

AN ECONOMETRIC MODEL FOR INDIA WITH EMPHASIS ON THE MONETARY SECTOR

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I. INTRODUCTION

THE dynamic nexus between fiscal deficit, money supply, inflation, and output has once again come into sharp focus in India as the Indian economy is currently passing through a state of historic transition. In the Indian context, the interaction of the monetary sector with the fiscal sector is particularly important given the fact that a substantial part of the fiscal deficit is financed by the net RBI (Reserve Bank of India) credit to the government which, in turn, has been the principal source of reserve money creation in India. In India, the gross fiscal deficit as a ratio to GDP (*RGFD*) has increased markedly from 3.5 per cent in 1970/71 to 8.3 per cent in 1990/91, though it has been brought down to 5–6 per cent during the last few years.¹ Given the relationship between reserve money and money supply, the importance of the fiscal stimulus to money supply is clearly evident in the Indian context. Similarly, the interaction of the monetary sector with the real sector is reflected in the demand functions for money and its components as well as in price formation. Moreover, the external sector determines the changes in the net foreign assets of the RBI, which feeds into the money stock determination. Against this back ground, it is surprising to find that barring a few exceptions, the short-term dynamics of fiscal deficit, money supply, inflation, and output have not been

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¹ The RBI credit to the government as a ratio to reserve money also increased over the period from about 74 per cent in the early 1970s to about 94 per cent in the early 1990s.

systematically examined for India.² This study therefore makes a modest attempt to address this important issue.

The paper has three objectives: (i) to build a monetary subsector model for India, (ii) to reestimate the existing IEG-DSE³ India model (1994) to incorporate observations relating to the period of economic reforms since the existing model has been estimated on the basis of data relating to the pre-reform period, 1970/71 to 1990/91, and (iii) to evaluate the impact of changes in fiscal and monetary policies on output, inflation, and trade flows during 1997/98 to 2001/2.

An evaluation of alternative programs may be a useful exercise to shed light on the shape of changes that may take place in the economy under different fiscal and monetary policies through an econometric model. The parameters of the model are estimated using the annual time-series data for the fiscal years 1970/71 through 1994/95. Data for this study are taken from published sources. The model was estimated by OLS. The choice of variables and functional forms of equations are made on the basis of theoretical, institutional, and data availability criteria. Needless to mention we have tried several alternative specifications, though we have not reported them here, to choose the best fit for each equation. In many cases we have incorporated dummy variables to neutralize the effects of outliers and sharp changes. This was necessary because some outliers arose due to changes in the definition of the variables. Dummy variables have also been introduced to incorporate the effects of major policy changes during the study period.

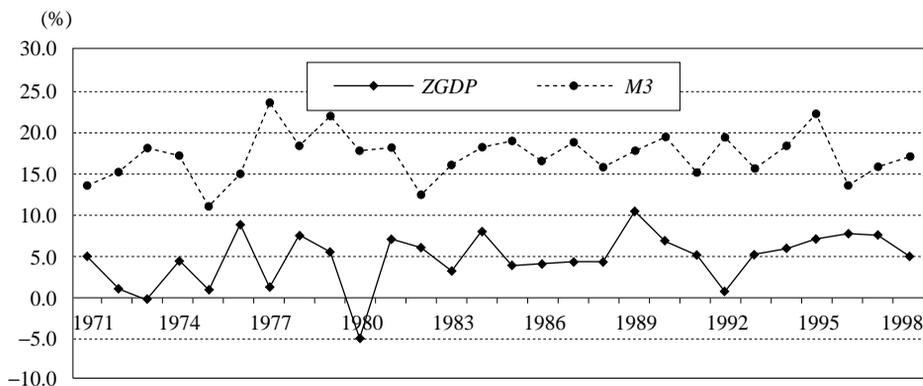
II. MONETARY POLICY FOR THE RECENT PERIOD

In India as in other developing economies, monetary policy plays a secondary role to fiscal policy. The large share of public (government) investment, production, and consumption in the economy confers on fiscal tools a considerable direct influence on the economy. However, time has also revealed that monetary policy plays a very

² Desai (1973), Marwah (1991), and Jadhav (1990, 1994), among others, provide a useful survey of earlier works on the subject.

³ The Institute of Economic Growth (IEG) and Delhi School of Economics (DSE). The IEG-DSE model (1994) was built on the basis of various sub-sector models (see, for example, Palanivel 1993a, 1993b; Pandit, Krishnamurty and Palanivel 1993). The model has been used extensively for forecasts and policy analysis (see Pandit, Krishnamurty, and Palanivel 1995; Krishnamurty, Pandit, and Palanivel 1995, 1996). Forecasts are usually made in March and September for major macroeconomic variables such as real GDP, inflation, consumption, capital formation, and trade flows in accordance with major categories of the Standard Industrialized Trade Classification (SITC). These forecasts are normally made for presentation at the spring and fall meetings of Project LINK, which is a cooperative, international, nongovernmental research activity in the field of macroeconomic forecasting and analysis. It was initiated thirty years ago under the auspices of the Social Science Research Council of the United States by professors Lawrence Klein and Bert Hickman of Stanford University. This project, currently carried on at the United Nations, integrates independently developed national econometric models into a global econometric model. The project encompasses seventy-eight country models, including the IEG-DSE model for India.

Fig. 1. Growth Rates in Money Supply and Real GDP



important role in the stabilization of the Indian economy. For example, in the face of severe external payments crises in 1990/91, monetary authorities in India acted swiftly through monetary and credit policies aiming at import compression and demand containment. These strong measures helped to improve the balance of payment problem though they had an adverse impact on the general level of economic activity.

We will now briefly review the monetary policy that evolved during the last three decades. At the outset, it would be useful to note that during the period real GDP (at 1980/81 prices) increased from about Rs 904 billion in 1970/71 to Rs 3,118 billion in 1997/98, at an annual exponential growth rate of about 4.5 per cent. The wholesale price index (1981/82 = 100) rose by more than nine times at an annual rate of about 8 per cent. The money supply ($M3$), however, increased very sharply by about seventy-five times, from about Rs 110 billion to Rs 8,254 billion for the same period, at an annual compound rate of 16 per cent. It can be seen from Figures 1 and 2 that both output growth and inflation rate exhibited considerable variation from year to year due mainly to weather induced fluctuations in agricultural output. External factors like oil crises and the Gulf War played an important role for large variations in prices during 1973/74, 1979/80, and 1990/91.

The income velocity of broad money has exhibited a downward trend suggesting that the demand for money has increased over the period 1970/71 to 1997/98. It can be seen from Figure 3 that while the income velocity of broad money ($M3$) has shown a sharp decline from 3.9 to 1.8, the same curve of narrow money ($M1$) has flattened. This reflects not only the changes in the financial structure, but also the typical characteristics of an economy where monetization has moved apace with financial developments.

Similarly, the money multipliers (M) corresponding to broad money ($M3$) as well as narrow money ($M1$) over the period 1970/71 to 1997/98 indicate a mixed

Fig. 2. Growth Rates in Money Supply and Wholesale Prices

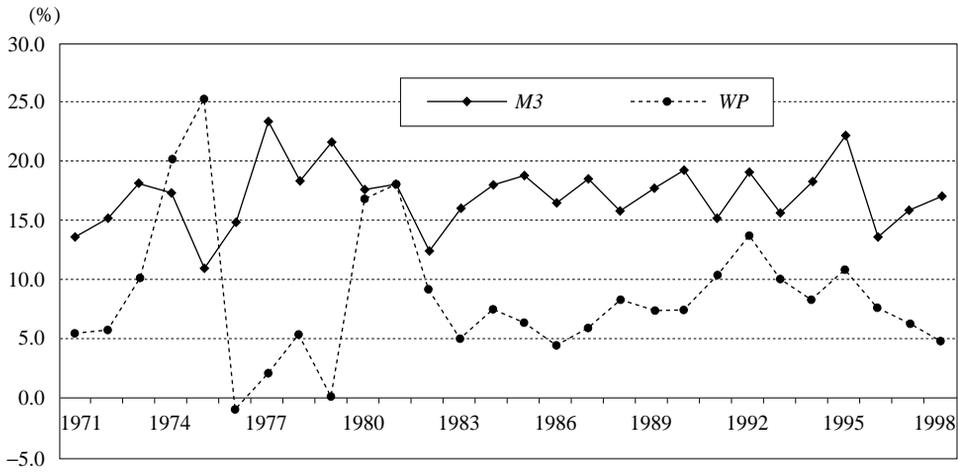
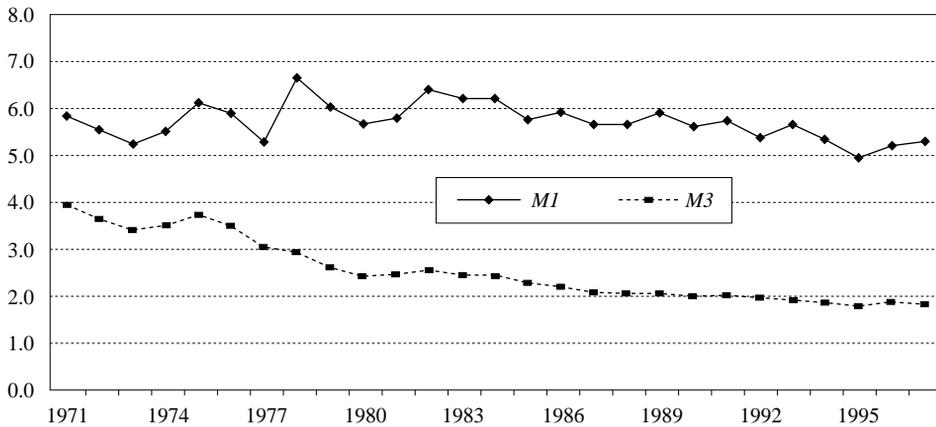


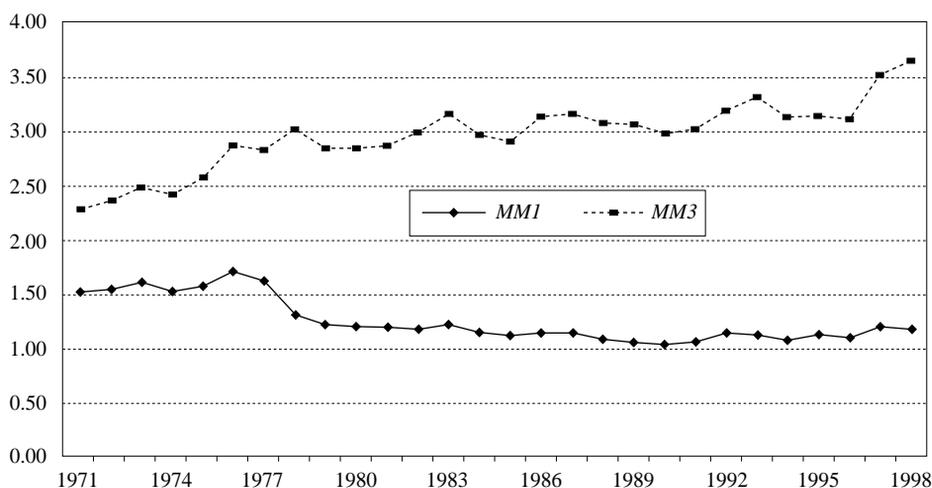
Fig. 3. Velocity of Money ($GDPMP/Money\ Stock$)



picture (see Figure 4). It can be seen that the *M1* multiplier has steadily declined from 1.53 in 1970/71 to 1.18 in 1997/98. On the other hand, the *M3* multiplier has gradually increased from 2.28 in 1970/71 to 3.65 in 1997/98, although it has fluctuated during recent years. The falling currency-deposit ratio and increasing time-demand deposit ratio in the wake of a substantial geographical expansion of the banking facilities, as well as greater awareness of portfolio adjustment, have resulted in increasing the value of the *M3* multiplier.

The tasks faced by the monetary authorities in India (the RBI) in the light of developments mentioned here were primarily related to aggregate demand man-

Fig. 4. Money Multipliers



agement with a focus on arresting sharp increases in the price level due to the periodic setbacks to agricultural output, particularly foodgrains output, as well as to some external factors.

Apart from its traditional central banking functions such as note issuing, serving as bankers' bank, and being banker to the government, the RBI has also been playing a unique development role in the interest of widening and deepening the financial system. Similarly, with the launching of the five-year plans, the RBI has also been moving ahead in performing a host of developmental and promotional functions, which are normally beyond the purview of a traditional central bank. It aims at the promotion of monetization and monetary integration of the economy, filling in the "credit gaps" and gaps in the financial infrastructure, catering to the financial needs of the economy with appropriate sectoral allocation, as well as supporting the planners in the efficient and productive deployment of investible funds with a view to attaining macroeconomic goals such as maximization of growth with stability and social justice (RBI 1985).

It should also be noted that these objectives must be fulfilled in an economy characterized by several dualities such as highly developed banking and financial institutions alongside traditional institutions in the unorganized financial sector, a highly industrialized sector with many small-scale unorganized sectors, etc. Likewise, in the Indian context, barring exceptional developments, such as large and continued accumulation of foreign assets with the RBI, the key to the successful control of money supply is the control of deficit financing by the government. These factors not only limit the options available in exercising monetary policy but also involve conflict in fulfilling various objectives. For example, the objective of regu-

lating money supply through traditional tools may conflict with the social objective of allocating bank credit to priority sectors of the economy or allocating credit to different productive sectors to meet the growth targets stipulated in the five-year plans (see RBI 1985).

In pursuit of achieving the above objectives simultaneously, the RBI, over the years, has used a large number of traditional and non-traditional quantitative as well as qualitative tools and techniques. The important ones among them are as follows: (i) cash reserve ratio (CRR), (ii) statutory liquidity ratio (SLR), (iii) bank rate (BR), (iv) open market operations, (v) selective credit control, (vi) refinance policy, and (vi) moral suasion.

1. *Cash reserve ratio*

Among these tools, the RBI has used the CRR as a main instrument because of its quick and predictable impact.⁴ The RBI is empowered to vary the CRR between 3 and 15 per cent of demand and time liabilities. The effectiveness of the CRR instrument has been augmented on occasions by imposing an additional cash reserve requirement, over and above the CRR specified from time to time. Any shortfall in the maintenance of the CRR attracts penal interest at the rate of 3 per cent above the bank rate for the first week of default and at 5 per cent thereafter.

The most important factor influencing the conduct of monetary policy since 1970 is the phenomenal increase in reserve money due to an increase in RBI credit to the government, over which the RBI had little control. This gave not only strong impetus to monetary expansion, but also the expansionary impact of reserve money increased over the years due to a decline in the currency-deposit ratio in the wake of a substantial geographical expansion of banking facilities. In this context, the only feasible approach to the control of money supply is to influence the value of the money multiplier by raising the CRR. This was done repeatedly and the rise in the average money multiplier has been more or less arrested after the mid-1980s; it is now stabilized at a level of 3.2. It is now clear that the CRR has been used frequently not only in the context of a sharp rise in prices due to failure of the monsoon but also as a primary instrument to counter the inflationary pressures resulting from large continuing fiscal deficits.

In the initial period since 1956 (when the RBI act was amended to use the CRR as a measure of monetary control), the RBI used the CRR very rarely, only once in the 1960s. In the 1970s, however, the CRR has been used a dozen times including minimum and incremental CRR. In the 1980s and 1990s, the CRR has been used more frequently. It may be noted that the successive upward revision in the changes

⁴ Several factors such as limited scope for open market operations, due to underdevelopment of the market for government securities, the continued popularity of fixed deposits with banks as an intermediary custodian of financial savings in the absence of other competing financial instruments have all led to the adoption of the CRR as a major instrument of monetary control in India.

in the CRR during the 1980s and 1990s was linked to a rapid growth in the fiscal deficit.

As mentioned earlier, the RBI is empowered to prescribe additional CRR, but they should not exceed 100 per cent of the excess of demand and time liabilities (DTL) over the prescribed base date, and further they should not result in increasing the effective average CRR beyond the statutory maximum of 15 per cent. In the last two and one-half decades, the RBI used this incremental CRR several times because of the advantage that it distinguishes between strong and weaker banks in the growth of deposits. But the critics, especially the Chakravarty Committee (1985), pointed out that when the weaker banks could be helped with suitable refinance facilities, there is no point in imposing an extra burden on the better and more efficient banks. Therefore, the committee recommended that the provision of incremental CRR should be sparingly used under very compelling circumstances.

When the RBI imposes a high CRR on banks, it pays a rate of interest at 10.5 per cent on the excess reserves impounded above the statutory minimum of 3 per cent. This is done with a view to safeguard the profitability of banks. Recently, the Narasimham Committee (1991) has, however, recommended that the interest rate paid to the banks on impounded deposits through the CRR above 3 per cent should be kept in alignment with banks' average cost of deposits and suggested that this could be equal to the banks' one-year deposit rate.

The CRR instrument is subject to some leakage in impounding bank reserves to a desirable extent. In India, the leakage is inherent in the system as the law allows banks to default for a limited period by paying a fine, which is usually nominal. During inflation or busy seasons, banks do not mind small fines and would purposely default to use the cash to make loans. Similarly, a leakage is possible when banks try to make up their liquidity position by selling government securities, which is called "switch operations." To prevent switch operations of liquidating government securities by banks, the RBI not only strictly enforces the SLR but also some times raises the SLR to siphon off excess liquidity with banks. This means the CRR becomes more effective when supplemented by the SLR.

It seems that the RBI has to rely inevitably on the CRR as a primary instrument of monetary control on account of the extensive monetization of public debt to support the large fiscal deficits. If fiscal deficits are checked and monetization of public debt is reduced, the pressure on reserve money level will be lessened and there will be no need to resort to the CRR very frequently as has been seen in recent years. In this context, it may be noted that since the government has substantially reduced the fiscal deficit and resolved to reduce it more, the RBI, following the Narasimham Committee (1991) suggestions, reduced the CRR significantly during the recent period. It may be also noted that ongoing financial sector reforms will make the bank rate and open market operations as effective instruments of monetary management, maybe as good as, or even better than, the CRR.

2. *Statutory liquidity ratio*

The statutory liquidity ratio (SLR) is another important tool in the hands of the RBI. The ratio of liquid assets to demand and time liabilities in India is known as the SLR. The liquid assets consist of (i) excess cash reserves, (ii) current account balances with other banks, and (iii) unencumbered government and other approved securities. The objective of the SLR in the Indian context is to impose financial discipline on the banks and to provide some protection to the depositors. The chief direct role of the SLR is to govern the allocation of total bank credit between the government and the commercial sector. The indirect role of monetary control is played through this direct role. This technique prevents the banks from divesting government securities in favor of commercial credits even when there is an incentive for such an action. Initially, the SLR was fixed at 20 per cent under the Banking Regulation Act (1949), which was revised upward to a minimum of 25 per cent in 1964. An amendment to this act, effective from March 1985, empowered the RBI to increase the SLR up to 40 per cent.

During the three decades, the SLR was used as a policy tool by raising it from time to time. The SLR was 25 per cent in 1970/71. It was gradually stepped up to 33 per cent in June 1974 and further to 34 per cent in December 1978. During the 1980s, it has been gradually revised upwards. It was 38 per cent in 1988. It was further raised to 38.5 per cent in September 1990.

Due to the high value of the SLR, the credit-deposit ratio of banks has declined because of diversification of bank funds into compulsory investment in government securities. The government securities market has been made increasingly "cap-tive" by the enhancement of the SLR. Even the RBI admitted that the use of the SLR is primarily "motivated not by a desire to enhance banks' liquidity but by the need to support a rapidly growing programme of government borrowing" (RBI 1980, p. 862). Over the years, lower yields on government securities and a high volume of bank investment in them adversely affected bank profitability. Beside this, as the Narasimham Committee pointed out, the high level of SLR investments has also tended to "crowd out" the nongovernment sector's access to bank funds, thus depriving productive activities of resources from the banking system. Following the recommendations of the Narasimham Committee, the RBI set a medium-term objective of reducing the SLR to 25 per cent from 1996/97 onwards. It may be noted that the average SLR which was around 38 per cent in 1991/92 was brought down to 29 per cent at the end of 1994/95 as the need for a high SLR had diminished with the progressive move to market-related interest rates on government securities. As a consequence, banking investment in government securities is increasingly being influenced by the return on them rather than by statutory requirements. With their zero risk, the SLR has become largely redundant.

3. *Bank rate*

The bank rate is another weapon in the armory of credit control of the RBI. In India the bank rate is the “standard rate at which the RBI is prepared to buy or rediscount bills of exchange or other commercial paper eligible for such purposes.” In the context of the underdeveloped state of the bill market and lack of eligible paper for discounting, the bank rate in India is essentially the rate at which the RBI extends advances to various categories of borrowers. Even this description has not been very correct until recently, since the RBI for various types of credits prescribed different rates, not a single rate. Evidently, there seems to exist a multiplicity of bank rates in practice. Moreover, unlike its counterparts in many other countries, the RBI has not changed the bank rate very often. The cost of commercial bank credit to the different borrowers was regulated mainly by directly prescribing the lending rates, rather than by acting through the bank rate. Therefore it is not surprising that the bank rate as an instrument of monetary control has fallen dormant in India.

The bank rate has been changed only about ten times since 1970. In January 1971 it was raised from 5 to 6 per cent. In May 1973 and July 1974, it was again raised to 7 and 9 per cent respectively as an anti-inflationary device. The 9 per cent rate was continued till July 1981 when it was raised to 10 per cent with a view to curbing the inflationary potentials in the economy.

It had remained unchanged since July 1981. In the context of inflationary pressures and a difficult balance of payments situation, and the need to evolve a benchmark RBI rate, the RBI activated the bank rate instrument in 1991 under a dear monetary policy program. It was raised from 10 to 11 per cent per annum effective from July 3, 1991, and further raised to 12 per cent per annum effective from October 8, 1991. Significantly, in the recent history of the operation of this instrument, the bank rate was lowered only once and that, too, very recently. In April 1997 not only did the RBI reduce the bank rate 1 percentage point, from 12 to 11 per cent per annum, but also gave it its due importance as an instrument by linking all interest rates with the bank rate.

4. *Open market operations*

In the conduct of monetary policy, the RBI is also legally empowered to use the technique of open market operations, which is a flexible instrument of credit control for altering the liquidity position of banks by dealing directly in the market. In India, open market operations did not have much scope, as the market in government securities was narrow, and the demand for such securities arose mainly out of statutory requirements in the absence of attractive coupon rates on these securities. By and large, the RBI has been employing open market operations to support public borrowing and promote the growth of the gilt-edged market by influencing the

cost and availability of credit, effectively through causing changes in bank liquidity positions as an instrument of monetary policy. The RBI does not ordinarily purchase securities against cash. Purchases were made only in switch transactions, by offering new securities against the old ones. Along with the increasing trend of net sales over the years, the holdings of government securities by the RBI have also steadily increased, indicating a perpetual support by the RBI to the securities market. The role of open market operations as an instrument of credit control will assume importance in the future, as the monetary system has been restructured in recent years, with an aim to deepen and broaden the market and to increase its liquidity.

5. *Selective credit control*

Selective credit control (SCC) operates as an adjunct of general credit control with a view to ensuring an adequate flow of credit to the desired productive sectors while restricting the excessive financing of speculative, unproductive, and less essential economic activities. The RBI operates SCC through one, or a combination, of the techniques of (i) a minimum margin for lending against the value of specific securities, (ii) a ceiling on the level of credit, and (iii) a minimum rate of interest on advances.

SCC has been applied to certain specified commodities such as foodgrains, oilseeds, and cotton. The RBI has been using SCC actively over the last two decades. It appears that it has not achieved much in restricting bank advances for the holding of stocks and in controlling the demand pressures on prices in respect to certain sensitive commodities covered by SCC. The RBI usually defends its SCC performance by arguing that SCC is meant only to moderate a price rise. It cannot expect to curb its basic trend. In recent years, the RBI has been making modifications in SCC on the basis of price-output developments, from time to time.

6. *Refinance policy*

A refinance facility provided by the RBI to the banks has played an important active and supportive role in credit regulation in India. The relative importance of this measure in different periods has obviously depended on the degree of liquidity constraint experienced in the banking system. The RBI's accommodation to banks through a refinance facility, besides a rediscounting facility, *ceteris paribus*, augments their lendable resources or reserves and consequently supports an expansion of credit and money supply. Since 1970 this policy was mainly oriented towards assisting banks to channel the flow of credit to certain preferred sectors. Hence, the system of refinance to banks had a limited scope to function as a measure of monetary control. There are three important types of refinance facilities of some significance. These are food credit refinance, export credit refinance and 182-day treasury bill refinance. The RBI's facility to refinance food credit given by the banks to the

public sector in building sizable buffer stocks has unique importance in India's economy for overall price stabilization policy. Until 1970 the government used to finance procurement operations. After 1970, public sector banks have been asked to provide credit to procurement agencies—called food credit. Since 1975/76, the full responsibility for financing food procurement operations has been shifted to the banking sector. This has had an impact of diversifying bank resources from other sectors to food credit. To relieve the pressures, the RBI introduced the scheme of refinancing food credit for banks. The policy of refinancing food credit varied proportionately from time to time with the changes in the liquidity position and the stance of monetary policy. It has emerged as an important dimension of the RBI's credit policy over the period. Similarly, banks have been advised to give liberal credit for exports and 182-day treasury bills under the priority sector lending. To ease the pressure on banks, export refinance and 182-day treasury bill refinance were implemented.

7. *Moral suasion*

The RBI seeks at times to influence the volume and directional flow of credit by appealing to banks and seeking their voluntary compliance with the guidelines rather than by enforced compliance with its directions. This instrument of monetary regulation, which is known as moral suasion, is found to be effective in India, particularly in controlling banks' liquidity. This can be seen in the maintenance of the SLR by the banks. While banks were required by statute to maintain a minimum users rate of 25 per cent of their demand and time liabilities, as a result of moral suasion by the RBI they usually maintain higher ratios.

From the foregoing review, it is clear that monetary policy is an arm of economic policy. The objectives of monetary policy are no different from the overall objectives of economic policy. In recent years, monetary policy has had to bear more than its normal share of responsibility, especially in the context of severe external payments crises such as high inflation. Despite the major preoccupation with short-term management of aggregate demand and other obligations, the longer-term objectives of promoting operational efficiency of the financial system and developing the money market have been pursued. In this respect, the recommendations of the Narasimham Committee for the financial system have had an important bearing on the formulation of monetary policy. The future course of monetary policy will have to be continually adapted to make it more effective and productive. The policy will have to be adapted to suit the unfolding macroeconomic scenario and emerging financial environment. With the financial sector reforms under way, significant changes in the instruments and conduct of monetary policy are inevitable in the next few years. Monetary policy reform will need to be carefully sequenced, as some of the changes have to be preceded by institutional development. While reserve requirements, interest rate controls, and direct controls on credit are going to

play a diminishing role, the new instruments of indirect control such as market-related interest rates, freer financial markets, and particularly the government securities market need to be put in place in a manner which will enable the RBI to absorb or provide liquidity to the financial system through effective use of open market operations. As different segments of the financial markets are integrated, the changes in interest rates will be transmitted more rapidly to all sectors of the economy, and, as such, interest rates will come to play an important role in an active monetary policy.

III. SPECIFICATIONS AND ESTIMATIONS

A. *Demand for Money*

Theoretically, the demand for money is generally hypothesized to be an increasing function of some measure of income or wealth (as a scale variable), a declining function of the rate(s) of return from alternative nonmonetary assets (as opportunity-cost variables), and some other variables representing the structural composition of the economy. The scale variable was in accordance with the transaction theories of money, which viewed money essentially as an inventory, held for transaction purposes. On the other hand, interest rate as a measure of the opportunity cost of holding money is in conformity with the asset theories of money, which presumed the demand for money to be a problem of portfolio choice.

In India, the demand for money has been subjected to numerous empirical analyses. While Jadhav (1994) provides a useful survey of the statistical demand functions for money, Gupta (1977) discusses the major problems concerning the empirical estimation of the demand function for money. According to Gupta (1977), one of the key problems is the treatment of saving deposits at banks. Should they be treated as demand deposits, as time deposits, or partly as demand and partly as time deposits? If the latter, in what proportions and how, can one decide on those proportions. RBI (1977) analysis reveals that the demand liability portion of saving deposits differs widely from bank to bank and year to year. For example, it was in the range of 64 to 65 per cent for 1961–63, 87 to 90 per cent for the years 1964–66, 92 to 93 per cent for next two years, and then declined to about 84 per cent. This has resulted in rather sharp fluctuations in the estimation of various monetary measures.

Another problem is the wide variety of rates of return on nonmonetary assets. Earlier studies tried a single or a few rates simultaneously in the demand function. The choice of individual rates also varied from researcher to researcher. In fact, Gupta (1977) rightly pointed out that the underlying choice criteria, in several cases, are highly questionable. According to him a weighted average of various time deposit rates would be appropriate. Instead of this series, in our empirical work we have used the one-to-three-year time deposit rate.

Total money stock consists of the currency in circulation (*CPEM*), demand deposits (*DDBEM*), time deposits (*TDBEM*), and “other deposits” of the RBI. The shares of currency and demand deposits in the total money supply (*M3*) declined, respectively, from about 40 and 27 per cent in 1970/71 to 19 and 15 per cent in recent years. On the other hand, the share of time deposits doubled from 33 per cent to about 65 per cent over the same period. The “other deposits” of the RBI comprise the demand deposits of quasi-government institutions like the Industrial Development Bank of India (IDBI), the Industrial Credit and Investment Corporation of India (ICICI), the Industrial Finance Corporation of India (IFCI), State Financial Corporations (SFC), deposits of the RBI Employees’ Co-operative Credit Society, etc. These constitute a negligible part of the money supply, with a share of less than 0.5 per cent. These structural features are important not only in the explanation of the demand for money, but also in the context of using the money multiplier process to estimate money supply changes.

Following Chick (1977) and several others, the demand function for money is formulated in nominal terms. The demand for currency held by the public (*CPEM*) in nominal terms is postulated to be a positive function of nominal private final consumption expenditure (*PC*), but a negative function of the commercial banks deposit rate for one to three years (*CBDR13*) and the share of nonagriculture GDP in the total GDP (*XNA/GDP*). Similarly, the demand for nominal demand deposits (*DDBEM*) is related positively to nominal nonagricultural income (*XNA*) and expected inflation rate (*MGWP*), but negatively to *CBDR13*. Likewise, the demand for nominal time deposits (*TDBEM*) is related positively to *XNA* and the relative return on *CBDR13* to competing assets like average return on government securities (*WRGS*) but negatively to the expected inflation rate. The following are estimated equations (the figures within parentheses represent *t*-values of corresponding coefficients; the figures in the *EL* line refer to elasticities evaluated at the point of means):

Currency held by the public

$$\begin{aligned}
 CPEM &= 175.6323 + 0.1813PC - 8.5753CBDR13 \\
 &\quad (3.73) \quad (7.23) \quad (3.05) \\
 EL &\quad \quad \quad 1.18 \quad \quad 0.26 \\
 &\quad - 2.7902(XNA/GDP \cdot 100) + 71.2505 \cdot D95, \\
 &\quad (2.80) \quad \quad \quad (5.90) \\
 &\quad \quad \quad 0.59
 \end{aligned}$$

$$\bar{R}^2 = 0.99; DW = 2.22; \text{ sample period: } 1971-95.$$

Demand deposits

$$\begin{aligned}
 DDBEM &= 147.8169 + 0.1639XNA - 29.1982\{[CBDR13(-2)] \\
 &\quad (3.47) \quad (26.93) \quad (4.57) \\
 EL &\quad \quad \quad 1.23 \quad \quad 1.17
 \end{aligned}$$

$$+ CBDR13(-1) + CBDR13]/3\} + 4.1686MGWP - 51.8225 \cdot D91,$$

(2.59) (2.71)
0.17

$\bar{R}^2 = 0.99$; $DW = 1.73$; sample period: 1972–95.

Time deposits

$$TDBEM = -222.3117 + 0.6072XNA + 132.4970(CBDR13/WRGS)$$

(4.37) (105.03) (2.47)

$$EL \quad 1.20 \quad 0.13$$

$$- 8.3092MGWP - 103.3393 \cdot D9192,$$

(2.70) (4.38)
0.07

$\bar{R}^2 = 0.99$; $DW = 2.08$; sample period: 1971–95.

Demand for total money stock⁵

$$M3 = CPEM + DDBEM + TDBEM + \text{other deposits.}$$

The estimated equations are generally good. The \bar{R}^2 are more than 90 per cent and there are no serious indications of auto-correlation of residuals. The coefficients have the expected signs and are statistically significant in almost all the cases. The estimated income elasticity of demand for currency, in our case the private final consumption expenditure, is 1.18. The estimated income elasticity of demand for demand and time deposits are 1.23 and 1.20 respectively.

B. Money Supply Process

Until the late 1960s, the supply of money was treated as a policy variable determined by the monetary authorities. But in recent years, a growing number of studies suggest that the supply stock of money should be endogenous in a macroeconomic model. In empirical research, in order to model the money supply process, a money multiplier approach is usually followed, in which the sources of reserve money are identified and then analyzed. This approach suggests that determinants of the money stock ($M3$) can be classified into two broad groups: (i) those that affect the money multiplier (M) and (ii) those that affect reserve money ($RMEM$).

The simple money multiplier comprises the ratio of currency to demand deposit ($CPEM/DDBEM$), the ratio of time deposits to demand deposits ($TDBEM/DDBEM$), and the ratio of reserves to deposits [required reserves ($WCRR$) and the actual reserve ($R2$)]. Since deposits undergo multiple expansion while currency does not, the money supply ($M3$) and money multiplier (M) are postulated as a negative function of $CPEM/DDBEM$. On the other hand, time deposits undergo relatively more expansion than demand deposits; the money multiplier is positively related to $TDBEM/DDBEM$. We have tried two ratios of reserves to deposits since the re-

⁵ The equation for other deposits is not reported here.

erves of banks are usually divided under two heads: (a) required reserves and (b) excess reserves. Required reserves are reserves which banks are required by statute to hold with the RBI. All other reserves are excess reserves, whether they are held as cash on hand or as balances with the RBI. Data are not readily available for excess reserves. Therefore, we used both *WCRR* and *R2*. Since reserves undergo relatively less expansion than non-reserves, *M* is negatively related to both the cash reserve ratio (*WCRR*) and *R2*.

The estimated equation is given below:

Money multiplier (*M*)

$$\begin{aligned}
 M = & 3.7869 - 1.1388(CPEM/DDBEM) + 0.3727(TDBEM/DDBEM) \\
 & (19.33) \quad (7.94) \quad (9.24) \\
 EL & \quad \quad 0.51 \quad \quad \quad 0.41 \\
 & - 2.7518R2 - 0.0326WCRR - 0.1582 \cdot D85 + 0.1152 \cdot D9293, \\
 & (2.17) \quad (4.07) \quad (2.02) \quad (1.74) \\
 & 0.11 \quad \quad 0.09
 \end{aligned}$$

$$\bar{R}^2 = 0.93; DW = 1.69; \text{ sample period: } 1971-95.$$

As can be seen, the money multiplier is well explained by the above variables. There is also little indication of auto-correlation. The coefficients have the expected signs and are statistically significant. The elasticity of the money multiplier with respect to *CPEM/DDBEM* is -0.51 , with respect to *TDBEM/DDBEM* is 0.41 and with respect to reserve is about -0.20 .

Although reserve money may be disaggregated into asset or liability components, in the money multiplier model the asset form is usually used, which shows the way reserve money is created. In the Indian context, the basic identity of the reserve money on the asset side is as follows:

$$\begin{aligned}
 \text{Reserve money (RMEM)} = & \text{net RBI credit to the government (RBNCGEM)} \\
 & + \text{RBI credit to commercial and cooperative banks (RBNCBEM)} + \text{RBI} \\
 & \text{credits to the commercial sector (RBNCSEM)} + \text{net foreign exchange as-} \\
 & \text{sets of the RBI (RBNFEEM)} + \text{government's currency liabilities to the} \\
 & \text{public (GCLPEM)} - \text{net nonmonetary liabilities of the RBI (RBNMLEM)}.
 \end{aligned}$$

A look at the sources of reserve money in recent years will show that the RBI's net credit to the government was the principal source of reserve money. Net RBI credit to the government as a proportion of reserve money was 79.7 per cent in 1970/71 and 81.5 per cent in 1980/81 and rose to more than 100 per cent in 1985/86, 1986/87, and 1990/91. However, due to ongoing economic reforms involving reduction of the fiscal deficit, it is now down to about 70 per cent. Among other sources of reserve money, RBI credit to the commercial sector (development banks) shows a remarkable increase from Rs 1.3 billion in 1970/71 to Rs 72.6 billion in 1991/92, and currently it now stands at about Rs 65 billion. The RBI credit to commercial and cooperative banks (including the National Bank for Agriculture

and Rural Development) increased from Rs 6.2 billion in 1970/71 to Rs 98.9 billion in 1992/93, and currently it stands at about Rs 134.7 billion. The net foreign exchange assets of the RBI show a notable increase from Rs 5.3 billion in 1970/71 to Rs 747.2 billion in 1994/95. It was at an all time low in 1974/75, when it declined to Rs 3.69 billion. During the first half of the 1980s, also, it showed some declining tendency. The government's currency liabilities to the public have remained more or less constant in the range of Rs 4 billion to Rs 6 billion during the 1970s. However, during the 1980s there was a steady rise from Rs 6.19 billion in 1980/81 to Rs 15.6 billion in 1989/90, and now it stands at more than Rs 21 billion. The increase in RBI nonmonetary liabilities during the recent period has tended to offset considerably the expansionary effect of other sources of reserve money. It increased steadily from Rs 7.1 billion in 1970/71 to Rs 47.7 billion in 1980/81 and to Rs 293.6 billion in 1994/95.

The components of reserve money, except Reserve Bank net foreign exchange assets (*RBNFEEM*), which is determined in the external sector, are modeled but not reported here due to space problems. However, it may be noted that net RBI credits to the government (*RBNCGEM*) is well explained by gross fiscal deficit (*GFD*) and its own lag. The elasticity of *RBNCGEM* with respect to *GFD* is 0.26 in the short run while in the long run it is about 2.8. Similarly, RBI credit to commercial and cooperative banks (*RBNCCBEM*) is well explained by banks' gross credit, bank rate, and its own lag. If commercial bank credit goes up, it is expected that banks will try to get more credit from the RBI so that it will have a positive sign. On the other hand, if the RBI raises the bank rate, then banks may not get enough profit from taking credit from the RBI and lending to private people. Therefore it will have a negative sign. The negative sign of its own lag may be justified on the ground that if last year's RBI credit to commercial and cooperative banks was very high, then in order to adjust, the RBI is expected to reduce this year's credit to commercial banks. While explaining RBI credit to the commercial sector, i.e., to the development banks (*RBNCSSEM*), we tried development bank credit to the commercial sector as an explanatory variable. Since it was not significant, we have simply related to its own lag. Both the government's currency liabilities to the public (*GCLPEM*) and RBI net nonmonetary liabilities (*RBNMLEM*) are simply related to their own lags.

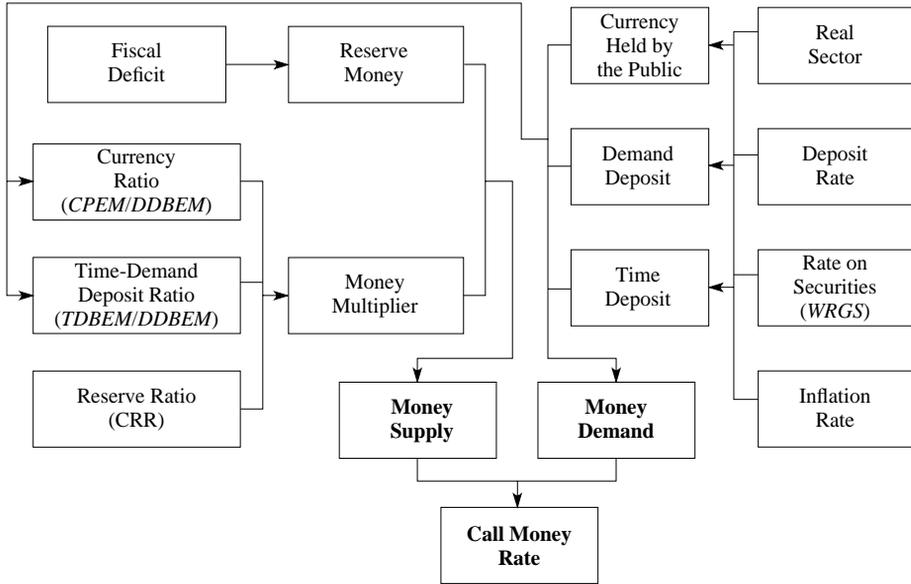
Total money supply

$$M3 = M \cdot RMEM.$$

C. *Equilibrium in the Monetary Sector*

The gap between the supply of and demand for money exerts pressures on the average call money rate until the gap vanishes. Hence, the call money rate is derived by setting the equilibrium position (Figure 5).

Fig. 5. Equilibrium in the Monetary Sector



D. Determinants of Interest Rates

We now turn to the interest rates. It may be noted that the RBI administered most interest rates over the study period. However, it may be useful to capture the economic factors behind the decisions of the RBI in fixing various rates. What is postulated in our interest rate equations is that rates of interest tend to be repetitive to a certain extent, and adjustment is made in accordance with other rates and related variables, such as price expectations. Therefore we have used the lagged dependent variable in many cases to capture the repetitive nature as well as adaptive expectations.

Among the nominal rates of return, the bank rate is assumed to be exogenous. The treasury bill rate is explained as a function of inflation rate and its own lag. The deposit rate of commercial banks (*CBDR13*) is postulated as a positive function of commercial banks' lending rates (*CBMLRSCC*), inflation rate (*MGWP*), average yield on government securities (*WRGS*), and dividend rate (*UTIDR*), but a negative function of gross domestic product at market prices (*GDPMP*). Similarly, *CBMLRSCC* is related positively to bank rate (*BR*) and prime lending rates (*PLR*) of the Industrial Development Bank of India, but negatively to its resource base (total deposits). Likewise, the lending rate for public procurement of foodgrains (*CRFP*) is related positively to foodgrain production (*IPFG*) and the deposit rate, but negatively to *MGWP*. The prime lending rate of the Industrial Development Bank of India (*PLRIDBI*) is related positively to *CBMLRSCC* and *BR* but nega-

tively to credit sanctioned by the term lending institutions. The *PLR* of other institutions is linked with the *PLR* of the Industrial Development Bank of India. The UTI (Unit Trust of India) dividend rate is postulated as a positive function of *CBDR13* and the inflation rate (*GWP*). The yield on government securities is mainly linked to the fiscal deficit ratio to the *GDPMP*, the inflation rate, and the exchange rate.

The estimated equations, not reported here, are generally good. The R^2 are more than 90 per cent, and there are no serious indications of auto-correlation of residuals. The coefficients have the expected signs and are statistically significant in almost all the cases.

E. *Government Securities*

In India, the market for government securities is dominated by financial institutions and, among them, by commercial banks. A large part of the market is captive as a result of statutory investment requirements imposed on various financial institutions.⁶ Data are not readily available about the statutory component of actual investment of financial institutions in government securities. The RBI occupies a pivotal position in the market. In brief, the market for government securities is not only very narrow and underdeveloped but also shallow. Interest rates offered on government securities are relatively low. However, albeit captive in nature, there has been a notable growth in the size of the market in the recent period. For example, commercial banks' investment in government securities has increased from about Rs 92 billion in 1980/81 to Rs 1,012 billion in 1993/94.

Commercial banks' investment in government and other approved securities is postulated to be a positive function of the statutory liquidity ratio (*WSLR*) and the return on government securities (*WRGS*), but a negative function of the return on competing investments in the private sector (*CBMLRSCC*) in the partial adjustment framework. The estimated equations are generally good. The R^2 are more than 90 per cent and there are no serious indication of auto-correlation of residuals. The coefficients have the expected signs and are statistically significant in almost all the cases.

F. *Bank Credit to the Private Sector*

In India, while commercial and cooperative banks provide generally short-term credit, a few large public sector development banks, notably the Industrial Development Bank of India (IDBI), the Industrial Credit and Investment Corporation of India (ICICI), the Industrial Finance Corporation of India (IFCI), and a spectrum of state-level financial institutions, provide medium-term and long-term credit.

The commercial banks' total credit to the private sector is postulated to be positively related to the nominal gross domestic product (*GDP*) but negatively related

⁶ In fact the RBI itself is the captive holder of government securities.

to the lending rate and investment in government securities (*SCBIGS*). The same can be estimated separately (in a disaggregated way) for food credit (public procurement) and nonfood credit. The food credit is explained by an index of production of foodgrains (*IPFG*), and the interest rate on the food credit in a partial adjustment framework. Similarly, nonfood credit is determined by output of the manufacturing sector (*XMN*), banks' resource base (*TD*), banks' minimum lending rate (*CBMLRSCC*), and investment in government securities (*SCBIGS*).

The development banks' credit to the private sector, mainly to the manufacturing sector, relates two concepts: (i) sanctions, which are the amount of credit the banks agreed to give and (ii) disbursement, which is the amount that the private sector actually takes. The sanctions of each major financial institution are postulated to be positively related to the nominal manufacturing output (*XMN*) but negatively related to their respective lending rates (*PLR*) and credit availability from commercial and cooperative banks (*SCBCOFC*). The disbursement is determined as a function of sanctions.

The estimated equations are generally good. The \bar{R}^2 are more than 90 per cent and there are no serious indications of auto-correlation of residuals. The coefficients have the expected signs and are statistically significant in almost all the cases.

G. *Other Equations*

The cash on hand with commercial banks is explained by the cash reserve ratio (*WCRR*), total demand deposits (*DDBEM*), the call money rate (*ACMR*), and the RBI's bank rate (*BR*). Similarly, the cash reserve ratio, bank rate, and the discount rate of ninety-one-day treasury bills (*TBR*) determine the commercial banks' reserve with the RBI.

Finally, there is an equation for the exchange rate that has not been explained in the external sector. The exchange rate (rupees per U.S. dollar) is assumed to be positively related to the ratio of the current account external deficit (*CABRBI*) or gross fiscal deficit (*GFD*) to the GDP at market prices (*GDPMP*) and inflation rate, but negatively related to the foreign exchange reserve (*FER*) in a partial adjustment framework.

Exchange rate (rupees per U.S. dollar)⁷

$$\begin{aligned}
 RSUS = & 5.2903 + 0.3654[(GFD/GDPMP) \cdot 100] - 0.0122FER(-1) \\
 & (3.58) \quad (3.33) \quad (4.48) \\
 EL: SR & \quad \quad 0.16 \quad \quad \quad 0.08 \\
 & + 0.0229GWP + 0.9701RSUS(-1) + 6.2526 \cdot DREFORM, \\
 & (0.94) \quad (11.23) \quad (6.00) \\
 & 0.01
 \end{aligned}$$

⁷ Since our data on current account deficit is entered into the model as negative, the negative sign of *CABRBI/GDPMP* is to be taken as positive.

$\bar{R}^2 = 0.99$; $DW = 1.82$; $h = 0.49$; sample period: 1971–95.

Or

$$\begin{aligned}
 RSUS &= 6.1486 - 0.4822[(CABRBI/GDPMP) \cdot 100] - 0.0126FER(-1) \\
 &\quad (4.03) \quad (3.56) \quad (4.81) \\
 EL &\quad \quad \quad 0.04 \quad \quad \quad 0.08 \\
 &+ 0.0085GWP + 1.0207RSUS(-1) + 5.9205 \cdot DREFORM, \\
 &\quad (0.36) \quad (13.61) \quad (6.21) \\
 &\quad \quad \quad 0.006
 \end{aligned}$$

$\bar{R}^2 = 0.99$; $DW = 2.10$; $h = -0.27$; sample period: 1971–95.

IV. VALIDATION OF THE MONETARY SUB-SECTOR MODEL

One of the important purposes of the econometric model is to explain the behavior of the endogenous variables. This is implemented by solving the estimated structure of the model for the values of the endogenous variables conditional on given values of the predetermined variables. Such an exercise is called simulation, which is simply the mathematical solution of a system of dynamic algebraic equations. In the previous section, the structural equations of the model were evaluated individually in terms of explanatory power, appropriateness of sign and size of coefficient with estimated t -ratio and DW or h -statistic. It is quite possible that individual estimated equations could satisfy all the statistical criteria of goodness of fit, and yet perform poorly when combined with the rest of the equations in the model in tracking the behavior of the endogenous variables. The overall simulation solutions help us in testing the reliability of the model in duplicating the economy. The real test of the structural model lies both in its closeness of fit for the sample period and its predictive ability beyond the sample period. A dynamic simulation experiment will be conducted for the period 1985/86 through 1994/95.

Two measures of forecast accuracy have been used. They are the root mean squared per cent error ($RMSPE$) and Theil's U -statistic (U). In algebraic terms, they may be stated as follows:

$$RMSPE = \sqrt{\frac{\sum[(y^s - y^a)/y^a]^2}{n}} \cdot 100,$$

$$U = \frac{\sqrt{\sum(y^s - y^a)^2/n}}{\sqrt{\sum(y^a)^2/n + \sum(y^s)^2/n}},$$

where n is the number of periods, y^s is the simulated value of an endogenous variable, and y^a is the actual value of an endogenous variable. Since these statistics are loss functions, better performance is indicated by small values of these statistics.

By conventional standards both $RMSPE$ and Theil's U -statistic appear to be reasonable for all variables. Of the forty-six endogenous variables in the monetary

sector, seventeen have *RMSPE* less than 5 per cent. Another sixteen are in the range of 5 to 10 per cent. Only thirteen variables have *RMSPE* of more than 10 per cent. It may be noted that most of variables for which *RMSPE* exceeds 10 per cent are not very important ones. Another point that has to be kept in mind in assessing the *RMSPE* is that most of the variables considered in the study were administered and hence difficult to predict very accurately. For almost all the variables, Theil's *U*-statistics are, however, very close to zero indicating the model's ability to capture turning points correctly.

V. THE COMPLETE MODEL

The monetary sector model, as discussed above, is combined here with other sectors such as the real sector and the external sector to carry out some policy-related simulation exercises. The parameters of the structural equations of these sectors in the existing IEG-DSE India model (1994) are somewhat outdated as they were estimated on the basis of data relating to the pre-reform period, 1970/71 to 1990/91. Therefore, we have reestimated them here for the period 1970/71 to 1994/95⁸ to incorporate observations relating to the period of economic reforms. Needless to say, the specifications of some of the equations in the real and external sectors have been changed. The broad structure of the model is as follows.

The real sector is classified into five sub-sectors, viz., agriculture, manufacturing, infrastructure, services, and public administration. Each sub-sector deals separately with output, prices, capital formation, etc. The agriculture sub-sector is further disaggregated into foodgrains and non-foodgrain components. Yield in both foodgrains and non-foodgrains are determined by capital stock, cropped area, and rainfall. Cropped area is allocated between foodgrains and nonfood crops, primarily by the relative prices of these categories. Yield and area of these two categories determine agricultural output. The wholesale prices are determined by money supply per unit of real GDP on the one hand and the available supply of the product (foodgrains and nonfood items), on the other. In addition, food prices are determined by per capita real consumption expenditure and the procurement prices for the two major foodgrains (rice and wheat) fixed by the government every year. Private and public capital formation in agriculture is disaggregated into fixed investment and inventory components. While capital formation by the private sector is endogenously determined, capital formation by the public sector is exogenous in nominal terms. Private capital formation is explained in terms of three factors, namely, average of agricultural GDP, relative price of agriculture, and real public investment in this sector. Private inventory investment is also explained on similar lines. The remaining equations in this sub-sector are mostly linking equations.

⁸ 1994/95 is the latest year for which firm data are available.

Manufacturing output is determined by capital stock, domestically produced raw materials which largely correspond to nonfood agricultural products, and infrastructure comprising power, transport, coal, etc. and imported raw materials, petroleum, oils, and lubricants, and chemicals. The prices of manufactures are determined by money supply per unit of real GDP, prices of agricultural raw materials, and various administered prices. General resource availability, public investment, and bank credit determine private investment in the manufacturing sector.

Similarly, the infrastructure output is determined by stock of capital. Prices are explained by the administered prices and other cost elements. Capital formation is explained by public investment and resource constraints. Inventory investment is explained by output in a partial adjustment framework. Depreciation is accounted for by output and capital stock.

Output in the service sector is explained by capital stock and the performance of the non-service sectors. In a somewhat similar fashion, output in the case of public administration and defense is partly dependent on the level of capital stock and partly on the magnitude of real public expenditure on consumption as well as capital formation. Private capital formation in the service sector is assumed to move in sympathy with the resources available to the private sector, i.e., total resources less private investment in agriculture and total public investment. It is also subject to an enabling influence coming from short- and long-term institutional credit availability and to a crowding-in phenomenon associated with total public sector capital formation. Inventory investment in the service sector is explained in a partial adjustment framework by short-term institutional credit. It is needless to add that in public administration and defense, capital formation is entirely due to the public sector and hence exogenous.

Overall we can say that the level of output in the economy is determined by the available capital stock given abundant labor supply, while the price levels are explained by money supply per unit of real GDP, some supply factors like foodgrain output, and some cost factors like administered prices. Private consumption expenditure is explained in terms of a trend component of disposable income and its short-term variation. While the former is intended to capture the permanent income effect, the latter represents transitory income. Government final consumption expenditure is determined mainly by real GDP at market prices. These five sub-sector outputs with prices and capital formation through identities determine economywide aggregates such as real and nominal GDP, the overall wholesale price index, the implicit GDP deflator, total capital formation, etc.

In explaining merchandise exports and imports, we deal separately with four categories used in Project LINK. These are SITC 0–1, SITC 2 and 4, SITC 3, and SITC 5–9. We explain volumes as well as unit values in all cases except the volume of exports of SITC 3 which is very small for India. Three factors, namely, world economic activity represented by world real GDP (*ZGDPW*), incentive for import-

TABLE I
SIZE OF THE COMPLETE MODEL

Blocks	Total Number of Equations	Technological/ Behavioral Equations	Linking Equations	Identities
1. Real sector:				
Agriculture	34	15	2	17
Manufacturing	17	8	2	7
Infrastructure	16	8	0	8
Services	17	8	0	9
Public administration	11	5	0	6
Consumption	11	4	2	5
Macro aggregates and others	51	4	0	47
2. Monetary sector	45	34	5	6
3. Trade and balance of payments:				
Exports	31	7	1	23
Imports	39	10	2	27
Balance of payments	23	0	1	22
Total	295	103	15	177

ers represented by the ratio of export unit value in dollars to the world export unit value for the relevant category, and an incentive to exporters, represented by the ratio of export unit value in rupees to the appropriate domestic price level, are used in explaining the volume of exports. Similarly, two factors, namely, the appropriate level of domestic activity and the corresponding unit value index relative to an appropriate domestic price level are used in explaining the volume of imports. Unit values of exports in rupee term are explained by an appropriate domestic price level and relevant export volumes. Unit values of imports in rupee terms are explained in a simple way by linking with corresponding world export unit values in U.S. dollars and the exchange rate (rupees per U.S. dollar).

VI. THE SIZE AND VALIDATION OF THE COMPLETE MODEL

The model consists of 295 equations of which 118 are stochastic relationships with unknown parameter, and 177 are identities.⁹ Their distribution is given Table I.

⁹ As mentioned earlier, the model is estimated for the period 1970/71 through 1994/95. The model is estimated by OLS as we have only about twenty-five observations and many exogenous variables. Our reliance on OLS estimation, in some cases incorporating the Cochran-Orcutt procedure to take care of serially correlated errors, has provided reasonable system simulation. How seriously this biases our results is hard to know, but OLS estimation in the context of large models is believed to be quite modest.

The entire model was dynamically simulated with historically given data on exogenous variables for the period 1985/86 to 1994/95. How well the model performs is indicated in Table II in terms of *RMSPE* for eighty selected important variables.

For half of them, the *RMSPE* is less than 5 per cent. Another twenty-one fall within the 10 per cent limit; only nineteen variables out of eighty are estimated with *RMSPE* exceeding the 10 per cent mark. It is worth emphasizing that most of the

TABLE II
HISTORICAL VALIDATION, 1985/86 TO 1994/95: FREQUENCY DISTRIBUTION OF
RMSPE FOR SOME IMPORTANT VARIABLES

Root Mean Square Percentage Error (<i>RMSPE</i>)	Frequency	Variables				
		Output	Prices	Consumption Investment	Monetary	Trade
0-5	40	<i>ZXAG</i>	<i>WPAG</i>	<i>ZGIAD</i>	<i>CPEM</i>	<i>EX09\$</i>
		<i>ZXIN</i>	<i>PXAG</i>	<i>PC</i>	<i>TDBEM</i>	<i>EX59\$</i>
		<i>ZXSR</i>	<i>WPMN</i>	<i>ZPC</i>	<i>M3D</i>	<i>CMERT\$</i>
		<i>ZXAD</i>	<i>PXMN</i>		<i>M</i>	
		<i>ZPDI</i>	<i>PXIN</i>		<i>RMEM</i>	
		<i>ZGDP</i>	<i>PXSR</i>		<i>TBR</i>	
		<i>ZGDPMP</i>	<i>PXAD</i>		<i>CBDR13</i>	
		<i>GDP</i>	<i>PGDP</i>		<i>PLRIDBI</i>	
		<i>GDPMP</i>	<i>WP</i>		<i>RYGSMT</i>	
		<i>PDI</i>	<i>CPI</i>		<i>WRGS</i>	
			<i>EXUV09</i>		<i>TDAI</i>	
			<i>PI</i>		<i>RYGSLT</i>	
		5-10	21	<i>ZXMN</i>	<i>IMUV09</i>	<i>ZGIAGPR</i>
				<i>ZGIT</i>	<i>CBMLRSCC</i>	<i>EX24\$</i>
				<i>GIT</i>	<i>UTIDR</i>	<i>EX59\$</i>
				<i>ZGFIT</i>	<i>RYGSST</i>	<i>IM09\$</i>
				<i>ZGIA</i>	<i>SCBIGS</i>	<i>IM3\$</i>
				<i>GIA</i>		<i>DMERT\$</i>
				<i>GFIT</i>		
				<i>GDS</i>		
10-15	8			<i>ZIITPR</i>	<i>SCBGC</i>	<i>IM59\$</i>
				<i>ZGISRPR</i>	<i>TSAI</i>	
				<i>ZGFCE</i>	<i>RSUS</i>	
				<i>GFCE</i>		
15 and above	11			<i>ZGIMNPR</i>	<i>SCBBLRBI</i>	<i>EX3\$</i>
				<i>ZGINPR</i>		<i>IM01\$</i>
				<i>IIT</i>		<i>IM24\$</i>
				<i>ZIIT</i>		<i>TBDGIC\$</i>
						<i>TBRBI\$</i> <i>CABRBI\$</i>
Total	80	11	13	19	21	16

Note: Description of variables is shown in Appendix.

important economic variables (major aggregates) like real and nominal GDP, wholesale and consumer prices, sectoral outputs and prices, nominal and real private final consumption, money supply, deposit and lending rates, yield on government securities, bank credits, total exports and imports in dollar terms, nominal and real gross investment all have *RMSPE* of less than 10 per cent. The overall performance of the model in terms of its ex post simulation ability in the last ten years reinforces confidence in its validity and robustness and provides a reasonable basis for undertaking actual forecasts for the future.

VII. SIMULATIONS FOR POLICY INFERENCE

Econometric models are built for practical use, not merely for intellectual enjoyment and satisfaction. In fact, they have been used as tools for forecasts and policy design. In this context, it is important to know the response characteristics of the model to policy change. In this section we use the model to illustrate the impacts of changes in monetary and fiscal policies. But before we go into simulation exercises, it needs to be noted that since the structural model has been estimated mostly on the basis of data relating to the pre-reform period (out of twenty-five observations, only the last four observations relate to the reform period), the parameters of the model are likely to change beyond the sample period due to a change in the economic regime. Therefore, the levels and growth rates of key variables as obtained in the beyond sample period should be considered only as indicative, and efficacy of the model has to be judged by the plausibility and consistency of the overall alternative growth scenarios. The maintenance of a living model must provide for monitoring, reestimation, and changing specification as new information about the economic environment unfolds.

A. *Assumptions for Forecasts or Base Solution*

Beyond sample forecasts depend crucially on the choice of the base year and assumptions relating to exogenous variables. With regard to base year, 1990/91 or 1991/92 would have been appropriate since the economic reform process started in 1991/92. However, both 1990/91 and 1991/92 turned out to be abnormal years due to the Gulf War, caste and communal violence, and balance of payments (BOP) crises. Therefore, we have used 1992/93 as the starting year for our empirical exercise.

Before going into assumptions underlying our baseline scenario or forecast, it is better to review briefly India's current economic outlook. Following impressive economic performance for three consecutive years, 1994/95 to 1996/97, economic activity slowed down in 1997/98. Real GDP growth in 1997/98 was at 5.0 per cent, compared with an average growth of over 7 per cent in the preceding three years, primarily due to negative growth in agricultural output in 1997/98. There has been

marked deceleration in the industrial sector. The index of industrial production, which recorded an impressive 12.1 per cent growth in 1995/96, fell to 7.1 and 4.2 per cent in 1996/97 and 1997/98, respectively. Growth of exports in U.S. dollars, which had risen to 21 per cent in 1995/96, also continued to decelerate for the third year in succession and was at 2.6 per cent in 1997/98. Imports, on a BOP basis, have decelerated even more sharply, partly due to a decline in the price of oil and partly due to the overall import slowdown itself. The current account position consequently continued to be good. The current account deficit, which was 1.8 per cent of GDP in 1995/96, continued to be about 1.5 per cent for the recent years. Despite a decline in foreign direct investment (FDI) and commercial borrowing and an outflow of portfolio investment by foreign institutional investors, foreign currency reserves (exclusive of gold and Special Drawing Rights, SDRs) continued to increase. Reflecting the slowdown in economic activity, the revenue position of the government recorded a sharp decline, resulting in a rise in the gross fiscal deficit to 6.1 per cent in 1997/98 from 5.2 per cent in 1996/97. The increase in the government's borrowings from the banking system, coupled with capital inflows, pushed up broad money growth above its long-term trend. Nevertheless, the situation with regard to inflation steadily improved over the last three years. The rate of inflation, measured by wholesale price index, declined from 7.7 per cent in 1995/96 to 5 per cent in 1997/98. There was also an all-round softening of interest rates.

The relative slowdown in real economic activity in 1997/98 and possibly in 1998/99 has to be viewed against the backdrop of an exceptionally turbulent and unfavorable domestic and external environment. These include (a) continued slowdown of investment as a result of poor expectations, (b) economic sanctions and the hostile international environment due to the nuclear test, (c) continued fallout of the East Asian economic crisis, and (d) domestic political uncertainty which has prevented any major policy initiatives.

In these circumstances it is difficult to forecast what turn the economy may take over the next few years. All the same, we feel prompted to look at the future under the following assumptions:

- (1) Weather conditions are assumed to be normal.
- (2) Nominal public investment as a per cent of *GDPMP* declined since 1990/91. To be precise, it declined from 8.8 per cent in 1994/95 to 7.4 per cent in 1996/97. We assume that this decline will be arrested at 7 per cent in 1997/98 and in subsequent years.
- (3) Real private investment is endogenous in the model. Yet, we do find it appropriate to adjust the behavioral relationships estimated from the past data in view of the changing economic climate. The deregulation and liberalization policies intended to attract foreign direct investment to promote domestic private investment should induce higher investment propensities, over and above the changes that are already built into the estimated relationships. To reflect

this in formal exercises, we introduce an adjustment factor in the estimated investment equations, in the form of a multiplicative trend. We assume a boost of 2, 3, and 3 per cent per annum, respectively, for real private investment in agriculture, manufacturing, and infrastructure sectors beyond the sample period.

- (4) For the same reason, we introduce a boost or restraint factor in the export and import volume equations too. To be precise, the extent of successful market penetration, market determined exchange rates, and other favorable non-price factors with regard to exports and various policy measures undertaken, or in process, are assumed to contribute a 1 per cent per annum quantum boost to exports for SITC categories, 0–1, 2 and 4, and 5–9 for each of the years 1995/96 to 2001/2.
- (5) The extent to which present trends in imports may decelerate due to improvement in the quantity and quality of domestic products, as well as due to the peaking of pent-up demand for imported goods and the holding of low inventories due to import liberalization—we assume import restraint of 1 per cent per annum for quantum of imports of SITC 0–1, 3, and 5–9 for each of the years 1995/96 to 2001/2.
- (6) Domestic production of crude oil, an important variable in determining the quantum of imports of SITC 3, has fallen drastically short of the eighth plan target. In view of this, it is assumed to be 37, 39, 41, 43, and 45 million tons respectively for the years 1997/98 to 2001/2.
- (7) With regard to the world economic scenario, we use the post–September 1998 Project LINK forecasts for calendar years.
- (8) Variables considered so far are more or less exogenous to the economy in the short and long run. Let us now turn to other variables, which are policy determined. The first of these is gross fiscal deficit. Due to exigencies imposed by international agencies like the International Monetary Fund (IMF) and World Bank and broad consensus on having a low inflation rate, the gross fiscal deficit as a ratio to *GDPMP (RGFD)* had been brought down to 5.2 per cent for 1996/97. But it increased to 6.1 per cent in 1997/98. For 1998/99, it is expected to be 5.6 per cent. We believe that the *RGFD* will be maintained at 5.0 per cent for the next few years. Similarly, given that the fiscal deficit of the government remains in check, with attempts to continue to hold its value, the Reserve Bank may target *M3* growth to be around 15–16 per cent per annum. In order to achieve this, the cash reserve ratio (CRR) is assumed to be 10 per cent for the period from 1998/99 to 2001/2. Similarly, the statutory liquidity ratio (SLR) is assumed to be 25 per cent for next few years. The bank rate is assumed to be 10 per cent for 1998/99 and 9 per cent for all the remaining years. For the years 1995/96 to 1997/98 the actual values of the bank rate, CRR, SLR, and *RGFD* are used.

Having mentioned all our assumptions, let us examine our forecasts. The fore-

casts (or base simulation), needless to mention, are contingent upon the assumptions made. As one can see, attention is focused only on major economic variables, namely, real GDP, wholesale price index, money supply, total exports, imports and current account balance in dollar terms, and real gross investment. The results are analyzed in two stages. In the first, we analyze the results for the sample period as well as a few years beyond the sample period, namely, 1995/96, 1996/97, and 1997/98 for which we have published information on the economy. Using this information, we can make an assessment about the overall efficacy of the model in tracking the time path of some key variables. In the second stage, we analyze the forecasts for 1998/99 to 2001/2.

Simulation results (forecasts) for 1992/93 through 2001/2 are presented in Table III, along with official figures (wherever available) which are either preliminary or quick estimates. Our estimates of real GDP are close to the official figures of the

TABLE III

A. Actual and Estimated Values for Real GDP, Prices, Consumption, and Capital Formation

Year	ZGDP	ZGDPE	WP	WPE	ZTC	ZTCE	ZGIT	ZGITE	RGIA	RGIAE
Sample period										
1992/93	2,252.7	2,245.3	228.7	224.8	1,913.1	1,920.0	521.4	493.9	23.1	22.1
1993/94	2,388.9	2,376.4	247.8	245.6	2,008.2	2,001.0	522.5	504.2	22.4	21.5
1994/95	2,561.0	2,534.0	274.7	273.8	2,085.5	2,090.2	642.9	640.2	25.4	25.7
Beyond sample period										
1995/96	2,761.3	2,747.7	295.8	291.1	2,220.0	2,224.9	699.2	673.1	25.8	25.2
1996/97	2,968.5	2,963.3	314.6	308.3	2,345.0	2,352.5	748.3	705.9	25.7	24.4
1997/98	3,118.3	3,121.6	329.8	324.2		2,454.2		742.0	24.8	23.1
1998/99		3,282.6		346.8		2,555.5		822.9		24.4
1999/00		3,489.5		368.5		2,678.3		915.6		25.7
2000/01		3,730.6		394.7		2,809.5		1,043.2		27.7
2001/02		4,002.4		423.3		2,955.4		1,174.8		29.3
Growth rates (%)										
Sample period										
1993/94	6.05	5.84	8.35	9.28	4.97	4.22	0.21	2.09		
1994/95	7.20	6.63	10.86	11.47	3.85	4.46	23.05	26.97		
Beyond sample period										
1995/96	7.82	8.43	7.68	6.34	6.45	6.44	8.77	5.14		
1996/97	7.50	7.85	6.36	5.88	5.63	5.74	7.01	4.86		
1997/98	5.05	5.34	4.83	5.17		4.32		5.12		
1998/99		5.16		6.97		4.13		10.90		
1999/00		6.30		6.27		4.80		11.27		
2000/01		6.91		7.11		4.90		13.93		
2001/02		7.29		7.25		5.19		12.61		

Note: ZGDP and ZGDPE are actual and estimated values of overall real GDP; WP and WPE are actual and estimated values of the aggregate wholesale price index; ZTC and ZTCE are actual and estimated values of total real consumption expenditure; ZGIT and ZGITE are actual and estimated values of total real gross investment (adjusted); and RGIA and RGIAE are actual and estimated values of investment ratios.

TABLE III (Continued)

B. Actual and Estimated Values for Trade and Balance of Payments

Year	<i>EX09\$</i>	<i>EX09\$E</i>	<i>IM09\$</i>	<i>IM09\$E</i>	<i>TB\$</i>	<i>TB\$E</i>	<i>TBRBI\$</i>	<i>TBRBI\$E</i>	<i>CAB\$</i>	<i>CAB\$E</i>
Sample period										
1992/93	18.54	18.95	21.88	22.16	-3.34	-3.22	-5.41	-5.47	-3.53	-3.56
1993/94	22.24	22.34	23.31	23.42	-1.07	-1.08	-4.06	-4.08	-1.16	-1.18
1994/95	26.33	26.11	28.65	28.50	-2.32	-2.39	-9.05	-9.18	-3.37	-3.71
Beyond sample period										
1995/96	31.80	31.96	36.68	36.58	-4.88	-4.62	-11.36	-10.95	-5.90	-5.40
1996/97	33.11	33.44	38.55	37.91	-5.44	-4.47	-14.82	-14.03	-4.49	-4.28
1997/98	33.98	33.19	40.78	39.36	-6.80	-6.17	-16.28	-15.50	-6.47	-6.05
1998/99		31.44		37.52		-6.08		-14.83		-6.09
1999/00		34.96		42.16		-7.19		-17.03		-7.96
2000/01		38.63		46.83		-8.20		-19.14		-9.71
2001/02		42.67		53.91		-11.24		-21.17		-11.38
Growth rates except for <i>TB\$</i> , <i>TBRBI\$</i> , and <i>CAB\$</i> for which it is ratio to <i>GDPMP</i> (%)										
Sample period										
1992/93					1.37	1.31	2.22	2.23	1.70	1.45
1993/94	19.95	17.92	6.50	5.68	0.41	0.42	1.57	1.58	0.45	0.46
1994/95	18.41	16.87	22.95	21.68	0.76	0.79	2.70	3.05	1.10	1.24
Beyond sample period										
1995/96	20.76	22.41	28.00	28.36	1.46	1.40	3.10	3.32	1.80	1.64
1996/97	4.12	4.62	5.10	3.63	1.51	1.24	3.70	3.90	1.20	1.19
1997/98	2.64	-0.74	5.79	3.84		1.69	3.90	4.25	1.70	1.66
1998/99		-5.29		-4.70		1.71		4.18	1.40	1.72
1999/00		11.22		12.37		1.87		4.42		2.06
2000/01		10.49		11.09		1.95		4.56		2.31
2001/02		10.46		15.12		2.47		4.65		2.50

Note: *EX09\$* and *EX09\$E* are actual and estimated values (in U.S.\$) of exports; *IM09\$* and *IM09\$E* are actual and estimated values (in U.S.\$) of imports; *TB\$* and *TB\$E* are actual and estimated values (in U.S.\$) of the trade balance (custom data); *TBRBI\$* and *TBRBI\$E* are actual and estimated values (in U.S.\$) of the trade balance (BOP data); and *CAB\$* and *CAB\$E* are actual and estimated values (in U.S.\$) of the current account balance.

C. Actual and Estimated Values for Monetary Variables

Year	<i>M3</i>	<i>M3E</i>	<i>SCBGC</i>	<i>SCBGCE</i>	<i>SCBIGS</i>	<i>SCBIGSE</i>	<i>WRGS</i>	<i>WRGSE</i>	<i>RSUS</i>	<i>RSUSE</i>
Sample period										
1992/93	3,668.3	3,646.8	1,519.8	1,475.9	759.5	750.7	12.46	11.96	28.96	28.34
1993/94	4,344.1	4,375.2	1,644.2	1,581.0	1,012.0	1,012.0	13.21	12.83	31.37	30.95
1994/95	5,314.3	5,331.4	2,115.6	2,074.1	1,176.8	1,184.7	11.92	11.53	31.40	31.43
Beyond sample period										
1995/96	6,040.1	5,985.0	2,540.2	2,544.3	1,322.3	1,303.6		10.67	33.45	33.07
1996/97	7,018.5	6,850.2	2,784.0	2,721.1	1,589.9	1,563.5		10.11	35.50	34.48
1997/98	8,253.9	8,093.9	3,240.8	3,259.3	1,869.6	1,787.3		10.81	37.20	37.75
1998/99		9,587.8		3,651.2		2,027.1		10.38		43.85
1999/00		11,121.2		4,213.5		2,295.4		9.78		45.65
2000/01		12,840.7		4,948.9		2,609.7		9.85		47.84
2001/02		14,817.7		5,868.8		2,974.0		9.90		50.56

TABLE III (Continued)

Year	<i>M3</i>	<i>M3E</i>	<i>SCBGC</i>	<i>SCBGCE</i>	<i>SCBIGS</i>	<i>SCBIGSE</i>	<i>WRGS</i>	<i>WRGSE</i>	<i>RSUS</i>	<i>RSUSE</i>
Growth rates (%)										
Sample period										
1993/94	18.42	19.97	8.18	7.12	33.26	34.81				
1994/95	22.33	21.86	28.67	31.19	16.29	17.07				
Beyond sample period										
1995/96	13.66	12.26	20.07	22.67	12.36	10.03				
1996/97	16.20	14.46	9.60	6.95	20.24	19.94				
1997/98	17.60	18.16	16.41	19.78	17.59	14.32				
1998/99		18.46		12.02		13.41				
1999/00		15.99		15.40		13.24				
2000/01		15.46		17.45		13.69				
2001/02		15.40		18.59		13.96				

Note: *M3* and *M3E* are actual and estimated values of money supply; *SCBGC* and *SCBGCE* are actual and estimated values of gross bank credit; *SCBIGS* and *SCBIGSE* are actual and estimated values of banks investment in securities; *WRGS* and *WRGSE* are actual and estimated values of the weighted average yield on securities; and *RSUS* and *RSUSE* are actual and estimated values of the exchange rate.

Central Statistical Organisation (CSO) for the period 1993/94 to 1996/97. The annual average growth rate of real GDP in the last five years (i.e., 1993/94 to 1997/98) is estimated by the CSO to have been 6.72 per cent, while our model estimates it at 6.82 per cent. For the post-sample period (1996–98) our estimate of real GDP is marginally higher than that of the CSO. Due to normal rainfall, it is predicted that the rate of growth in agricultural output will be about 5 per cent in 1998/99 over the depressed level of 1997/98. Over the next four years growth rates in agriculture will return to about 2.5 per cent. Value added in manufacturing is predicted to increase in 1998/99 by about 5.2 per cent compared to a little over 6 per cent last year. Similarly, growth of value added in infrastructure is more or less the same as last year, at about 5 per cent. There are good chances that next year (1999/2000) will experience growth of manufacturing at about 8 per cent, accelerating to 9 per cent in 2001/2. The story will be similar for the infrastructure sector. With continued low growth in manufacturing and infrastructure, we expect some decline in the services sector also. Value added in this sector is predicted to grow by 7 per cent compared to 8.8 per cent in 1997/98. The rate of growth during 1999–2002 is likely to accelerate to the 8–10 per cent range. Last year, public administration recorded a sharp increase of nearly 14 per cent in value added primarily because of the increased salaries of central government employees. It is predicted to return to 5–6 per cent during the next three years (1999–2002). These sectoral growth rates imply an overall real GDP growth of about 5.2 per cent in 1998/99, picking up gradually to about 7 per cent in 2001/2. For the ninth plan, as a whole, the average GDP growth rate is likely to be 6.6 per cent. This suggests that the Planning Commission

target of 7 per cent economic growth for the ninth plan may be difficult to achieve, although the rate is not unattainable if infrastructure bottlenecks are eliminated.

Our estimates of the rate of inflation, measured by the wholesale price index (*WPI*), shows a steady decline for the period 1994/95 to 1997/98, as actually happened. For the post-sample period (1996–98), our estimates of the rate of inflation are 6.3, 5.9, and 5.2 per cent, respectively, while officially it was put at 7.7, 6.4, and 4.8 per cent. An increase in the rate of inflation is quite likely for the current fiscal year 1998/99. In subsequent years it is expected to be about 7 per cent, so that for the ninth plan as a whole the average inflation rates should be less than 7 per cent.

The robust export growth (about 20 per cent per annum) witnessed during 1993–96 could not be sustained during the last two or three years, due to many factors such as deceleration in domestic manufacturing activities, decline in world trade, slight over-valuation of the rupee and East Asian crises. According to customs data on merchandise trade, after registering a modest growth of 5 per cent in 1996/97, it decelerated further to 2 per cent in 1997/98. The performance continues to be worrisome in the current year 1998/99 with the possibility of negative growth. Our model correctly indicates some deceleration in export growth. Our forecast for the next few years is that, in dollar terms, exports will increase by an average rate of about 10 per cent per annum. Import growth also showed a sharp deceleration in 1996/97 and 1997/98 (about 5 per cent) as compared to the average growth rate of about 25 per cent during 1993–96. While some deceleration in import growth is expected for several reasons, the deceleration observed has been far too large. The deceleration has also been partly for the wrong reasons, namely, the slowing down of industrial growth. Like exports, our model indicates some deceleration in import growth. Import growth is expected to pick up to 12 per cent in 1999/2000, and though it shows a modest deceleration in 2000/2001, it picks up again to 15 per cent in 2001/2. The trade deficit will be of the order of U.S.\$ 6.8 billion in 1997/98, as compared to U.S.\$ 5.4 billion in 1996/97. The trade deficit is likely to widen in subsequent years.

In dealing with foreign trade performance, it is necessary to distinguish the data released by the Directorate General of Commercial Intelligence and Statistics (*DGCI&S*) and the Reserve Bank of India balance-of-payments (*RBI-BOP*) data. *DGCI&S* data refers to customs series, while *RBI-BOP* refers to payment and receipt. Data on imports in the latter includes non-dutied and non-dutiable imports. Making reasonable assumptions about the markup on exports (2–3 per cent) and imports (6–8 per cent) on account of the above, we find that the trade deficit on the *BOP* basis also widens, year after year.

Taking net invisibles into account, on the basis of reasonable assumptions (i.e., net invisibles are assumed to be about 1.5 per cent of *GDP* in our model), the current account deficit which was about U.S.\$ 6 billion in 1997/98 will gradually widen to about U.S.\$ 11.4 billion in 2001/2. As a per cent of *GDPMP*, the current account

deficit turns out to be less than the desired level of 2 per cent in the last few years. But it increases to 2.5 per cent for the subsequent three years. The projected deficit appears to be sustainable, given current large foreign exchange reserves (U.S.\$ 29 billion) and increasing private foreign investment flows.

In our earlier IEG-DSE model (1994), money supply and exchange rate were treated as exogenous variables. For the first time in our model simulation, we have endogenized not only the money supply and the exchange rate, but also other monetary related variables. It will be interesting to see how they perform. Our estimates of money supply for the post-sample period 1995/96, 1996/97, and 1997/98 are Rs 5,985 billion, Rs 6,850 billion, and Rs 8,094 billion, while the Reserve Bank of India estimates were Rs 6,040 billion, Rs 7,018 billion, and Rs 8,254 billion, respectively. Money supply is likely to grow at about 18.5 per cent for 1998/99, 16 per cent for 1999/2000, and 15.4 per cent for both 2000/2001 and 2001/2. Broadly our model predicts that the economy is moving to a higher growth path with a tolerable inflation rate. Positive aspects of reforms and favorable weather conditions are perhaps reasons for this relatively good performance.

B. *Policy Experiments*

An evaluation of alternative policy options may be a useful exercise using the model we built to shed light on the shape of changes that may take place in the economy during the next few years. We shall treat the forecasts discussed above as the baseline for comparison with alternative scenarios. The exercise will be carried out for 1999/2000, 2000/2001, and 2001/2 focusing on the fiscal deficit, public investment as a percentage of *GDPMP*, exchange rate, money supply growth, bank credit, rainfall, etc. There are twelve sets of counterfactual simulations being conducted, four relate to fiscal policy, another four of them relate to monetary policies, one relates to the foreign sector, two relate to monsoons (rainfall), and the remaining one relates to a policy mix involving simultaneous changes in various policies. In each simulation having a prescribed exogenous shock, all other exogenous variables remain unchanged (see Table IV).

C. *Fiscal Policy Experiment*

In India, fiscal policy is mainly concerned with the fiscal deficit and public investment. Reduction of the fiscal deficit and the share of public investment are two important measures of the structural adjustment program. In order to understand their impact on major economic variables, we have made four policy experiments. The first exercise (Simulation 1: S1) was conducted with a 2.0 percentage point sustained increase in the gross fiscal deficit ratio for the period 1999/2000 to 2001/2.¹⁰ The second exercise (S2) was conducted with a 2.0 percentage point sustained

¹⁰ *RGFD* is assumed to be 7 per cent instead of 5 per cent for the period 1999/2000 to 2001/2.

TABLE IV
PER CENT DEVIATIONS FROM BASELINE FOR ALTERNATIVE SIMULATIONS

Year	ZGDP	WP	ZTC	ZGIT	M3	RSUS	EX09\$	IM09\$	TB\$	RCAB
Base solution										
1998/99	3,282.6	346.8	2,555.5	822.9	9,587.8	43.85	31.44	37.52	-6.08	-1.72
1999/00	3,489.5	368.5	2,678.3	915.6	11,121.2	45.65	34.96	42.16	-7.19	-2.06
2000/01	3,730.6	394.7	2,809.5	1,043.2	12,840.7	47.84	38.63	46.83	-8.20	-2.31
2001/02	4,002.4	423.3	2,955.4	1,174.8	14,817.7	50.56	42.67	53.91	-11.24	-2.50
Simulation 1: Ratio of fiscal deficit increases by 2 per cent in 1999–2002										
1999/00	0.02	2.81	-0.20	2.09	7.74	3.01	-0.81	1.16	10.75	13.64
2000/01	0.21	8.61	-0.30	6.87	15.36	14.41	-5.02	1.17	30.33	43.36
2001/02	1.02	15.10	0.09	11.04	23.34	34.18	-10.86	-2.51	29.17	66.39
Average	0.42	8.84	-0.14	6.67	15.48	17.20	-5.56	-0.06	23.42	41.13
Simulation 2: Ratio of fiscal deficit decreases by 2 per cent in 1999–2002										
1999/00	-0.02	-2.67	0.20	-2.00	-7.35	-2.80	0.77	-1.17	-10.59	-13.23
2000/01	-0.20	-7.93	0.34	-7.04	-13.83	-12.71	5.54	-1.48	-34.53	-43.66
2001/02	-0.99	-13.39	0.03	-11.82	-19.67	-28.61	16.13	3.67	-43.65	-70.72
Average	-0.40	-7.99	0.19	-6.95	-13.62	-14.70	7.48	0.34	-29.59	-42.54
Simulation 3: Ratio of public investment increases by 2 per cent in 1999–2002										
1999/00	0.07	0.55	-0.10	11.60	0.16	7.13	-3.90	0.73	23.26	38.44
2000/01	1.37	0.87	0.64	13.88	1.00	15.56	-6.95	-2.20	20.15	44.28
2001/02	2.82	1.55	1.40	16.38	2.02	25.09	-9.15	-4.89	11.25	48.41
Average	1.42	0.99	0.65	13.95	1.06	15.93	-6.67	-2.12	18.22	43.71
Simulation 4: Ratio of public investment decreases by 2 per cent in 1999–2002										
1999/00	-0.07	-0.60	0.11	-11.60	-0.17	-7.31	4.51	-0.95	-27.48	-39.69
2000/01	-1.37	-0.93	-0.63	-13.71	-1.02	-15.38	8.95	2.85	-25.89	-44.41
2001/02	-2.79	-1.57	-1.38	-15.87	-2.02	-23.73	13.36	7.43	-15.07	-47.06
Average	-1.41	-1.03	-0.63	-13.73	-1.07	-15.47	8.94	3.11	-22.82	-43.72
Simulation 5: If bank credit increases by 10 per cent in 1999–2002										
1999/00	0.00	0.53	-0.05	3.08	1.34	1.17	-0.52	0.28	4.13	5.91
2000/01	0.16	1.06	0.04	3.93	1.40	3.24	-1.42	-0.14	5.87	9.57
2001/02	0.44	1.40	0.19	4.43	2.01	5.57	-2.27	-1.02	3.73	10.61
Average	0.20	1.00	0.06	3.81	1.58	3.33	-1.40	-0.29	4.58	8.70
Simulation 6: If GM3 is maintained at 12 per cent in 1999–2002										
1999/00	-0.01	-1.25	0.09	-1.08	-3.44	-1.35	0.38	-0.54	-5.02	-6.32
2000/01	-0.10	-3.66	0.15	-3.38	-6.34	-6.10	2.53	-0.60	-15.37	-20.23
2001/02	-0.49	-6.13	-0.03	-5.31	-9.09	-13.57	6.44	1.57	-16.89	-30.99
Average	-0.20	-3.68	0.07	-3.26	-6.29	-7.00	3.11	0.14	-12.43	-19.18
Simulation 7: If GM3 is maintained at 20 per cent in 1999–2002										
1999/00	0.01	1.26	-0.09	1.07	3.45	1.36	-0.38	0.53	4.94	6.27
2000/01	0.10	4.10	-0.16	3.56	7.52	6.83	-2.53	0.64	15.57	21.57
2001/02	0.52	7.55	0.01	6.02	11.81	16.73	-6.05	-1.28	16.85	35.23
Average	0.21	4.30	-0.08	3.55	7.60	8.31	-2.99	-0.04	12.45	21.02
Simulation 8: If bank rate, CRR, and SLR are reduced by 2 per cent in 1999–2002										
1999/00	0.01	1.14	-0.08	1.05	3.15	1.26	-0.35	0.49	4.57	5.82
2000/01	0.09	2.73	-0.07	2.60	4.15	4.92	-1.89	0.29	10.56	14.97
2001/02	0.40	3.75	0.13	3.11	5.19	9.27	-3.52	-1.23	7.48	17.46
Average	0.17	2.54	-0.01	2.26	4.16	5.15	-1.92	-0.15	7.54	12.75
Simulation 9: If exchange rate is depreciated by 10 per cent more than forecasted values in 1999–2002										
1999/00	-0.01	0.76	-0.22	0.34	0.18	11.11	-5.92	-6.46	-9.08	5.10

TABLE IV (Continued)

Year	ZGDP	WP	ZTC	ZGIT	M3	RSUS	EX09\$	IM09\$	TB\$	RCAB
2000/01	0.01	1.71	-0.36	0.93	0.52	19.40	-7.79	-10.11	-21.03	1.50
2001/02	0.15	2.55	-0.38	1.22	1.00	23.54	-7.10	-11.68	-29.03	-7.43
Average	0.05	1.68	-0.32	0.83	0.57	18.01	-6.94	-9.42	-19.71	-0.28
Simulation 10: If bad rainfall occurs in 1999/2000										
1999/00	-1.84	1.34	-1.31	-0.22	0.30	0.28	0.32	0.27	0.05	2.24
2000/01	0.00	0.55	0.09	0.30	0.08	0.63	-0.34	-0.04	1.35	1.19
2001/02	0.06	0.18	0.06	-0.41	0.14	0.03	-0.01	-0.27	-1.26	-1.89
Average	-0.59	0.69	-0.38	-0.11	0.17	0.31	-0.01	-0.01	0.05	0.52
Simulation 11: If bad rainfall occurs in both 1999/2000 and 2000/2001										
1999/00	-1.84	1.34	-1.31	-0.22	0.30	0.28	0.32	0.27	0.05	2.24
2000/01	-1.76	1.86	-1.20	0.11	0.36	1.01	-0.12	0.18	1.59	3.54
2001/02	0.06	0.71	0.15	-0.12	0.23	0.76	-0.40	-0.39	-0.34	-0.79
Average	-1.18	1.31	-0.79	-0.08	0.30	0.68	-0.07	0.02	0.43	1.67
Simulation 12: Combined-public investments up by 1%, M3 by 2%, credit by 5%, RSUS by 5%										
1999/00	0.04	1.76	-0.25	8.22	3.10	10.93	-5.50	-2.59	11.59	29.18
2000/01	0.84	3.74	0.11	11.04	4.26	23.37	-9.14	-6.22	7.54	38.02
2001/02	1.99	5.30	0.70	12.87	5.92	34.92	-10.91	-9.42	-3.80	36.87
Average	0.95	3.60	0.19	10.71	4.43	23.08	-8.52	-6.08	5.11	34.69

decrease in the gross fiscal deficit ratio for the same period.¹¹ The third and fourth (S3 and S4) experiments were conducted with a 2.0 percentage point sustained increase or decrease in the share of public investment in the *GDPMP*, respectively.

The experiments reveal that a sustained increase in the gross fiscal deficit ratio increases the growth of all major macro variables, while a sustained decrease in the gross fiscal deficit ratio decreases the growth of output, inflation, money supply, and investment. The results show that an increase in the fiscal deficit would have increased the level of GDP by about 0.4 per cent per annum during the period, but at the same time, the price level would have increased by about 8 per cent per annum. In fact the impact becomes larger as we move along. It should be noted that even though an increase in the fiscal deficit increases real GDP growth, the impact seems to be marginal. But it becomes unsustainable, in terms of high inflation and an adverse balance of payments. There are interesting non-symmetries between the two cases. Similarly, a sustained increase or decrease of 2 per cent in the share of public investment will result in a increase or decrease of about 1.4 per cent per annum real GDP with about 1 percentage point higher or lower inflation. Increased public investment also leads to widening trade deficits, with a large depreciation of the exchange rate. However, the exercise clearly establishes that if the government wishes to accelerate the growth of the economy to the 7–8 per cent range, with a tolerable inflation rate, then increasing public investment will be an important factor to consider. It may be noted that about two-thirds of the public investment goes

¹¹ *RGFD* is assumed to be 3 per cent instead of 5 per cent for the period 1999/2000 to 2001/2.

into developing infrastructure such as irrigation, power, roads, etc. which are the main bottlenecks for any sustainable high economic growth.

D. *Monetary Policy Experiment*

In India, monetary policy is mainly concerned with the growth of money supply and the growth of bank credit. The first experiment here (S5) was conducted with a 10 per cent sustained increase in bank credit (both short and long term) from its forecasted value from 1999/2000 to 2001/2. A second experiment (S6) was conducted with an assumption that the growth of money supply is maintained at 12 per cent per annum for the period 1999/2000 to 2001/2. A third experiment (S7) was conducted, on the assumption that the growth of money supply is maintained at 20 per cent per annum for the period 1999/2000 to 2001/2. A fourth experiment (S8) under monetary policy was conducted with the assumption that the bank rate, cash reserve ratio, and the statutory liquidity ratio are reduced by 2 per cent every year from baseline levels for the period 1999/2000 to 2001/2.

A 10 per cent increase in bank credit from its forecasted value for the period 1999/2000 to 2001/2 is likely to increase real GDP by 0.20 per cent per annum while it pushes up inflation annually by 1 per cent. Similarly, the results reveal that more money supply means more output, a higher price level, a large trade deficit, or vice versa. If growth of money supply is maintained at about 12 per cent, this would reduce the level of GDP and inflation by about 0.2 and 3.7 per cent per annum respectively. On the other hand, if growth of money supply is maintained at about 20 per cent, both output and price levels would increase, but the increase in price levels are not sustainable in the long run. The story is almost the same if we change the bank rate, cash reserve ratio, and the statutory liquidity ratio. Output increases by about 0.2 per cent per annum, but the increase in the price level is high (about 2.5 per cent per annum).

E. *Trade Policy Experiment*

In India, trade policy is mainly centered on the control of imports, the promotion of exports, and maintenance of stability or devaluation of exchange rates. Of these, devaluation of the exchange rate is probably the government's most controversial policy instrument, and is one of the significant measures in the economic reforms. Therefore, we have conducted an experiment (S9) with a 10 per cent sustained devaluation of the exchange rate of the rupee over the U.S. dollar for the period 1999/2000 to 2001/2.

Results of the S9 simulation indicate that the level of overall GDP remains more or less same, but the price level is higher by about 1.7 per cent per annum. A mild J-curve phenomenon is observed in our trade components. Export growth is lower than in the baseline for the first two years, although it improves considerably in the third year. This is because elasticities with respect to the exchange rate are less than

unity in the short run but in excess of unity in the long run. Again, as we know about the trade sub-model in the IEG-DSE model, imports have large price elasticities, so that the response to currency depreciation is strong. Lower GDP growth and the accompanying lower import absorption further strengthen this effect. Consequently, import growth slows down by about 9 percentage points annually. In absolute terms the import bill in dollars is lower by almost 27 per cent in 2001/2. Consequently, situations with respect to the trade deficit and the current account deficit are estimated to improve substantially. The trade deficit is lowered by 20 per cent per annum without widening as we have seen in the baseline scenario. The current account deficit is also less, as a percentage of *GDPMP*.

F. *Natural Factors Related Experiments*

In India, overall performance generally depends on the performance of agriculture. As we know agriculture is, in turn, dependent on the monsoon. In this context, we have run two more simulation exercises. First (S10), with the assumption that rainfall is deficient in 1999/2000; whereas the second (S11), with the assumption that rainfall is deficient both in 1999/2000 and 2000/2001.

Results of these simulations indicate that the level of overall GDP is lowered by about 2 per cent for first and second years without any significant adverse effect in the third year. However, the price level increases by 1.3 per cent for the first year, about 2 per cent for the second year, and a spillover effect of 0.7 per cent for the third year.

G. *A Policy Mix Experiment*

Our exercise indicates that there is a relation between real GDP growth and inflation. In this context, it would be interesting to carry out a policy mix experiment focusing mainly on some important fiscal, monetary, and trade policies. For this exercise (S12), it is assumed that (i) public investment as a percentage of *GDPMP* is 8 per cent (instead of 7 per cent in the baseline simulation) for 1999/2000 to 2001/2, (ii) there is a 5 per cent sustained increase in bank credit, (iii) there is a 2 per cent sustained increase in the money supply, and (iv) there is a 5 per cent sustained increase in exchange rate depreciation from its forecasted values, 1999/2000 to 2001/2.

Results indicate that the level of overall GDP will be higher by 1 per cent per annum. Under this simulation, real GDP is likely to grow at about 6.3, 7.7, and 8.5 per cent respectively for the next three years. Inflation will be higher by 3.6 per cent than the base simulation. To be precise, the rate of inflation is expected to be 8.1, 9.2, and 8.9 per cent for the period 1999–2002. Trade flows are likely to be lower than baseline simulation. However, the trade deficit is almost the same as in the base simulation.

VIII. SUMMARY AND CONCLUSIONS

The objectives of this study were: (i) to build a monetary sub-sector model for India, (ii) to reestimate the existing IEG-DSE India model (1994) to incorporate observations relating to the period of economic reforms, since the existing model has been estimated on the basis of data relating to the pre-reform period, 1970/71 to 1990/91, and (iii) to evaluate the impact of changes in trade, fiscal, and monetary policies on output, inflation, and trade flows.

In the monetary sub-sector we explained the demand for money, supply of money, structure of interest rates, gross bank credit, bank investment in securities, the exchange rate, etc. with the intent of capturing the interdependence between real, fiscal, and monetary sectors. Some salient features of our monetary sub-sector model compared to earlier models are as follows: (i) the monetary model is fairly large with about forty-six equations, (ii) the money supply process is made endogenous, and (iii) interest rate, sanctions, and disbursements by the term lending institutions are brought into the model.

The historical validation of the monetary sub-sector model shows good performance. Of the forty-six endogenous variables in the monetary sector, seventeen have *RMSPE* of less than 5 per cent for the period 1985/86 to 1994/95. Another sixteen are in the range of 5 to 10 per cent. Only thirteen variables have *RMSPE* of more than 10 per cent. It may be noted that most of variables for which *RMSPE* exceeds 10 per cent are those of small magnitudes and are not very important ones. Another point that has to be kept in mind in assessing the *RMSPE* is that many of the variables considered in the study were administered and hence difficult to predict very accurately. For almost all the variables, Theil's *U*-statistics are, however, very close to zero, indicating the model's ability to capture turning points correctly.

The monetary sector model is combined later with other sectors, such as the real sector and external sector, to carry out some policy-related simulation exercises. The parameters of the structural equations of these sectors in the existing IEG-DSE India model (1994) are somewhat outdated, as they were estimated on the basis of data relating to the pre-reform period, 1970/71 to 1990/91. Therefore, we have reestimated them here for the period 1970/71 to 1994/95 by incorporate observations relating to the period of economic reforms. Needless to say, the specifications of some of the equations in the real and external sectors have been changed.

The entire model was simulated dynamically with historically given data for exogenous variables for the period 1985/86 to 1994/95. The validation of the complete model performed equally well. For one-half of the eighty major endogenous variables, the *RMSPE* is less than 5 per cent. Another twenty-one fell within the 10 per cent limit, and only nineteen variables out of eighty are estimated with *RMSPE* exceeding the 10 per cent mark. It is worth emphasizing that most of the important

economic variables, such as real and nominal GDP, wholesale and consumer prices, sectoral outputs and prices, nominal and real private final consumption, money supply, deposit and lending rates, yield on government securities, bank credits, total exports and imports in dollar terms, nominal and real gross investment have *RMSPE* of less than 10 per cent, although the track record of historical validation leaves much to be desired with respect to investment behavior. It calls for improvement in specification and use of a more refined database than is available and accessible to us at the present time. The overall performance of the model in terms of its predictive ability in the last ten years establishes its validity and robustness and provides a reasonable basis for undertaking forecasts for the future.

The complete model is then used to project growth paths of the economy during 1998/99 through 2001/2. Broadly our model predicts that, although the economy is undergoing a difficult period due to an exceptionally turbulent and unfavorable domestic and external environment, the situation is likely to improve over the next two or three years. The economy most probably will move to a higher growth path with a tolerable inflation rate. A year or so later when both adverse external factors and domestic political uncertainties have either disappeared or worked themselves for better, the economy should be in a position to take advantage of changed circumstances. But, in our view, this depends on whether the country gets back to the reform agenda, which has been held in abeyance for over three years. The economy has benefited from the reforms, which were put in place in the first two to three years in the early 1990s. Further gains cannot be expected unless more and bolder policy initiatives are taken. It sounds strange, but true, that India has so far focused largely on stabilization. The other half concerned with structural adjustments needs now to be taken up more urgently in order not only to accelerate the growth involved, but also to sustain the higher growth with tolerable inflation.

In this context, an evaluation of alternative policy options may be a useful exercise to shed light on the shape of changes that may take place in the economy under alternative policy options through the model we built. This exercise was carried out for 1999/2000, 2000/2001, and 2001/2 focusing on the fiscal deficit, public investment, exchange rate, money supply growth, bank credit, rainfall, etc. Our exercise indicates that there is a trade-off between higher real GDP growth and low inflation.

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APPENDIX

THE MODEL

Agricultural Block

Index of Yield: Foodgrains

$$IYFG = \exp\{-2.5875 + .4106 \cdot \log[ZNFKAG(-1)/IAAC] + .0448 \cdot DUMRFG - .0366 \cdot (DUMRFG \cdot DUMRFG) + 1.4077 \cdot \log(IAFG) + .0098 \cdot TIMEDUM\}.$$

Index of Yield: Non-foodgrains

$$IYNF = \exp\{1.4465 + .14953 \cdot \log[ZNFKAG(-1)/IAAC] + .0076 \cdot DUMRNF + .0031 \cdot DUMRNF \cdot DUMRNF + .0059 \cdot TIMEDUM + .6262 \cdot \log(IANF) - .0573 \cdot D8692 + .061 \cdot D89\}.$$

Index of Area under Foodgrains

$$IAFG = \exp[1.4555 + .12295 \cdot LRP123 + .6714 \cdot \log(IAAC) + .0187 \cdot \log(ZGIAGPU) - .0404 \cdot DREFOR - .0222 \cdot D88].$$

$$LRP123 = \log[WPF(-3) + WPF(-2) + WPF(-1)] - \log[WPNF(-3) + WPNF(-2) + WPNF(-1)].$$

Index of Area under All Crops

$$IAAC = \exp\{3.7403 + .0154 \cdot DUMRAC + .13363 \cdot \log[ZNFKAG(-1)] - .0425 \cdot D88\}.$$

Index of Area under Non-foodgrains

$$IANF = (IAAC/.2518) - (IAFG*.7482/.2518).$$

Index of Production: Foodgrains

$$IPFG = (YFG*IAFG)/100.$$

Index of Production: Non-foodgrains

$$IPNF = (YNF*IANF)/100.$$

Index of Production: All Crops

$$IPAC = \exp[-.0069868 + .62587*\log(IPFG) + .3757*\log(IPNF)].$$

Real GDP in Agriculture and Allied Sectors

$$ZXAG = \exp[1.9442 + .91004*\log(IPAC)].$$

Nominal GDP in Agriculture and Allied Sectors

$$XAG = ZXAG*PXAG/100.$$

Index of Wholesale Price: Food Items

$$WPF = -36.1946 + 76.6094*\{[M3EM + M3E(-1)]/(2*ZGDP)\} - .3465*IPFG(-1) \\ + .4854*IPPRW + .06116*ZPCP + 17.9934*D92.$$

Index of Wholesale Price: Foodgrains

$$LWPF = .29535 + .92958*\log(WPF) + [AR(1) = .5242].$$

$$WPF = \exp(LWPF).$$

Index of Wholesale Price: Nonfood Items

$$WPNF = 6.1669 + 119.6098*\{[M3EM + M3EM(-1)]/(2*ZGDP)\} \\ + .1462*[(ZXMN/IPNF)*100] + 21.4304*D9295 - 8.6063*D8690.$$

Index of Procurement Price of Rice and Wheat

$$IPPRW = 9.3626 + .3983*WPF - .084017*\{[WPAG(-1)/WPMN(-1)]*100\} \\ + .6311*IPPRW(-1) + 17.2777*D94.$$

Index of Wholesale Price of Agriculture

$$WPAG = [(17.386*WPF + 10.081*WPNF)/27.467].$$

Implicit Price Deflator for Agricultural GDP

$$LPXAG = -.10994 + 1.0407*\log(WPAG) + [AR(1) = .4471].$$

$$PXAG = \exp(LPXAG).$$

Implicit Price Deflator for Agricultural Investment

$$PIAG = [(GIAGPR + GIAGPU)/(ZGIAGPR + ZGIAGPU)]*100.$$

Implicit Price Deflator for Agricultural Inventory Investment

$$PIIAG = -28.7754 + 1.3990*WPAG + [AR(1) = -1.1978].$$

Implicit Price Deflator for Private Agricultural Investment

$$PIAGPR = -10.2959 + .5766*WPMN + .6995*WPAG + 12.4331*D9091.$$

Implicit Price Deflator for Public Agricultural Investment

$$PIAGPU = -41.8143 + 1.3115*WPMN + .3849*WPAG + [AR(1) = .76315].$$

Real Private Investment in Agriculture

$$ZGIAGPRA = -18.958 + .0280*\{[ZXAG + ZXAG(-1) + ZXAG(-2)]/3\} + .6204*ZGIAGPU \\ + .1624*\{[WPAG(-1)/WPMN(-1)]*100\} - 6.6412*D84 \\ + .2968*ZGIAGPR(-1) + 7.7857*DREFORM.$$

$$ZGIAGPR = [ZGIAGPRA*\exp(.02*DTIME)].$$

Real Private Inventory Stock in Agriculture

$$ZISAGPR = 11.3836 + .03796*ZXAG + 2.4222*ZISAGPU + 2.3160*D8895.$$

Real Depreciation in Agriculture

$$ZDPAG = -10.3977 + .05601*ZNFKAG(-1) + [AR(1) = 1.2648].$$

Real Net Fixed Capital Stock in Agriculture

$$ZNFKAG = ZNFKAG(-1) + ZGIAGPR - ZIIAGPR + ZGIAGPU - ZIIAGPU - ZDPAG.$$

Nominal Private Investment in Agriculture

$$GIAGPR = (ZGIAGPR * PIAGPR) / 100.$$

Real Public Investment in Agriculture

$$ZGIAGPU = (GIAGPU / PIAGPU) * 100.$$

Real Public Inventory Investment in Agriculture

$$ZIIAGPU = (IIAGPU / PIIAG) * 100.$$

Real Private Inventory Investment in Agriculture

$$ZIIAGPR = ZISAGPR - ZISAGPR(-1).$$

Real Private Fixed Investment in Agriculture

$$ZGFIAGPR = ZGIAGPR - ZIIAGPR.$$

Real Public Fixed Investment in Agriculture

$$ZGFIAGPU = ZGIAGPU - ZIIAGPU.$$

Real Public Inventory Stock in Agriculture

$$ZISAGPU = ZISAGPU(-1) + ZIIAGPU.$$

Manufacturing Block

Capital Productivity in Manufacturing

$$LIPKMN = -.5601 + .1222 * \log[IPNF / ZNFKMN(-1)] + .4814 * \log[ZXIN / ZNFKMN(-1)] \\ + .03678 * \log[ZIM235 / ZNFKMN(-1)] + [AR(1) = .8315] + .02 * DTIME.$$

$$IPMN = ZNFKMN(-1) * \exp(LIPKMN).$$

Real GDP in Manufacturing

$$LZXMN = .9344 + .9674 * \log(IPMN) + [AR(1) = .6755].$$

$$ZXMN = \exp(LZXMN).$$

Nominal GDP in Manufacturing

$$XMN = ZXMN * PXMN / 100.$$

Index of Wholesale Price for Manufactures

$$WPMN = 18.1392 + 54.6643 * \{ [M3EM + M3EM(-1)] / (2 * ZGDP) \} + .2347 * WPADMN \\ + .1253 * IMUV09 + .1969 * WPNF + 5.8642 * D9095 - 7.4810 * D88.$$

Implicit Price Deflator for Manufacturing GDP

$$LPXMN = .074591 + 1.0022 * \log(WPMN) + [AR(1) = .4226].$$

$$PXMN = \exp(LPXMN).$$

Implicit Price Deflator for Manufacturing Investment

$$PIMN = [(GIMNPR + GIMNPU) / (ZGIMNPR + ZGIMNPU)] * 100.$$

Implicit Price Deflator for Manufacturing Inventory Investment

$$PIIMN = .71815 + 1.0471 * WPMN + 118.8358 * D86 + 145.878 * D87.$$

Implicit Price Deflator for Manufacturing Private Investment

$$PIMNPR = -12.9044 + 1.2748 * WPMN + 21.6588 * D8687.$$

Implicit Price Deflator for Manufacturing Public Investment

$$PIMNPU = -10.9919 + 1.2661 * WPMN + 34.7926 * D8687.$$

Real Private Investment in Manufacturing

$$ZGIMNPR = 14.2335 + .1047 * \{ [(GIA - GITPU - GIAGPR) / PIMNPR] * 100 \} \\ + .3149 * (NFCF / PIMNPR * 100) + .5739 * (TDAI / PIMNPR * 100) \\ + 34.3059 * D8995.$$

$$ZGIMNPR = [ZGIMNPR * \exp(.03 * DTIME)].$$

Real Private Inventory Investment in Manufacturing

$$ZIIMNPR = 31.8492 + .8269 * ZGIMNPR - .4342 * PIMNPR - 11.0554 * D8284.$$

Real Depreciation in Manufacturing

$$ZDPMN = -4.2603 + .008044 * ZXMN + .0689 * ZNFKMN(-1) + [AR(1) = .9070].$$

Net Real Capital Stock in Manufacturing

$$ZNFKMN = ZNFKMN(-1) + ZGIMNPR - ZIIMNPR + ZGIMNPU - ZIIMNPU - ZDPMN.$$

Nominal Private Investment in Manufacturing

$$GIMNPR = ZGIMNPR * PIMNPR / 100.$$

Real Public Investment in Manufacturing

$$ZGIMNPU = (GIMNPU / PIMNPU) * 100.$$

Real Public Inventory Investment in Manufacturing

$$ZIIMNPU = (IIMNPU / PIIMN) * 100.$$

Real Private Fixed Investment in Manufacturing

$$ZGFIMNPR = ZGIMNPR - ZIIMNPR.$$

Real Public Fixed Investment in Manufacturing

$$ZGFIMNPU = ZGIMNPU - ZIIMNPU.$$

Infrastructure Block

Capital Productivity in Infrastructure

$$LZXKIN = -0.9146 - .060876 * \log[ZNFKIN(-1)] + [AR(1) = .4586].$$

Real GDP in Infrastructure

$$ZXIN = \exp(LZXKIN) * ZNFKIN(-1) + 15 * DTIME.$$

Nominal GDP in Infrastructure

$$XIN = ZXIN * PXIN / 100.$$

Implicit Price Deflator for Infrastructure GDP

$$PXIN = -23.1493 + .2643 * WPADMN + 1.4751 * CPI(-1) + [AR(1) = .5457].$$

Implicit Price Deflator of Investment in Infrastructure

$$PIIN = [(GIINPR + GIINPU) / (ZGIINPR + ZGIINPU)] * 100.$$

Implicit Price Deflator of Inventory Investment in Infrastructure

$$PIIIN = 9.1719 + .6575 * IMUV3 + .4002 * IMUV7 + 85.1663 * D8687 + 61.4683 * D93 \\ + [AR(1) = .5501].$$

Implicit Price Deflator of Private Investment in Infrastructure

$$PIINPR = 6.6105 + .4403 * WPADMN + .4784 * PXIN.$$

Implicit Price Deflator of Public Investment in Infrastructure

$$PIINPU = 9.1884 + .1042 * WPADMN + .7533 * PXIN + 13.8799 * D92.$$

Real Private Investment in Infrastructure

$$ZGIINPRA = -11.1225 + .2012 * ZGITPU + .038298 * \{[(GIA - GITPU - GIAGPR) / PIINPR] \\ * 100\} + [AR(1) = .6035].$$

$$ZGIINPR = [ZGIINPRA * \exp(.03 * DTIME)].$$

Real Private Inventory Investment in Infrastructure

$$ZIIINPR = 11.8159 - .4846 * ZISINPR(-1) + .014113 * ZXIN.$$

Real Depreciation in Infrastructure

$$ZDPIN = -9.6595 + .06253 * ZXIN + .06934 * ZNFKIN(-1) + [AR(1) = .7044].$$

Real Net Fixed capital stock in Infrastructure

$$ZNFKIN = ZNFKIN(-1) + ZGIINPR - ZIIINPR + ZGIINPU - ZIIINPU - ZDPIN.$$

Nominal Private Investment in Infrastructure

$$GIINPR = ZGIINPR * PIINPR / 100.$$

Real Public Investment in Infrastructure

$$ZGIINPU = (GIINPU / PIINPU) * 100.$$

Real Public Inventory Investment in Infrastructure

$$ZIIINPU = (IINPU / PIIIN) * 100.$$

Real Private Fixed Investment in Infrastructure

$$ZGFIINPR = ZGIINPR - ZIIINPR.$$

Real Private Inventory Stocks in Infrastructure

$$ZISINPR = ZISINPR(-1) + ZIIINPR.$$

Real Public Fixed Investment in Infrastructure

$$ZGFIINPU = ZGIINPU - ZIIINPU.$$

Services Block

Capital Productivity in the Service Sector

$$LZXKSR = -5.4395 + .6522*\log[ZNFKSR(-1)] + .2939*\log[ZXNSR/ZNFKSR(-1)] \\ + [AR(1) = .8291].$$

Real GDP in the Service Sector

$$ZXSR = ZNFKSR(-1)*\exp(LZXKSR).$$

Real GDP in the Non-Service Sector

$$ZXNSR = ZXAG + ZXMN + ZXIN + ZXAD.$$

Nominal GDP in the Service Sector

$$XSR = ZXSR*PXSR/100.$$

Implicit GDP Deflator in the Service Sector

$$PXSR = 28.512 + 69.0716*\{[M3EM + M3EM(-1)]/(2*ZGDP)\} + .5329*CPI \\ + [AR(1) = .8104].$$

Implicit Deflator of Investment in the Service Sector

$$PISR = [(GISRPR + GISRPU)/(ZGISRPR + ZGISRPU)]*100.$$

Implicit Deflator of Private Investment in the Service Sector

$$PISRPR = -10.5399 + 1.2919*PXSR.$$

Implicit Deflator of Public Investment in the Service Sector

$$PISRPU = -23.3389 + 1.2761*PXSR - 497.5152*D88.$$

Implicit Deflator of Inventory Investment in the Service Sector

$$PIISR = 7.8523 + .8851*PXSR - 67.611*D86 + 82.0148*D87.$$

Real Private Investment in the Service Sector

$$ZGISRPR = 16.2480 + .1562*\{[(GIA - GITPU - GIAGPR)/PISRPR]*100\} \\ + .01213*ZGITPU(-1) + .4361*\{[NFCF(-1)/PISRPR(-1)]*100\} \\ + 29.754*D86 + 12.397*D87.$$

Real Private Investment Stock in the Service Sector

$$ZISSRPR = 28.9935 + .035435*[(SCBCOFC/PISRPR)*100] + .8691*ZISSRPR(-1) \\ - 25.941*D8993.$$

Real Depreciation in the Service Sector

$$ZDPSR = -9.3531 + .010645*ZXSR + .030548*ZNFKSR(-1).$$

Real Net Fixed Capital Stock in the Service Sector

$$ZNFKSR = ZNFKSR(-1) + ZGISRPR - ZISSRPR + ZGISRPU - ZISSRPU - ZDPSR.$$

Nominal Private Investment in the Service Sector

$$GISRPR = ZGISRPR*PISRPR/100.$$

Real Public Investment in the Service Sector

$$ZGISRPU = (GISRPU/PISRPU)*100.$$

Real Private Inventory Investment in the Service Sector

$$ZISSRPR = [ZISSRPR - ZISSRPR(-1)].$$

Real Public Inventory Investment in the Service Sector

$$ZISSRPU = (IISRPU/PIISR)*100.$$

Real Private Fixed Investment in the Service Sector

$$ZGFISRPR = ZGISRPR - ZISSRPR.$$

Real Public Fixed Investment in the Service Sector

$$ZGFISRPU = ZGISRPU - ZISSRPU.$$

Public Administration and Defense

Real per Capita GDP in Public Administration and Defense

$$LZXPAD = -5.14636 + 1.3877 * \log[ZNFKAD(-1)/POP] \\ + .1906 * \log[(ZGFCE + ZGITPU)/POP] + [AR(1) = .7894].$$

Real GDP in Public Administration and Defense

$$ZXAD = POP * \exp(LZXPAD).$$

Nominal GDP in Public Administration and Defense

$$XAD = ZXAD * PXAD / 100.$$

Implicit GDP Deflator in Public Administration and Defense

$$PXAD = .0008167 + 1.3544 * CPI(-1).$$

Implicit Deflator of Investment in Public Administration and Defense

$$PIAD = -21.1761 + 1.1840 * PXAD + 7.1383 * D8690 + [AR(1) = .3302].$$

Implicit Deflator of Inventory Investment in Public Administration and Defense

$$PIIAD = 8.0497 + .8293 * PXAD + 85.2988 * D8687.$$

Real Depreciation in Public Administration and Defense

$$ZDPAD = -1.4497 + .05320 * ZXAD + .011364 * ZNFKAD(-1).$$

Real Net Fixed Capital Stock in Public Administration and Defense

$$ZNFKAD = ZNFKAD(-1) + ZGIAD - ZIIAD - ZDPAD.$$

Real Investment in Public Administration and Defense

$$ZGIAD = (GIAD/PIAD) * 100.$$

Real Inventory Investment in Public Administration and Defense

$$ZIIAD = (IIAD/PIIAD) * 100.$$

Real Fixed Investment in Public Administration and Defense

$$ZGFIAD = (ZGIAD - ZIIAD).$$

Consumption

Real Private per Capita Consumption

$$ZPCP = 585.3838 + .53245 * AZPDIP + .5345 * (ZPDIP - AZPDIP) + [AR(1) = .8031].$$

Real Private Consumption

$$ZPC = (ZPCP * POP).$$

Nominal Private Consumption

$$PC = (ZPC * PPC) / 100.$$

Implicit Deflator for Private Consumption

$$PPC = 6.8546 + 1.0860 * CPI - 4.1932 * D7489 + [AR(1) = .6970].$$

Government Final Consumption Expenditure

$$LGFCE = .6555 + 1.15438 * \log(CPI) - .1154 * D74 + [AR(1) = .9544].$$

$$GFCE = \exp(LGFCE).$$

Real Government Final Consumption Expenditure

$$ZGFCE = (GFCE / PGFCE) * 100.$$

Implicit Deflator for Government Consumption

$$PGFCE = \exp[-.0245 + 1.0118 * \log(PGDP)].$$

Nominal Personal Disposal Income

$$PDI = \exp[-.16568 + .9936 * \log(GDPMPI)].$$

Real Personal Disposal Income

$$ZPDI = (PDI / PPC) * 100.$$

Real Personal per Capita Disposal Income

$$ZPDIP = ZPDI / POP.$$

$$AZPDIP = [ZPDIP + ZPDIP(-1) + ZPDIP(-2)] / 3.$$

Indirect Taxes Less Subsidies (Public Finance Sector)

$$LIDL\text{SUB} = 1.0376 + .6833 \cdot \log(GDP) + [AR(1) = .9478].$$

$$IDLSUB = \exp(LIDL\text{SUB}).$$

$$ZIDLSUB = IDLSUB/PGDP \cdot 100.$$

Net Credit Flows

$$NFCF = SCBCOFC - SCBCOFC(-1).$$

Index of Administered Wholesale Prices of Minerals, Fuels, etc.

$$WPADMN = -2.0897 + .27356 \cdot WP + .1558 \cdot IMUV3 + .6096 \cdot WPADMN(-1) \\ + 9.0757 \cdot D818794.$$

Index of Oilseeds Output

$$IPOS = 34.217 + 3.9019 \cdot DUMRNF - 1.3181 \cdot DUMRNF \cdot DUMRNF + 6.6111 \cdot TIME \\ + [AR(1) = .7950].$$

Real Government Consumption Expenditure and Investment

$$ZEPUB = ZGFCE + ZGITPU.$$

Total GDP, Price, and Investment

Total Real GDP

$$ZGDP = ZXAG + ZXMN + ZXIN + ZXSR + ZXAD.$$

Total Nominal GDP

$$GDP = (ZGDP \cdot PGDP)/100.$$

Implicit Price Deflator for Total GDP

$$PGDP = (PXAG \cdot ZXAG + PXMN \cdot ZXMN + PXIN \cdot ZXIN + PXSR \cdot ZXSR \\ + PXAD \cdot ZXAD)/ZGDP.$$

Nominal Total GDP at Market Prices

$$GDPMP = GDP + IDLSUB.$$

Real Total GDP at Market Prices

$$ZGDPMP = ZGDP + ZIDLSUB.$$

Implicit Price Deflator for GDPMP

$$PGDPMP = GDPMP/ZGDPMP \cdot 100.$$

Aggregate Wholesale Price Index

$$WP = (27.467 \cdot WPAG + 15.491 \cdot WPADMN + 57.042 \cdot WPMN)/100.$$

Consumer Price Index

$$CPI = -1.6898 + .5502 \cdot WPF + .42295 \cdot WPMN + [AR(1) = .7081].$$

Nominal Total Private Investment of Using Sectors

$$GITPR = GIAGPR + GIMNPR + GIINPR + GISRPR.$$

Nominal Total Investment of Using Sectors

$$GIT = GITPR + GITPU.$$

Errors and Omissions in Nominal Total Investment

$$EM2 = SEM2 \cdot GIT.$$

Nominal Total Investment of Using Sectors (Adjusted)

$$GIA = GIT + EM2.$$

Nominal Total Private Inventory Investment

$$IIPR = (ZIIAGPR \cdot PIAG + ZIIMNPR \cdot PIIMN + ZIIINPR \cdot PIIN + ZIISRPR \cdot PIISR)/100.$$

Nominal Total Inventory Investment

$$IIT = IIPR + IIPU.$$

Nominal Private Fixed Investment

$$GFIPR = GITPR - IIPR.$$

Nominal Public Fixed Investment

$$GFIPU = GITPU - IIPU.$$

Nominal Total Fixed Investment

$$GFIT = GFIPR + GFIPU.$$

Real Total Private Investment of Using Sectors

$$ZGITPR = ZGIAGPR + ZGIMNPR + ZGIINPR + ZGISRPR.$$

Real Total Investment of Using Sectors

$$ZGIT = ZGITPR + ZGITPU.$$

Errors and Omissions in Real Total Investment

$$ZEM2 = ZSEM2 * ZGIT.$$

Real Total Investment of Using Sectors (Adjusted)

$$ZGIA = ZGIT + ZEM2.$$

Real Total Private Inventory Investment of Using Sectors

$$ZIIPR = ZIIAGPR + ZIIMNPR + ZIINPR + ZIISRPR.$$

Real Total Public Inventory Investment of Using Sectors

$$ZIIPU = ZIIAGPU + ZIIMNPU + ZIINPU + ZIISRPU + ZIIAD.$$

Real Total Private Fixed Investment of Using Sectors

$$ZGFIPR = ZGFIAGPR + ZGFIMNPR + ZGFIINPR + ZGFISRPR.$$

Real Total Public Fixed Investment of Using Sectors

$$ZGFIPU = ZGFIAGPU + ZGFIMNPU + ZGFIINPU + ZGFISRPU + ZGFIAD.$$

Real Total Fixed Investment of Using Sectors

$$ZGFIT = ZGFIPR + ZGFIPU.$$

Real Total Public Investment of Using Sectors

$$ZGITPU = ZGFIPU + ZIIPU.$$

Real Total Inventory Investment of Using Sectors

$$ZIIT = ZIIPR + ZIIPU.$$

Total Consumption

$$TC = PC + GFCE.$$

Gross Domestic Savings

$$GDS = GIA + CABNAS.$$

Saving Ratio (RGDS)

$$RGDS = GDS / GDPMP * 100.$$

Errors and Omissions in GDP Identity

$$EO = [GDPMP - (PC + GFCE + GIA + CABNAS)].$$

$$EM = [GDPMP - (PC + GFCE + GIT + CABNAS)].$$

$$SDGDPMP = GDPMP - (PC + GFCE + GIA + EXRMSNA - IMPMSNA).$$

$$RSDGDPM = SDGDPMP / GDPMP * 100.$$

Trade and Balance of Payments

Merchandise Exports and Unit Values (Custom Data)

SITC: 0 and 1 (Food and Live Animals plus Beverages and Tobacco)

Real Exports

$$ZEX01 = \exp[1.5383 + .7479 * \log[ZGDPW(1)] - .6023 * \log\{[EXUV01 / WEUVF(-1) * 100] / INXRUS * 100\} + .3487 * \log[ZEX01(-1)] - .2155 * D89 + .035 * DTIME].$$

Unit Values

$$EXUV01 = \exp\{-.4310 + .6737 * \log(WPF) + .1696 * \log[ZEX01(-1)] + .3327 * \log[EXUV01(-1)] + .3727 * D78\}.$$

Nominal Exports

$$EX01 = (ZEX01 * EXUV01) / 100.$$

SITC: 2 and 4 (Crude Materials, Inedible except Fuels plus Exports of Animal and Vegetable Oils, Fats, and Waxes)

Real Exports

$$ZEX24 = \exp[3.0477 + .01877 * \log[ZGDPW(-1)] - .25055 * \log\{[EXUV24/WEUVP(-1) * 100]/INXRSUS * 100\} + .2581 * D879495 - .1505 * D789093 + .035 * DTIME].$$

Unit Values

$$EXUV24 = \exp\{-.2204 + .3981 * \log(WPNF) + .6782 * \log[EXUV24(-1)] - .1851 * D879194 + .14988 * D829092\}.$$

Nominal Exports

$$EX24 = (ZEX24 * EXUV24) / 100.$$

SITC: 3 (Exports of Mineral Fuels, Lubricants, and Related Materials)

Unit Values

$$EXUV3 = \exp\{-3.1504 + .5933 * \log[DIUVFU(-1)] + 1.0601 * \log(INXRSUS) + .4153 * D809095 - .3809 * D839192\}.$$

Nominal Exports

$$EX3 = (ZEX3 * EXUV3) / 100.$$

SITC: 5 to 9 (Chemical Products, Manufactured Goods, etc.)

Real Exports

$$ZEX59 = \exp[.4977 + .5170 * \log[ZGDPW(-1)] - .3658 * \log\{[EXUV59/WEUVMF(-1) * 100] / INXRSUS * 100\} + .7400 * \log[ZEX59(-1)] + .1765 * D7795 - .1411 * D83].$$

Unit Values

$$EXUV59 = \exp\{-.7204 + .7429 * \log(WPMN) + .3233 * \log(ZEX59) + .1944 * \log[EXUV59(-1)] - .1551 * D8195\}.$$

Nominal Exports

$$EX59 = (ZEX59 * EXUV59) / 100.$$

Total Merchandise Exports (SITC 0 to 9)

Real Exports

$$ZEX09 = ZEX01 + ZEX24 + ZEX3 + ZEX59.$$

Unit Values

$$EXUV09 = (EX09 / ZEX09) * 100.$$

$$EXUV09A = -3.5888 + 1.0670 * EXUV09 - 8.9598 * D899091 + 5.9759 * D838495.$$

Nominal Exports

$$EX09 = EX01 + EX24 + EX3 + EX59.$$

Merchandise Imports and Unit Values (Custom Data)

SITC: 0 and 1 (Food and Live Animals plus Beverages and Tobacco)

Real Imports

$$ZIM01 = \exp\{5.954 - 2.1381 * \log[IPAC(-1)] - 1.3745 * \log(IMUV01/WPAG * 100) + 1.6616 * \log(ZGDP) + 1.265 * D756795 - .00 * DTIME\}.$$

Unit Values

$$IMUV01 = \exp\{-4.2777 + .9172 * \log[WEUVF(-1)] + .7910 * \log(INXRSUS) + .2334 * \log[IMUV01(-1)] - .3894 * D899193\}.$$

Nominal Imports

$$IM01 = (ZIM01 * IMUV01) / 100.$$

SITC : 2 (Crude Materials)

Real Imports

$$ZIM2 = \exp\{-1.6439 + 1.3731 * \log(ZXMN) - .8251 * \log(IMUV2/WPMN * 100) - .4048 * D7576 + .4221 * D78\}.$$

Unit Values

$$IMUV2 = \exp\{-3.3646 + .5172 * \log[WEUVP(-1)] + 1.1934 * \log(INXRSUS) + .1814 * D9093 - .4143 * D94\}.$$

Nominal Imports

$$IM2 = (ZIM2 * IMUV2) / 100.$$

SITC: 3 (Fuels and Lubricants)

Real Imports

$$ZIM3 = \exp\{-3.090 + .6854 * \log(ZGDP) - .1930 * \log(DPCR) - .08866 * \log(IMUV3 / WP * 100) + .7623 * \log[ZIM3(-1)] - .3650 * D75 + .1833 * D8083 - .00 * DTIME\}.$$

Unit Values

$$IMUV3 = \exp\{-4.2316 + 1.0099 * \log(DIUVFU(-1)) + .8984 * \log(INXRSUS) - .4847 * D73 + .2314 * D7475\}.$$

Nominal Imports

$$IM3 = (ZIM3 * IMUV3) / 100.$$

SITC: 4 (Animal and Vegetable Oils, Fats, and Waxes)

Real Imports

$$ZIM4 = \exp\{7.9084 - .3488 * \log(IPOS) - 1.224 * \log(IMUV4 / WPNF * 100) + .6549 * \log[ZIM4(-1)] + 1.8486 * D78 - 1.096 * D90\}.$$

Unit Values

$$IMUV4 = \exp\{-.335 + .1857 * \log[WEUVP(-1)] + .9145 * \log(INXRSUS) - .4116 * D879091\}.$$

Nominal Imports

$$IM4 = (ZIM4 * IMUV4) / 100.$$

SITC: 2 and 4 (Crude Materials and Animal and Vegetable Oils, Fats, and Waxes)

Real Imports

$$ZIM24 = ZIM2 + ZIM4.$$

Nominal Imports

$$IM24 = (ZIM2 * IMUV2 + ZIM4 * IMUV4) / 100.$$

SITC: 5 to 9 (Chemical Products, Manufactured Goods, etc.)

Real Imports

$$ZIM59 = \exp\{.0652 + .9012 * \log(ZXMN) - .9891 * \log(IMUV59 / WPMN * 100) + .6605 * \log(ZGFIT) + .1221 * D758087\}.$$

Unit Values

$$IMUV59 = \exp\{-1.0186 + .4240 * \log[WEUVMF(-1)] + .2490 * \log(INXRSUS) + .5637 * \log[IMUV59(-1)] + .2746 * D75 - .4553 * D95\}.$$

Nominal Imports

$$IM59 = ZIM59 * IMUV59 / 100.$$

Real Imports: SITC 5

$$ZIM5 = 7.5639 + .14021 * ZIM59 + [AR(1) = .56895].$$

Real Imports: SITC 2, 3, and 5

$$ZIM235 = ZIM2 + ZIM3 + ZIM5.$$

Unit Values: SITC 7

$$IMUV7 = 16.9268 + .7535 * IMUV59 + 21.8764 * D87 - 36.8869 * D909395 + [AR(1) = .6094].$$

Total Merchandise Imports (SITC 0 to 9)

Real Imports

$$ZIM09 = ZIM01 + ZIM24 + ZIM3 + ZIM59.$$

Nominal Imports

$$IM09 = IM01 + IM24 + IM3 + IM59.$$

Unit Values

$$IMUV09 = (IM09 / ZIM09) * 100.$$

$$IMUV09A = -.3561 + .9944 * IMUV09 - 19.6336 * D95 + [AR(1) = .6637].$$

Export Receipts: Merchandise (NAS)

$$EXRMNAS = K1EXNAS * EX09.$$

Credits Merchandise Exports—Total (BOP-RBI)

$$CMERT = K2EXRBI * EX09.$$

Import Payments—Total (BOP-NAS)

$$IMPMNAS = K3IMNAS * IM09.$$

Debits Merchandise Imports—Total (BOP-RBI)

$$DMERT = K4IMRBI * IM09.$$

Real Import Payments—Total (BOP-NAS)

$$ZIMPMNA = (IMPMNAS / IMUV09A) * 100.$$

Real Export Receipts: Merchandise (NAS)

$$ZEXRMNA = (EXRMNAS / EXUV09A) * 100.$$

Net Invisible (RBI)

$$NINVTRBI = .01 * GDPMP.$$

Net Invisible (NAS)

$$NINVTNAS = -2.8150 + .9717 * NINVTRBI.$$

Real Net Invisible

$$ZNINVTNA = \{NINVTNAS / [(EXUV09A + IMUV09A) / 2]\} * 100.$$

Trade Balance (DGCI&S)

$$TBDGCIS = EX09 - IM09.$$

Trade Balance (NAS)

$$TBNAS = EXRMNAS - IMPMNAS.$$

Trade Balance (RBI)

$$TBRBI = CMERT - DMERT.$$

Current Account Balance (NAS)

$$CABNAS = EXRMNAS - IMPMNAS + NINVTNAS.$$

Current Account Balance (RBI)

$$CABRBI = CMERT - DMERT + NINVTRBI.$$

Ratio of Current Account Balance to GDP

$$RCABNAS = CABNAS / GDPMP * 100.$$

$$RCABRBI = CABRBI / GDPMP * 100.$$

Conversion into U.S. Dollars Terms

$$ZEX01\$ = ZEX01 / RSUS.$$

$$ZEX24\$ = ZEX24 / RSUS.$$

$$ZEX3\$ = ZEX3 / RSUS.$$

$$ZEX59\$ = ZEX59 / RSUS.$$

$$ZEX09\$ = ZEX09 / RSUS.$$

$$EX01\$ = EX01 / RSUS.$$

$$EX24\$ = EX24 / RSUS.$$

$$EX3\$ = EX3 / RSUS.$$

$$EX59\$ = EX59 / RSUS.$$

$$EX09\$ = EX09 / RSUS.$$

$$EXUV09A\$ = (EXUV09A / INXRSUS) * 100.$$

$$ZIM01\$ = ZIM01 / RSUS.$$

$$ZIM24\$ = ZIM24 / RSUS.$$

$$ZIM3\$ = ZIM3 / RSUS.$$

$$ZIM59\$ = ZIM59 / RSUS.$$

$$ZIM09\$ = ZIM09 / RSUS.$$

$$IM01\$ = IM01 / RSUS.$$

$$IM24\$ = IM24 / RSUS.$$

$$IM3\$ = IM3 / RSUS.$$

$$\begin{aligned}
IM59\$ &= IM59/RSUS. \\
IM09\$ &= IM09/RSUS. \\
IMUV09A\$ &= (IMUV09A/INXRSUS)*100. \\
INXRSUS &= (RSUS/7.908)*100. \\
IMPMNAS\$ &= IMPMNAS/RSUS. \\
DMERT\$ &= DMERT/RSUS. \\
EXRMNAS\$ &= EXRMNAS/RSUS. \\
CMERT\$ &= CMERT/RSUS. \\
TBRBI\$ &= TBRBI/RSUS. \\
TBDGCIS\$ &= TBDGCIS/RSUS. \\
NINVTNA\$ &= NINVTNAS/RSUS. \\
NINVTRB\$ &= NINVTRBI/RSUS. \\
CABNAS\$ &= CABNAS/RSUS. \\
CABRBI\$ &= CABRBI/RSUS. \\
GDPMP\$ &= GDPMP/RSUS.
\end{aligned}$$

Monetary Block

Demand for Money

Currency with Public

$$\begin{aligned}
CPEM &= 175.6323 + .1813*PC - 8.5753*CBDR13 - 2.7902*[(XNA/GDP)*100] \\
&\quad + 71.2505*D95.
\end{aligned}$$

Demand Deposits

$$DDBEM = 147.8168 + .1639*XNA - 29.19817*MCBDR13 + 4.1686*MGWP - 51.8225*D91.$$

Other Deposits

$$ODEM = -.4032 + .004005*M3D + 12.9612*D95.$$

Time Deposits

$$\begin{aligned}
TDBEM &= -222.3117 + .6072*XNA + 132.4969*(CBDR13/WRGS) - 8.3091*MGWP \\
&\quad - 103.3393*D9192.
\end{aligned}$$

$$M3D = CPEM + DDBEM + TDBEM + ODEM.$$

$$XNA = GDP - XAG.$$

$$M3EM = M3.$$

Money Supply

Reserve Money

$$RMEM = RBNCGEM + RBCOBEM + RBCCSEM + RBNFEEM + GCLPEM - RBNMLEM.$$

Reserve Bank's Net Credit to Government

$$\begin{aligned}
RBNCGEM &= 6.6492 + .5760*GFD + .8283*RBNCGEM(-1) + 46.9063*D9091 \\
&\quad - 127.5458*D9495.
\end{aligned}$$

Reserve Bank's Credit to Commercial and Cooperative Banks (including NABARD)

$$\begin{aligned}
RBCOBEM &= 6.8909 + .07374*SCBGC - .4779*BR - .3969*RBCOBEM(-1) \\
&\quad + 30.5301*D899091 - 27.6564*D94.
\end{aligned}$$

Reserve Bank's Credit to Commercial Sector (Development Banks)

$$RBCCSEM = 2.1651 + 1.02198*RBCCSEM(-1) + 14.3418*D89 - 8.9827*D8393.$$

Government's Currency Liabilities to Public

$$GCLPEM = -.09054 + 1.0677*GCLPEM(-1) + 1.4436*D868788.$$

Reserve Bank's Nonmonetary Liabilities

$$RBNMLEM = 1.7096 + 1.06456*RBNMLEM(-1) + 33.6587*D85791 - 42.0346*D94.$$

Money Multiplier ($M3/RMEM$)

$$\begin{aligned}
M &= 3.7869 - 1.1388*(CPEM/DDBEM) + .3727*(TDBEM/DDBEM) - 2.7518*[(SCBC \\
&\quad + SCBBLRBI)/(DDBEM + TDBEM)] - .0326*WCRR + .1152*D9293 - .1582*D85.
\end{aligned}$$

Total Money Supply

$$M3 = M * RMEM.$$

$$RBNFEEM = (SRBNFEEM * FER) * [\exp(.1 * DITIME)].$$

Equilibrium in the Monetary Sector

$$ACMR = 4.6123 - .01234 * M3 + .011259 * M3D + .6541 * ACMR(-1) + 7.2509 * D9192.$$

Interest Rates

Treasury Bill Rate 91 Days

$$TBR = .8296 + .02966 * MGWP + .7663 * TBR(-1).$$

Commercial Banks' Deposit Rate for 1 to 3 Years

$$CBDR13 = .7798 - .0002537 * GDPMP + .1917 * WRGS + .073818 * CBMLRSCC \\ + .19503 * MGWP + 2698 * UTIDR - 1.0794 * D8494.$$

Commercial Banks' Minimum Lending Rates

$$CBMLRSCC = 4.883 - .006174 * (DDBEM + TDBEM) + .011157 * SCBGC + .6663 * PLRIDBI \\ + .2289 * BR + 1.7926 * D8081 - .9707 * D9193.$$

Lending Rate for Public Procurement of Food Grains

$$CRFP = 3.4398 + .00587 * IPFG + .7151 * CBDR13 - .1063 * MGWP + .2886 * CRFP(-1) \\ + 2.8423 * D92.$$

Prime Lending Rates of Industrial Development Bank of India

$$PLRIDBI = -.6193 + .2269 * CBMLRSCC - .00003565 * TSAI + .19804 * BR \\ + .6193 * PLRIDBI(-1) + 4.4623 * D92 + 1.3622 * D8191.$$

Prime Lending Rates of Industrial Finance Corporation of India

$$PLRIFCI = .03162 + .99615 * PLRIDBI + .76027 * D7576 + 1.5011 * D95 + [AR(1) = .8362].$$

Prime Lending Rates of Industrial Credit and Investment Corporation of India

$$PLRICICI = .2021 + .9826 * PLRIDBI + .8087 * D95.$$

Prime Lending Rates of State Finance Corporation of India

$$PLRSFC = 2.1224 + .17536 * PLRIDBI + .6687 * PLRSFC(-1).$$

Dividend Rate of Unit Trust of India

$$UTIDR = -1.1999 + .3084 * CBDR13 + .01366 * GWP + .9332 * UTIDR(-1) + 4.1141 * D92.$$

Redemption Yield of Govt. of India Securities—Short Term

$$RYGSST = -.1850 + .2994 * (GFD/GDPMP) * 100 + .8132 * RYGSST(-1) + 4.0738 * D8992 \\ - 3.0036 * D94.$$

Redemption Yield of Govt. of India Securities—Medium Term

$$RYGSMT = .03899 + .4411 * (GFD/GDPMP) * 100 + .3752 * MRYGSST + .09595 * MGWP \\ + .11481 * MRSUS.$$

Redemption Yield of Govt. of India Securities—Long Term

$$RYGSLT = -.2770 + .5728 * (GFD/GDPMP) * 100 + .4655 * MRYGSMT + .08255 * MGWP \\ + .0859 * MRSUS + 3.490 * D89.$$

Weighted Average Interest Rate on Market Borrowing by Govt. during the Year

$$WRGS = -.9333 + .6506 * [(RYGSST + RYGSMT + RYGSLT)/3] + .6537 * (GFD/GDPMP) * 100 \\ + .0791 * MGWP - 1.5079 * D899091.$$

Bank Credit

Food Credit (Public Procurement) of the Commercial Banks

$$SCBFCPP = -30.0008 + .5409 * IPFG - 1.6321 * CRFP + .8968 * SCBFCPP(-1) \\ - 33.0987 * D8889.$$

Nonfood Credit of the Commercial Banks

$$SCBCOFC = 9.6454 + .3125 * XMN + .6963 * (DDBEM + TDBEM) - 1.5468 * CBMLRSCC \\ - 1.2355 * SCBIGS - 73.0766 * D92.$$

Total Credit of Commercial Banks

$$SCBGC = SCBFCPP + SCBCOFC.$$

Sanctions by Industrial Development Bank of India

$$SIDBI = 17.5233 + .1189*XMN - 2.7154*PLRIDBI - 26.7452*D909I + 32.6634*D95.$$

Disbursements by Industrial Development Bank of India

$$DIDBI = .3449 + .6743*SIDBI - 19.6012*D95.$$

Sanctions by Industrial Finance Corporation of India

$$SIFCI = 10.2958 + .03988*XMN - 1.3753*PLRIFCI + 6.6595*D95.$$

Disbursements by Industrial Finance Corporation of India

$$DIFCI = .2820 + .5326*SIFCI + 3.3374*D9293.$$

Sanctions by Industrial Credit and Investment Corporation of India

$$SICICI = 8.2513 + .01162*XMN - .9291*PLRICICI + 1.2466*SICICI(-1) + 28.5426*D95.$$

Disbursements by Industrial Credit and Investment Corporation of India

$$DICICI = .3900 + .5297*SICICI - 8.5497*D95.$$

Sanctions by Other Financial Institutions

$$SOFI = 26.0077 + .1189*XMN - 3.6593*PLRSFC + .3995*SOFI(-1) - 31.1045*D909I + 41.1797*D93.$$

Disbursements by Other Financial Institutions

$$DOFI = -.3132 + .7226*SOFI - 22.1459*D95.$$

Total Sanctions by All Prime Lending Financial Institutions

$$TSAI = SIDBI + SIFCI + SICICI + SOFI.$$

Total Disbursements by All Prime Lending Financial Institutions

$$TDAI = DIDBI + DIFCI + DICICI + DOFI.$$

Investment in Government Securities

Commercial Banks' Investment in Govt. and Other Approved Securities

$$SCBI = -39.7104 + 1.3727*WSLR + 4.6036*WRGS - 2.0229*CBMLRSCC + 1.1298*SCBI(-1) + 101.4227*D95 - 41.3003*D87.$$

Banks' Investment in Govt. Securities

$$SCBIGS = 2.1990 + .8020*SCBI + 137.1667*D9495.$$

Cash Reserves

Cash with the Commercial Banks

$$SCBC = -3.974124 + .917874*WCRR + .01669*DDBEM - .2909501*ACMR + .624735*BR - 2.084459*D7494.$$

Commercial Banks' Cash Balance with Reserve Bank

$$SCBBLRBI = 331.1418 + 14.3044*WCRR + 108.0347*MBR - 299.3367*MTBR + 138.4045*D95 - 91.7489*D848593.$$

Commercial Banks' Cash in Hand and Balance with Reserve Bank

$$SCBCBLRB = SCBC + SCBBLRBI.$$

Exchange Rate (Rupee per Unit of U.S. dollar)

$$RSUS = 5.2903 + .3654*[(GFD/GDPMP)*100] - .0122*FER(-1) + .0229*GWP + .9701*RSUS(-1) + 6.2526*DREFORM.$$

(Or)

$$RSUS = 6.1486 - .4822*[(CABRBI/GDPMP)*100] - .0126*FER(-1) + .0085*GWP + 1.0207*RSUS(-1) + 5.9205*DREFORM.$$

Definitional Identities

$$MTBR = [TBR(-2) + TBR(-1) + TBR]/3.$$

$$MBR = [BR(-2) + BR(-1) + BR]/3.$$

$$MCBDR13 = [CBDR13(-2) + CBDR13(-1) + CBDR13]/3.$$

$$MRYGSMT = [RYGSMT(-2) + RYGSMT(-1) + RYGSMT]/3.$$

$$MRYGSST = [RYGSST(-2) + RYGSST(-1) + RYGSST]/3.$$

$$MWRGS = [WRGS(-2) + WRGS(-1) + WRGS]/3.$$

$$MRSUS = [RSUS + RSUS(-1) + RSUS(-2)]/3.$$

$$GWP = \{ [WP/WP(-1)] - 1 \} * 100.$$

$$MGWP = [GWP + GWP(-1) + GWP(-2) + GWP(-3) + GWP(-4)]/5.$$

List of Variables and Their Description

Notes:

1. Each data series is annual but covers a different twelve months period.
2. CY refers to calendar year—January 1 through December 31; for instance, CY 1970 refers to 1970.
3. FY refers to financial year—April 1 through March 31; for instance, FY 1970/71 refers to 1971.
4. AY refers to agricultural year—July 1 through June 30; for instance, AY 1970/71 refers to 1971.
5. The data series refer to FY (fiscal or financial year), unless otherwise stated.
6. * denotes exogenous dummy variables.
7. Prefix “Z” refers to series at constant prices, i.e., at 1980/81 prices; no prefix “Z” refers to nominal/current.
8. All value series are in rupees billion, unless otherwise stated; series in U.S. dollars are in billion indicated by suffix “\$” wherever necessary.
9. Price indices are with base 1980/81 = 100, unless otherwise stated.
10. NAS refers to National Accounts Statistics publications (for sources of data).
11. RBI refers to Reserve Bank of India publications.
12. IMF refers to International Monetary Fund publications.
13. UN refers to United Nations publications.
14. DGCI&S refers to Directorate General of Commercial Intelligence and Statistics.
15. ES refers to Economic Survey, Government of India.
16. Dummy variables are listed with prefix “D” with year(s). For example, *D9295* refers to a dummy variable equal to 1 for 1991/92 and 1994/95, 0 for all other years.

<i>ACMR</i>	: Average call money rates (RBI).
<i>AR(1)</i>	: Auto regressive term estimated by the Cochran-Orcutt method.
<i>AZPDIP</i>	: Average of real per capita personal disposable income.
<i>BR*</i>	: Bank rate (RBI).
<i>CABNAS</i>	: Current account balance (NAS).
<i>CABRBI</i>	: Current account balance (RBI).
<i>CBDR13</i>	: Commercial banks’ deposit rate for one to three years (RBI).
<i>CBMLRSCC</i>	: Commercial banks’ minimum lending rate (RBI).
<i>CMERT</i>	: Credits merchandise exports—Total (BOP-RBI).
<i>CPEM</i>	: Currency held by the public—End March (RBI).
<i>CPI</i>	: Index of consumer prices—All India (Base: 1982 = 100; CY) (ES, RBI).
<i>CRFP</i>	: Ceiling rate on food procurement credit.
<i>D73*</i>	: Dummy variable equal to 1 for 1972/73, 0 for all other years.
<i>D74*</i>	: Dummy variable equal to 1 for 1973/74, 0 for all other years.
<i>D7475*</i>	: Dummy variable equal to 1 for 1973/74 and 1974/75, 0 for all other years.
<i>D75*</i>	: Dummy variable equal to 1 for 1974/75, 0 for all other years.

- D756795** : Dummy variable equal to 1 for 1974/75, 1975/76, 1976/77, and 1994/95, 0 for all other years.
- D7576** : Dummy variable equal to 1 for 1974/75 and 1975/76, 0 for all other years.
- D7577** : Dummy variable equal to 1 for 1974/75 to 1976/77, 0 for all other years.
- D758087** : Dummy variable equal to 1 for 1974/75, 1979/80, and 1986/87, 0 for all other years.
- D7790345** : Dummy variable equal to 1 for 1976/77, 1989/90, 1992/93, 1993/94, and 1994/95, 0 for all other years.
- D78** : Dummy variable equal to 1 for 1977/78, 0 for all other years.
- D789093** : Dummy variable equal to 1 for 1977/78, 1989/90, and 1992/93, 0 for all other years.
- D8083** : Dummy variable equal to 1 for 1979/80 to 1982/83, 0 for all other years.
- D809095** : Dummy variable equal to 1 for 1979/80, 1989/90, and 1994/95, 0 for all other years.
- D8184** : Dummy variable equal to 1 for 1980/81 to 1983/84, 0 for all other years.
- D8195** : Dummy variable equal to 1 for 1980/81 and 1994/95, 0 for all other years.
- D8284** : Dummy variable equal to 1 for 1981/82 and 1983/84, 0 for all other years.
- D829092** : Dummy variable equal to 1 for 1981/82, 1989/90, and 1991/92, 0 for all other years.
- D83** : Dummy variable equal to 1 for 1982/83, 0 for all other years.
- D838495** : Dummy variable equal to 1 for 1982/83, 1983/84, and 1994/95, 0 for all other years.
- D839192** : Dummy variable equal to 1 for 1982/83, 1990/91, and 1991/92, 0 for all other years.
- D8393** : Dummy variable equal to 1 for 1982/83 and 1992/93, 0 for all other years.
- D84** : Dummy variable equal to 1 for 1983/84, 0 for all other years.
- D849495** : Dummy variable equal to 1 for 1983/84, 1993/94, and 1994/95, 0 for all other years.
- D86** : Dummy variable equal to 1 for 1985/86, 0 for all other years.
- D8687** : Dummy variable equal to 1 for 1985/86 and 1986/87, 0 for all other years.
- D8690** : Dummy variable equal to 1 for 1985/86 and 1989/90, 0 for all other years.
- D8692** : Dummy variable equal to 1 for 1985/86 and 1991/92, 0 for all other years.
- D87** : Dummy variable equal to 1 for 1986/87, 0 for all other years.
- D879091** : Dummy variable equal to 1 for 1986/87, 1989/90, and 1990/91, 0 for all other years.
- D8791** : Dummy variable equal to 1 for 1986/87 to 1990/91, 0 for all other years.
- D879194** : Dummy variable equal to 1 for 1986/87, 1990/91, and 1993/94, 0 for all other years.
- D88** : Dummy variable equal to 1 for 1987/88, 0 for all other years.
- D8889** : Dummy variable equal to 1 for 1987/88 and 1988/89, 0 for all other years.
- D8895** : Dummy variable equal to 1 for 1987/88 and 1994/95, 0 for all other years.
- D89** : Dummy variable equal to 1 for 1988/89, 0 for all other years.
- D899091** : Dummy variable equal to 1 for 1988/89, 1989/90, and 1990/91, 0 for all other years.
- D899193** : Dummy variable equal to 1 for 1988/89, 1990/91, and 1992/93, 0 for all other years.
- D8995** : Dummy variable equal to 1 for 1988/89 and 1994/95, 0 for all other years.
- D90** : Dummy variable equal to 1 for 1989/90, 0 for all other years.
- D9091** : Dummy variable equal to 1 for 1989/90 and 1990/91, 0 for all other years.
- D9093** : Dummy variable equal to 1 for 1989/90 and 1992/93, 0 for all other years.
- D91** : Dummy variable equal to 1 for 1990/91, 0 for all other years.
- D9192** : Dummy variable equal to 1 for 1990/91 and 1991/92, 0 for all other years.
- D92** : Dummy variable equal to 1 for 1991/92, 0 for all other years.
- D9293** : Dummy variable equal to 1 for 1991/92 and 1992/93, 0 for all other years.
- D9295** : Dummy variable equal to 1 for 1991/92 and 1994/95, 0 for all other years.
- D93** : Dummy variable equal to 1 for 1992/93, 0 for all other years.
- D94** : Dummy variable equal to 1 for 1993/94, 0 for all other years.
- D9495** : Dummy variable equal to 1 for 1993/94 and 1994/95, 0 for all other years.
- D95** : Dummy variable equal to 1 for 1994/95, 0 for all other years.

<i>DDBEM</i>	: Demand deposits with banks—End March (RBI).
<i>DICICI</i>	: Disbursements by Industrial Credit and Investment Corporation of India (RBI).
<i>DIDBI</i>	: Disbursements by Industrial Development Bank of India (RBI).
<i>DIFCI</i>	: Disbursements by Industrial Finance Corporation of India (RBI).
<i>DINVT</i>	: Debits invisible—Total (BOP-RBI).
<i>DIUVFU*</i>	: Unit value indices of imports of fuel of developed economies in U.S. dollars (Base: 1980 = 100; CY; UN).
<i>DMERT</i>	: Debits merchandise imports—Total (BOP-RBI).
<i>DPCR*</i>	: Domestic production of crude in Million Tons (ES).
<i>DREFORM*</i>	: Dummy variable equal to 1 for the years 1991/92 to 1994/95, 0 for all other years.
<i>DTIME</i>	: Adjustment time trend variable for post sample period, 0 for sample period.
<i>DUMRAC*</i>	: Discrete scale variable (dummy) for rainfall index of all crops; 0: normal; 1: above normal; -1: below normal (AY)
<i>DUMRFG*</i>	: Discrete scale variable (dummy) for rainfall index of foodgrains; 0: normal; 1: above normal; -1: below normal (AY)
<i>DUMRNF*</i>	: Discrete scale variable (dummy) for rainfall index of non-foodgrains; 0: normal; 1: above normal; -1: below normal (AY)
<i>EM</i>	: Errors and omissions in <i>GDPMP</i> identity (NAS).
<i>EM2*</i>	: Errors and omissions in nominal gross investment (NAS).
<i>EX01</i>	: Nominal exports of food and live animals plus beverages and tobacco; SITC 0 and 1 (DGCI&S).
<i>EX09</i>	: Total nominal exports; SITC 0 to 9 (DGCI&S).
<i>EX24</i>	: Nominal exports of crude materials, and animal and vegetable oils, fats, and waxes; SITC 2 and 4 (DGCI&S).
<i>EX3</i>	: Nominal exports of mineral fuels, lubricants, and related materials; SITC 3 (DGCI&S).
<i>EX59</i>	: Nominal exports of chemical products, manufactured goods, machinery and transport equipment, etc. (DGCI&S).
<i>EXNAS</i>	: Exports—Merchandise (NAS).
<i>EXRBI</i>	: Exports—Merchandise (RBI).
<i>EXRINAS</i>	: Export receipts: Invisible (NAS).
<i>EXRMNAS</i>	: Export receipts: Merchandise (NAS).
<i>EXUV01</i>	: Index of export unit values; SITC 0 and 1 (DGCI&S).
<i>EXUV09</i>	: Implicit price index of export unit values; SITC 0 to 9 (DGCI&S).
<i>EXUV09A</i>	: Price deflator for exports (DGCI&S).
<i>EXUV24</i>	: Index of export unit values; SITC 2 and 4 (DGCI&S).
<i>EXUV3</i>	: Index of export unit values; SITC 3 (DGCI&S).
<i>EXUV59</i>	: Implicit price deflator for SITC 5 to 9 (DGCI&S).
<i>EXUVW</i>	: Index of world export unit values of all commodities in U.S. dollars (Base: 1985 = 100; CY; IMF).
<i>FER*</i>	: Foreign exchange reserves—End March (RBI).
<i>GCLPEM</i>	: Government's currency liabilities to the public—End March (RBI).
<i>GDP</i>	: Gross domestic product at factor cost (NAS).
<i>GDPMP</i>	: Gross domestic product at market prices (NAS).
<i>GDS</i>	: Gross domestic savings—Total (NAS).
<i>GDSH</i>	: Gross domestic savings—Household sector (NAS).
<i>GFCE</i>	: Government final consumption expenditure (NAS).
<i>GFD*</i>	: Gross fiscal deficit of the central government (CF).

<i>GFIPR</i>	: Gross fixed private investment—Total of using sectors (NAS).
<i>GFIPU*</i>	: Gross fixed public investment—Total of using sectors (NAS).
<i>GFIT</i>	: Gross fixed investment Total—Using sectors (NAS).
<i>GIA</i>	: Gross investment adjusted for errors and omissions (NAS).
<i>GIAD*</i>	: Gross investment in public administration and defense (NAS).
<i>GIAGPR</i>	: Gross investment in agriculture, forestry, and fishing—Private (NAS).
<i>GIAGPU*</i>	: Gross investment in agriculture, forestry, and fishing—Public (NAS).
<i>GIINPR</i>	: Gross investment in infrastructure—Private (NAS).
<i>GIINPU*</i>	: Gross investment in infrastructure—Public (NAS).
<i>GIMNPR</i>	: Gross investment in manufacturing—Private (NAS).
<i>GIMNPU*</i>	: Gross investment in manufacturing—Public (NAS).
<i>GISRPR</i>	: Gross investment in services—Private (NAS).
<i>GISRPU*</i>	: Gross investment in services—Public (NAS).
<i>GIT</i>	: Gross investment—Total of using sectors (NAS).
<i>GITPR</i>	: Gross investment private—Total of using sectors (NAS).
<i>GITPU*</i>	: Gross investment public—Total of using sectors (NAS).
<i>GNPMP</i>	: Gross national product at market prices (NAS).
<i>GNS</i>	: Gross national savings (NAS).
<i>GWP</i>	: Rate of change of wholesale prices in per cent .
<i>IAAC</i>	: Index numbers of area under all crops—Total (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
<i>IAFG</i>	: Index numbers of area under foodgrains—Total (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
<i>IANF</i>	: Index numbers of area under non-foodgrains—Total (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
<i>IDLSUB</i>	: Indirect taxes less subsidies (NAS).
<i>IAD*</i>	: Inventory investment in public administration and defense (NAS).
<i>IAG*</i>	: Inventory investment in agriculture, forestry, and fishing (NAS).
<i>IAGPU</i>	: Inventory investment in agriculture, forestry, and fishing—Public (NAS).
<i>IINPU*</i>	: Inventory investment in infrastructure—Public (NAS).
<i>IIMNPU*</i>	: Inventory investment in manufacturing—Public (NAS).
<i>IIPR</i>	: Inventory investment; Total of using sectors—Private (NAS).
<i>IIPU*</i>	: Inventory investment; Total of using sectors—Public (NAS).
<i>IISRPU*</i>	: Inventory investment in services—Public (NAS).
<i>IIT</i>	: Inventory investment—Total of using sectors (NAS).
<i>IM01</i>	: Imports of food and live animals plus beverages and tobacco; SITC 0 and 1 (DGCI&S).
<i>IM09</i>	: Total imports SITC 0 to 9 (DGCI&S).
<i>IMPINAS</i>	: Import payments—Invisible (NAS).
<i>IM2</i>	: Imports of crude materials (DGCI&S).
<i>IM24</i>	: Imports of crude materials, inedible, except fuels; SITC 2 and 4 (DGCI&S).
<i>IM3</i>	: Imports of mineral fuels, lubricants, and related materials; SITC 3 (DGCI&S).
<i>IM4</i>	: Imports of animal and vegetable oils (DGCI&S).
<i>IM59</i>	: Total imports of SITC 5 to 9 (DGCI&S).
<i>IMPMNAS</i>	: Import payments—Total (BOP-NAS).
<i>IMUV01</i>	: Index of unit value of import of food and live animals chiefly for food plus beverages and tobacco; SITC 0 and 1 (DGCI&S).
<i>IMUV09</i>	: Index of unit value of imports (implicit); SITC 0 to 9 (DGCI&S).

- IMUV09\$* : Index of unit value of imports in U.S. dollars; SITC 0 to 9 (DGCI&S, RBI).
IMUV09A : Index of unit value of imports; SITC 0 to 9 (DGCI&S).
IMUV2 : Index of unit value of import of crude materials, inedible, except fuels; SITC 2 (DGCI&S).
IMUV3 : Index of unit value of import of mineral fuels, lubricants, and related materials; SITC 3 (DGCI&S).
IMUV4 : Index of unit value of import of animal and vegetable oils, fats, and waxes; SITC 4 (DGCI&S).
IMUV59 : Index of unit value of import of chemicals products, manufactured goods, machinery, and transport equipment, etc.; SITC 5 to 9 (DGCI&S).
IMUV7 : Index of unit value of import of machinery and transport equipment; SITC 7 (DGCI&S).
INXRSUS : Index of exchange rate—Rupees per U.S. dollar (Base: 1980/81 = 100) (RBI).
IPAC : Index of production of all crops—Total (Base: Triennium ending; AY) (RBI, ES).
IPFG : Index of production of foodgrains—Total (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
IPKLM : Index of production capital stock of manufacturing (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
IPMN : Index of production of manufacturing (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
IPNF : Index of production of non-foodgrains—Total (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
IPOS : Index of production of oilseeds (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
IPPRW : Index of procurement prices of rice and wheat (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
IYFG : Index numbers of yield of foodgrains—Total (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
IYNF : Index numbers of yield of non-foodgrains—Total (Base: 1981/82 = 100; Triennium ending; AY) (RBI, ES).
*K1EXNAS** : *EXRMNAS/EX09*.
*K2EXRBI** : *CMERT/EX09*.
*K3IMNAS** : *IMPMNAS/IM09*.
*K4IMRBI** : *DMERT/IM09*.
LGFCF : Natural logarithm of *GFCE*.
LIDLSUB : Natural logarithm of *IDLSUB*.
LIPKMN : Natural logarithm of *IPMN/ZNFKMN(-1)*.
LPXAG : Natural logarithm of *PXAG*, i.e., implicit price deflator for GDP originating from agriculture, forestry, and fishing.
LPXMN : Natural logarithm of *PXAG*, i.e., implicit price deflator for GDP originating from manufacturing.
LRP123 : Relative prices of foodgrains and non-foodgrains in natural logarithm, i.e., $\log[WPF(-3) + WPF(-2) + WPF(-1)] - \log[WPNF(-3) + WPNF(-2) + WPNF(-1)]$.
LWPF : Wholesale price index of foodgrains in natural logarithm.
LZXKIN : Natural logarithm of *ZXIN/ZNFKIN(-1)*.
LZXKSR : Natural logarithm of *ZXSR/ZNFKSR(-1)*.
LZXPAD : Natural logarithm of *ZXMN*, i.e., real GDP originating from manufacturing.

<i>LZXMN</i>	: Natural logarithm of <i>ZXAD/POP</i> .
<i>M</i>	: Money multiplier (RBI).
<i>M3</i>	: Money stock—End March (RBI).
<i>MGWP</i>	: Expected inflation rate, i.e., [<i>GWP</i> + <i>GWP</i> (-1) + <i>GWP</i> (-2) + <i>GWP</i> (-3) + <i>GWP</i> (-4)]/5.
<i>NFCF</i>	: Net credit flow—Scheduled commercial banks (RBI).
<i>NINVTNAS</i>	: Net invisible (BOP-NAS).
<i>NINVTRBI</i>	: Net invisible (BOP-RBI).
<i>ODEM</i>	: Other deposits with RBI—End March (RBI).
<i>PC</i>	: Total private consumption expenditure in market (NAS).
<i>PDI</i>	: Personal disposable income (NAS).
<i>PDIP</i>	: Personal disposable income—Per capita in Rs. (NAS).
<i>PFI</i>	: Implicit price deflator for total fixed investment—Using sectors.
<i>PGDP</i>	: Implicit price deflator for GDP at factor cost (NAS).
<i>PGDPMPI</i>	: Implicit price deflator for GDP at market prices (NAS).
<i>PGFCE</i>	: Implicit price deflator for government final consumption expenditure (NAS).
<i>PI</i>	: Implicit price deflator for gross investment—Total of using sectors (NAS).
<i>PIA</i>	: Implicit price deflator for gross investment adjusted—Total (NAS).
<i>PIAD</i>	: Implicit price deflator for gross investment in public administration and defense (NAS).
<i>PIAG</i>	: Implicit price deflator for gross investment in agriculture, forestry, and fishing—Total (NAS).
<i>PIAGPR</i>	: Implicit price deflator for gross investment in agriculture, forestry, and fishing—Private (NAS).
<i>PIAGPU</i>	: Implicit price deflator for gross investment in agriculture, forestry, and fishing—Public (NAS).
<i>PII</i>	: Implicit price deflator for inventory investment—Total of using sectors (NAS).
<i>PIIAD</i>	: Implicit price deflator for inventory investment in public administration and defense (NAS).
<i>PIIAG</i>	: Implicit price deflator for inventory investment in agriculture, forestry, and fishing (NAS).
<i>PIIIN</i>	: Implicit price deflator for inventory investment in infrastructure (NAS).
<i>PIIMN</i>	: Implicit price deflator for inventory investment in manufacturing (NAS).
<i>PIIN</i>	: Implicit price deflator for gross investment in infrastructure—Total (NAS).
<i>PIINPR</i>	: Implicit price deflator for gross investment in infrastructure—Private (NAS).
<i>PIINPU</i>	: Implicit price deflator for gross investment in infrastructure—Public (NAS).
<i>PIISR</i>	: Implicit price deflator for inventory investment in services (NAS).
<i>PIMN</i>	: Implicit price deflator for gross investment in manufacturing (NAS).
<i>PIMNPR</i>	: Implicit price deflator for gross investment in manufacturing—Private (NAS).
<i>PIMNPU</i>	: Implicit price deflator for gross investment in manufacturing—Public (NAS).
<i>PISR</i>	: Implicit price deflator for gross investment in services (NAS).
<i>PISRPR</i>	: Implicit price deflator for gross investment in services—Private (NAS).
<i>PISRPU</i>	: Implicit price deflator for gross investment in services—Public (NAS).
<i>PLRICICI</i>	: Prime lending rates of Industrial Credit and Investment Corporation of India (RBI).
<i>PLRIDBI</i>	: Prime lending rates of Industrial Development Bank of India (RBI).
<i>PLRIFCI</i>	: Prime lending rates of Industrial Finance Corporation of India (RBI).
<i>PLRSFC</i>	: Prime lending rate of State Financial Corporations of India (RBI).
<i>POP*</i>	: Population in billion (NAS).

<i>PPC</i>	: Implicit price deflator for private final total consumption expenditure in market (NAS).
<i>PXAD</i>	: Implicit price deflator for GDP—Factor cost in public administration and defense (NAS).
<i>PXAG</i>	: Implicit price deflator for GDP—Agriculture, forestry, and fishing (factor cost) (NAS).
<i>PXIN</i>	: Implicit price deflator for GDP—Infrastructure (factor cost) (NAS).
<i>PXMN</i>	: Implicit price deflator for GDP—Manufacturing (factor cost) (NAS).
<i>PXSR</i>	: Implicit price deflator for GDP—Services (factor cost) (NAS).
<i>RBCOBEM</i>	: Reserve Banks' claims on commercial and cooperative banks (including NABARD) (RBI).
<i>RBCCEM</i>	: Reserve Bank's claims on the commercial sector—End March (RBI).
<i>RBNCGEM</i>	: Reserve Bank's net credit to the government—End March (RBI).
<i>RBNFEEM</i>	: Reserve Bank net foreign exchange assets—End March (RBI).
<i>RBNMLEM</i>	: Net nonmonetary liabilities of RBI—End March (RBI).
<i>RGDS</i>	: Ratio of gross domestic savings to <i>GDPMP</i> in per cent.
<i>RGFD*</i>	: Ratio of gross fiscal deficit to <i>GDPMP</i> in per cent.
<i>RMEM</i>	: Reserve money stock—End March (RBI).
<i>RSUS</i>	: Exchange rate of the rupee against U.S. dollar (RBI).
<i>RYGSLT</i>	: Redemption yield of Government of India securities—Long term (RBI).
<i>RYGSMT</i>	: Redemption yield of Government of India securities—Medium term (RBI).
<i>RYGSST</i>	: Redemption yield of Government of India securities—Short term (RBI).
<i>SCBBLRBI</i>	: Scheduled commercial bank's cash balance with Reserve Bank (RBI).
<i>SCBC</i>	: Cash in hand (RBI).
<i>SCBCBLRBI</i>	: Cash in hand and balances with Reserve Bank (RBI).
<i>SCBCOFC</i>	: Scheduled commercial banks' credit—Other than food credit (RBI).
<i>SCBFCPP</i>	: Scheduled commercial banks' food credit—Public procurement (RBI).
<i>SCBGC</i>	: Gross bank credit (RBI).
<i>SCBI</i>	: Investments in government and other approved securities (RBI).
<i>SCBIGS</i>	: Scheduled commercial banks' investment in government securities (RBI).
<i>SEM2*</i>	: Ratio of <i>EM2</i> to <i>GDPMP</i> in per cent.
<i>SICICI</i>	: Sanctions by Industrial Credit and Investment Corporation of India Limited (RBI).
<i>SIDBI</i>	: Sanctions by Industrial Development Bank of India (RBI).
<i>SIFCI</i>	: Sanctions by Industrial Finance Corporation of India (RBI).
<i>SOFI</i>	: Sanctions by other financial institutions (RBI).
<i>TBDGICS</i>	: Trade balance (DGCI&S).
<i>TBNAS</i>	: Trade balance (NAS).
<i>TBR</i>	: Treasury bill rate 91 days (RBI).
<i>TBRBI</i>	: Trade balance (BOP-RBI).
<i>TC</i>	: Total consumption of private and public (NAS).
<i>TDAl</i>	: Total disbursements by all term—Lending institutions (RBI).
<i>TDBEM</i>	: Time deposits with banks—End March (RBI).
<i>TIME*</i>	: Time trend.
<i>TIMEDUM*</i>	: Dummy variable equal to 1 for 1984/85 to 1994/95, 0 for all other years.
<i>TSAl</i>	: Total sanctions by all institutions (RBI).
<i>UTIDR</i>	: Dividend rate of Unit Trust of India (RBI).
<i>WCRR*</i>	: Weighted average of cash reserve ratio (RBI).
<i>WEUVF*</i>	: Unit value indices of exports of food of world in U.S. dollars (Base: 1980 = 100 and 1990 = 100; CY; UN).

- WEUVMF** : Unit value indices of exports of manufactured goods of world in U.S. dollars (Base: 1980 = 100; CY; UN) .
- WEUVP** : Unit value indices of exports of primary commodities of world in U.S. dollars (Base: 1980 = 100; CY; UN).
- WP* : Wholesale price index of all commodities (Base: 1991/92 = 100) (RBI, ES).
- WPADMN* : Wholesale price index of minerals, fuel, power, light, and lubricants (Base: 1991/92 = 100) (RBI, ES).
- WPAG* : Wholesale price index of agricultural commodities (Base: 1991/92 = 100) (RBI, ES).
- WPF* : Wholesale price index of food articles (Base: 1991/92 = 100) (RBI, ES).
- WPFG* : Wholesale price index of foodgrains (Base: 1991/92 = 100) (RBI, ES).
- WPMN* : Wholesale price index of manufactured products (Base: 1991/92 = 100) (RBI, ES).
- WPNF* : Wholesale price index of agricultural articles (Base: 1991/92 = 100) (RBI).
- WRGS* : Weighted average interest rates on market borrowings—Government of India securities (RBI).
- WSLR** : Weighted average of statutory liquidity ratio (RBI).
- XAD* : Nominal GDP in public administration and defense (NAS).
- XAG* : Nominal GDP in agriculture (NAS).
- XAGGDP* : Share of GDP in agriculture and allied activities to GDP in per cent (NAS).
- XIN* : Nominal GDP in infrastructure (NAS).
- XMN* : Nominal GDP in manufacturing (NAS).
- XNA* : Nominal GDP in nonagriculture (NAS).
- XNAGDP* : Share of nonagriculture GDP to overall GDP in per cent (NAS).
- XSR* : Nominal GDP in services (NAS).
- ZDPAD* : Depreciation in public administration and defense—Real (NAS).
- ZDPAG* : Depreciation in agriculture, forestry, and fishing—Real (NAS).
- ZDPIN* : Depreciation in infrastructure—Real (NAS).
- ZDPMN* : Depreciation in manufacturing—Real (NAS).
- ZDPSR* : Depreciation in services—Real (NAS).
- ZEM2** : Errors and omissions in gross real investment—Total of industry of use (NAS).
- ZEPUB* : Government final consumption expenditure plus government public sector investment—Real (NAS).
- ZEX01* : Real exports of food and live animals plus beverages and tobacco; SITC 0 and 1 (DGCI&S).
- ZEX09* : Total real exports; SITC 0 to 9 (DGCI&S).
- ZEX24* : Real exports of crude materials, inedible except fuels and animal and vegetable oils, fats, and waxes; SITC 2 and 4 (DGCI&S).
- ZEX3** : Real exports of mineral fuels, lubricants, and related materials; SITC 3 (DGCI&S).
- ZEX59* : Real exports of chemical products, manufactured goods, machinery and transport equipment, miscellaneous manufactured articles plus commodities and transactions; SITC 5 to 9 (DGCI&S).
- ZGDP* : Real gross domestic product at factor cost (NAS).
- ZGDPMP* : Real gross domestic product at market prices (NAS).
- ZGDPW* : World real gross domestic product.
- ZGFCE* : Real government final consumption expenditure (NAS).
- ZGFIAD* : Real gross fixed investment in public administration and defense (NAS).
- ZGFIAG* : Real gross fixed investment in agriculture, forestry, and fishing—Total (NAS).
- ZGFIAGPR* : Real gross fixed investment in agriculture, forestry, and fishing—Private (NAS).

<i>ZGFIAGPU</i>	: Real gross fixed investment in agriculture, forestry, and fishing—Public (NAS).
<i>ZGFIIN</i>	: Real gross fixed inventory investment in infrastructure—Total (NAS).
<i>ZGFIINPR</i>	: Real gross fixed investment in infrastructure—Private (NAS) .
<i>ZGFIINPU</i>	: Real gross fixed investment in infrastructure—Public (NAS).
<i>ZGFIMN</i>	: Real gross fixed investment in manufacturing—Total (NAS).
<i>ZGFIMNPR</i>	: Real gross fixed investment in manufacturing—Private (NAS).
<i>ZGFIMNPU</i>	: Real gross fixed investment in manufacturing—Public (NAS).
<i>ZGFIPR</i>	: Real gross fixed investment private—Total (NAS).
<i>ZGFIPU</i>	: Real gross fixed investment (public)—Total of using sectors (NAS).
<i>ZGFISR</i>	: Real gross fixed investment in services—Total (NAS).
<i>ZGFISRPR</i>	: Real gross fixed investment in services—Private (NAS).
<i>ZGFISRPU</i>	: Real gross fixed investment in services—Public (NAS).
<i>ZGFIT</i>	: Real gross fixed investment total of all using sectors (NAS).
<i>ZGIA</i>	: Real gross investment adjusted for errors and omissions (NAS).
<i>ZGIAD</i>	: Real gross investment in public administration and defense (NAS).
<i>ZGIAG</i>	: Real gross investment in agriculture—Total (NAS).
<i>ZGIAGPR</i>	: Real gross investment (private) in agriculture, forestry, and fishing (NAS).
<i>ZGIAGPU</i>	: Real gross investment (public) in agriculture, forestry, and fishing (NAS).
<i>ZGHIINPR</i>	: Real gross inventory investment in infrastructure—Private (NAS).
<i>ZGHIINPU</i>	: Real gross inventory investment in infrastructure—Public (NAS).
<i>ZGHIIN</i>	: Real gross inventory investment in infrastructure—Total (NAS).
<i>ZGHIINPR</i>	: Real gross investment in infrastructure—Private (NAS); Adjusted.
<i>ZGHIINPRA</i>	: Real gross investment in infrastructure—Private (NAS); Unadjusted.
<i>ZGHIINPU</i>	: Real gross investment in infrastructure—Public (NAS).
<i>ZGHIIPR</i>	: Real gross inventory investment—Private (NAS).
<i>ZGIMN</i>	: Real gross investment in manufacturing—Total (NAS).
<i>ZGIMNPR</i>	: Real gross investment in manufacturing—Private (NAS); Adjusted.
<i>ZGIMNPRA</i>	: Real gross investment in manufacturing—Private (NAS); Unadjusted.
<i>ZGIMNPU</i>	: Real gross investment in manufacturing—Public (NAS).
<i>ZGISR</i>	: Real gross investment in services—Total (NAS).
<i>ZGISRPR</i>	: Real gross investment in services—Private (NAS).
<i>ZGISRPU</i>	: Real gross investment in services—Public (NAS).
<i>ZGIT</i>	: Real gross investment total of all using sectors (NAS).
<i>ZGITPR</i>	: Real gross investment (private)—Total of using sectors (NAS).
<i>ZGITPU</i>	: Real gross investment (public)—Total of using sectors (NAS).
<i>ZGNPMP</i>	: Real gross national product at market prices (NAS).
<i>ZIDLSUB</i>	: Real indirect taxes less subsidies (NAS).
<i>ZII</i>	: Real inventory investment—Total of using sectors (NAS).
<i>ZIIAD</i>	: Real inventory investment in public administration and defense (NAS).
<i>ZIIAGPR</i>	: Real inventory investment in agriculture, forestry, and fishing—Private (NAS).
<i>ZIIAG</i>	: Real inventory investment in agriculture, forestry, and fishing—Total (NAS).
<i>ZIIAGPU</i>	: Real inventory investment in agriculture, forestry, and fishing—Public (NAS).
<i>ZIIIN</i>	: Real inventory investment in infrastructure—Total (NAS).
<i>ZIIINPR</i>	: Real inventory investment in infrastructure—Private (NAS).
<i>ZIIINPU</i>	: Real inventory investment in infrastructure—Public (NAS).
<i>ZIIMN</i>	: Real inventory investment in manufacturing—Total (NAS).
<i>ZIIMNPR</i>	: Real inventory investment in manufacturing—Private (NAS).
<i>ZIIMNPU</i>	: Real inventory investment in manufacturing—Public (NAS).

<i>ZIIPR</i>	: Real inventory investment; total of using sectors—Private (NAS).
<i>ZIIPU</i>	: Real inventory investment; total of using sectors—Public (NAS).
<i>ZIISR</i>	: Real inventory investment in services (NAS).
<i>ZIISRPR</i>	: Real inventory investment in services—Private (NAS).
<i>ZIISRPU</i>	: Real inventory investment in services—Public (NAS).
<i>ZIIT</i>	: Real inventory investment—Total of using sectors (NAS).
<i>ZIM01</i>	: Real imports of food and live animals plus beverages and tobacco; SITC 0 and 1 (DGCI&S).
<i>ZIM09</i>	: Total real imports; SITC 0 to 9 (DGCI&S).
<i>ZIM2</i>	: Real imports of crude materials, inedible, except fuels; SITC 2 (DGCI&S).
<i>ZIM3</i>	: Real imports of mineral fuels, lubricants, and related materials; SITC 3 (DGCI&S).
<i>ZIM4</i>	: Real imports of animal and vegetable oils, fats, and waxes; SITC 4 (DGCI&S).
<i>ZIM5</i>	: Real imports of chemicals and related products; SITC 5 (DGCI&S).
<i>ZIM59</i>	: Real imports of chemical products, manufactured goods, machinery, and transport equipment, etc.; SITC 5 to 9 (DGCI&S).
<i>ZISAGPR</i>	: Real inventory stock in agriculture, forestry, and fishing—Private (NAS).
<i>ZISAGPU</i>	: Real inventory stock in agriculture, forestry, and fishing—Public (NAS).
<i>ZISINPR</i>	: Real inventory stock in infrastructure—Private (NAS).
<i>ZISINPU</i>	: Real inventory stock in infrastructure—Public (NAS).
<i>ZISMN</i>	: Real inventory stock in manufacturing—Total (NAS).
<i>ZISSRPR</i>	: Real inventory stock in services—Private (NAS).
<i>ZISSRPU</i>	: Real inventory stock in services—Public (NAS).
<i>ZNFKAD</i>	: Real net fixed capital stock in public administration and defense (NAS).
<i>ZNFKAG</i>	: Real net fixed capital stock in agriculture, forestry, and fishing (NAS).
<i>ZNFKIN</i>	: Real net fixed capital stock in infrastructure (NAS).
<i>ZNFKMN</i>	: Real net fixed capital stock in manufacturing (NAS).
<i>ZNFKSR</i>	: Real net fixed capital stock in services (NAS).
<i>ZNINVTNAS</i>	: Real net invisible (BOP-NAS).
<i>ZPC</i>	: Real total private consumption expenditure in domestic market (NAS).
<i>ZPCP</i>	: Real per capita private total final consumption expenditure in domestic market in rupees (NAS).
<i>ZPDI</i>	: Real personal disposable income (NAS).
<i>ZPDIP</i>	: Real per capita personal disposable income in rupees (NAS).
<i>ZXAD</i>	: Real GDP at factor cost in public administration and defense (NAS).
<i>ZXAG</i>	: Real GDP at factor cost in agriculture, forestry, and fishing (NAS).
<i>ZXIN</i>	: Real GDP at factor cost in infrastructure (NAS).
<i>ZXKIN</i>	: $ZXIN/ZNFKIN(-1)$.
<i>ZXKSR</i>	: $ZXSR/ZNFKSR(-1)$.
<i>ZXMN</i>	: Real GDP at factor cost in manufacturing (NAS).
<i>ZXNSR</i>	: GDP at factor cost originating in sectors other than services (NAS).
<i>ZXSR</i>	: Real GDP at factor cost in services (NAS).