Performance and Determinants of India's GDP Since 1950: A Quantitative Analysis

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I INTRODUCTION

The great depression of 1930, Second World War and independence of most of the Asian and African countries from colonial rule necessitated the study of principles and policies pertaining to economic development. In general practice, economic development and economic growth are considered interchangeable but economists like J. A. Schumpeter (1949) and C. P. Kindleberger (1958) have made distinctions in the two words. For example Kindleberger defined, "Economic Growth means more output and economic development implies both more output and changes in the technical and institutional arrangements, by which it is produced". Although the economists like Simon Kuznetts (1966), Meir & Baldwin (1957) and H. Libenstine (1957) have defined development in terms of national income and per capita income. The concept of social welfare has been taken as an integral part of economic development by the economists like Arrow (1951, 1963); Atinkinson (1983); Rauls (1958, 1971, 1982 and 1985); and Sen (1970, 1977, 1986 and 1990). However, the issue has got prime importance among the economists and policy makers especially after the World War II when various under developed

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economies of the world were trying to accelerate the pace of economic development.

It is very difficult to define as well as compare the underdeveloped nations in terms of per capita income. According to United Nations (1949), p.26, an underdeveloped nation is one in which, "On the whole, production is carried on with a relatively small amount of real per capita per head and relatively backward techniques in the broadest sense of the word". In opinion of Kurihara (1959), p.26, "the most serviceable single indicator of underdeveloped economy is low per capita income whatever else may be said to characterize such an economy". An analysis of per capita income in the year 1971 which was published in U.N. statistical year book (1972) reveals that the lowest income countries, containing 26 percent of the world population have only 4 percent of the per capita Gross National Product (GNP) of developed countries containing an approximately equal proportion of the world population. Also there are several diversities among the underdeveloped countries themselves. For example in most of the Asian countries central planning is entrusted the task of accelerating the pace the economic development. At the same time, Latin American countries, generally, have relied upon private entrepreneurship to ensure desired economic growth.

The need for a comprehensive plan has become a matter of compelling urgency in the country due to the ravages of Second World War and the economic & political consequences of the partition of the country which followed in the wake of achievement of freedom and steady worsening of the economic situation in the world and India.

India has adopted mixed economy (a mid way between capitalistic and socialistic pattern) within the framework of democracy in order to attain rapid economic development. The working committee of the congress party passed a comprehensive resolution on planned economy for the country and the appointment of planning commission. The national planning commission (NPC) was established on 15th March 1950. It was interested with the work of

economic and social development as envisaged in the preamble, the fundamental rights as well as directive principles of the state policy of Indian constitution. In order to accomplish these objectives the process of planned economic development was started on 1st April 1951 as First Five Year Plan (1951-56). Since 1951 the process of planned economic development has been continuing and currently 11th Five-Year Plan is in progress (2007-12).

The planned economic development during the 40 years period (1950-91) has showed a mixed scenario. For example per annum growth in GDP during first fifteen years 1950-65 was found at 4 percent while during the period 1967-80 it declined marginally and stood at merely 3.45 percent per annum {Bhalla (2000-01), pp.1-23}. However the decade of eighties which witnessed improvement in Agricultural sector, Mining & Manufacturing sector, Service sector and Export sector has resulted in 5.46 per cent per annum growth in the GDP. In this connection it is significant to observe that the overall growth in GDP during the period 1950 to 1991 was not very impressive due to constant pulls and pressures.

In the early 1991, Indian economy faced several economic crises, like fiscal imbalances, mounting inflationary pressures and severe balance of payment crisis etc. The congress government, which assumed office at the end of June 1991, responded quickly to these problems. As a rescue measure, a series of new policy measures were announced in July 1991 by the government of India {Jalan, (1992)}. These are also known as Structural Adjustment Programmes (SAPs) of 1991{Bhalla (2000-01), p.11}.

The major thrust of present paper is to evaluate the performance (for the period 1950 to 2006) as well as determinants (for the period 1975 to 2006) of Gross Domestic Product (GDP) of Indian economy. The present study has been divided into five sections. Research methodology & data structure has been described in section II. Empirical results are contained in section III. Determinants of India's GDP are presented in section IV. Section V deal with the concluding observations and suggestions.

II Data Structure and Research Methodology:

In order to sketch India's GDP performance (at current as well as constant prices) along with its various components {Beckerman, (1996)} like, (1) Gross Domestic Product at Factor Cost (at current prices), (2) Net Domestic Product at Factor Cost (at current prices), (3) Gross Domestic Product at Market Price (at current prices), (4) Net Domestic Product at Market Price (at current prices), (5) Gross National Product at Factor Cost (at current prices), (6) Net National Product at Factor Cost (at current prices), (7) Gross National Product at Market Price (at Current Prices), (8) Net National Product at Market Price (at current prices), (9) Gross Domestic Product at Factor (at constant price), (10) Net Domestic Product at Factor Cost (at constant price), (11) Gross Domestic Product at Market Price (at constant price), (12) Net Domestic Product at Market Price (at constant price), (13) Gross National Product at Factor Cost (at constant price), (14) Net National Product at Factor Cost (at constant price), (17) Gross National Product at Market Price (at constant price), (16) Net National Product at Market Price (at constant price) have been taken into account. The time series data for the period 1950-2006 has been taken from the handbook of statistics on Indian economy.

In order to estimates India's GDP performance for the period 1950-2006, we have applied Ordinary Least Square Technique (OLS). To measure the growth of any economic phenomena Semi log model / log lin model {Johanston, (1997)} is employed as:

$$\text{Ln } Y_i = \alpha_0 + \alpha_1 t + u_i \text{ ----------(2.1)}$$

In equation (2.1), Ln Y_i = Gross Domestic Product and its components at current prices in natural log form, u_i is the random disturbance term and t is the time trend from 1950 to 2006. And, α_1 is the estimate of the growth rate of the variable of Y_i.

The growth rate for the Period 1950-2006;

$$g_{yx\ 1950\text{-}2006} = \hat{\alpha}_1 * 100 \ldots\ldots\ldots (2.2)$$

Further an attempt has been made to estimate the average annual growth of India's GDP and its various components for the sub periods like 1950-60; 1961-70; 1971-80; 1981-90; 1991-2000 and 2001-2006. For this purpose the technique of slope dummy and intercept dummy has been employed {Gujrati, (2003)}. More specifically in the present study, we have adopted the regression equation as mentioned below:

$$\text{Ln } Y_i = \alpha_0 + \alpha_1 t + \alpha_2 D_1 + \alpha_3 (D_1 * t) + \alpha_4 D_2 + \alpha_5 (D_2 * t) + \alpha_6 D_3 + \alpha_7 (D_3 * t) + \alpha_8 D_4 + \alpha_9 (D_4 * t) + \alpha_{10} D_5 + \alpha_{11} (D_5 * t) + v_i \quad \ldots\ldots (2.3)$$

Where,

D_1 is the first dummy = 1950-51 to1960 -61 = 0
1961-62 to 2006-07 = 1

D_2 is the second dummy = 1950-51 to1970 -71 = 0
1971-72 to 2006-07 = 1

D_3 is the third dummy = 1950-51 to1980 -81 = 0
1981-82 to 2006-07 = 1

D_4 is the fourth dummy = 1950-51 to1990 -91 = 0
1990-91 to 2006-07 = 1

D_5 is the fifth dummy = 1950-51 to 2000 -01 = 0
2000 -01 to 2006-07 = 1

v_i is the random disturbance term. Ln Y_i, and t are same as explained in equation 2.1.

In the above regression equation, growth in India's GDP for the period 1950-60 will be measured by

$$g_{yx\ 1950\text{-}60} = \hat{\alpha}_1 * 100 \ldots\ldots\ldots (2.4)$$

Growth in GDP for the period 1961-70 will be given by

$$g_{yx\ 1961\text{-}70} = (\hat{\alpha}_1 + \hat{a}_3) * 100 \ldots\ldots\ldots (2.5)$$

Similarly, growth in the GDP for the period 1971-80 will be given by

$$g_{yx\ 1971\text{-}80} = (\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5) * 100 \ldots\ldots\ldots (2.6)$$

Growth in the GDP for the period 1981-90 will be given by

$$g_{yx\ 1981\text{-}90} = (\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5 + \hat{a}_7) * 100 \ldots\ldots\ldots (2.7)$$

Also for the period 1991-2000 growth in GDP will be given by

$$g_{yx\ 1991\text{-}00} = (\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5 + \hat{a}_7 + \hat{a}_9) * 100 \ldots\ldots\ldots (2.8)$$

For the period 2001-2006 growth in GDP will be given by

$$g_{yx\ 2001\text{-}06} = (\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5 + \hat{a}_7 + \hat{a}_9 + \hat{a}_{11}) * 100 \ldots\ldots\ldots (2.9)$$

The policy makers and researchers may assume that Gross Domestic Product has increased over the years. In view of this we may assume that per annum growth in India's GDP during the period 2001 to 2006 has been higher than during 1991 to 2000, per annum growth during the period 1991 to 2000 has been higher during 1981 to 1990, per annum growth of GDP during the period 1981 to 1990 is higher than the period 1971 to 1980, per annum growth of GDP during the period 1971 to 1980 is higher than the period 1960 to 1971,

per annum growth of GDP during the period 1961 to 1970 is higher than the period 1950 to 1961. The above-mentioned conditions may be stated as,

$g_{yx\ 2001\text{-}06} > g_{yx\ 1991\text{-}2000}$;

$g_{yx\ 1991\text{-}2000} > g_{yx\ 1981\text{-}90}$;

$g_{yx\ 1981\text{-}90} > g_{yx\ 1971\text{-}80}$;

$g_{yx\ 1971\text{-}80} > g_{yx\ 1961\text{-}70}$;

$g_{yx\ 1961\text{-}70} > g_{yx\ 1950\text{-}60}$

i.e.

$$(\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5 + \hat{a}_7 + \hat{a}_9 + \hat{a}_{11}) * 100 > (\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5 + \hat{a}_7 + \hat{a}_9) * 100;$$

$$(\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5 + \hat{a}_7 + \hat{a}_9) * 100 > (\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5 + \hat{a}_7) * 100;$$

$$(\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5 + \hat{a}_7) * 100 > (\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5) * 100;$$

$$(\hat{\alpha}_1 + \hat{a}_3 + \hat{a}_5) * 100 > (\hat{\alpha}_1 + \hat{a}_3) * 100;$$

$$(\hat{\alpha}_1 + \hat{a}_3) * 100 > \hat{\alpha}_1 * 100$$

There are several economic parameters that affect the GDP either directly or indirectly in an economy. These parameters may be government expenditure, population, industrial production, private final consumption expenditure, savings, employment, import, export, foreign exchange reserve and many others. Virtually determination of GDP is a complex phenomenon. In the present study the determination of GDP has been done with the help of Two Stage Least Square Model (2SLS) {Theil (1953), and Basmann (1957)}. The simultaneous equation system comprises three single equations with thirteen variables for which time series data has been taken for the period 1975-76 to 2006-07. Out of thirteen variables in the model, three variables are taken as endogenous while, remaining ten variables are considered as

exogenous. The functional form of complete simultaneous model is given below:

$Y = \Phi_1(Y_{(-1)}, X, M, E)$……..(2.10)

$M = \Phi_2(Y, X_{(-1)}, MS, IP, PFCE, DE, S)$……(2.11)

$E = \Phi_3(Y_{(-1)}, GE, P)$…….(2.12)

Where

Y = Gross Domestic Product at Factor Cost (Current Prices)

$Y_{(-1)}$ = Gross Domestic Product at Factor Cost (Current Prices) at one period lag.

X= Value of Indian Exports in Rs. Crore.

$X_{(-1)}$= Value of Indian Exports in Rs. Crore at one period lag.

M= Value of Indian Imports in Rs. Crore

E= Sum of Public Sector Employment and Private Sector Employment in the Economy (in Crore)

MS= Money Supply in the Indian economy in terms of M_3

IP= Industrial Production of Indian Economy (in Rs. Crore)

PFCE= Private Final Consumption Expenditure of Indian Economy (in Rs. Crore)

DE= Defence Expenditure of Government of India (in Rs. Crore)

S= Savings in Indian Economy (in Rs. Crore)

GE= Government Expenditure of India (in Rs. Crore)

P= Mid year Population in India (in Crore).

III. Empirical Results

III.1 Gross Domestic Product of India at current prices (1950-2006)

Percentage change in GDP and its components (at current prices) over previous year during the period 1950 to 2006 has been shown in Table 1. One of the salient features regarding percentage change in GDP over the previous year that emerged from Table 1 is that excepting the years 1952 and 1954 percentage change in GDP has been positive with minimum change in the year 1955 over the year 1954 and maximum change in the year 1973 over the year 1972. In the year 1952 and 1954 percentage change in GDP along with its various components has been found negative over the respective previous year figures. Graph 1 shows the percentage change in GDP and its components over the previous year since 1950 to 2006.

In this section, an attempt has been made to estimate average annual growth in GDP and its components (at current prices). Average annual growth in GDP and its components for the period 1950 to 2006 has been measured through the equation 2.1 (Section II).

$\text{Ln } Y_i = \beta_0 + \beta_1 t + u_i$ ----------(3.1-3.8)

Where i =1…….8

$\text{Ln } Y_1$ = Gross Domestic Product at Factor Cost at Current Prices in natural log form,

$\text{Ln } Y_2$ = Net Domestic Product at Factor Cost at Current Prices in natural log form,

$\text{Ln } Y_3$ = Gross Domestic Product at Market Price at Current Prices in natural log form,

$\text{Ln } Y_4$ = Net Domestic Product at Market Price at Current Prices in natural log form,

$\text{Ln } Y_5$ = Gross National Product at Factor Cost at Current Prices in natural log form,

$\text{Ln } Y_6$ = Net National Product at Factor Cost at Current Prices in natural log form,

$\text{Ln } Y_7$ = Gross National Product at Market Price at Current Prices in natural log form,

Ln Y_8 = Net National Product at Market Price at Current Prices in natural log form;

t = time trend for the period 1950 to 2006;

And u_i is the random disturbance term and i varies from 1, 2 ...8.

The average annual growth in GDP and its components for sub periods like 1950-60, 1961-70, 1971-80, 1981-90, 1991-2000 and 2001-2006 has been measured through the equation 2.3 as given in section II.

$$\text{Ln } Y_i = \gamma_0 + \gamma_1 t + \gamma_2 D_1 + \gamma_3 (D_1 * t) + \gamma_4 D_2 + \gamma_5 (D_2 * t) + \gamma_6 D_3 + \gamma_7 (D_3 * t) + \gamma_8 D_4 + \gamma_9 (D_4 * t) + \gamma_{10} D_5 + \gamma_{11} (D_5 * t) + v_i \quad \ldots\ldots(3.9\text{-}3.16)$$

Where Y_i and t is same as explained in equation (3.1 - 3.8); D_1, D_2, D_3 and D_4 are same as in section II; and v_i is the random disturbance term and i varies from 1----8.

Estimated regression results for equations 3.1-3.8 and equations 3.9-3.16 have been presented in table 2 and table 3 respectively. Based on these regression results, average annual growth in GDP and its components for entire period i.e. 1950 to 2006 as well as for sub periods during the study are presented in table 4. Facts reveal that the average annual growth in GDP and its components (at current prices) has been more than eleven percent for the entire period. For example, average annual growth in GDP at factor cost (at current prices) was recorded at 11.4 percent while, NDP at factor cost (at current prices) grew at the rate 11.1 percent per annum during 1950 to 2006.

Table 4 also highlights the decadal per annum growth as well as shift in GDP and its components. The decadal (1950-60) per annum growth in GDP and its components was found more than 5 percent (except NDP at FC and NNP at FC) while it stood more than 10 percent during the decade of 1961-70 (Table 4). For example, average annual growth in GDP at factor cost for the period 1950-60 was recorded at 5.2 percent, which increased and stood at 10.5

percent during the period 1961-70. It is important to note that the shift in GDP and its components during the period 1961-70 over the period 1950-60 was found positive and was recorded at more than 5 percent for all the components of GDP. It is evident from the Table 4 that per annum growth in GDP and its components during 1971-80 was more than 11 percent excepting in case of NDP at factor cost which was found 10.5 percent. Thus shift in GDP and its components registered nominal (less than one percent) per annum increase during the period 1971-80 over the period 1961-70. Facts reveal that the shift in per annum growth in GDP at factor cost (at current prices) was merely 0.6 percent during 1971-80 over the period 1961-70. It is obvious from the table that per annum growth in GDP at FC, GDP at MP and NDP at MP was found more than 13 percent during the period 1981-90. Only the shift in NDP at FC was more than 2 percent during the period 1981-90 over the period 1971-80. And, finally per annum growth in GDP and its components was found more than 13 percent during the period 1991-2000. For example GDP at factor cost during this period stood at 13.4 percent. It is worth mentioning here that as compared to the period 1991-2000 the shift in GDP and its components was negative during the period 2001-06 (Table 4).

The average annual growth rate of GDP and its components was found statistically significant at 1 percent level of significance for the entire study period 1950 to 2006. The analysis pertaining to decadal shift in GDP and its components as contained in table 4 reveals several interesting results. Only decadal per annum shift during the period 1961-70 as compared to the period 1950-60 was found statistically insignificant at 1 percent level of significance.

III.2 Gross Domestic Product at Constant Prices:

Table 5 reveals percentage change in GDP and its components (at constant prices) as compared to the previous year during the period 1950 to 2006. From this table three important features may be noticed. First of all the percentage change in GDP and its components was found negative in the years of 1957, 1965, 1972 and 1979 over the previous year. Secondly, maximum

percentage change was observed in the year 1988 as compared to 1987 and finally percentage change in GDP at factor cost in 1991 was merely 1.4 percent over the previous year, which corroborates the deteriorating position of overall Indian economy during the terminal year of eighties. Eventually, this has led the genesis of introduction of economic reforms in Indian economy in July 1991.

Percentage change in GDP and its components at constant prices over the previous year is given in the Graph 2 for the periods 1950-06.

This section also throws some light on the estimation of average annual growth in GDP and its components at constant prices. In order to measure average annual growth in GDP for the period 1950 to 2006, the regression equation has been estimated in the following manner.

$\text{Ln } X_i = \delta_0 + \delta_1 t + \Phi_i$ ----------(3.17-3.24)

Where i =1…….8

$\text{Ln } X_1$ = Gross Domestic Product at Factor Cost at Constant Prices in natural log form,

$\text{Ln } X_2$ = Net Domestic Product at Factor Cost at Constant Prices in natural log form,

$\text{Ln } X_3$ = Gross Domestic Product at Market Price at Constant Prices in natural log form,

$\text{Ln } X_4$ = Net Domestic Product at Market Price at Constant Prices in natural log form,

$\text{Ln } X_5$ = Gross National Product at Factor Cost at Constant Prices in natural log form,

$\text{Ln } X_6$ = Net National Product at Factor Cost at Constant Prices in natural log form,

$\text{Ln } X_7$ = Gross National Product at Market Price at Constant Prices in natural log form,

$\text{Ln } X_8$ = Net National Product at Market Price at Constant Prices in natural log form;

t = time period 1950 to 2006; and Φ_I is the random disturbance term.

For sub periods like 1950-60, 1961-70, 1971-80, 1981-90, 1991-2000 and 2001-06 average annual growth in GDP has been estimated through following regression equation:

$$\text{Ln } X_i = \psi_0 + \psi_1 t + \psi_2 D_1 + \psi_3 (D_1 * t) + \psi_4 D_2 + \psi_5 (D_2 * t) + \psi_6 D_3 + \psi_7 (D_3 * t) + \psi_8 D_4 + \psi_9 (D_4 * t) + \psi_{10} D_5 + \psi_{11} (D_5 * t) + \varepsilon_i \quad \ldots\ldots(3.25\text{-}3.32)$$

Where $\text{Ln}X_i$ and t is same as explained in equation (3.17 - 3.24); D_1, D_2, D_3, D_4 and D_5 are same as in section II; and ε_i is the random disturbance term and varies from 1----8.

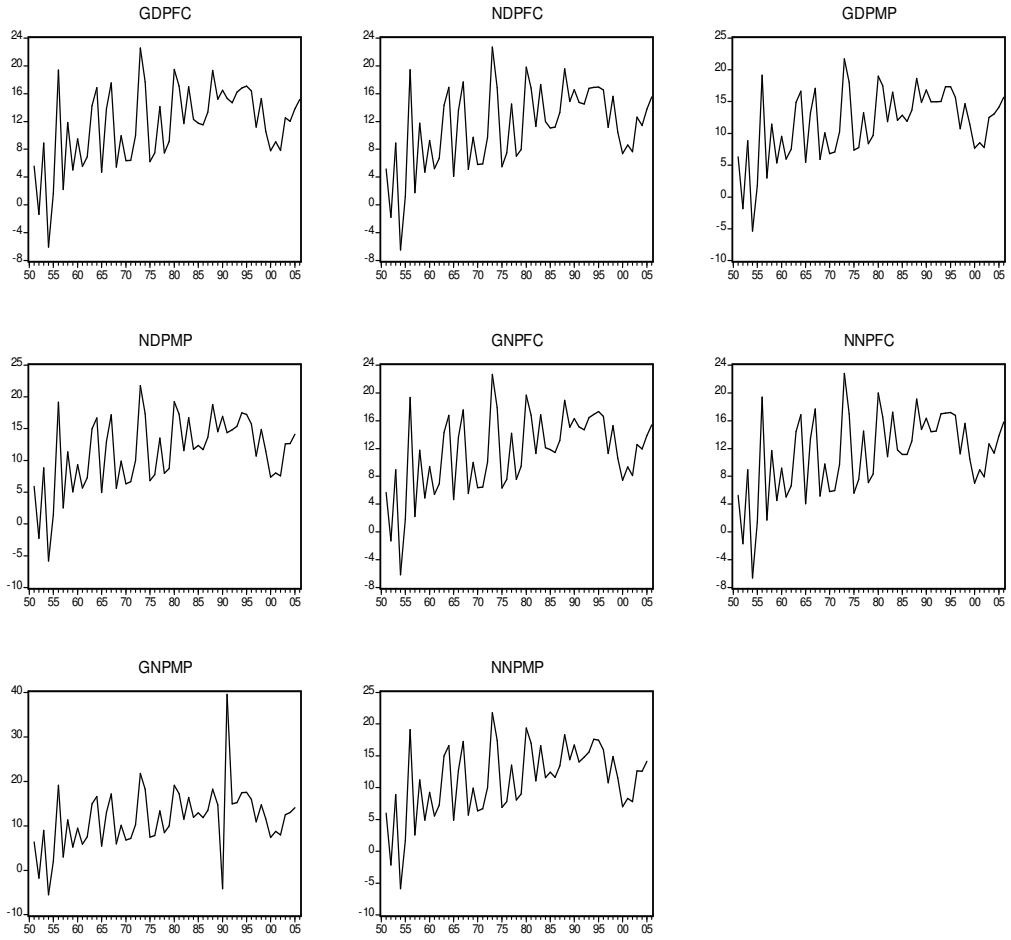
Table 1: GDP and its components at current prices (1950-2006): Percentage changes over previous year (%)

year	GDPFC	NDPFC	GDPMP	NDPMP	GNPFC	NNPFC	GNPMP	NNPMP
1950	-	-	-	-	-	-	-	-
1951	5.6	5.2	6.3	5.9	5.7	5.3	6.4	6.0
1952	-1.4	-1.8	-1.9	-2.3	-1.3	-1.7	-1.8	-2.2
1953	8.9	8.9	8.8	8.8	9.0	9.0	8.9	8.9
1954	-6.1	-6.5	-5.4	-5.8	-6.2	-6.6	-5.5	-5.9
1955	1.6	1.2	1.8	1.4	1.8	1.4	2.0	1.6
1956	19.4	19.4	19.1	19.2	19.3	19.4	19.1	19.1
1957	2.2	1.7	3.0	2.6	2.2	1.7	3.0	2.5
1958	11.9	11.8	11.5	11.3	11.8	11.7	11.4	11.2
1959	5.0	4.7	5.4	5.1	4.9	4.5	5.2	4.9
1960	9.5	9.3	9.5	9.3	9.4	9.2	9.5	9.3
1961	5.5	5.2	6.0	5.7	5.4	5.1	5.8	5.5
1962	6.9	6.7	7.5	7.3	6.9	6.7	7.5	7.2
1963	14.3	14.3	14.9	14.9	14.3	14.4	14.9	15.0
1964	16.8	16.9	16.6	16.7	16.8	16.8	16.6	16.6
1965	4.7	4.1	5.5	5.0	4.7	4.1	5.4	4.9
1966	13.8	13.6	13.2	12.9	13.7	13.4	13.0	12.8
1967	17.5	17.7	17.1	17.2	17.6	17.7	17.1	17.2
1968	5.5	5.1	5.9	5.6	5.5	5.2	5.9	5.7
1969	10.0	9.7	10.1	9.9	10.0	9.8	10.1	9.9

1970	6.4	5.8	6.8	6.3	6.4	5.8	6.8	6.3
1971	6.4	5.9	7.1	6.7	6.4	5.9	7.1	6.7
1972	10.0	9.7	10.2	10.0	10.0	9.7	10.3	10.0
1973	22.6	22.7	21.7	21.7	22.6	22.8	21.8	21.8
1974	17.7	16.9	18.1	17.3	17.9	17.0	18.2	17.4
1975	6.2	5.5	7.4	6.8	6.3	5.6	7.5	6.9
1976	7.5	7.5	7.8	7.8	7.5	7.5	7.8	7.8
1977	14.1	14.5	13.3	13.5	14.2	14.5	13.3	13.6
1978	7.5	7.0	8.3	8.0	7.6	7.1	8.4	8.1
1979	9.1	8.0	9.7	8.7	9.4	8.3	10.0	9.0
1980	19.5	19.8	19.0	19.2	19.7	20.0	19.1	19.4
1981	17.1	16.8	17.5	17.3	16.8	16.5	17.2	17.0
1982	11.7	11.3	11.9	11.5	11.3	10.8	11.5	11.1
1983	17.0	17.3	16.4	16.7	16.9	17.2	16.3	16.6
1984	12.3	12.0	12.0	11.7	12.1	11.8	11.9	11.5
1985	11.7	11.0	12.9	12.3	11.8	11.1	12.9	12.4
1986	11.5	11.2	11.9	11.7	11.4	11.1	11.8	11.6
1987	13.4	13.3	13.7	13.7	13.2	13.1	13.5	13.5
1988	19.3	19.6	18.6	18.8	18.9	19.1	18.2	18.3
1989	15.2	14.9	14.9	14.5	15.1	14.7	14.7	14.4
1990	16.5	16.6	16.8	16.9	16.3	16.3	-4.1	16.7
1991	15.4	14.7	14.9	14.3	15.1	14.4	39.5	14.0
1992	14.7	14.5	14.9	14.8	14.7	14.5	14.9	14.8
1993	16.2	16.8	15.0	15.4	16.5	17.0	15.2	15.6
1994	16.8	16.9	17.3	17.5	16.9	17.1	17.4	17.6
1995	17.1	17.0	17.3	17.2	17.3	17.2	17.5	17.4
1996	16.4	16.5	15.7	15.7	16.6	16.8	15.9	16.0
1997	11.2	11.1	10.8	10.7	11.3	11.3	10.9	10.8
1998	15.3	15.6	14.7	14.9	15.3	15.6	14.7	14.9
1999	10.5	10.4	11.5	11.5	10.6	10.5	11.5	11.5
2000	7.8	7.4	7.7	7.3	7.4	7.0	7.4	7.0
2001	9.1	8.6	8.5	8.0	9.3	8.9	8.7	8.3
2002	7.9	7.6	7.8	7.6	8.1	7.9	8.0	7.8
2003	12.5	12.6	12.5	12.6	12.6	12.7	12.5	12.6
2004	12.0	11.4	13.1	12.6	11.9	11.3	13.0	12.6
2005	13.8	13.8	14.1	14.1	13.8	13.8	14.1	14.1
2006	15.2	15.5	15.7	-	15.4	15.8	-	-

Note: Calculated on the basis Data given in the Handbook of Statistics on Indian Economy (2007), RBI

Graph 1: Components of Indian GDP at current prices (1950-2006)



Note: Data has been taken from Table 1

Table 2: Average annual growth rate for GDP and its Components at current prices for the period 1950-06: Regression Results

Equation	Constant	t	R- square	Adj R-square	SER

3.1	8.487 (156.94)*	0.114 (70.19)*	0.989	0.989	2.232
3.2	8.463 (152.51)*	0.111 (67.22)*	0.988	0.988	2.350
3.3	8.563 (164.66)*	0.115 (73.83)*	0.990	0.989	2.052
3.4	8.519 (158.78)*	0.113 (68.84)*	0.989	0.988	2.119
3.5	8.485 (157.53)*	0.114 (70.37)*	0.989	0.989	2.214
3.6	8.461 (153.14)*	0.111 67.40)*	0.988	0.988	2.330
3.7	8.542 (162.14)*	0.114 (71.02)*	0.989	0.989	2.042
3.8	8.518 (159.51)*	0.112 (69.07)*	0.989	0.987	2.098

Note: (i) Regression equation (3.1-3.6) estimated on the basis of data given in the Handbook of Statistics on Indian Economy (2007), RBI,
(ii) Figures in the parenthesis are t-value.

Estimated regression results for equation (3.17-3.24) and equation (3.25-3.32) are shown in Table 6 and Table 7 respectively. Average annual growth in GDP and its components at constant prices for entire period as well as for sub period during the study are presented in Table 8. It is evident from the table that average annual growth from GDP and its components has been found more than four percent for the entire period i.e. 1950 to 2006. For instance, average annual growth in GDP at factor cost (at constant prices) stood at 4.3 percent while, NDP at factor cost (constant prices) was recorded at 4.1 percent per annum during the period 1950 to 2006. Table 8 attempts to explain decadal per annum growth in GDP and its components as well as shift in GDP and its components. For example, for the decade of 1950-60 per annum growth in GDP and its components was found closer to 4 percent, while it was around 3.5 percent per annum during the decade of 1961-70. Here it is significant to observe that shift in GDP and its components during the period 1961-70 over the period 1950-60 were found negative, although less than one percent. This

table also reveals that per annum growth in GDP at market price, NDP at market price and GNP at market price during the decade 1971-80 was found less than respective per annum growth in these components of GDP during the decade 1961-70. In addition, per annum growth in remaining five components of GDP (at constant price) was found higher in the decade 1971-80 as compared to per annum growth in respective five components of GDP during the period 1961-70. Similarly, the average annual growth in eight components of GDP was found more than five percent in the decade 1981-90. As compared to the decade 1971-80, shift in GDP and its components was found positive for the period 1981-90. Per annum growth in GDP and its components was found around 6 percent as compared to the respective per annum growth in the decade of 1981-90. Thus the decadal growth of GNP at factor cost at constant price was found positive during 1991-2000 over 1981-90. The average annual growth rate for the period 2001-06 was registered more than seven percent and shift in all the components of GDP was positive over the period 1991-2000.

Table 8 reveals several interesting results. First of all per annum growth in GDP and its components in the decade 1961-70 has declined as compared to the decade 1950-60. Secondly, no significant change in per annum growth in GDP and its components during the decade 1971-80 over the decade 1961-70 has been found. Thirdly, it is significant to mention here that per annum growth in GDP and its components during the decade 1981-90 as compared to the decade 1971-80 has improved and was found statistically significant at 1 percent level of significance.

IV. Determinants of Gross Domestic Product in Indian Economy:

This section attempts to explore the determinants of Gross Domestic Product (at Factor Cost) in the Indian economy. Data regarding determinants of GDP has been taken from the period 1975 to 2006.
The model can be written as:

$$Y = \upsilon_1 Y(-1) + \upsilon_2 X + \upsilon_3 M + \upsilon_4 E + U_1 \ldots\ldots\ldots\ldots\ldots\ldots (4.1)$$

$$M = \tau_1 Y + \tau_2 X(-1) + \tau_3 MS + \tau_4 IP + \tau_5 PFCE + \tau_6 DE + \tau_7 S + U_2 \ldots\ldots\ldots (4.2)$$

$$E = \varsigma_1 Y(-1) + \varsigma_2 GE + \varsigma_3 P + U_3 \ldots\ldots\ldots (4.3)$$

Where, υ_i, τ_i and ς_i are coefficients and variables are explained in section II (Research Methodology)

In the system of simultaneous equation (4.1-4.3), equation 4.1 is over identified as per rank[1] and order[2] conditions. Accordingly equation 4.1 which determines the GDP of Indian economy has been estimated through the technique of 2SLS and the estimated regression results are shown in Table 9.

Table 3: Average annual growth rate for GDP and its Components at current prices
for the sub period 1950-60, 1961-70, 1971-80, 1981-90, 1991-2000 and 2001-2006): Regression Results

Equation	3.9	3.1	3.11	3.12	3.13	3.14	3.15	3.16
Constant	9.073 (325.77)*	9.059 (316.68)*	9.11 (338.40)*	9.096 (329.48)*	9.071 (326.89)*	9.056 (317.65)*	9.108 (313.08)*	9.093 (330.75)*
t	0.052 (12.70)*	0.049 (11.75)*	0.054 (13.54)*	0.051 (12.60)*	0.052 (12.75)*	0.049 (11.78)*	0.054 (12.53)*	0.051 (12.65)*
D1	-0.576 (-6.84)*	-0.583 (-6.75)*	-0.564 (-6.94)*	-0.571 (-6.85)*	-0.576 (-6.87)*	-0.584 (-6.78)*	-0.565 (-6.43)*	-0.572 (-6.89)*
D2	-0.19 (-1.27)	-0.17 (-1.12)	-0.205 (-1.42)	-0.189 (-1.28)	-0.215 (-1.44)	-0.198 (-1.29)	-0.223 (-1.46)	-0.214 (-1.45)
D3	-0.579 (-2.70)	-0.623 (-2.82)	-0.545 (-2.63)	-0.583 (-2.74)	-0.505 (-2.36)	-0.541 -2.46	-0.107 (-0.48)	-0.509 (-2.40)
D4	-0.08 (-0.29)	-0.167 (-0.58)	0.007 -0.03	-0.062 (-0.22)	-0.182 (-0.65)	-0.282 (-0.98)	-0.455 (-1.55)	-0.164 (-0.59)
D5	0.809 -1.34	0.881 -1.42	0.562 -0.96	0.988 -1.3	-0.829 (-1.38)	0.903 -1.46	0.939 -1.17	1.017 -1.34
D1t	0.053 (8.51)*	0.051 (8.40)*	0.053 (8.73)*	0.054 (8.63)*	0.053 (8.51)*	0.054 (8.40)*	0.053 (8.05)*	0.054 (8.64)*
D2t	0.006 -0.96	0.005 -0.78	0.007 -1.12	0.006 -0.96	0.007 -1.13	0.007 -0.96	0.008 -1.19	0.007 -1.14
D3t	0.019 -2.9	0.021 -3.03	0.018 -2.83	0.019 -2.94	0.017 -2.55	0.018 -2.65	0.005 -0.78	0.017 -2.59
D4t	0.004 -0.007	0.006 -0.83	0.001 -0.22	0.003 -0.46	0.006 -0.91	0.008 -1.22	0.014 -2.04	0.005 -0.82

D5t	-0.018 (-1.62)	-0.019 (-1.71)	-0.014 (-1.24)	-0.022 (-1.52)	-0.019 (-1.66)	-0.02 (-1.75)	-0.021 (-1.38)	-0.022 (-1.57)
R^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Adj. R^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
SER	0.083	0.088	0.077	0.08	0.082	0.087	0.089	0.079

Note: (i) Regression equation (3.1-3.6) estimated on the basis of data given in the Handbook of Statistics on Indian Economy (2007), RBI, (ii) Figures in the parenthesis are t-value.

Table 9 represents the Two Stage Least Square results along with Ordinary Least Square results for equation 4.1. It is obvious that as compared to the coefficient of exogenous variables in OLS model, the value of these coefficients in Two Stage Least Square technique has improved. This shows that Two Stage Least Square technique has shown better results than OLS technique. The positive value of coefficients of exogenous variables in both OLS as well as 2SLS techniques reveal that these four variables like $GDP_{FC(-1)}$, export, import and employment have emerged as a major determinant of GDP in the Indian economy. However, the 2SLS results reveal that GDP at one period lag, export and employment have emerged as significant determinants (at 5 percent level of significance) of the GDP in Indian Economy.

Table 4: Average annual growth (in %) of Gross Domestic Product and its Component at Current prices (for the period 1950-2006 and for sub period 1950-60, 1961-70, 1971-80, 1981-90, 1991-2000 and 2001-06)

Components (At Current Prices)	GDPFC	NDPFC	GDPMP	NDPMP	GNPFC	NNPFC	GNPMP	NNPMP
Growth rate for the period 1950-2006	11.4	11.1	11.5	11.3	11.4	11.1	11.4	11.2
Growth rate for the period 1950-60	5.2	4.9	5.4	5.1	5.2	4.9	5.4	5.1

Growth rate for the period 1961-70	10.5	10	10.7	10.5	10.5	10.3	10.7	10.5
Shift over the period 1950-60	5.3	5.1	5.3	5.4	5.3	5.4	5.3	5.4
Growth rate for the period 1971-80	11.1	10.5	11.4	11.1	11.2	11	11.5	11.2
Shift over the period 961-70	0.6	0.5	0.7	0.6	0.7	0.7	0.8	0.7
Growth rate for the period 1981-90	13	12.6	13.2	13.2	12.9	12.8	12	12.9
Shift over the period 1971-80	1.9	2.1	1.8	1.9	1.7	1.8	0.5	1.7
Growth rate for the period 1991-00	13.4	13.2	13.3	13.5	13.5	13.6	13.4	13.4
Shift over the period 1981-90	0.4	0.6	0.1	0.3	0.6	0.8	1.4	0.5
Growth rate for the period 2001-06	11.6	11.3	11.9	11.3	11.6	11.6	11.3	11.2
Shift over the period 1991-00	-1.8	-1.9	-1.4	-12.2	-1.9	-2	-2.1	-2.2

Note: Calculated on the basis of Table 2 and Table 3

Table 5: GDP and its components at Constant Prices (1950-2006): Percentage changes over previous year (%)

year	GDPFC	NDPFC	GDPMP	NDPMP	GNPFC	NNPFC	GNPMP	NNPMP
1950	-	-	-	-	-	-	-	-
1951	2.3	2.0	2.9	2.6	2.5	3.1	2.2	2.8
1952	2.8	2.6	2.6	2.4	2.9	2.7	2.6	2.4
1953	6.1	5.9	6.1	6.0	6.1	6.2	6.0	6.0

1954	4.2	4.0	4.8	4.6	4.2	4.7	3.9	4.5
1955	2.6	2.2	3.2	2.9	2.7	3.4	2.4	3.1
1956	5.7	5.4	5.6	5.3	5.7	5.5	5.4	5.3
1957	-1.2	-1.7	-0.4	-0.9	-1.3	-0.5	-1.8	-0.9
1958	7.6	7.4	7.4	7.2	7.5	7.3	7.4	7.2
1959	2.2	1.9	2.6	2.3	2.0	2.5	1.7	2.2
1960	7.1	7.0	5.5	5.4	7.0	5.5	7.0	5.4
1961	3.1	2.8	3.7	3.5	3.0	3.6	2.7	3.4
1962	2.1	1.8	2.9	2.7	2.0	2.9	1.7	2.6
1963	5.1	4.9	6.0	5.8	5.1	6.0	4.9	5.9
1964	7.6	7.5	7.5	7.4	7.5	7.3	7.4	7.2
1965	-3.7	-4.3	-2.7	-3.2	-3.7	-2.7	-4.4	-3.3
1966	1.0	0.5	0.0	-0.5	1.0	0.0	0.6	-0.5
1967	8.1	8.1	7.8	7.8	8.0	7.7	8.0	7.6
1968	2.6	2.2	3.4	3.1	2.7	3.4	2.3	3.1
1969	6.5	6.4	6.5	6.4	6.5	6.5	6.4	6.4
1970	5.0	4.9	5.2	5.0	5.0	5.2	4.9	5.0
1971	1.0	0.6	1.6	1.3	1.0	1.7	0.6	1.3
1972	-0.3	-0.9	-0.5	-1.1	-0.3	-0.5	-0.8	-1.0
1973	4.6	4.4	3.3	3.1	4.7	3.4	4.5	3.2
1974	1.2	0.7	1.2	0.8	1.3	1.3	0.9	0.9
1975	9.0	9.3	9.1	9.5	9.1	9.3	9.5	9.6
1976	1.2	0.9	1.7	1.3	1.3	1.7	0.9	1.4
1977	7.5	7.6	7.3	7.4	7.6	7.3	7.7	7.4
1978	5.5	5.5	5.7	5.7	5.5	5.7	5.5	5.7
1979	-5.2	-6.2	-5.2	-6.1	-5.0	-5.1	-6.0	-5.9
1980	7.2	7.3	6.7	6.8	7.2	6.8	7.4	6.9
1981	5.6	5.7	6.0	6.1	5.5	5.9	5.5	5.9
1982	2.9	2.7	3.5	3.3	2.6	3.1	2.3	2.9
1983	7.9	8.1	7.3	7.4	7.8	7.3	8.1	7.4
1984	4.0	3.8	3.8	3.6	3.8	3.7	3.6	3.5
1985	4.2	4.0	5.2	5.2	4.2	5.3	4.0	5.2
1986	4.3	4.2	4.8	4.7	4.3	4.7	4.1	4.6
1987	3.5	3.3	4.0	3.8	3.3	3.8	3.0	3.5
1988	10.2	10.6	9.6	10.0	9.8	9.4	10.3	9.7
1989	6.1	6.1	6.0	5.9	6.1	5.9	6.1	5.9
1990	5.3	5.1	5.5	5.4	5.0	5.3	4.8	5.2
1991	1.4	0.9	1.1	0.6	1.4	1.0	0.9	0.5
1992	5.4	5.3	5.5	5.4	5.4	5.5	5.4	5.5
1993	5.7	5.6	4.8	4.6	5.9	5.0	5.9	4.8
1994	6.4	6.4	6.7	6.7	6.5	6.7	6.5	6.8
1995	7.3	7.3	7.6	7.6	7.3	7.6	7.3	7.6
1996	8.0	8.1	7.6	7.6	8.1	7.7	8.3	7.8

1997	4.3	4.0	4.1	3.8	4.5	4.3	4.3	4.0
1998	6.7	6.7	6.2	6.1	6.7	6.2	6.7	6.1
1999	6.4	6.2	7.4	7.3	6.4	7.4	6.2	7.3
2000	4.4	4.1	4.0	3.7	4.0	3.7	3.7	3.4
2001	5.8	5.6	5.2	5.0	6.0	5.4	5.8	5.2
2002	3.8	3.4	3.7	3.4	3.9	3.9	3.5	3.5
2003	8.5	8.6	8.4	8.5	8.7	8.5	8.8	8.6
2004	7.5	7.5	8.3	8.4	7.4	8.2	7.3	8.3
2005	9.0	9.1	9.2	9.4	9.0	9.2	9.1	9.4
2006	9.4	9.6	9.4	-	9.6	-	9.9	-

Note: Calculated on the basis Data given in the Handbook of Statistics on Indian Economy (2007), RBI

Table 6: Average annual growth rate for GDP and its Components at constant prices for the period 1950-06: Regression Result

Equation	Constant	t	R- square	Adj R-square	SER
3.17	12.168 (505.20) *	0.043 (59.61) *	0.985	0.985	0.443
3.18	12.138 (465.65) *	0.041 (52.85) *	0.981	0.980	0.519
3.19	12.235 (540.77) *	0.044 (64.18) *	0.987	0.987	0.391
3.2	12.216 (532.01) *	0.042 (59.21) *	0.985	0.984	0.388
3.21	12.165 (504.62) *	0.043 (59.35) *	0.985	0.984	0.444
3.22	12.241 (577.87) *	0.043 (66.44) *	0.988	0.988	0.330
3.23	12.135 (465.23) *	0.041 (52.59) *	0.980	0.980	0.519
3.24	12.214 (534.12) *	0.041 (59.22) *	0.985	0.985	0.384

Note: (i) Regression equation (3.1-3.6) estimated on the basis of data given in the Handbook of Statistics on Indian Economy (2007), RBI, (ii) Figures in the parenthesis are t-value.

Table 7: Average annual growth rate for GDP and its Components at constant prices for the sub period 1950-60, 1961-70, 1971-80, 1981-90, 1991-2000 and 2001-06): Regression Results

Equation	3.25	3.26	3.27	3.28	3.29	3.3	3.31	3.32
Constant	12.277 (879.58)*	12.261 (813.44)*	12.325 (899.23)*	12.31 (836.08)*	12.275 (880.04)*	12.323 (899.82)*	12.259 (813.06)*	12.308 (836.96)*
t	0.037 (18.17)*	0.035 (15.60)*	0.039 (19.53)*	0.037 (17.03)*	0.037 (18.14)*	0.039 (19.50)*	0.035 (15.56)*	0.037 (17.01)*
D1	0.035 -0.83	0.039 -0.86	0.039 -0.96	0.043 -0.96	0.034 -0.81	0.039 -0.94	0.039 -0.86	0.042 -0.95
D2	-0.044 (-0.59)	-0.069 (-0.85)	0.005 -0.7	-0.014 (-0.18)	-0.069 (-0.93)	-0.017 (-0.24)	-0.096 -1.19	-0.039 _-0.50)
D3	-0.523 (-4.87)*	-0.566 (-4.87)*	-0.598 (-5.66)*	-0.644 (-5.67)*	-0.457 (-4.25)*	-0.538 (-5.09)*	-0.494 (-4.25)*	-0.578 (-5.10)*
D4	-0.388 (-2.76)	-0.391 (-2.57)	-0.286 (-2.07)	-0.279 (-1.88)	-0.467 -3.32	-0.358 (-2.59)	-0.479 (-3.15)	-0.357 ((-2.41)
D5	-0.789 (-2.61)	-0.831 (-2.54)	-0.949 (-3.20)	-0.764) (-1.88)	-0.787 (-2.61)	-0.721 (-1.91)	-0.828 (-2.54)	-0.749 (-1.85)
D1t	0.003 (-0.82)	-0.003 (-0.84)	-0.003 (-0.97)	-0.003 (-0.95)	-0.003 (-0.89)	-0.003 (-1.03)	-0.003 (-0.91)	-0.003 (-1.02)
D2t	0.001 -0.33	0.002 -0.6	-0.001 (-0.39)	-0.0004 (-0.12)	0.002 -0.69	-0.0002 (-0.06)	0.003 -0.96	0.001 -0.21
D3t	0.016 (4.82)*	0.018 (4.84)*	0.019 (5.66)*	0.02 (5.667)*	0.014 (4.18)*	0.017 (5.06)*	0.015 (4.18)*	0.018 (5.08)*
D4t	0.009 -2.55	0.009 -2.36	0.006 -1.8	0.005 -1.6	0.01 -3.12	0.008 -2.32	0.011 -2.95	0.007 -2.14
D5t	0.014 -2.54	0.015 -2.46	0.017 -3.12	0.014 -1.8	0.014 -2.53	0.013 -1.84	0.015 -2.45	0.014 -1.78
R^2	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Adj. R^2	0.999	0.998	0.999	0.998	0.999	0.999	0.998	0.998
SER	0.02	0.024	0.02	0.022	0.02	0.019	0.024	0.023

Note: (i) Regression equation (3.1-3.6) estimated on the
basis of data given in the Handbook of Statistics on Indian Economy (2007), RBI,
(ii) Figures in the parenthesis are t-value.

Table 8: Average annual growth (in %) of Gross Domestic Product and its Component at Constant prices (for the period 1950-2006 and for sub period 1950-60, 1961-70, 1971-80, 1981-90, 1991-2000 and 2001-06)

Components (AT Current Prices)	GDPFC	NDPFC	GDPMP	NDPMP	GNPFC	NNPFC	GNPMP	NNPMP
Growth rate for the period 1950-2006	4.3	4.1	4.4	4.2	4.3	4.3	4.1	4.1
Growth rate for the Period 1950-60	3.7	3.5	3.9	3.7	3.7	3.9	3.5	3.7
Growth rate for the period 1961-70	3.4	3.2	3.6	3.4	3.4	3.6	3.2	3.4
Shift over the Period 1950-60	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Growth rate for the period 1971-80	3.5	3.4	3.5	3.36	3.6	3.58	3.5	3.5
Shift over the Period 961-70	0.1	0.2	-0.1	-0.04	0.2	-0.02	0.3	0.1

Growth rate for the period 1981-90	5.1	5.2	5.4	5.36	5	5.28	5	5.3
Shift over the Period 1971-80	1.6	1.8	1.9	2	1.4	1.7	1.5	1.8
Growth rate for the period 1991-00	6	6.1	6	5.86	6	5.88	6.1	6
Shift over the Period 1981-90	0.9	0.9	0.6	0.5	1	0.8	1.1	0.7
Growth rate for the period 2001-06	7.4	7.6	7.7	7.26	7.4	7.18	7.6	7.4
Shift over the Period 1991-00	1.4	1.5	1.7	1.4	1.4	1.3	1.5	1.4

Note: Calculated on the basis of Table 6 and Table 7

Table 9: Determinants of Gross Domestic Product of India for the period 1975-2006

Variables	Model				
	Ordinary Least Square		Two Stage Least Square		
	Coefficient	t-values	Coefficient	t-values	Instrumental Variables
Constant	-260948.4	(66814.15)*	-288902.4	(84636.60)*	Industrial Sector Production , Money Supply
GDP (one period lag)	0.989	(0.043)*	0.869	(0.071)*	

Export	0.511	(0.675)	2.868	(1.235)*	(M3), PFCE, Population, Saving, Service Sector Production Total Expenditure
Import	0.177	(0.317)	-0.978	(0.589)	
Employment	117722.0	(28183.65) *	36036.94	(3.729)*	
R^2	0.999		0.998		
DW Statistics	1.844		2.2015		
AIC	22.904		-		
SC	23.136		-		
SER	21159.93		22059.71		

Note: (i) calculated on the basis of equation 4.1 and data has been taken from the Hand Book of Statistics on Indian Economy (2007), RBI.

(ii) * 5 percent level of significance.

V. Findings of the Study:

In the present study an attempt has been made to address the performance as well as determinants of Gross Domestic Product of Indian economy. In order to find out the performance of GDP in India, eight various components (at current prices and at constant prices) of GDP from the period 1950 to 2006 have been taken into account. For this purpose the technique of regression analysis (Ordinary Least Square) with the help of dummy variables (for different sub periods like; 1950-60, 1961-70, 1971-80, 1981-90, 1991-2000 and 2001-06) has been employed. The empirical findings pertaining to performance of GDP reveal very interesting results. For example, average annual growth rate of GDP and its various components (at current prices) grew more than 13 percent in the last two decades which is insignificant, while average annual growth of GDP and its components (at current prices) varied in between 11.2 percent to 11.9 percent. Growth in GDP and its components (at constant price) recorded more than 7 percent in the period 2001-06, which is also significant. For the period 1950-2006 the average annual growth of India's

GDP and its components at constant prices was recorded more than 4 percent. The performance of Indian economy during the first three decades i.e. 1950-60, 1961-70 and 1971-80 can be regarded as the "Hindu growth rate" but afterwards major changes were introduced in the form of economic liberalization which have a positive impact on the all sectors of economy. As a result the growth rate has been more than five percent during the decade 1981-90. Under the canvas of economic reforms of 1991 the positive and statistically significant structural changes can be seen in GDP and its components at constant prices. The growth rate achieved during 1991-2000 and 2001-2006 has been more than six percent and seven percent respectively.

This is a positive sign for Indian economy consisting of more than one billion population.

Similarly, for the determinants of GDP of Indian economy, 2SLS technique has been employed. For this purpose data relating to its different variables has been taken from the period 1975-2006. Empirical results reveal that export and employment have been the significant determinants of GDP. In order to accelerate the pace of GDP, the Government should make its policies in such a way that employment and export could be enhanced.

Notes:

1. ***Rank Condition*:**

In a System of three equations any equation is identified if and only if it is possible to construct at least one non zero determinants of order two from the coefficients of the variables excluded from that particular equation but contained in the other equations of the model {Koutsoyiannis (1996) pp353-355}

Let us consider the structural model

$$Y = \upsilon_1 Y(-1) + \upsilon_2 X + \upsilon_3 M + \upsilon_4 E + U_1 \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$M = \tau_1 Y + \tau_2 X(-1) + \tau_3 MS + \tau_4 IP + \tau_5 PFCE + \tau_6 DE + \tau_7 S + U_2 \ldots\ldots\ldots\ldots (2)$$

$$E = \varsigma_1 Y(-1) + \varsigma_2 GE + \varsigma_3 P + U_3 \ldots\ldots\ldots\ldots (3)$$

The model may be rewritten in the form,

$$-Y + \upsilon_1 Y(-1) + \upsilon_2 X + 0X(-1) + \upsilon_3 M + \upsilon_4 E + 0MS + 0IP + 0PFCE + 0DE + 0S + 0GE + 0P + U_1 = 0 \ldots$$

$$\tau_1 Y + 0Y(-1) + 0X + \tau_2 X(-1) - M + 0E + \tau_3 MS + \tau_4 IP + \tau_5 PFCE + \tau_6 DE + \tau_7 S + 0GE + 0P + U_2 = 0 \ldots$$

$$0Y + \varsigma_1 Y(-1) + 0X + 0X(-1) + 0M - E + 0MS + 0IP + 0PFCE + 0DE + 0S + \varsigma_2 GE + \varsigma_3 P + U_3 = 0 \ldots\ldots\ldots$$

Ignoring error terms the table of the parameters of the model is as

Table M1: parameters of the model

Equations	Y	Y(-1)	X	X(-1)	M	E	MS	IP	PFCE	DE	S	GE	P
Equation 4	-1	υ_1	υ_2	0	υ_3	υ_4	0	0	0	0	0	0	0
Equation 5	τ_1	0	0	τ_2	-1	0	τ_3	τ_4	τ_5	τ_6	τ_7	0	0
Equation 6	0	ς_1	0	0	0	-1	0	0	0	0	0	ς_2	ς_3

Here we have to examining for identification the first equation of the model thus deleting the non zero coefficients from the equation 4

Table M 2: parameters of excluded variable in the model

Equations	X(-1)	MS	IP	PFCE	DE	S	GE	P
Equation 5	τ_2	τ_3	τ_4	τ_5	τ_6	τ_7	0	0

Equation 6	0	0	0	0	0	0	ς_2	ς_3

From the table M 2 it is possible to construct determinants of order two and also there is twelve determinants of order 2 is non-zero. Hence the equation 4 of our model is identified.

2. Order Condition:

Whether the equation is exactly identified or over identified we use this condition

$$(K-M) \geq (G-1)$$

Where;

K = Number of total variable in the model = 13

G = Total Number of Equations= 3

M = Number of variables (endogenous and exogenous) included in a particular equation = 5

Hence;

$(K-M) \geq (G-1) \Rightarrow (13-5) \geq (3-1) \Rightarrow 8 > 2$

Therefore the second equation is over identified.

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