3. STRUCTURE OF THE MODEL

3.1 - TOTAL ASSETS OF THE FINANCIAL INSTITUTIONS

3.1.1: RESERVE BANK

1) Asset Ratios:

\[ \phi_R = \frac{AR}{GNP} \]

where AR is the total assets of Reserve Bank and GNP denotes Gross National Product.

\[ \epsilon_R = \frac{\Delta AR}{\Delta GNP} \]

where \( \epsilon_R \) is the elasticity of assets of Reserve Bank and \( \Delta \) is the rate of growth in absolute term.

2) Elasticity of assets and coefficient of variations in Reserve Bank:

\[ \epsilon_R = \text{Ratio of annual rate of growth of assets of Reserve Bank and of GNP (both at current market prices)} \]

Coefficient of variations = Standard Deviation + Mean.

3) The Regression Analysis:

\[ \phi_R = f(a) \quad \text{where } a \text{ is Real GNP per head} \]

\[ \phi_R = f(b) \quad \text{where } b \text{ is rate of growth of real GNP per head} \]

\[ \phi_R = f(c) \quad \text{where } c \text{ is price level change.} \]
Therefore, the following regression equations can also be drawn in addition to above three equations:

\[ \phi_R = f(a, c) \]
\[ \phi_R = f(b, c) \]
\[ \phi_R = f(a, b, c) \]
\[ \phi_R = f(a, b, c, t) \text{ where } t \text{ is time for each equation standard error is } R^2. \]

3.1.2: **COMMERCIAL BANKS**

1) **Asset Ratios:**

\[ \phi_C = \frac{Ac}{GNP} \quad \text{where } Ac \text{ is the total assets of commercial banks.} \]

\[ \varepsilon_C = \frac{\Delta Ac}{\Delta GNP} \quad \text{where } \varepsilon_C \text{ is the elasticity of assets of commercial banks.} \]

2) **Coefficient of variations of commercial banks:**

Coefficient of variations = Standard deviations + Mean

3) **The Regression Analysis**

\[ \phi_C = f(a), f(b) \text{ and } f(c) \]

and also

\[ \phi_C = f(b, c) \]
\[ \phi_C = f(a, c) \]
\[ \phi_C = f(a, b, c) \]
\[ \phi_C = f(a, b, c, t) \text{ where every notation has its usual meaning.} \]
3.1.3: THE BANKING SYSTEM (Reserve Bank and Commercial Banks)

1) The Asset Ratios:

\[ \phi_B = \frac{AB}{GNP} \]  where AB is the total assets of banking systems.

\[ \epsilon_B = \frac{AB}{GNP} \]  where \( \epsilon_B \) is the elasticity of assets of banking systems.

2) Coefficient of variations of banking system:

Coefficient of variations = Standard deviations + Mean.

3) Regression Analysis:

\[ \phi_B = f(a), f(b) \text{ and } f(c) \]

\[ \phi_B = f(b,c), f(a,c) \text{ and } f(a,b,c); \text{ and} \]

\[ \phi_B = f(a,b,c,t). \]

3.1.4: SPECIALIZED INSTITUTIONS

1) The Asset Ratio:

\[ \phi_s = \frac{As}{GNP} \]  where As is the total assets of specialized institutions.

\[ \epsilon_s = \frac{As}{GNP} \]  where \( \epsilon_s \) is the elasticity of assets of specialized institutions.

2) Coefficient of variations of specialized institutions:

Coefficient of variation = Standard deviation + Mean.

3) Regression Analysis:

\[ \phi = f(a), f(b) \text{ and } f(c) \]
\[ \phi = f(a,c), f(b,c), f(a,b,c) \]; and
\[ \phi = f(a,b,c,t). \]

3.1.5 : TOTAL FINANCIAL INSTITUTIONS

1) The Asset Ratio:
\[ \phi = \frac{A}{GNP} \] where \( A \) is the total asset of total financial institutions.
\[ \epsilon = \frac{\Delta A}{\Delta GNP} \] where \( \epsilon \) is the elasticity of total financial institutions.

2) Coefficient of variations of total financial institutions:
Coefficient of variation = Standard deviation / Mean.

3) Distribution of assets among financial institutions:
\[ \phi = \phi_R + \phi_B + \phi_S + \phi_C \]

4) Regression Analysis:
\[ \phi = f(a,b,c,t). \]

3.2 - LOANS AND DISCOUNTS

3.2.1 : RESERVE BANK

1) The Credit Ratios:
\[ \psi_R = \Delta \text{credit} + \Delta \text{GNP} \]
where \( \Delta \text{credit} \) is the change in credit provided during two subsequent year by Reserve Bank.
2) Regression Analysis:

\[ \psi_R = f(a, b, c, t). \]

3.2.2 : **COMMERCIAL BANKS**

1) The Credit Ratio:

\[ \psi = \text{Credit Ratio} \]

\[ \psi_c = \text{Credit} + \Delta \text{GNP} \quad \text{where } \Delta \text{Credit is the rate of change in credit facility in commercial banks.} \]

2) Regression Analysis:

\[ \psi_c = f(a, b, c, t). \]

3.2.3 : **BANKING SYSTEM**

1) The Credit Ratio:

\[ \psi_c = \Delta \text{Credit of Banking System} + \text{GNP}. \]

2) Regression Analysis:

\[ \psi_c = f(a, b, c, t). \]

3.2.4 : **SPECIALIZED INSTITUTIONS**

1) The Credit Ratio:

\[ \psi_s = \Delta \text{Credit of Specialized Institutions} + \Delta \text{GNP}. \]

2) The Regression Analysis:

\[ \psi_s = f(a, b, c, t). \]
3.2.5: **TOTAL FINANCIAL INSTITUTIONS**

1) The Credit Ratio:

\[ \text{The Credit Ratio} = \frac{\Delta \text{Credit of Total Financial Institutions}}{\Delta \text{GNP}} \]

2) Regression Analysis:

\[ \psi = f(a, b, c, t) \]

3) Distribution of Credit:

\[ \psi = \psi_R + \psi_C + \psi_B + \psi_S \]

3.3 - **INVESTMENT**

3.3.1: **RESERVE BANK**

1) The Investment Ratio:

\[ I_R = \frac{\Delta \text{Investment of Reserve Bank}}{\Delta \text{GNP}} \]

2) Regression Analysis:

\[ I_R = f(a, b, c, t) \]

3.3.2: **COMMERCIAL BANKS**

1) The Investment Ratio:

\[ I_C = \frac{\Delta \text{Investment of Commercial Banks}}{\Delta \text{GNP}} \]

2) Regression Analysis:

\[ I_C = f(a, b, c, t) \]
3.3.3: BANKING SYSTEM

1) The Investment Ratio:

\[ I_B = \frac{\Delta \text{Investment of Banking System}}{\Delta \text{GNP}} \]

2) Regression Analysis:

\[ I_B = f(a, b, c, t). \]

3.3.4: SPECIALIZED INSTITUTIONS

1) The Investment Ratio:

\[ I_s = \frac{\Delta \text{Investment of Specialized Institutions}}{\Delta \text{GNP}} \]

3.3.5: TOTAL FINANCIAL INSTITUTIONS

1) Investment Ratio:

\[ I = \frac{\Delta \text{Credit of Total Financial Institutions}}{\Delta \text{GNP}} \]

2) Regression Analysis:

\[ I = f(a, b, c, t). \]

3) Distribution of Total Investment:

\[ I = I_R + I_C + I_B + I_s \]

Thus the above regression analysis can be summarized as the structure of model primarily depends upon the asset of the total financial institutions with their credit facilities and investment project in respect of Gross National Product.
of the Indian economy.

The following page consist of the summary of the independent variables, dependent variables and their relationship among various components of financial institutions, such as, Reserve Bank, commercial banks, banking system and specialized institutions.

Financial structure is displayed in this model in terms of such variables as $\phi_n$, $\psi_n$ and $I_n$, where subscript $n$ refers to a specific financial institution.

Long-term economic transformation is rather a multi-dimensional phenomenon in which social and demographic aspects are difficult to be overlooked. Population growth, therefore, has been taken as a relevant explanatory variable in the model. The difference between 1971 and 1981 census is equally distributed among this period for simplicity of calculation.

The approach followed in relating financial structure variables to long-term economic transformation has been to calculate a set of regression equations with long-term economic magnitudes as explanatory variables. The estimation procedure has been that of a single equation least square regression. Each equation, so developed is tested for each group of financial institution, and their total and sub-totals. They include:

1. Reserve Bank
### A SUMMARY TABLE ON THE MODEL

<table>
<thead>
<tr>
<th>DEPENDENT VARIABLES</th>
<th>$\phi_R$</th>
<th>$\phi_C$</th>
<th>$\phi_B$</th>
<th>$\phi_S$</th>
<th>$\phi$</th>
<th>$\psi_R$</th>
<th>$\psi_C$</th>
<th>$\psi_B$</th>
<th>$\psi_C$</th>
<th>$\psi$</th>
<th>$I_R$</th>
<th>$I_C$</th>
<th>$I_B$</th>
<th>$I_B$</th>
<th>$I$</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a, c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b, c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a, b, c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a, b, c, t</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| ELASTICITIES
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>COEFFICIENT</td>
<td>VARIATIONS</td>
</tr>
<tr>
<td>DISTRIBUTION</td>
<td>(percent)</td>
</tr>
<tr>
<td>THE SHARE IN :</td>
<td>$\phi, \psi$, and I (percent)</td>
</tr>
<tr>
<td>RESERVE BANK</td>
<td>COM BKS</td>
</tr>
<tr>
<td>BKS Syst Spec Inst Total</td>
<td>Res Bank Com Bks. Syst Spec Inst Total</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

23
2. Commercial banks

3. Banking system (Reserve Bank and commercial banks)

4. Specialized lending institutions

5. All financial institutions (Reserve Bank, commercial banks, and specialized lending institutions).

The classification to four financial institutions is by no means exhaustive. Non availability of data about other institutions has been prohibitive, however.

The variables include in the equations can be consolidated as follows:

a - real GNP
b - rate of growth of real GNP per capita
c - rate of change of wholesale price level
d - per capita real GNP
g - annual rate of growth of real GNP
p - annual rate of growth of population
t - time trend (Initial year = 1).

The all economic variables are entered in million of Rupees except for rates of change which are in percent.

It is important to note firstly that certain explanatory variables are mutually exclusive in one regression equation due to the simple fact that they are not independent but rather represent more or less the same effect. Secondly all regress equations are in linear form. Thirdly there has been
no different characterization for different financial institutions as regard to the way they are related to whole economic structure. No different band of alternative specifications has been confined to any particular financial institution.

Actual annual time series of the relevant variables have been the main body of statistical information. A full calendar year has been used as a unit of observation.

The data source for this investigation is given in Appendix 'A' with a computer program by which help, all the computational work has been done and the tables on the following pages have been derived. The computer program is written in the format required by SPSS [8]. This software package was developed by Norman H. Nie and others of the University of Chicago keeping in mind the need of social science researchers.

The above program was run with the data on IBM 3033 Computer at Data Processing Center of the University of Petroleum & Minerals, Dhahran, Saudi Arabia.

The number of observations varied from one analysis to another. The effect of a limited number of observations is that the values of the error terms are little bit increased, which in turn decreases the reliability of the estimates of the coefficients derived from the regression equation. To
overcome this problem in some of the cases it is assumed that explanatory variables are lagged by one year.