wide spectrum of determinants of currency has been identified in the reviewed literature, though many are dropped out for their insignificant influence.

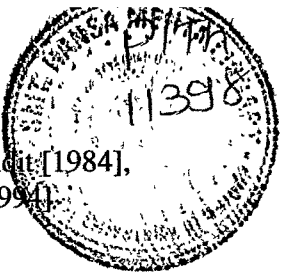
Demand Deposits [DD]

Demand deposits are deposits held in banks which are payable on demand through cheque or otherwise. Among deposits, it is only demand deposits which serve as a medium of exchange as their ownership can be transferred through cheques and clearing arrangement. They are also known as money at call or overnight money.

Demand deposits are as good as currency since both are non-interest bearing. However, they are not entirely homogeneous. Demand deposits are referred to as near money. They are characterized by lesser liquidity but a greater degree of safety in comparison to currency. These are primarily held as transaction balances and yield little or no income to the bearer. The same set of factors that influence currency might influence demand deposits as well. Various models for determinants of demand deposits have been presented in the literature.

The models for determinants of demand deposits have been formulated with nominal as well as real demand deposits. Demand Deposits have been defined in a number of ways.

1. Nominal Demand Deposits: Mammen [1967], G.S. Gupta [1973], Rao, Venkatachalam and Vasudevan [1981], Bose [1994]



2. Real Demand Deposits: K.L. Gupta [1970], Pandit [1984], Bose [1994], Jadhav [1994]

3. Real Bank Deposits: Chakrabarty [1987]

4. Nominal Incremental Bank Deposits: Rangarajan and Arif [1990]

Determinants of Demand Deposits:

The main determinants identified for demand deposits are income, rate of interest, number of commercial bank branches, expected inflation rate and lag of the dependent variable. All of these determinants for demand deposits have also been identified as determinants of currency.

1. Income

Among the determinants of demand deposits, income is considered as the most important determinant. Income has been defined alternatively as national income and non-agricultural income in nominal and real terms.

i. Nominal National Income: Rao, Venkatachalam and Vasudevan [1981], Bose [1994]

ii. Real National Income: K.L. Gupta [1970], Chakrabarty [1987], Bose [1994], Jadhav [1994]

iii. Nominal Non-agricultural Income: Mammen [1967], G.S. Gupta [1973], Rao, Venkatachalam and Vasudevan [1981], Bose [1994]

iv. Real Non-agricultural Income: Pandit [1984]

Some of the studies such as Rao-Venkatachalam-Vasudevan [1981] and Bose [1994] have simultaneously taken both nominal national income and nominal non-agricultural income as a percentage of total income as determinants of demand deposits. Besides, Bose [1994] also tried to examine the influence of real national income on real demand deposits.

2. Rate of Interest

The other important determinant of demand deposits is the rate of interest. Various kinds of interest rates have been taken by different studies for demand deposit models, namely, loan rate, short-term interest rate, rate of return on government bonds, time deposit rate, rate of return on private securities, real weighted average of fixed deposit rates and real call money rate.

i. Loan Rate:	G.S. Gupta [1973]
ii. Short-term Interest Rate:	Mammen [1967], Pandit [1984]
iii. Time Deposit Rate:	K.L. Gupta [1970], Rao, Venkatachalam and Vasudevan [1981], Chakrabarty [1987], Bose [1994]
iv. Rate of return on private securities:	K.L. Gupta [1970]

Jadhav [1994] used real weighted average of fixed deposit rates and real call money rate simultaneously in the models for demand deposits.

3. Number of Commercial Bank Branches:	Bose [1994]
4. Expected Inflation Rate:	Pandit [1984], Jadhav [1994]
5. Lag of Dependent Variable:	K.L. Gupta [1970], Pandit [1984], Chakrabarty [1987], Jadhav [1994]

Time Deposits [TD]

Time deposits have a fixed term of maturity and are not payable on demand nor can cheques be drawn on them. These can be withdrawn only after maturity of the fixed time period. Time deposits are interest bearing deposits that have to be converted into either cash or demand deposits before they can be spent. Time deposits are the least liquid of the three components of broad money stock. Nonetheless, they are characterized by a greater degree of safety and profitability.

Studies have arrived at functions for determinants of time deposits specified in nominal as well as real terms.

Largely the studies reviewed have identified income, rate of interest, number of commercial bank branches and time trend as the determinants of time deposits. The same determinants were identified for demand deposits as well.

1. Nominal Time Deposits: Mammen [1967], G.S. Gupta [1973], Ahluwalia [1979], Bose [1994]

2. Real Time Deposits: Bose [1994]

Determinants of Time Deposits

1. Income

Income is an important determinant of time deposits. Different measures of income have been used as determinants of time deposits.

i. Nominal national income: Mammen [1967], Bose [1994]

ii. Real national income: Bose [1994]

iii. Nominal non-agricultural income: G.S. Gupta [1973]

iv. Real non-agricultural income: Ahluwalia [1979]

2. Rate of Interest

Different definitions of rate of interest have been used by different studies. At least three studies, Mammen [1967], G.S. Gupta [1973] and Ahluwalia [1979] have used two alternative definitions of interest rate simultaneously in the models for determinants of time deposits. The most commonly used interest rate variable is the time deposit rate of interest.

Rate of Interest has been defined as -

i. Time Deposit Rate: Mammen [1967], Ahluwalia [1979], Bose [1994]

ii. Rate of Return on Government Securities: G.S. Gupta [1973], Ahluwalia [1979]

iii. Loan Rate: G.S. Gupta [1973]

iv. Short-Term Deposit Rate: Mammen [1967]

Other determinants of time deposits are -

3. Number of Commercial Bank Branches: Bose [1994]
4. Time Trend: G.S. Gupta [1973]

A study by Dasgupta and Gupta [2005] established a demand model for determinants of broad money. The time period of the study is 1990-2000 for the long-run demand estimation and 1997-2000 for the short-run demand estimation. The following independent variables were identified for the long-run broad money demand functions: nominal GDP, permanent income and gross capital formation in the economy. The determinants for short-run demand equation were monthly estimates of GDP, savings by Indians, interest rates and lag of the dependent variable [monthly broad money supply].

Life Funds [LF]

Life funds are an important component of household financial saving. They include life insurance, postal insurance and state insurance funds. Life funds are contractual and compulsive in nature. These are long-term commitments which guarantee financial cover for contingencies like death and disability.

Life fund is the only contractual saving instrument for which a saving model has been developed. In the vast literature on savings, Bose [1994] was found to be the only study that estimated a saving function for determinants of life funds. He fitted a log-linear equation for Life Funds upon Personal Disposable Income. The analysis period spans over 1970-71 to 1992-93. He found personal disposable income to be a highly significant variable explaining savings in life funds. The elasticity of household saving in life funds with respect to personal disposable income was found to exceed unity.

Household Investment in Shares and Debentures [HH_{sh}]

Household investment in shares and debentures is derived residually as the total investment in shares and debentures less the intra-sectoral investments and investments by all other sectors.

Not many studies have analysed this component of household financial saving. Bose [1994] estimated simple linear as well as log-linear regressions for Household Investment in Shares and Debentures by regressing it upon the Index of all India Industrial Securities [Ordinary Share Prices]. The time period for the analysis covers 1970-71 through 1992-93.

Ordinary share prices were found to be a significant explanatory variable of household investment in shares and debentures. The elasticity of household investment in shares and debentures to ordinary share prices was greater than unity.

5.2 Model Specifications and Hypotheses

Based on the review of literature, as discussed in the earlier section, the present section identifies the determinants of aggregate household savings as well as its components as given in the respective saving functions along with the hypotheses formulated. To avoid the repetition of the specifications of the variables as well as to economise on the space, the abbreviations and definitions of the variables identified in the study have been given separately in Section 5.3.1 under methodology.

Household Saving [HHS]

a. Household Saving Function

$$HHS = f\left[Y, INT, PCNB_{-1}, \Pi^{e}_{-1}, HHS_{-1}\right]$$

b. Hypotheses

The hypothesized relationship between household saving and the identified determinants are:

H 1: An increase in Income [Y] tends to increase Household Saving.

H 2: Household Saving responds positively to Rate of Interest [INT].

H 3: Rate of Change in Number of Commercial Bank Branches [$PCNB_{-1}$] has a positive influence on Household Saving.

H 4: Expected Rate of Inflation [Π^{e}_{-1}] leads to increase in Household Saving.

H 5: Lag of Household Saving [HHS_{-1}] has a positive effect on current Household Saving.

Household Saving in Financial Assets [FA]

a. Function for Household Saving in Financial Assets

$$\mathbf{FA} = f\left(\mathbf{Y, INT, PCNB_{-1}, \Pi^{e}_{-1}, FA_{-1}}\right)$$

b. Hypotheses

The hypotheses on the relationship between household saving in financial assets and its determinants are stated as:

H 1: Household Saving in Financial Assets share a direct relationship with Income [Y].

H 2: Interest Rate [INT] has a positive influence on Household Saving in Financial Assets.

H 3: Rate of Change in Number of Commercial Bank Branches [$PCNB_{-1}$] and Household Saving in Financial Assets are positively related.

H 4: Expected Rate of Inflation [Π^{e}_{-1}] affects Household Saving in Financial Assets positively.

H 5: Lag of Household Saving in Financial Assets [FA_{-1}] has a positive impact on the current value of Household Saving in Financial Assets.

Currency [CUR]

a. Currency Function

$$C = f\left[Y, INT, PCNB_{-1}, \Pi^{e}_{-1}, CUR_{-1}\right]$$

b. Hypotheses

The hypothesized relationship between currency and the selected determinants are listed below:

H 1: An increase in Income [Y] leads to increase in savings in Currency.

H 2: Rate of Interest [INT] has a negative impact on Currency.

H 3: Rate of Change in Number of Commercial Bank Branches [$PCNB_{-1}$] and Currency share a negative relationship.

H 4: Expected Rate of Inflation [Π^{e}_{-1}] has a depressing effect on Currency.

H 5: Savings in Currency are positively related to the Lag of Currency [CUR_{-1}].

Demand Deposits [DD]

a. Function for Demand Deposits

$$DD = f\left[Y, INT, PCNB_{-1}, \Pi^{e}_{-1}, DD_{-1}\right]$$

Two things are worth highlighting here. One, non-agricultural income as the income variable has been given much emphasis as the determinant of demand deposits in the literature reviewed. Second, the a priori sign of the interest rate variable is not consistent between models. Different measures of interest rate vary in their direction of relationship with demand deposits. For instance, the time deposit rate of interest shares an inverse relationship with demand deposits in the RVV model and K.L. Gupta model, while it positively influences demand deposits for Chakrabarty's model and Bose's model for determinants of demand deposits.

b. Hypotheses

The hypotheses on the nature of relationship between demand deposits and the selected determinants are stated as:

H 1: Income [Y] and Demand Deposits share a positive relationship.

H 2: Rate of Interest [INT] has a positive influence on Demand Deposits.

H 3: Rate of Change in Number of Commercial Bank Branches [$PCNB_{-1}$] has a positive impact on Demand Deposits.

H 4: Expected Rate of Inflation [Π^{e}_{-1}] tends to discourage savings in Demand Deposits.

H 5: Lag of Demand Deposits [DD_{-1}] has a positive effect on current Demand Deposits.

Time Deposits [TD]

a. Function for Time Deposits

$$\mathbf{TD} = f\left(\mathbf{Y, INT, PCNB_{-1}, \Pi^{e}_{-1}, TD_{-1}}\right)$$

b. Hypotheses

The following relationship has been hypothesised between time deposits and the identified determinants:

H 1: Income [Y] exerts a positive influence on Time Deposits.

H 2: An increase in Rate of Interest [INT] encourages savings in Time Deposits.

H 3: Time Deposits are positively related to the Rate of Change in Number of Commercial Bank Branches [$PCNB_{-1}$].

H 4: Expected Rate of Inflation [Π^{e}_{-1}] tends to reduce savings in Time Deposits.

H 5: The Lag of Time Deposits [TD_{-1}] shares a direct relationship with current Time Deposits.

Life Funds [LF]

a. Function for Life Funds

$$LF = f\left(PDI,\ \Pi^{e}_{-1},\ LF_{-1}\right)$$

b. Hypotheses

The following hypotheses have been formulated for life funds and the identified determinants:

H 1: Personal Disposable Income [PDI] and Life Funds are positively related.

H 2: The impact of Expected Rate of Inflation [Π^{e}_{-1}] on Life Funds is negative.

H 3: Lag of Life Funds [LF_{-1}] has a positive impact on the current savings in Life Funds.

Household Investment in Shares and Debentures [HH_{sh}]

a. Function for Household Investment in Shares and Debentures

$$HH_{sh} = f\left(PCIND_{-1},\ INT,\ \Pi^{e}_{-1},\ HH_{sh-1}\right)$$

b. Hypotheses

The relationship between household investment in shares and debentures and the preferred explanatory variables have been hypothesized as:

H 1: The Rate of Change in Index of Industrial Securities [$PCIND_{-1}$] tends to influence Household Investment in Shares and Debentures positively.

H 2: Movements in the Rate of Interest [INT] are negatively related to Household Investment in Shares and Debentures.

H 3: Expected Rate of Inflation [Π^{e}_{-1}] has a negative impact on Household Investment in Shares and Debentures.

H 4: Household Investment in Shares and Debentures in the current period is positively related to the Lag of Household Investment in Shares and Debentures [HH_{sh-1}].

5.3 Methodology

This section discusses the variable specifications, time period of estimation, and the estimation procedure involved for finding the nature and degree of relationship between household saving components and the identified determinants.

5.3.1 Variable Specifications

➢ *Saving Instruments*

The specifications and definitions of each one of the saving variables [dependent variables] have been discussed as follows:

1. Household Saving [HHS]:

Household saving is taken as the sum total of household physical savings and household financial savings [net financial assets].

2. Household Saving in Financial Assets [FA]:

Household saving in financial assets refers to Gross Financial Saving. It is the sum total of net Household Financial Saving and Financial Liabilities of the household sector.

3. Currency [CUR]:

Currency refers to currency held by the public which consists of notes in circulation, rupee coins in circulation, small coins in circulation and cash with banks. Currency is measured in stock terms.

4. Demand Deposits [DD]:

Demand deposits are deposits of the public with banks which are payable on demand. Demand deposits are also measured in stock terms.

5. Time Deposits [TD]:

Time deposits are deposits of the people with banks which can be withdrawn only after a period of notice. Time deposits too are measured in stock terms.

Demand deposits and time deposits together constitute bank deposits. Any change in the behaviour of demand and time deposits gets reflected in the aggregate behaviour of bank deposits.

6. Life Funds [LF]:

Household saving in life funds are net of loans and advances and comprise savings through LIC premia, postal life insurance and state government's life insurance. These are measured as change in life funds annually.

7. Household Investment in Shares and Debentures [HH_{sh}]:

Household investment in shares and debentures is derived as a residual after deducting intra-sectoral investments and investments by all other sectors from total investment in shares and debentures. It is measured as annual flow of household saving in shares and debentures.

➢ *Determinants of Saving Instruments*

All the determinants identified for various saving instruments have been defined as follows:

1. Income:

Three alternative definitions of income have been used in the empirical analysis of macro-econometric modelling of household saving and its components. These are:

i. National Income [Y]:

National Income has been defined as Gross Domestic Product [GDP] at current market prices.

ii. Non-agricultural Income [YNAY]:

Income accruing from the non-agricultural sector is expressed as a percentage of total national income. It has been calculated as:

YNAY = Percentage of gross domestic product at factor cost [current prices]
– Percentage of gross domestic product at factor cost [current prices] in agriculture, fishing and forestry.

iii. Personal Disposable Income [PDI]:

Income has also been defined as personal disposable income [PDI]. Personal disposable income is the balance of personal income over payments such as direct taxes and other miscellaneous receipts of government.

2. Rate of Interest [INT]:

Rate of interest is the price of money services. It is the price that has to be paid for borrowing money. It is also called the opportunity cost of holding money. The interest rate used in the analysis refers to the rate of interest on 1 year to 3 years time deposits.

3. Rate of Change in Number of Commercial Bank Branches [PCNB]

The year 1969 marked the nationalisation of fourteen major commercial banks. There was expansion in the financial infrastructure, regional rural banks were set up and efforts were geared up to mobilize potential savings from the unbanked rural and semi-urban areas. The number of commercial bank offices in the country grew and the deposits per branch also increased. Thereby, the number of commercial bank branches in the country has become an important determinant of household financial savings.

Household financial saving in the current time period would be influenced by the number of commercial bank branches in the previous year. Therefore, the number of commercial bank branches is taken with a lag.

In the present study, the number of commercial bank branches has been specified as the rate of change in the number of commercial bank branches.

4. Lag of Dependent Variable:

Lag refers to the value of the dependent variable at the end of accounting period of the previous year.

In certain causal relations, the total influence of a change in an independent variable is not felt in the same time period that the cause occurred but is distributed over time and thus the full reaction is evoked only after some passage of time, that is, after some lag. In the context of our model, this implies that household savings in the current time period is influenced not only by values of independent variables in the current period but also by the past values of the independent variables. The effect of past values of explanatory variables gets captured in the lagged dependent variable. This has been discussed in detail by Gupta and Chawla [1979] as summarised in Box No. 1.

5. Expected Rate of Inflation [Π^e]:

Inflation means a sustained rise in the general price level. It is the proportionate rate of increase in the general price level per unit of time. Inflationary expectations are always taken along with the lag of dependent variable. The impact of inflationary expectations on household saving and its components can be determined by using the 'expectation model' as explained by Gupta and Chawla [1979], summarised in Box No.2.

The expected rate of inflation is measured as the lag of the Wholesale Price Index [WPI] for all commodities. Wholesale price index is measured as the average of weeks with the base year: 1981-82.

6. Rate of Change in Index of Industrial Securities [PCIND]:

Index numbers of all India industrial securities is equal to the annual average of ordinary share price indices provided by the RBI [Base: 1980-81=100]. In our analysis, the index of industrial securities has been specified as the rate of change in index of industrial securities. The lagged series of index of industrial securities [ordinary share price indices] has been used to calculate the rate of change in the index of industrial securities.

Box No. 1 *Distributed Lag Model*

The current value of the dependent variable depends on the current as well as past behaviour of independent variable[s]. This can be mathematically presented as:

$$Y_t = \alpha + \beta_0 X_t + \beta_1 X_{t-1} + \ldots\ldots\ldots + \beta_s X_{t-s} + U_t \qquad \text{Eq.1.}$$

Where,
Y is the dependent variable,
X's are independent variables, and
S stands for the length of the lag

Such models are called distributed lag models.

This is a partial analysis, revealing the effect of a unit change in independent variable on the dependent variable, treating all other independent variables as constants.

Estimation of the above model [Eq.1] poses problems in terms of deciding the length of the lag, reduction in the degrees of freedom caused through increased number of explanatory variables, decreased number of explanatory variables, decreased number of observations, and multi-collinearity. In order to avoid these problems, Koyck [1954] has assumed that the lag coefficients are a set of geometrically falling weights. Under this assumption, the model [Eq.1] becomes

$$Y_t = \alpha + \beta_0 X_t + \lambda\beta_0 X_{t-1} + \lambda^2\beta_0 X_{t-2} + \ldots\ldots + \lambda^s\beta_0 X_{t-s} + U_t \qquad \text{Eq.2.}$$

$$[0 < \lambda < 1]$$

Lagging equation 2 by one time period and multiplying that by λ on both sides, we have:

$$\lambda Y_{t-1} = \lambda\alpha + \lambda\beta_0 X_{t-1} + \lambda^2\beta_0 X_{t-2} + \lambda^3\beta_0 X_{t-3} + \ldots. + \lambda^{s+1}\beta_0 X_{t-[s+1]} + \lambda U_{t-1} \qquad \text{Eq.3.}$$

By subtracting equation 3 from 2, we have:

$$Y_t = \alpha[1 - \lambda] + \beta_0 X_t + \lambda Y_{t-1} + [U_t - \lambda U_{t-1}]$$

or,
$$Y_t = \alpha^* + \beta_0 X_t + \lambda Y_{t-1} + U_t^* \qquad \text{Eq.4.}$$

Where,

$$\alpha^* = \alpha[1 - \lambda]$$

$$U_t^* = U_t - \lambda U_{t-1}$$

The above equation 4 is the final model with one year lag of dependent variable. Therefore, the original distributed lag model is simplified under koyck's assumption and reduced to a lagged dependent variable model also known as an autoregressive model. This is referred to as the Koyck transformation. Such a model shows the time path of the dependent variable in relation to its past values.

Box No. 2 *Expectation Model*

Under the expectation model, the value of a dependent variable is determined in two stages. The first stage explains the variable and the second stage describes the formation of expectations. The relationship between the dependent variable and the expected value of independent variable can be mathematically expressed as:

$$Y_t = a + b\ X^e_t + U_t \qquad \text{Eq.5.}$$

$$X^e_t = a_0 X_{t-1} + a_1 X_{t-2} + a_2 X_{t-3} \qquad \text{Eq.6.}$$

Where, Y_t is the dependent variable and X^e_t stands for the expected value of X in time period t.

The current value of Y depends on the expected rather than the true value of X, for the true value is not known at the time of decision-making.

Besides, expectations are formed on the basis of past values of the variables under question. Therefore, Y_t will depend upon expectations of X. Expectations can be determined as a weighted average of the past values of X.

By substituting equation 6 in equation 5, we have

$$Y_t = a + a_0 b\ X_{t-1} + a_1 b\ X_{t-2} + a_2 b\ X_{t-3} + \ldots\ldots + U_t \qquad \text{Eq.7.}$$

Therefore, equation 7 appears in the form of a distributed lag model.

However, the question that arises here is: what should be the length of the lag? We can simplify equation 7 above, on the lines of Koyck's assumption that the weights of equation 7 decline in geometrical progression. Hence, we arrive at the following expectation model of the form:

$$Y_t = a[1 - \delta] + a_0 b\ X_{t-1} + \delta\ Y_{t-1} + [U_t - \delta U_{t-1}]$$

$$[a < \delta < 1]$$

or, $$Yt = a^* + b^*\ X_{t-1} + \delta\ Y_{t-1} + U_t^* \qquad \text{Eq.8.}$$

Where, $a^* = a[1 - \delta]$

$b^* = a_0 b$

$U_t^* = [U_t - \delta\ U_{t-1}]$

Thus, it is clear that equation 7 is similar to equation 1 and equation 8 is similar to equation 4 [refer Box No.1]. The only difference is that instead of X_t, there is X_{t-1} in the expectation model. It is to be noted that inflationary expectation always comes along with one year lagged value of dependent variable as explanatory variables influencing the dependent variable.

Saving as a function of inflationary expectations can be stated as:

$$S_t = a + b\ \Pi^e_{t-1} + c\ S_{t-1}$$

5.3.2. Time Period and Sources of Data

The time period for the determinant analysis of household saving and its components covers the post-bank nationalization period from 1970-71 to 2003-04. The time period for the analysis of household investment in shares and debentures covers the time period from 1970-71 to 1998-99. The time period was shortened since the compilation of RBI index for ordinary share prices was discontinued by the Reserve Bank of India since 1999-2000.

The data used in the analysis has been collected from various sources. Data for number of commercial bank branches were compiled from Reports on Currency and Finance and various issues of the Indian Economic Survey. Ordinary share price indices were collected from RBI publications such as Reports on Currency and Finance and Handbook of Statistics on Indian Economy [RBI]. The source of data for estimating the percentage share of non-agricultural income in national income was the National Accounts Statistics of India [EPWRF]. Rest of the data have been obtained from the Handbook of Statistics on Indian Economy [RBI]. All data are based on the new series [Base: 1993-94] of national accounts.

5.3.3 Estimation Procedure

With the objective of finding out the determinants of household saving and also for examining the nature of long-run relationship between the household saving components and their determinants, the present study uses the cointegration approach.

The estimation procedure involves the following steps:

1. The analysis for determinants of household savings uses long time series data. As already discussed in the earlier chapter, time series analysis requires that the variables be stationary. The use of non-stationary variables leads to spurious results. Hence, in the first step, the variables are tested for stationarity or unit roots using the Augmented Dickey-Fuller [ADF] test. The existence or absence of unit roots determines whether the variables are non-

stationary or stationary. The number of unit roots the variable contains determines the order of integration or the level at which the variable becomes stationary. Once unit roots are examined, the variables should be stationary at the same level or have the same order of integration.

2. In the next step, the variables [saving components and the determinants] having the same order of integration is selected for estimating multivariate regressions. Variables of different order of integration cannot be taken for the analysis as the equations estimated would be tested for cointegration in the following step. The a priori requirement for cointegration tests is that the variables [dependent and independent] should be integrated of the same order.

   A number of equations have been estimated for each saving component for different combinations of suitable explanatory variables [determinants]. The functions for household saving components have been specified in log-linear functional forms. The Ordinary Least Squares method is used for estimating the functions for household saving and its components.

3. The estimated regressions are then tested for the existence or absence of a long-run relationship between the saving components and their determinants. Augmented Engle-Granger [AEG] test has been employed for the purpose.

   The AEG test applies the ADF test equations to the residual series derived from the estimated multivariate regressions [cointegrating regressions] for determining the number of unit roots or order of integration of the residual series. If the residual series is found to be integrated of an order lower than that of the dependent and independent variables used in the cointegrating regression, the variables are said to be cointegrated implying that the dependent and independent variables share a stable long-run relationship.

4. Once cointegration has been examined for all the estimated functions for saving components, only the best fit equations are selected for the final

analysis from the saving functions that confirm the existence of cointegration. The criteria for selection of equations is based on test statistics such as R^2, $\bar{R}^2$, D-W, Durbin's h statistic, S.E. of the estimated regression and F-statistic.

5. Finally, the degree of relationship between saving components and their determinants is examined using the elasticity obtained from estimated best fit equations. The coefficients of the determinants directly explain the elasticity with the relevant saving component.

5.4 Empirical Results

1. Unit Root Test

The time series variables used for the determinant analysis are mostly taken in logarithms. The variables to be included in the saving models, both dependent and independent variables, are examined, for the presence of unit roots using the ADF test equation. The ADF test equation has a constant term and a lag = 1. The results of unit root tests are displayed in Table 1.

The results of unit root test reveals that all the variables are integrated of the order one, which means that the variables are first difference stationary [I(1)]. Therefore, household saving and each one of its components along with their determinants are stationary at level one [I(1)]. This satisfies the pre-condition for undertaking the cointegration test.

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*	
1. Log HHS	-0.20	-5.06*	I [1]
2. Log FA	-1.49	-5.96*	I [1]
3. Log CUR	1.00	-3.83*	I [1]
4. Log DD	0.48	-4.36*	I [1]
5. Log TD	-1.96	-3.17**	I [1]
6. Log LF	0.95	-3.74*	I [1]
7. Log HH_{sh}#	-1.99	-3.53**	I [1]
8. Log Y	-0.74	-4.24*	I [1]
9. Log YNAY	-0.63	-6.68*	I [1]
10. Log PDI	-0.37	-4.63*	I [1]
11. Log INT	-1.56	-3.68*	I [1]
12. Log $PCNB_{-1}$	-1.27	-5.28*	I [1]
13. Log Π^e	-1.64	-4.25*	I [1]
14. $PCIND_{-1}$#	-2.58	-5.25*	I [1]
	Mackinnon Critical Values : 1% = -3.658 5% = -2.959 10% = -2.618		

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

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

Household Investment in Shares and Debentures and Index of Industrial Securities [Ordinary Share Prices] has been taken for the time period 1970-1998.

Mackinnon Critical Values:	1%	5%	10%
Log HH_{sh} :	-3.830	-3.029	-2.655
$PCIND_{-1}$:	-3.720	-2.985	-2.632

2. Estimation of Multivariate Regressions

As the saving instruments and the determinants are found to be stationary at the same level, the next step involves estimation of the specified models for household saving and its components. Multivariate regressions are estimated using the Ordinary Least Squares method. Alternative functions have been estimated for household saving and its components using three different definitions of income - national income [Y], non-agricultural income [YNAY] and personal disposable income [PDI], along with other identified determinants. These equations have then been tested for cointegration to find out whether there exists a long-run stable relationship between the saving instruments and their determinants. Only the best fit equations sufficed by the criterion of existence of cointegration have been selected for the final analysis. The rest of the regression outcomes along with their unit root tests and cointegration results have been displayed in the Appendix [Nos. III, IV and V].

3. Cointegration Test

The estimated multivariate regressions are tested for long-run relationship between the saving variables and their determinants. The estimated regressions are used to derive the residual series which are tested for stationarity or unit roots using the Augmented Engle-Granger [AEG] test for cointegration. A residual series stationary at level zero [I(0)] would imply cointegration for the respective multivariate regression. Let us take each component one by one.

As the dependent and independent variables used in the analysis of household saving determinants are integrated of the first order [I(1)], if the residual series are found to be stationary at level zero or integrated of the order zero [I(0], the dependent and independent variables in the multivariate regression are cointegrated implying a long-run equilibrium relationship between the saving variable and all the identified determinants.

3. The Best Fit Equations

Household Savings [HHS]

➢ The Estimated Equation

$$\log HHS = -0.557 + 0.494 \log Y - 0.108 \log INT - 0.038 \log PCNB_{-1}$$
[1.20] [2.05] [1.46] [1.26]

$$+ 0.034 \log \Pi^{e}_{-1} + 0.542 \log HHS_{-1}$$
[0.15] [3.53]

R Square	*Adjusted R Square*	*S.E. of regression*	*Durbin's h*	*F-statistic*
0.998	0.998	0.031	0.112*	2638.144

* signifies that there is no problem of either positive or negative first-order autocorrelation in residual.

➢ Findings

The following observations emerge from the above stated equation:

1. The following determinants were identified for household savings - national income, rate of interest, rate of change in number of commercial bank branches, expected rate of inflation and the lag of household saving.

2. The overall test results of the equation are good with 99.0 percent explanatory power of the equation as measured by $\bar{R}^2$. The estimate of standard error of the equation is very small, F-value is significant and there is no problem of autocorrelation in the residuals.

3. Except for expected rate of inflation, all other determinants are listed well in the equation with significant t-value.

4. National income has a positive and significant impact on household savings. The income elasticity of household savings is 0.49.

5. Although significant, the interest rate variable has not given the a priori sign. Same is the case with the rate of change in number of commercial bank branches. Even the measure of response of household savings to these two variables [elasticity] is very poor.

6. Inflationary expectations tend to increase household savings, confirming to the a priori sign but its coefficient is statistically insignificant. There is a weak influence of expected rate of inflation on household savings.

7. The current value of household saving is quite elastic to the lag of household savings with an elasticity measure of 0.54.

➢ Cointegration Test

Table: 2 Cointegration Test [HHS]				
Test of Cointegration : Augmented Engle-Granger [AEG] Test[#] Lag = 1 Time Period : 1970-71 to 2003-04				
Dependent Variable[£]	**ADF Test Statistic for Residual[@]**			**Inference on Cointegration**
	Level	***First Difference***	***Order of Integration***	
Log HHS	-3.699*	-	I [0]	Cointegration
	Mackinnon Critical Values : 1% = -2.645 5% = -1.953 10% = -1.622			

ADF test equation for unit root test of residual is without a constant and trend.
£ All models include variables that are integrated to the order one i e. I[1] stationary variables.
@ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1% ** = Significant at 5% *** = Significant at 10%

The function for the saving component estimated in the previous step is examined for cointegration using the Augmented Engle-Granger [AEG] test. The ADF test equation has been applied to the residual series derived from the estimated equation for saving variable, for determining the unit roots in the residual series. The ADF test statistic presented in the second column of the above table is compared with the Mackinnon critical values to find out the order of integration of the residual variable. If the ADF test statistic exceeds the Mackinnon critical values, the order of integration is determined at the particular level of significance. An integration order for the residual variable which is less than the integration order of the dependent and independent variables in the estimated function, confirms cointegration or a long-run stable relationship between the dependent and independent variables.

The cointegration test results for aggregate household saving equation yields a residual series which is integrated of the order zero or stationary at zero level [I(0)]. This indicates that in the household saving equation, all the identified determinants share a stable long-run relationship with aggregate household savings.

➢ Conclusion

The aggregate household savings are largely determined by the current national income and the past saving behaviours, both with the positive influence on household saving. The other variables, rate of interest and rate of change in number of commercial bank branches though enjoying long-run relationship with the household saving, have a weak influence on household saving. It seems the households are not influenced by the future inflationary expectations while taking decisions on savings.

Household Saving in Financial Assets [FA]

➢ The Estimated Equation

In the preliminary step, we estimated two functions for household saving in financial assets with alternative definitions of income - national income and non-agricultural income along with other identified determinants. For both the functions, the Durbin's h value indicated towards the problem of negative first-order autocorrelation in residuals. Hence, we selected the final equation based on the sign of the determinants, significance of t-values, the goodness of fit as revealed by the R^2 values, standard error of the respective regressions and the significance of F-statistic. The following function was selected for household saving in financial assets:

$$\underset{}{\log FA} = \underset{[0.83]}{-1.031} + \underset{[1.03]}{0.847 \log YNAY} - \underset{[1.08]}{0.099 \log INT} - \underset{[1.07]}{0.046 \log PCNB_{-1}}$$

$$+ \underset{[2.61]}{0.685 \log \Pi^{e}_{-1}} + \underset{[4.62]}{0.581 \log FA_{-1}}$$

R Square	*Adjusted R Square*	*S.E. of regression*	*Durbin's h*	*F-statistic*
0.997	0.996	0.042	-2.603$^{\$}$	1530.643

$ indicates the problem of negative first-order autocorrelation in residual.

➢ Findings

The main points to be highlighted in the above equation are:

1. The determinants identified for household saving in financial assets are non-agricultural income, rate of interest, rate of change in number of commercial bank branches, expected rate of inflation and lag of household saving in financial assets. Out of these determinants, non-agricultural income, expected rate of inflation and lag of household saving in financial assets confirm to the a priori expected signs.

2. The coefficients of all the determinants are significant. Therefore, all the determinants are listed well in the function for household saving in financial assets. The overall explanatory power of the equation as measured by $\overline{R}^2$ at 99.0 percent is very good. However, there is indication of negative autocorrelation in residuals. The F-statistic is highly significant and standard error of the regression is quite low at 0.04.

3. Household saving in financial assets respond strongly to non-agricultural income. They share an elasticity of 0.84.

4. The behaviour of interest rate is as usual unpredictable. The interest rate coefficient has a negative impact on household savings in financial assets. The response of household saving in financial assets is weak towards the rate of interest.

5. Household saving in financial assets are neutral to the rate of change in number of commercial bank branches with almost zero elasticity. This is surprising because number of commercial bank branches is theoretically an important determinant of financial savings.

6. The expected rate of inflation is one of the most significant variables in the household financial saving function. Household savings in financial assets respond positively and significantly to inflationary expectations. The elasticity estimate is equal to 0.69.

7. The current values of household financial saving are sensitive to its past values.

➢ Cointegration Test

Table: 3	**Cointegration Test [FA]**			
Test of Cointegration : Augmented Engle-Granger [AEG] Test[#] Lag = 1 Time Period : 1970-71 to 2003-04				
Dependent Variable[£]	**ADF Test Statistic for Residual[@]**			**Inference on Cointegration**
	Level	***First Difference***	***Order of Integration***	
Log FA	-5.155*	-	I [0]	Cointegration
	Mackinnon Critical Values : 1% = -2.645 5% = -1.953 10% = -1.622			

ADF test equation for unit root test of residual is without a constant and trend.
£ All models include variables that are integrated to the order one i.e. I[1] stationary variables.
@ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1% ** = Significant at 5% *** = Significant at 10%

The residual series derived from the multivariate regression for household saving in financial assets is found to be stationary at zero level [I(0)]. Therefore, each one of the identified determinants are cointegrated or share a stable long-run relationship with household saving in financial assets.

➢ Conclusion

Household saving in financial assets are very sensitive to non-agricultural income which has turned out to be an important determinant of household financial savings. Household saving in financial assets are also quite elastic to the expected rate of inflation and to past savings in household financial assets. Saving is a continuous process over time and hence the past saving behaviours tend to influence the current savings. Other determinants such as rate of interest and rate of change in number of commercial bank branches are weak determinants of savings in financial assets.

Components of Household Financial Saving

Currency [CUR]

➢ The Estimated Equation

$$\log CUR = -0.653 + 0.479 \log YNAY + 0.001 \log INT - 0.024 \log PCNB_{-1}$$
$$[1.26] \quad [1.45] \qquad [0.03] \qquad [1.32]$$

$$- 0.041 \log \Pi^{e}_{-1} + 0.975 \log CUR_{-1}$$
$$[0.34] \qquad [16.64]$$

R Square	*Adjusted R Square*	*S.E. of regression*	*Durbin's h*	*F-statistic*
0.999	0.999	0.017	0.729*	6311.901

* Signifies that there is no problem of either positive or negative first-order autocorrelation in residual.

➢ Findings

The following broad observations can be made from the above equation:

1. The determinants identified for the currency function are non-agricultural income, rate of interest, rate of change in number of commercial bank branches, expected rate of inflation and lag of currency.

2. Except for the rate of interest, all other coefficients confirm to the predicted signs. The rate of interest and expected rate of inflation are found to be statistically insignificant. The overall explanatory power of the equation is high at 99.0 percent as denoted by the $\bar{R}^2$ value. The standard error of the regression is only 0.02 and the F-statistic is very large. Durbin's h confirms no problem of autocorrelation in residual.

3. Currency responds moderately to percentage share of non-agricultural income in national income with an elasticity of 0.48.

4. In case of currency, the rate of change in number of commercial bank branches is found to be consistent with its a priori sign. However, the coefficient of the number of commercial bank branches is statistically insignificant.

5. An almost unitary elasticity of 0.98 indicates proportionate influence of current savings in currency to its past values [lag of currency].

➢ Cointegration Test

Table: 4	**Cointegration Test [CUR]**			
Test of Cointegration : Augmented Engle-Granger [AEG] Test[#] Lag = 1 Time Period : 1970-71 to 2003-04				
Dependent Variable[£]	**ADF Test statistic for Residual[@]**			**Inference on cointegration**
	Level	***First Difference***	***Order of Integration***	
Log CUR	-4.112*	-	I [0]	Cointegration
	Mackinnon Critical Values : 1% = -2.645 5% = -1.953 10% = -1.622			

ADF test equation for unit root test of residual is without a constant and trend.
£ All models include variables that are integrated to the order one i.e. I[1] stationary variables.
@ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1% ** = Significant at 5% *** = Significant at 10%

The cointegration test for the currency function reveals that the residual series is stationary at zero level [I(0)] indicating that the identified determinants of currency share a long-run equilibrium relationship with savings in currency.

➢ Conclusion

The most important determinants of household savings in currency are non-agricultural income and lag of currency. Savings in currency are particularly sensitive to non-agricultural income. Although confirming to the a priori expected sign and long-run relationship, currency is absolutely inelastic to inflationary expectations, rate of interest and rate of change in number of commercial bank branches.

Demand Deposits [DD]

➢ The Estimated Equation

$$\log DD = \underset{[0.05]}{-0.077} + \underset{[0.23]}{0.227 \log YNAY} - \underset{[0.31]}{0.039 \log INT} - \underset{[0.99]}{0.053 \log PCNB_{-1}}$$

$$+ \underset{[0.74]}{0.242 \log IT^{e}_{-1}} + \underset{[5.52]}{0.807 \log DD_{-1}}$$

R Square	*Adjusted R Square*	*S.E. of regression*	*Durbin's h*	*F-statistic*
0.993	0.992	0.051	-1.667*	757.608

* signifies that there is no problem of positive or negative first-order autocorrelation in residual.

➢ Findings

The important features of the above equation are:

1. The identified determinants for the function for demand deposits are non-agricultural income, rate of interest, rate of change in number of commercial bank branches, expected rate of inflation and lag of demand deposits.

2. The coefficients of the explanatory variables are by and large insignificant and against the a priori signs. The non-agricultural income and lag of demand deposits are the only two determinants that confirm to the a priori expected signs. The $\overline{R}^2$ at 99.0 percent indicates a very high overall explanatory power of the equation. The standard error of the regression is only 0.05 and F-statistic is also significant. Durbin's h indicates that there is no problem of autocorrelation in residuals.

3. The response of demand deposits is either negligible or weak to the identified determinants except for lag of demand deposits which is a significant determinant of current demand deposits with an elasticity of 0.81.

➢ Cointegration Test

Table: 5 Cointegration Test [DD]

Test of Cointegration : Augmented Engle-Granger [AEG] Test#
Lag = 1
Time Period : 1970-71 to 2003-04

Dependent Variable£	ADF Test statistic for Residual@			Inference on Cointegration
	Level	*First Difference*	*Order of Integration*	
Log DD	-4.584*	-	I [0]	Cointegration
	Mackinnon Critical Values : 1% = -2.645 5% = -1.953 10% = -1.622			

ADF test equation for unit root test of residual is without a constant and trend.
£ All models include variables that are integrated to the order one i.e. I[1] stationary variables.
@ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1% ** = Significant at 5% *** = Significant at 10%

The residual series obtained from the demand deposits function is stationary at zero level [I(0)] implying a stable long-run relationship between demand deposits and each one of the identified determinants.

➢ Conclusion

Demand deposits are weakly responsive to non-agricultural income which has turned out to be an insignificant determinant. It is the past savings in demand deposits which have a significant positive impact on the current demand deposits. The expected rate of inflation has only a marginal positive influence on demand deposits. Demand deposits are interest inelastic. The rate of change in number of commercial bank branches fail to influence the savings in demand deposits.

Time Deposits [TD]

➢ The Estimated Equation

$$\log TD = -0.293 + 0.302 \log YNAY - 0.074 \log INT + 0.004 \log PCNB_{-1}$$
$$[0.36] \quad [0.57] \qquad [1.36] \qquad [0.17]$$

$$+ 0.202 \log \Pi^{e}_{-1} + 0.89 \log TD_{-1}$$
$$[1.41] \qquad [13.85]$$

R Square	*Adjusted R Square*	*S.E. of regression*	*Durbin's h*	*F-statistic*
0.999	0.999	0.025	0.391*	5445.871

* signifies that there is no problem of either positive or negative first-order autocorrelation in residual.

➢ Findings

The following broad observations emerge from the above equation:

1. The equation estimated for time deposits identifies the following determinants - non-agricultural income, rate of interest, rate of change in number of commercial bank branches, expected rate of inflation and lag of time deposits.

2. Non-agricultural income and rate of change in number of commercial bank branches are statistically insignificant determinants. The overall explanatory power of the equation is 99.0 percent as measured by $\bar{R}^2$. Standard error of the regression is very low and F-statistic is significant. Also, the residual is free from any problem of autocorrelation as indicated by Durbin's h statistic.

3. Past savings in time deposits has been found to be the most important determinant of current time deposits. Lagged time deposits have a significant and positive impact on current value of time deposits. The measure of elasticity is very close to unity.

4. As compared to the other determinants, non-agricultural income has a relatively moderate impact on time deposits. A 1.0 point increase in non-agricultural income leads to 0.3 points increase in savings in time deposits. The coefficient of non-agricultural income is however statistically insignificant.

5. The coefficients of interest rate and expected inflation rate show unpredicted signs but are statistically significant. Time deposits are almost inelastic to these two determinants.

6. Savings in time deposits are insensitive to the rate of change in the number of commercial bank branches. The latter has also been found to be an insignificant explanatory variable.

➢ Cointegration Test

Table: 6 **Cointegration Test [TD]**				
Test of Cointegration : Augmented Engle-Granger [AEG] Test[#] Lag = 1 Time Period : 1970-71 to 2003-04				
Dependent Variable[£]	**ADF Test Statistic for Residual[@]**			**Inference on Cointegration**
	Level	***First Difference***	***Order of Integration***	
Log TD	-4.295*	-	I [0]	Cointegration
	Mackinnon Critical Values : 1% = -2.645 5% = -1.953 10% = -1.622			

ADF test equation for unit root test of residual is without a constant and trend.
£ All models include variables that are integrated to the order one i.e. I[1] stationary variables.
@ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1% ** = Significant at 5% *** = Significant at 10%

For time deposits, the residual series obtained from the multivariate regression for time deposits is found to be stationary at level zero [I(0)]. This indicates a long-run equilibrium relationship between time deposits and each one of the identified determinants.

➢ Conclusion

Time deposits are relatively inelastic to non-agricultural income. Non-agricultural income is also an insignificant explanatory variable. The most important determinant of time deposits is the lag of time deposits. Time deposit is a long-term commitment and the accumulated time deposits over the years tend to have

a significant influence on current savings in time deposits. Time deposits show a weak response to inflationary expectations whereas they are absolutely inelastic to the rate of interest and rate of change in number of commercial bank branches. The rate of change in number of commercial bank branches is also statistically insignificant and carries the sign against the hypothesised sign.

Life Funds [LF]

➢ The Estimated Equation

$$\log LF = -1.508 + 0.594 \log PDI - 0.251 \log \Pi^{e}_{-1} + 0.666 \log LF_{-1}$$
$$[2.07] \quad [2.03] \qquad [1.10] \qquad [4.67]$$

R Square	*Adjusted R Square*	*S.E. of regression*	*Durbin's h*	*F-statistic*
0.999	0.998	0.029	-0.861*	6548.047

* signifies that there is no problem of either positive or negative first-order autocorrelation in residual.

➢ Findings

The following observations are made from the above equation:

1. The determinants identified for the saving equation for life funds are personal disposable income, expected rate of inflation and lag of life funds as the determinants.

2. All the explanatory variables are listed well with the a priori expected signs and statistically significant coefficients.

3. The overall explanatory power of the equation is very high at 99.0 percent. The standard error of the regression is quite low and the equation has no problem of autocorrelation as indicated by Durbin's h statistic. The F-statistic is also significant.

4. Life funds are sensitive to personal disposable income. The elasticity of life funds to personal disposable income is 0.59.

5. Lag of life funds have a significant positive impact on the current value of life funds. The degree of impact of the former being 0.67.

As personal disposable income is the most important determinant of savings in life funds, life funds was also regressed upon personal disposable income alone. The results were consistent with that of Bose [1994]. We found a highly elastic response of household saving in life funds to personal disposable income. The elasticity measure between the two was found to be over unity, equal to 1.32.

➢ Cointegration Test

Table: 7	**Cointegration Test [LF]**			
Test of Cointegration : Augmented Engle-Granger [AEG] Test[#] Lag = 1 Time Period : 1970-71 to 2003-04				
Dependent Variable[£]	**ADF Test Statistic for Residual[@]**			**Inference on Cointegration**
	Level	***First Difference***	***Order of Integration***	
Log LF	-5.035*	-	I [0]	Cointegration
	Mackinnon Critical Values : 1% = -2.645 5% = -1.953 10% = -1.622			

ADF test equation for unit root test of residual is without a constant and trend.
£ All models include variables that are integrated to the order one i.e. I[1] stationary variables.
@ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1% ** = Significant at 5% *** = Significant at 10%

The cointegration test for life funds arrive at a stationary residual series which is integrated of the order zero [I(0)]. Therefore, the determinants in the life funds saving equation share a stable long-run relationship with life funds.

➢ Conclusion

Household savings in life funds are quite responsive to personal disposable income and to past savings in life funds. The elasticity of life funds to inflationary expectations is however very low. In comparison to non-agricultural income, personal disposable income shares a relatively strong relationship or elasticity with financial saving asset.

Household Investment in Shares and Debentures [HH_{sh}]

➢ The Estimated Equation

$$\log HH_{sh} = \underset{[1.42]}{-0.909} + \underset{[4.36]}{0.602}\, PCIND_{-1} - \underset{[0.40]}{0.393}\log INT + \underset{[2.26]}{1.048}\log IT^{e}_{-1} + \underset{[4.29]}{0.678}\log HH_{sh-1}$$

R Square	*Adjusted R Square*	*S.E. of regression*	*Durbin's h*	*F-statistic*
0.971	0.965	0.153	-1.303*	159.039

* signifies that there is no problem of either positive or negative first-order autocorrelation in residual.

➢ Findings

The points worth noting in the above regression are:

1. The equation estimated for household investment in shares and debentures identifies the following determinants - rate of change in index of industrial securities, rate of interest, expected rate of inflation, lag of household investment in shares and debentures.

2. The rate of change in index of industrial securities was included in the equation without log. The overall explanatory power of the equation as measured by $\bar{R}^2$ is high at 96.0 percent while the standard error is 0.15 only. The F-statistic is significant and there is no indication of autocorrelation problem as indicated by the Durbin's h statistic.

3. Except for the rate of interest, the coefficients of all other explanatory variables are statistically significant and confirm to the expected signs. The only variable that is found to be against the predicted sign is the expected rate of inflation.

4. The household investment in shares and debentures respond positively to rate of change in index of industrial securities. It has a high coefficient value of 0.60.

5. It is important to note that higher interest rates tend to lower household savings in shares and debentures. This implies a possible substitution between financial saving instruments. With interest rates rising, it becomes more attractive and safe to park savings in other substitutes of financial assets such as demand and time deposits.

6. Inflationary expectations play a major role in encouraging household investment in shares and debentures. Savings in shares and debentures respond more than proportionately to a change in the expected rate of inflation.

7. The lag of household investment in shares and debentures has a positive significant impact on current value of household investment in shares and debentures. The magnitude of elasticity being 0.68.

We estimated two regressions for household saving in shares and debentures, out of which one equation is similar to Bose's model [1994]. Bose found a significant

positive impact of index of industrial securities on household saving in shares and debentures for a log-linear function between the two. In our results too, the rate of change in index of industrial securities turned out to be a significant determinant of household investment in shares and debentures with an over unitary elasticity of 1.15. However, the cointegration results revealed that household saving in shares and debentures and rate of change in index of industrial securities do not share a long-run relationship. Therefore, we added additional explanatory variables to Bose's simplified model for household saving in shares and debentures, which turned out to be a better model.

➢ Cointegration Test

Table: 8	**Cointegration Test [HH_{sh}]**		
Test of Cointegration : Augmented Engle-Granger [AEG] Test[#] Lag = 1 Time Period : 1970-71 to 2003-04			
Dependent Variable[£]	**ADF Test Statistic for Residual[@]**		**Inference on Cointegration**
	Level	***First Difference***	***Order of Integration***
Log HH_{sh}[$]	-2.281**	-	I [0]	Cointegration
	Mackinnon Critical Values : 1% = -2.697 5% = -1.960 10% = -1.625		

ADF test equation for unit root test of residual is without a constant and trend.
£ All models include variables that are integrated to the order one i.e. I[1] stationary variables.
@ Significance is based on Mackinnon critical values for rejection of hypothesis of a unit root.
* = Significant at 1% ** = Significant at 5% *** = Significant at 10%
$ Time period for the analysis of household investment in shares and debentures is 1970-71 to 1998-99.

Critical Values of 't': Percentage Points of t-Distribution

Time Period: 1970 – 2003

No. of Obs. [n]	***No. of Explanatory Variables [k]***	***Degree of Freedom [= n-k]***	***Level of Significance***			
			20%	***10%***	***5%***	***1%***
29*	4	25	1.316	1.708	2.060	2.787
34	5	29	1.311	1.699	2.045	2.756
34	4	30	1.310	1.697	2.042	2.750
34	3	31	-do-	-do-	-do-	-do-

Note: This table is a summary of the critical values and level of significance of t-test which are directly relevant in the present study on determinants of household savings.

* The time period taken for estimating the function for household investment in shares and debentures is from 1970-1998.

The residual derived from the long-run equation for household investment in shares and debentures is found to be stationary at zero level [I(0)]. This means that each one of the identified determinants in the shares and debentures equation share a long-run equilibrium relationship with household investment in shares and debentures.

➢ Conclusion

Household investment in shares and debentures are found to share a highly elastic relationship with expected rate of inflation with an elasticity value of over unitary. An increase in inflationary expectations tends to increase savings in shares and debentures. Shares and debentures is the only household saving component to witness such a significant impact of inflationary expectations. This indicates that Indian households do consider expectations about future prices while making saving decisions. Shares and debentures are also sensitive to the rate of change in index of industrial securities and past savings in shares and debentures but relatively inelastic to the interest rate.

5.5 Conclusions and Inferences

The present chapter deals with the determinants of household saving and its components. An extensive review of literature has been carried out on the determinants of household saving and its components. A large number of studies on macro econometric modelling in India were also reviewed for identifying some of the important determinants of household saving components in the country. The variables that were found to be more popularly used as household saving determinants were income, rate of interest, number of bank branches, rate of inflation, lag of dependent variable and time trend.

On the lines of the reviewed literature, we developed our own models for household saving and its components. We estimated saving equations for household saving; household saving in financial assets; and financial saving instruments such as currency, demand deposits, time deposits, life funds and household investment in shares and debentures.

The important determinants of household saving instruments identified for the analysis were income [defined alternatively as national income, non-agricultural income and personal disposable income]; rate of interest; rate of change in number of commercial bank branches; expected rate of inflation and lag of saving [dependent] variable. The rate of change in the index of industrial securities [ordinary share prices] was taken as a determinant for the analysis of household saving in shares and debentures. A set of hypotheses was formulated for the relationship between saving components and the identified determinants.

Another objective of the present study was to find out the nature and degree of long-run relationship between household saving components and the determinants. For this purpose, the cointegration technique was employed for identifying the determinants of household saving and its components and to test the long-run relationship between them. The analysis for determinants of household savings involved the following steps:

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

2. Estimation of Multivariate Regressions: Using the Ordinary Least Squares method for the saving components and their determinants [dependent and independent variables] that are integrated of the same order.

3. Cointegration Test: Augmented Engle-Granger [AEG] test for examining unit roots of residuals for confirming absence/presence of cointegration or a long-run relationship between saving components and the identified determinants.

The nature and importance of each one of the identified determinants of savings has been summarised below:

So far in the chapter, we have identified the important determinants of saving instruments for understanding the nature of relationship between saving instruments and their determinants. In this part of the chapter, we undertake the analysis from the determinants perspective. We have taken each determinant of saving instruments individually in order to study the nature of relationship and magnitude of impact of the determinants on saving instruments in the Indian economy.

The determinants of saving instruments studied in the following text are income, rate of interest, rate of change in number of commercial bank branches, expected rate of inflation, rate of change in index of industrial securities and lag of dependent [saving] variable.

The tables for each determinants of saving show the saving variables with the empirical sign indicating the nature of relationship, and the constant elasticity which measures the magnitude of relationship between saving instruments and the respective saving determinant.

Income

Income has been defined in three alternative ways - National Income [Y], Non-agricultural Income [YNAY] and Personal Disposable Income [PDI]. The equations confirming to a priori signs of an income variable has been selected for the analysis.

Income Variables	*Saving Variables*	*Empirical Sign*	*Constant Elasticity*
Y	HHS	Positive	0.49
YNAY	FA	Positive	0.85
YNAY	CUR	Positive	0.48
YNAY	DD	Positive	0.23
YNAY	TD	Positive	0.30
PDI	LF	Positive	0.59

National income [Y] turned out to be statistically the most significant income determinant among the three specified ones [Y, YNAY, PDI] for aggregate household savings [HHS]. Non-agricultural income [YNAY] has been included for functions of household saving in financial assets [FA], currency [CUR], demand deposits [DD] and time deposits [TD]. Personal disposable income [PDI] has been the income determinant identified for life funds [LF].

In consistency with the literature reviewed, our results confirm a positive relationship between income specifications and the saving instruments. The income

elasticity of saving ranges from 0.23 to 0.85 for different saving components with the highest elasticity for household saving in financial assets.

Non-agricultural income is found to have a substantial influence on majority of the saving variables. This could be the possible outcome of the structural shift taking place in the macro economy from agricultural to non-agricultural sectors.

Rate of Interest

In view of the financial expansion in the Indian economy in the post- nationalisation period, rate of interest and number of commercial bank branches in the country have become important determinants influencing savings.

A large number of studies have examined the influence of different measures of interest rate on saving variables. The hypothesised sign of relationship between rate of interest and saving variables is usually positive, except for currency and shares and debentures.

Saving Variables	*Empirical Sign*	*Constant Elasticity*
HHS	Negative	0.11
FA	Negative	0.09
CUR	Positive	0.00
DD	Negative	0.04
TD	Negative	0.07
HH_{sh}	Negative	0.39

Rate of interest has largely been found to share a negative relationship with the saving instruments, against the a priori expected signs. Moreover, the rate of interest turns out to be a very poor determinant of saving instruments. It has almost a negligible effect on saving variables with an elasticity ranging from 0.00 to 0.04. Surprisingly, rate of interest has a comparatively moderate negative influence on household saving in shares and debentures with an elasticity estimate of 0.39. It also confirms to the a priori expected sign.

Rate of Change in Number of Commercial Bank Branches

The phenomenal growth in the banking industry in India in the post-bank nationalisation period led to financial deepening in the economy which brought about a spread of bank branches into semi-urban and rural areas, setting up of Regional Rural Banks, expansion in the number of bank branch offices, rise in the size of population per branch, increase in the deposits with commercial banks and availability of a large menu of financial instruments to save in.

Saving Variables	*Empirical Sign*	*Constant Elasticity*
HHS	Negative	0.04
FA	Negative	0.05
CUR	Negative	0.02
DD	Negative	0.05
TD	Positive	0.00

The rate of change in number of commercial bank branches has been hypothesised to have a largely positive impact on the saving variables. In our results, the rate of change in number of commercial bank branches has in fact turned out to be the weakest determinant of saving instruments. It shares a negative relationship with majority of the saving variables except for time deposits. The rate of change in number of commercial bank branches fail to influence any of the saving instruments with almost a zero elasticity ranging from 0.00 to 0.05.

Expected Rate of Inflation

Saving Variables	*Empirical Sign*	*Constant Elasticity*
HHS	Positive	0.03
FA	Positive	0.69
CUR	Negative	0.04
DD	Positive	0.24
TD	Positive	0.20
LF	Negative	0.25
HH_{sh}	Positive	1.05

The nature of relationship between the expected rate of inflation and saving instruments is varied. Inflationary expectations have a negative influence on currency and life funds which confirms to their a priori expected signs. Inflationary expectations have a positive influence on other saving variables. The inflation elasticity of saving variables ranges from inelastic to very elastic, between 0.03 to the highest 1.05.

Inflationary expectations have an insignificant influence on most of the saving instruments except for a moderate impact on savings in financial assets and a strong positive impact on shares and debentures. The elasticity of household investment in shares and debentures to expected rate of inflation is over unity.

Rate of Change in Index of Industrial Securities

Saving Variable	*Empirical Sign*	*Coefficient Value*
HH_{sh}	Positive	0.60*

* It represents the coefficient value of percentage change in index of industrial securities as this determinant has not been taken in lag.

The rate of change in index of industrial securities has been found to have a positive and significant impact on household saving in shares and debentures. They share a sensitive relationship with a high coefficient of 0.6. This is in consistency with the results of Bose [1994] who arrived at similar results.

Lag of Saving Variable

Saving Variables	*Empirical Sign*	*Constant Elasticity*
HHS	Positive	0.54
FA	Positive	0.58
CUR	Positive	0.98
DD	Positive	0.81
TD	Positive	0.89
LF	Positive	0.67
HH_{sh}	Positive	0.68

The lag of saving variables has turned out to be the most important determinant of current savings. Lag of saving shares a significant positive relationship with each one of the saving instruments with an elasticity value ranging from 0.54 to as high as 0.98. The past savings in currency is particularly influential in raising current savings in currency with an elasticity estimate of almost unitary. The lag of saving also has a similar impact on other saving instruments.

➢ Overall Conclusion

The most important determinant of saving instruments is the lag of saving. Saving instruments are very sensitive to the past savings. Saving is a continuous process over time and it is the past patterns or behaviour in savings which seem to be influencing the current saving behaviour. A significant positive influence of past savings on current savings indicates the strong set preferences in the Indian household sector.

The second important determinant of saving instruments is income. Although the income elasticity of saving is only moderate, income is a significant variable explaining savings. Among the three measures of income identified in the study [national income, non-agricultural income and personal disposable income], non-agricultural income better explains the influence on household saving instruments. In view of the structural shift taking place in the Indian economy from agriculture to non-agricultural sectors, this finding suggests further enhancing of household savings.

Another important determinant of saving instruments is expected rate of inflation, with mixed results. The saving instruments - aggregate household saving and currency are absolutely inelastic to expected rate of inflation; demand deposits, time deposits and life funds show very little response to the expected rate of inflation; household saving in financial assets shares a moderately elastic relationship with inflationary expectations and household saving in shares and debentures shares a highly elastic relationship with expected inflation rate. The results indicate that to a certain extent, Indian households do consider expectations on future prices while making saving decisions. Current household savings are also based on expectation

of future inflation. Although majority of the saving instruments respond only moderately or weakly to inflationary expectations, the household saving in shares and debentures increases substantially in response to an increase in inflationary expectations in order to earn higher income for the future rise in prices.

The other two determinants, rate of interest and rate of change in number of commercial bank branches are found to be weak determinants of saving instruments. Majority of the saving variables are inelastic to the rate of interest. The finding of a negligible interest rate elasticity of saving in India confirms to the findings in the literature on macro variable interactions of saving. Shares and debentures have turned out to be the only saving instrument witnessing a moderate impact of interest rate. As shares and debentures are a substitute to other saving assets, household preferences change in response to changing interest rates. With rise in interest rates, households start saving in other instruments that yield profits along with a certain degree of safety.

The rate of change in number of commercial bank branches has turned out to be an absolute insignificant determinant of saving instruments. The results indicate that it is not the banking structure in the economy which influences household savings. The nature and magnitude of household savings in India are neither influenced by the rate of return on saving instruments nor by the financial infrastructure. It is mainly the past years saving behaviour and the current income of households which influence household savings.

References

1. Ahluwalia, I.J. [1979], Behaviour of Prices and Output in India : A Macro-econometric Approach, Macmillan Company of India.

2. Akinci O. [2003], *'Modelling the Demand for Currency Issued in Turkey'*, The Central Bank of the Republic of Turkey, Research Department, Central Bank Review 1, pp. 1-25.

3. Bose, D. [1994], *'Disaggregation of Household Savings'*, RBI staff studies, December.

4. Callen T. and C. Thimann [1997], *'Empirical Determinants of Household Saving: Evidence from OECD Countries'*, IMF working paper, International Monetary Fund, WP/97/181, December.

5. Cassino V., Misich P. and J. Barry [1997], *'Forecasting the demand for currency'*, Currency Department, Reserve Bank Bulletin, Vol. 60, No. 1.

6. Chakrabarty, T.K. [1987], *'Macroeconometric model of the Indian Economy'*, RBI Occasional Papers.

7. Dasgupta B. and R. Gupta [2005], *'The Macroeconomic Reform and the Demand for Money in India'*, Working Paper 2, University of Pretoria, August.

8. Dirschmid W. and E. Glatzer [2004], *'Determinants of the Household Saving Rate in Austria'*, Monetary Policy & The Economy, Q4, pp. 25 to 38.

9. Gupta, G.S. [1973], *'A Monetary Policy Model for India'*, Sankhya, Series B. December

10. Gupta, G.S. and D. Chawla [1979], *'Lagged Variable models and their Estimation'*, Working Paper, No. 273, April.

11. Gupta, K.L. [1970], *'The Demand for Money in India: Further Evidence'*, The Journal of Development Studies, Vol. 6, No. 1-4, pp. 159-168.

12. Halicioglu, F. and M. Ugur [2005], *'On Stability of the Demand for Money in a Developing OECD Country:The Case of Turkey'*, Global Business and Economic Review, Vol.7, No.3, forthcoming, September.

13. Jadhav, N. [1994], Monetary Economics for India, Macmillan India Limited, New Delhi.

14. Koğar C.I. [1995], *'Cointegration test for money demand - The case for Turkey and Israel'*, The Central Bank of The Republic of Turkey, Research Department, Discussion Paper No: 9514, May.

15. Koyck, L.M. [1954], Distributed Lag and Investment Analysis, North Holland Publishing Co., Amsterdam

16. Mammen, T. [1967], An Econometric Study of the Money Market in India, Ph.D. Dissertation, University of Pennsylvania.

17. Muradoglu G. and T. Fatma [1996], *'Differences in Household Savings Behaviour: Evidence from Industrial and Developing Countries'*, The Developing Economies, Vol. 34, No. 2, June.

18. Nair L. R. [2005], *'Financial Sector Liberalization and Household Savings in India'*, paper presented in ninth capital market conference, Centre for Development Studies, Kerela State, India.

19. Nakagawa S. and T. Shimizu [2000], *'Portfolio Selection of Financial Assets by Japan's Households: Why are Japan's Households reluctant to Invest in Risky Assets?'*, Bank of Japan, August.

20. Pandit, V. [1984], *'Macroeconomic Adjustments in a Developing Economy : A Medium Term Model of Outputs and Prices in India'*, Indian Economic Review.

21. Pani, P.K. [1984], *'A Macromodel of Indian Economy with Special Reference to output, Demand and prices [1969-70 to 1981-82]'*, RBI Occasional Papers, December.

22. Ramanathan, R. [1970], *'Composition of Household Saving in Urban India'*, Indian Economic Review, Vol. 5, pp. 229-39.

23. Rangarajan, C. and R.R. Arif [1990], *'Money Output and Prices A Macroeconometric Model'*, Economic and Political Weekly, Vol. 21, April.

24. Rao B.B. and R. Singh [2006], *'Demand for Money in India: 1953-2003'*, University of the South Pacific, Suva [Fiji], Forthcoming, Applied Economics.

25. Rao, D.C., Venkatachalam, T.R. and A. Vasudevan [1981], *'A Short term Model to Forecast Monetary Aggregates Some Interim Results'*, RBI Occasional Papers.

26. Ul Haque N., Pesaran M. and S. Sharma [1999], *'Neglected Heterogeneity and Dynamics in Cross Country Savings Regressions'*, IMF working paper 128.