ECONOMIC GROWTH PERFORMANCE OF INDIA
SOURCES AND DETERMINANTS: 1970-71 TO 1999-2000

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Dissertation submitted in partial fulfillment of the requirements for the degree of ***Master of Philosophy in Applied Economics*** *of the* ***Jawaharlal Nehru University***

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I hereby affirm that the work for this dissertation, Economic Growth Performance of India: Sources and Determinants: 1970-71 to 1999-2000, being submitted as part of the requirements of the M.Phil Programme in Applied Economics of the Jawaharlal Nehru University, was carried out entirely by myself. I also affirm that it was not part of any other programme of study and has not been submitted to any other University for the award of any degree.

30/6

June 30, 2003

R. Mohan

Certified that this study is the bona fide work of R. Mohan, carried out under our supervision at the Centre for Development Studies.

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Dedicated to

My little son M. Prashant Krishnan

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Mohan

ABSTRACT OF THE DISSERTATION

ECONOMIC GROWTH PERFORMANCE OF INDIA SOURCES AND DETERMINANTS: 1970-71 TO 1999-2000

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This study examines the nature and trends of economic growth in India for the period 1970-71 to 1999-2000 and attempts to empirically verify the impacts of its sources and determinants. In sources, the contribution factors like labour, capital and productivity increase to overall growth are considered and in determinants, we consider the impact of change in size of government on overall growth rate. The influence of the determinant mentioned above on one of the sources, namely, productivity increase is also analysed.

On examining the growth performance for the period it is found that the long-term trend in overall growth rates underwent two upward shifts, the first one during the mid-1980s and the second one during the first-half of the 1990s. Both these shifts are found to be statistically significant. The following two hypotheses: i) whether the economic growth is a consequence of productivity increase or ii) Whether it is demand-led through increase in government spending are tested. Empirical evidence shows that not only do productivity increase and government spending have a strong association with aggregate growth rates, but also increase in government spending, especially its capital and social sector expenditure, significantly influences productivity increase.

On analysing the composition of expenditure of the Centre and the States for the thirty-year period, it is felt that a reallocation of the expenditure in favour of capital expenditure and spending on social services will be conducive to productivity increase and make the growth process more fiscally sustainable. But there are formidable impediments in effecting changes in expenditure patterns. To analyse these, questions in the realm of political economy of government expenditure and resource mobilisation are discussed.

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CHAPTER 1

INTRODUCTION

" the riches and, so far as power depends upon
riches, the power of every country
must always be in proportion to the
value of its annual produce....."
(Adam Smith quoted in
David Ricardo: The Principles of Political Economy and
Taxation: 1911: 235)

1.1 Background of the Study

The study of economic growth is essentially an inquiry into the causes of Wealth of Nations, a name so familiar, thanks to the Magnum Opus of Adam Smith published in 1776. This is a traditional area but having an evolving and ever growing literature, which is both empirical and theoretical. The subject of economic growth is widely discussed not only in academic circles, but also among administrators, the business community and by all persons taking an intelligent interest in economic affairs. Recently, it is a widely discussed topic in our country, with the planning commission having targeted the growth rate at eight percent for the Tenth Five Year Plan.

The summary measure of economic growth is often the growth of value of goods and services produced in a country in a given period of time. Economic growth can also be stated as the deep qualitative transformation of the way people organise themselves. In the Smithian perspective, the fundamental character of economic growth is the division of labour and increasing specialisation. The discussion on economic growth of nations occupied the pride of place in the classical political economy, particularly the discussion on growth and distribution of output. The Ricardian and Malthusian framework, the Marxian approach and the Schumpeterian analysis are all important strands in the discussion on economic growth. The Keynesian thinking also is intimately connected with the economic growth by espousing the need for public spending in demand deficient situations. In the mid-twentieth century, there was a revival in the discussion, with emphasis on sources of growth and conditional convergence among countries.

The output of goods and services produced in a country in effect mirrors its power and riches and economic growth captures the track of enrichment of nations. This

notion of political and economic processes of a nation gives economic growth the status of a prime economic variable. Though interpreting and analysing economic growth is important in itself, what is more relevant is how it is achieved. Based on the concept of value of goods as the labour embodied in it, Ricardo (1911: 185-186) elucidated the ways of achieving economic growth as

> " ... the wealth of a country may be increased in two ways: it may be increased by employing a greater portion of revenue in the maintenance of productive labour, which will not only add to the quantity, but to the value of the mass of commodities; or it may be increased, without employing any additional quantity of labour, by making the same quantity more productive, which will add to the abundance, but not to the value of commodities. In the first case, a country would not only become rich, but the value of its riches would increase. It would become rich by parsimony- by diminishing its expenditure on objects of luxury and enjoyment, and employing those savings in reproduction. In the second case, there will not necessarily be either any diminished expenditure on luxuries and enjoyments, or any increase in quantity of productive labour employed, but with the same labour more will be produced... Of these two modes, the last must be preferred, since it produces the same effect without the privation and dimunition of enjoyments which can never fail to accompany the first mode."

This passage from Ricardo demonstrates that the classical political economists were not only interested in economic growth but also how it was achieved. Economic growth through improvement in labour productivity was preferred to the one, which resulted from employment of more labour for the same task. Much later, in the mid-twentieth century, Solow followed by others, did a quantitatively rigorous study on how growth was achieved, albeit within certain standard neo-classical assumptions. Their studies separated the sources of growth- that is, the contribution of factors of production like land, labour, capital and the residual, which is the increase in output per unit of input. The neo-classical theories visualised the sources of growth as capital accumulation and exogenous technological progress. The later developed endogenous growth theories, placed emphasis on research and development activities (which are rewarded legally by some monopoly power, like patents and copyrights for innovations) and human capital quality[1] as sources of economic growth.

In all these theoretical perspectives, the significance of examining how growth is achieved has been acknowledged. The analysis of the underlying factors of economic

[1] See Barro (1997) for a comparative discussion on the neo-classical and endogenous growth theories.

growth attains importance especially, when there is a perceptible increase in growth rates and decisive policy shifts. This can be done by examining its sources and determinants. Our study distinguishes the determinants of growth from its sources. The sources of growth are the contribution of factors of production like land, labour, capital and improved productivity of all these factors to overall growth. On the other hand, the determinants of growth describe the role of some lead sector like the export sector or the government or factors like investment, private final consumption expenditure, et cetera. As regards the studies on sources of long-run economic growth, Dennison (1974), Mankiw, Romer and Weil (1992) are illustrative examples. (We review more studies in Chapter 3). There have also been a large number of cross-country researches utilising the available data sets of comparable Gross Domestic Product[2] on determinants of economic growth, for example, Feder (1982), Ram (1986), Barro (1997) et cetera.

1.2 The Scope of the Study

The growth performance of India since her independence in 1947 has been higher than it was during the first half of the twentieth century. The average growth rate at 3.5 percent in the first three decades in independent India's history was double of what had been achieved during the first fifty years of the last century (The Cambridge Economic History of India, Vol II, 1982: 959-960). This was followed by a second noticeable upward shift in growth rates since 1980s and it rose to 5 percent on an average. Barring a dip in 1991-92, the growth rates were maintained at 5 to 6 percent during the 1990s also. To state in brief, there was more than one upward shift in average growth rates during the last century. The period of the first shift was the one which embarked on planned economic development with the aim of achieving a socialistic pattern of society, efforts to step up domestic savings, concentration on basic and heavy industries, green revolution and at the same time institutional reforms like land reforms and community development programmes. We are not venturing into examining the pros and cons of any of these in our study. Suffice it to say that, in spite of the increase in growth rates when compared to the pre-independence period, this period had a stagnant growth rate of 3.5 percent throughout. The first break out of this stagnant growth rate occurred in the 1980s and has been maintained since

[2] For example, the Summers-Heston tables available on the World Bank web.

then[3]. The period of 1980s was one of decisive shifts away from the economic policies based on controls, and can be described as one of internal liberalisation. This was continued in the 1990s along with opening up in the external sector. The increase in economic growth in these two decades, characterised by policy shifts of a substantial measure led to formulation of two major hypotheses- one holding that the increase in growth is due to the improvement in productivity in the economy as a consequence of economic policy reforms [Virmani (2001), Acharya (2002a, 2002b), Dholokia (2002)] and the other taking the position that the increase in government spending during the 1980s led to demand side impacts on growth [Joshi and Little (1994), Srinivasan (2001)]. To examine these hypotheses empirically, we have to look at the sources and determinants of growth.

1.3 Objectives of the Study

The objectives of the study can be summarised as

i) Empirical verification of the sources and determinants of the economic growth in India during the period 1970-71 to 1999-2000.

ii) Analysis of how the growth rate rose to a higher level during this period. The major propositions advanced in the studies on economic growth in India during this period which have been stated in the previous section, are empirically verified. As regards the first hypothesis, we do not get into the analysis of the link between productivity increase and economic policy reforms, but stop with analysing the contribution of productivity increase to economic growth.

iii) Examining whether these hypotheses are competitive or complementary, that is, whether there is any significant relation between government spending and productivity growth. The association between components of government expenditure like capital and revenue on growth rates and social sector spending on productivity have also been analysed, to get a clearer picture on how growth has been achieved.

iv) A discussion of the political economic constraints which impede the altering of the composition of the expenditure to make it more growth friendly.

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[3] Studies on economic growth (which we review in Chapter 2) differ whether the growth rates were significantly higher in the 1990s when compared to the 1980s. We test this statistically and discuss the results in the next chapter. For the present discussion, it is only meant that the growth rates since the 1980s were higher than the earlier three post-independence decades.

1.4 Methodology and Database

Methodology

To meet the objectives of the study, we first examine the growth performance in India during the thirty-year period, by analysing the underlying trends in growth, by removing the irregular and cyclical fluctuations, using statistical smoothening methods. This is done for the aggregate and the three sectors. On finding two decisive upward shifts in the overall trend growth rates in the mid-1980s and the early 1990s, we test the statistical significance of these shifts. Then we proceed to examine separately the two hypothesis stated earlier. First, we disentangle the share of factors of production and total factor productivity in the growth process to find the contribution of productivity. We estimate the Total Factor Productivity as a residual, by subtracting from the overall growth rate, the growth rates of labour force and capital, adjusted by the average of their factor income shares. The growth accounting exercise is done with the standard assumptions required in the neo-classical framework, like marginal products of factors equalling their factor income shares, substitutability between factors, and constant returns to scale. We compute the residual with and without human capital as a factor of production and compare the results. We stop short of decomposing the residual further, for want of data on other possible factors.

The next step is to verify the second hypothesis. Here we analyse the impact of total government expenditure on growth rates, using a model used by Ram (1986) for a cross–country study on government size and economic growth. We use Ordinary Least Squares method for testing the association between components of total government expenditure on growth and productivity increase. To analyse the results of the quantitative exercise and the composition of state spending, we look at reasons, which are essentially political economic in nature.

Database

The main reasons for selecting time period of 1970-71 to 1999-2000, is that it witnessed major economic policy shifts, political changes and survived a few crisis years due to weather changes in output, external shocks, short run balance of payments crisis and also had a perceptible increase in overall growth rates. The starting point is chosen at the 1970s because, it was a decade preceded by two earlier

decades of planned development. This was also the decade, which preceded the 1980s and the 1990s, when decisive switching of policies from controls and state ownership was undertaken.

For computing growth rates, we take the value of Gross Domestic Product at factor cost at 1993-94 prices, published by Central Statistical Organisation (CSO) as the measure of output of goods and services in the economy. Though the conventional and official measure of Gross Domestic Product does not take into consideration environmental degradation and related aspects, which affect the qualitative transformation of the way people organise themselves, it is used for want of a more comprehensive official measure.

There are measurement problems in the officially measured GDP, especially in the agricultural and allied sectors and the services sector.[4] Srinivasan (2003) has discussed this and opined that the underestimation of GDP need not undermine credibility, unless it is politically or otherwise motivated; it arises only because of biases inherent in estimation procedures. According to him, if there are no reasons to believe that, its proportionate bias has changed over time, its mere existence need not affect analysis of trends[5]. Given these views, we proceed to analyse the trends, sources and determinants of growth based on the official estimates of the Gross Domestic Product (GDP) and Net Domestic Product (NDP).

The size of the government has been measured by the aggregate expenditure of Central and State governments, net of Central loans and grants to the States. The source of this data is the Handbook of Statistics on Indian Economy (2001) published by the Reserve Bank of India. The same source is used for data on components of government expenditure, like capital, revenue and social sector spending.

The problem in measurement of size of government is that, whichever measure (for example, total expenditure, total revenue) we use, it cannot fully capture the impact of government size on economic growth. There are some government interventions,

[4] For a discussion, see National Accounts Statistics published by EPW Research Foundation (2002).
[5] While discussing the other motivations in estimations of output, it is worth mentioning the present controversy on the CSO's estimation of aggregate growth rate at 4.4 percent for the year 2002-03. This has been disputed by the Investment, Information and Credit Rating Agency (ICRA). The main argument of the latter is that the agricultural output is underestimated. The states have exaggerated the drought effect on agricultural output and using this the CSO has estimated the aggregate output. According to the alternative estimate, the growth rate is at least 5 percent. (The Hindu 15/02/2003:13). This is of course outside the period of our study.

which are not reflected in these measures. The form of government intervention causes variation in government size, though the impact on economic growth is same. We discuss these issues with examples in Chapter 4. In spite of these limitations, we are proceeding with the quantification of growth rates and government size for the purpose of clarity and precision in analysis, while recognising the apparent limitations. In the words of Maddison (2003: 18), the advantages of quantification are, "Quantification clarifies issues which qualitative analysis leaves fuzzy. It is more readily contestable and likely to be contested. It sharpens scholarly discussion, sparks off rival hypotheses, and contributes to the dynamics of research process".

1.5 Organisation of the Study

This study has five chapters including this one. In Chapter 2 we analyse the growth performance during the period of our study, by reviewing a few studies on economic growth, analysing overall and sectoral growth rates and examining their trend after removing the cyclical and irregular fluctuations. This is done as a prelude to testing the two earlier mentioned hypotheses on the growth performance of India for the three decadal period 1970-71 to 1999-2000. We also analyse whether there has been any statistically significant increase in overall growth rates during the last three decades of the bygone century.

In Chapters 3 and 4, we examine the underlying hypotheses for increase in growth rates. In the Chapter 3, we estimate the sources of growth in India for the period of our study by doing a growth accounting exercise. The human capital proxied by employment in organised sector is included as a factor of production and the results compared with the productivity growth computed by excluding it. The trends in productivity growth in India over the last three decades in the previous century are also analysed. Its association with the overall growth is also examined and the same is compared with that of the factor inputs like labour and capital.

In Chapter 4, the relationship between growth rate and the change in government spending and its components, viz. capital and revenue expenditure is analysed, as this is perceived as an important determinant of economic growth. In this Chapter, we also look into the aspect of whether the two hypotheses on impact of productivity increase and increase in government spending on growth rates, are in fact competing

or complementary. This is done here by empirically examining the association between productivity increase and growth of government spending and its components like expenditure on social sector.

In the same Chapter, we also try to link the patterns of movements in government expenditure to the political economic factors, for finding an answer to what impedes the alteration of composition of expenditure, in favour of those having a positive and statistically significant impact on economic growth and productivity increase.

In Chapter 5, we highlight the main findings of our empirical analysis and conclude that a reallocation of the composition of state spending is called for in the Indian context in order to make it more oriented towards productivity increase and have a more fiscally sustainable growth process. The substantial political economic constraints in doing this are given due recognition, while drawing the above conclusion.

CHAPTER 2

ECONOMIC GROWTH PERFORMANCE OF INDIA: 1970-71 TO 1999-2000

2.1 Introduction

In this chapter we analyse the growth performance of the Indian economy over the last three decades, using real Gross Domestic Product (GDP) at factor cost as the measure of output of goods and services. Our aim in looking at the movements of overall growth and its underlying trend is to get an idea about the pattern of growth rates, before we proceed to analyse the response of economic growth to productivity increase, government spending and its components.

The Indian economy which had a constant growth rate during the decades of 1950s and 1960s, broke out of that in the 1980s. Barring the dip in 1979-80 and 1991-92, the growth rates perceptibly increased from an average of 3.5 percent in the first three decades (the 1950s to the 1970s) to approximately 6 percent in the 1980s and 1990s.

2.2 A Review of Literature on the Growth Performance of the Indian Economy

There is a large body of literature on the analysis of economic growth in India, its nature and trends. The literature on the pre-1990s growth focus on i) the increase in growth during the decades following independence in comparison with the first half of the twentieth century, ii) the reasons for stagnation and at times retrogression during the 1960s, and its increase during the 1980s. On the other hand the literature on the post-1990s growth discuss the growth performance in the 1990s and its relation to economic reforms, stress on its recovery after the dip in 1991-92 and try to explore the reasons for its loss of speed or slow down in the latter half of the 1990s. We briefly review a few representative ones here by dividing them into the following three parts.

2.2.1 Studies on the Economic Growth for the Period 1950s to 1980s

The main aim of these studies was to examine the trends in economic growth during the three decades of economic planning after independence, which witnessed an increase in growth rates as compared to the first half of the twentieth century. The growth rate of output in the first half of the last century, was one half to one third of what it was on an average during 1950-51 to 1970-71. The per capita incomes

increased about 40 percent in the first two decades after independence compared to an estimated 24 to 30 percent improvement in the first half of the century (The Cambridge Economic History of India, Vol II, 1982: 959-960). The studies on economic growth in the decades following independence, focussed on the impacts of the policies such as heavy industry led development in the second five year plan, the fallout of the Chinese war and the drought in the 1960s, the contractionary fiscal policies followed in the early 1970s, et cetera The scenario of the1950s and the 1960s, was considered as the era of decolonisation and the decades which witnessed the process of transition of newly emergent nations from passive victims of external exploitation to active arbiters of their own destiny (Sen 1991), and the studies analyse the growth performance during this period given this broad political and economic background. We cite a few representative ones in the following table.

Table 2.1
Review of Studies on the Growth Performance during 1950s-1980s

Author and Year of Study	Purpose of Study	Significant Findings
Sau (1973)	Examination of fluctuations in growth patterns in 1950s and 1960s.	The reason for fluctuations and retrogression in growth rates in the 1960s was the structure of Industry- a large consumer goods industry on a thin base of capital goods industry.
Raj (1984)	Examination of trends in Growth rates from 1952-53 to 1982-83.	The study disagreed with the view that there was slowdown of growth rates since the mid –1960s. Dividing the period into four sub-periods, viz. 1952-53 to 1959-60, 1960-61 to 1967-68, 1968-69 to 1975-76 and 1976-77 to 1982-83, the study found that there was no evidence of decline in growth rate of GDP, but some slight improvement in the average rate estimated for each of the sub-periods, though too small to be statistically significant. Using three-year moving averages, the study found a regular seven-year cycle in agriculture, which was followed by manufacturing after a lag of one or two years.
Rudra (1985)	Critical analysis of Raj (1984).	The criticism of Raj (1984) was based on i) three year moving averages are taken when admittedly the cycles are of seven to eight years and ii) lack of statistical rigour in drawing conclusions. The study however did not challenge the findings made by Raj (1984).
Sen (1991)	Analysis of Development strategies and Growth Theories in Indian Context 1950s-1970s.	The low growth in 1970s was due to contractionary fiscal policies, which suited for a savings constrained economy was applied to a fiscally constrained economy.

2.2.2 Studies on Economic Growth in India: Comparison of the 1980s and Previous Decades

In these studies, the focus of analysis shifted to analysing the apparent increase in growth rates, which occurred since the 1980s, when compared with the first three decades of independence. The Table 2.2 illustrates a few studies, which compare the growth rates of the period 1950s to 1980s and examine whether there was any significant improvement in growth rates during the period.

Table 2.2
Review of Studies on Difference in Growth Rates in the 1980s and Previous Decades

Author and year	Purpose of Study	Significant findings
Bhargava and Joshi (1990)	To examine the difference in growth rate in the sub-periods within 1960-61 to 1986-87.	There was substantial increase in growth rates during this period. The rise in growth rate was more pronounced when 1980-81was taken as the break year rather than when 1975-76 was taken so, though neither was statistically significant, when tested using Chow's test.
Nagaraj (1990)	Testing the trends of growth rate in India's GDP for the period 1950-51to 1987-88.	GDP as well as major sectors grew faster during the period 1980-81 to 1987-88, with the secondary sector leading the other two.
Joshi and Little (1994)	To examine the trends in growth rates from 1960-61 to 1989-90.	The growth rate from 1960-61 to 1975-76 was 3.4 percent and that from 1976-77 to 1989-90 was 4.7 percent. Five possible reasons for the increase in growth rates are 1) greater pressure of demand 2) more efficient use of existing resources 3) higher investment 4) higher rate of growth of the quality of labour force and 5) more efficient investment. Though the increase is considerable, the standard Chow's test failed to reject the null hypothesis of no significant break at 5 percent level

2.2.3 Studies on Comparison of Growth Performance: the 1980s and the 1990s

The comparison of the growth performance of these two decades is of special interest as the 1990s was the decade in which economic policy reforms got implemented, as part of major official policy in the wake of the 1991 balance of payments crisis, though the internal liberalisation by the relaxation of controls over the manufacturing

sector had started in the 1980s itself.[1] The quick recovery of growth rates after the dip in 1991-92 also evoked interest. Another feature, the slowdown of the upward trajectory of growth since the mid- 1990s, provoked the thinking of researchers, and economy watchers. The fact that previous decade of the 1980s, had witnessed a higher growth rate than the first three decades of independence and that there were major economic policy shifts in the internal and external sectors in the 1990s, were the main reasons behind examining how the growth rates performed during the latter decade vis-à-vis the former one. However, the studies comparing the growth rates of the 1980s and the 1990s, have reached contrasting conclusions. The post-1990s studies can be sub-divided into three as those which find i) that there is no increase in growth rates in the 1990s when compared to the 1980s, ii) that there is significant increase in growth rates during the 1990s vis-a-vis the 1980s and iii) those which focus on the slowdown of growth rates since the mid-1990s. The following table cites a few such studies.

Table 2.3 (a)
Review of Studies Finding No Increase in Growth Rates during the 1990s

Author and Year	Purpose of study	Significant findings
Nagaraj (2000)	To examine whether there was a structural break in growth rate during the 1990s.	The growth rate during the 1990s did not differ significantly from that of the 1980s. Among the sectors, the secondary sector showed a statistically significant decline.
Chandrasekhar and Ghosh (2002)	Analysis of impact of economic reforms on growth	Average growth of the trend growth in the Indian economy showed a discernible slowdown to 4.4 percent in the 1990s and liberalisation and reforms failed to deliver the promised higher growth rate[2].

In the next table we summarise a few studies which concluded that there was substantial increase in growth rates during the 1990s, when compared with the 1980s.

[1] Lewis (1995) attributes the Indian economic reform as a creeping process from the late 1960s onwards.

[2] See also Acharya (2002b) which cited T.N.Srinivasan of Yale University, who posed the interesting question of what was the new "Hindu Rate of Growth". If the sectoral (agriculture, industry, services) average growth rates of the 30 year period (1950-51 to 1980-81) are taken and the sectoral shares of GDP of the late 1990s applied, we obtain the new Hindu growth rate of 4.1 percent.

Table 2.3 (b)
Review of Studies Finding Increase in Growth Rates during the 1990s

Author and Year	Purpose of study	Significant findings
Kumar (1999)	Comparison of growth rates between pre- and post reform periods (pre- and post-1990s).	Excluding 1991-92, the average growth rate during the 1990s was 6.8 percent as compared to 5.5 percent in the 1980s. The mid-1990s slow down was attributed to East Asian contagion effects and post-Pokharan II sanctions.
RBI (2001)	Examination of trends in growth rates during 1970-2000	There are two structural breaks in 1981 and 1991 respectively. The growth rates increased from 3.4 percent in the 1970s to 5.6 percent in the 1980s to 6.5 percent in the 1990s. The slow down in mid-1990s is due to low aggregate demand and adverse investment climate
Virmani (2001)	Analysis of the underlying causes of the pre- and post-reform growth rates	Taking 1985 as the break point of pre-and post-reform periods, the improved growth rates was attributed to outward shifting of the aggregate supply function of the economy due to productivity increase consequent to economic policy reforms. Though demand side impact of higher government spending was also noted, the emphasis was on the former.
Acharya (2002a, 2002b)	Analysis of growth during the 1990s- the post- reform period.	The decade of 1990s witnessed the fastest growth of 6.1 percent in India's recorded history. The reasons are due to productivity gains from deregulation and reforms. The study casted a doubt on the fast growth of tertiary sector and attributed a part of it to same work getting more pay and therefore was spurious.
Dholokia (2002)	Analysis of sources of growth during 1960-2000.	The growth rate as well as acceleration increased since 1985 and this was due to the impact of economic policy reforms.

Now we proceed to look at the studies which focussed on the mid-1990s slowdown by analysing internal reasons and attempting to link it with global slowdown in economic growth rates.

Table 2.3 (c)
Studies on the Slowdown of Growth Since the Mid-1990s

Author and Year	Purpose of study	Significant findings
Desai (2000)	Comparison of Slow down in the mid-1990s with the structural retrogression during the mid-1960s.	The slack on the demand side was more evident during the recent period. The similarities were industrial investment's mismatch with the demand pattern and two poor agricultural years.
Karnik (2001)	Examining slow down of growth rate since the mid-1990s and a way out of the slowdown.	The problems confronting India's growth rate are essentially structural and cyclical problems got superimposed there. Cyclical remedies like increase in expenditure in the short-run will not be a remedy for the slow down.
Rakshit (2002)	Analysis of Stagnation of growth after the mid-1990s.	Inappropriate budgetary stance and anti-cyclical fiscal policies.
Shetty (2001)	To analyse the slowdown in growth rates in the mid-1990s and suggest ways out.	Investment in lead infrastructural sectors for activating the economy, deriving theoretical support from Hirschman's unbalanced growth approach.
Venkitaramanan (2001)	Analysis of the global growth slowdown and its impact on India and role of government.	An active role is envisaged for the government in remedying the possible downturn in output arising out of the global output slowdown.
IMF (2002)	Analysis of global economic trends.	The world economy had been experiencing its most significant slowdown since the early 1990s. The global business cycle was driven mainly by fluctuations in industrial countries. During the period 1970-2000, the world real output growth had started falling after having reached a peak in the early 1970's and the movement had been fluctuating ever since.

Though the above cited views on growth performance for all the three time periods, differ on conclusions regarding statistical significance of increase in growth rates during the 1990s, they by and large agree that growth rates showed the first upward movement in the three decades after independence, as compared to the first half of the twentieth century, and the second in the 1980s. These findings have been reached by the studies having vastly different focuses and using different methodologies. Though these studies have made relevant and valuable contributions, two major critical comments that can be offered on all of them are i) underlying patterns of growth were not examined by disentangling the trend growth movements of the aggregate and comparing it with the trend movements of the Sectors and ii) none of these studies attempted to analyse the growth movements and linking it with the sources and

determinants of growth[3]. We proceed to examine the growth performance during 1970-71 to 1999-2000, with these objectives in mind.

2.3 Analysis of the Growth Performance during 1970-71 to 1999-2000: With Reference to Policy Shifts

From the above studies we infer that the growth rates in the Indian economy increased during the last three decades which witnessed economic policy reforms and rise in government spending. Here we look at the shifts in policy regimes, during the period of our study, before proceeding to analyse the growth rates and its trends with the objective of examining its sources and determinants as stated in the previous section.

2.3.1 Economic Situation and Policy Shifts during 1970-71 to 1999-2000: Highlights

The decade of 1970s was one preceded by two decades of planned development which witnessed a rise in growth rate vis-a-vis the pre-Independence period. The growth rate averaged to 3.5 percent during the 1950s and the 1960s, which is often described as the Hindu rate of Growth.[4] The 1970s faced two severe droughts in 1972 and 1978 and a rather high inflation in 1973 and 1974. The government followed a contractionary fiscal policy by impounding part of the wages of the organised working class as compulsory deposit, withdrawing the statutory 8.33 percent minimum bonus et cetera [Sen (1991), Joshi and Little (1994)]. Sen (1991) argued that the contractionary fiscal policies were followed as the constraint facing growth was wrongly identified as a saving constraint instead of the fiscal constraint. The close of the 1970s saw a severe drought and second oil shock and an unusually low negative growth rate of 5 percent.

The movement of overall growth rates during the subsequent two decades evokes special interest, because of the decisive but gradual liberalisation policies which began in the 1980s. This was also the decade that witnessed the increase in government spending and debts. The average growth rates for the first time since independence reached 5 percent level and has been sustained at that level, albeit with a few

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[3] Barring Dholokia (2002), which analysed the sources of growth. But here also determinants are not empirically analysed separately.

[4] A popular term in the literature on economic growth, coined by the late Raj Krishna.

abnormal low growth years.[5] After the 1980s' experience of achievement of higher growth rates, the main concern has shifted to achieving a growth rate that is fiscally sustainable.[6]

The threshold of the 1990s saw a rather unprecedented balance of payments crisis and the country was on the brink of defaulting external debt repayments, which was however averted. This crisis heralded the unfolding of a package of reforms, especially in the form of release of controls in the external sector (for example, by making rupee gradually convertible on the current account and bringing down peak customs tariff in stages and facilitating more imports), and restraining of government's budgetary stance policies, by abandoning the automatic monetisation of budget deficit at low interest rates. The 1990s also witnessed a mid-course tight monetary policy, for combating a rising inflation, which was proving politically costly. This was followed by a low interest rate regime since the late 1990s, but these years also witnessed a halt in the downward movement of fiscal deficit and a downswing of capital expenditure and rising revenue expenditure. The latter half of the 1990s has been characterised as the period during which undone or second generation reforms were waiting to be implemented (Desai 2000) and also as a period, which market oriented reforms failed to deliver a higher growth rate (Chandrasekhar and Ghosh 2002).

Given this general backdrop, let us examine the year-wise overall and sectoral growth rates, sectoral contributions to overall growth rate, decadal growth of overall economy and its sectoral components, and underlying trends[7] in overall growth rates and the three main sectors primary, secondary and tertiary, to get a clear cut picture of the

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[5] Studies like that of Nagaraj (1990) and Bhargava and Joshi (1990) found that the growth rates started increasing since mid-1970s. The former study stated that the growth rate since 1975-76 was 4.2 percent when compared to 3.5 percent in the period 1950-51 to 1974-75. But the higher growth in the 1980s appeared to be a statistically stronger proposition than the break in 1975-76, according to Nagaraj (1990). Bhargava and Joshi (1990) found using Chow's test for structural break that there was no statistically significant break during 1960-61 to 1986-87, but discussed the *apparent* increase in growth rates.

[6] Though the aim to achieve a still higher growth rate of 8 percent has been stated in the Tenth plan, it is now generally accepted after the 1991 external sector crisis, that a growth process should not only achieve higher levels of growth, but also should be fiscally sustainable. We examine this in detail in Chapter 4.

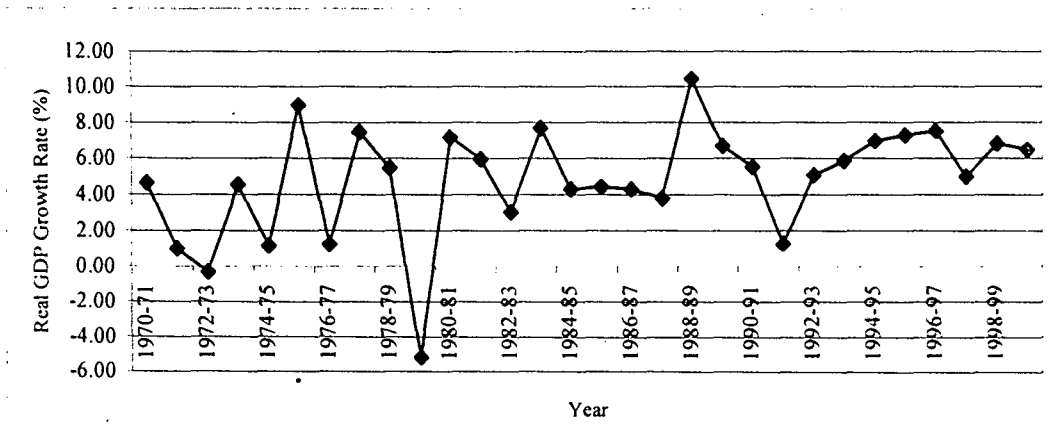
[7] The trends are obtained after removing cyclical and irregular fluctuations using the methods described in the subsequent sections.

growth performance of the period marked by internal and external liberalisation, substantially, yet gradually. This is a prelude to analysing what had driven the growth during this period, whether it was productivity improvement due to policy reforms or it was a demand led growth arising from a higher government spending.

2.3.2 Overall Growth Rate: Pattern during 1970-71 to 1999-2000

As already mentioned, during the period of three decades, the overall growth rate showed a perceptible increase since the 1980s, when compared to the earlier two decades. When we graphically plot the growth rates, it can be seen that the path of the growth rate of real Gross Domestic Product does not show an accelerated movement; instead it is marked by regular three-year fluctuations. These fluctuations abated for the first time during the early 1990s and there was a sustained upward trend after the dip in 1991-92. This however started declining after 1996-97. There are two distinct patterns in the 1990s, that is, pre- and post-1996, with the latter period having a lower growth rate.

Figure 2.1
Growth Rate of GDP at 1993-94 Prices at Factor Cost: 1970-71 to 1999-2000



To get a better idea of the pattern of the growth rate and also its fluctuations, let us examine the year-wise and then the decadal growth rates of overall growth rates and that of the three sectors, viz. Primary, Secondary and Tertiary.

2.3.3 Sectoral Growth Rates and Contributions to Aggregate Growth Rate

Table 2.4 presents the annual growth rates (for aggregate and the sectors) and sectoral contributions to the aggregate growth rate of the Indian economy, for the three decades from the 1970s to the 1990s. The overall GDP recorded a negative growth rate only in two years 1972-73 and 1979-80 during this period. The negative growth rate in 1972-73 was caused by primary sector only, whereas the second one during 1979-80 could be attributed to both primary and secondary sectors together. In 1991-92, even though both primary and secondary sectors recorded negative growth rates, the overall growth rate was positive, albeit a low value, thanks to the tertiary sector. It is worth noting that the tertiary sector has not recorded a negative growth rate in any of these years.

The pattern of sectoral shares evidently show the economy changing from a primary sector dominant one to that in which tertiary sector is dominant. The primary sector share has been falling since the 1970s and the secondary sector shares have been almost constant and showing a moderate increase since the end of the 1980s (Table 2.4). The place of the dominant sector has been taken by the tertiary sector, which has been showing a continuous increase and claiming almost one –half of the sectoral shares by the end of the 1990s. The fall in the sectoral share of the primary sector is on expected lines in a developing economy, but the noteworthy feature is that it is the tertiary sector which has taken the place of the primary sector, rather than the secondary sector[8].

Another summary measure that can be examined is the sectoral contributions to the aggregate growth rate. It can also be observed from Table 2.4 that for the 1990s, the services sector had made the largest contribution to the growth rate, leading the other two sectors in every single year. For the 1980s, the services sector led the

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[8] For a discussion on this, see Bhattacharya and Mitra (1990). There are some recent studies which have been sceptical about the sharp increase in services sector growth rates, especially in the 1990s [Vaidyanathan (2001), Acharya (2002b)]. Doubts were expressed on the measuremental accuracy of the services sector output by Vaidyanathan (2001), while Acharya (2002b) argued for netting out a part of this growth as spurious, that is, the same work getting more pay, and attributed this mainly to government pay increases.

contributions for six out of ten years. During the 1970s, the services sector had led the growth for five years. Out of the total period of thirty years, the contribution of the tertiary sector was the largest in the aggregate growth rate, in twenty-one years.

Table 2.4
Overall and Sectoral Growth Rates, Sectoral Shares and Contributions: 1970-71 to 1999-2000

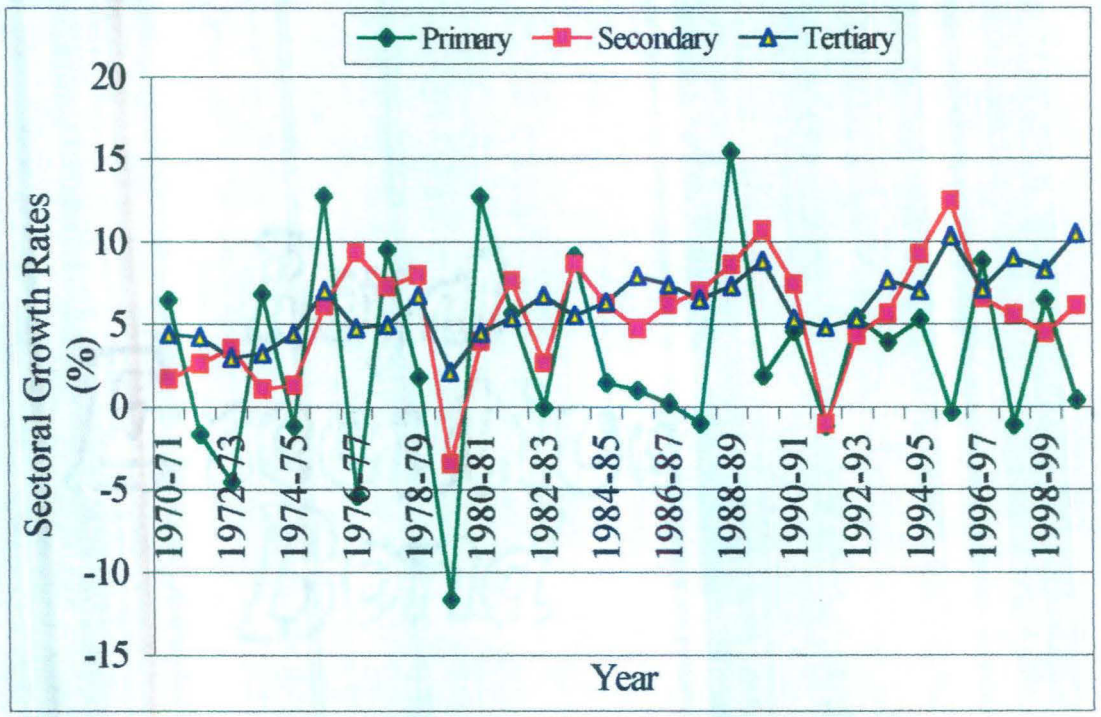
Year	Growth Rates (%)				Sectoral Shares			Sectoral contributions To Growth		
	Primary	Secondary	Tertiary	Overall	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
1970-71	6.47	1.69	4.38	4.82	0.48	0.20	0.32	0.61	0.07	0.32
1971-72	-1.63	2.60	4.21	1.08	0.47	0.20	0.32	-0.70	0.47	1.23
1972-73	-4.53	3.53	2.97	-0.43	0.46	0.21	0.33	5.80	-2.03	-2.77
1973-74	6.85	1.07	3.24	4.41	0.45	0.21	0.34	0.70	0.05	0.25
1974-75	-1.14	1.30	4.41	1.22	0.45	0.20	0.34	-0.42	0.21	1.20
1975-76	12.74	6.09	7.01	9.40	0.46	0.20	0.34	0.62	0.13	0.25
1976-77	-5.35	9.34	4.75	0.98	0.45	0.21	0.35	-2.05	1.64	1.41
1977-78	9.51	7.24	4.97	7.42	0.44	0.21	0.35	0.56	0.21	0.23
1978-79	1.81	8.00	6.73	4.82	0.44	0.22	0.35	0.16	0.36	0.48
1979-80	-11.61	-3.41	2.12	-4.99	0.41	0.22	0.36	1.00	0.16	-0.16
1980-81	12.70	3.95	4.49	7.65	0.41	0.22	0.37	0.67	0.11	0.22
1981-82	5.70	7.63	5.42	6.01	0.42	0.22	0.36	0.40	0.28	0.33
1982-83	-0.02	2.67	6.71	3.02	0.41	0.22	0.37	0.00	0.19	0.81
1983-84	9.14	8.67	5.55	7.68	0.41	0.22	0.37	0.48	0.25	0.27
1984-85	1.47	6.23	6.32	4.31	0.40	0.22	0.37	0.14	0.32	0.54
1985-86	1.02	4.72	7.93	4.45	0.39	0.22	0.38	0.09	0.24	0.68
1986-87	0.20	6.19	7.36	4.33	0.38	0.23	0.39	0.02	0.32	0.66
1987-88	-1.01	6.98	6.50	3.83	0.36	0.23	0.41	-0.09	0.42	0.68
1988-89	15.43	8.61	7.28	10.47	0.36	0.23	0.40	0.53	0.19	0.28
1989-90	1.89	10.68	8.85	6.70	0.36	0.24	0.40	0.10	0.37	0.53
1990-91	4.59	7.42	5.32	5.57	0.35	0.24	0.41	0.29	0.32	0.39
1991-92	-1.14	-1.02	4.80	1.30	0.35	0.24	0.41	-0.29	-0.18	1.48
1992-93	5.41	4.29	5.35	5.12	0.34	0.24	0.42	0.36	0.20	0.44
1993-94	3.91	5.65	7.67	5.90	0.34	0.24	0.42	0.22	0.23	0.55
1994-95	5.32	9.26	7.01	6.98	0.33	0.24	0.43	0.25	0.32	0.43
1995-96	-0.35	12.47	10.32	7.32	0.32	0.25	0.43	-0.01	0.41	0.60
1996-97	8.84	6.56	7.13	7.51	0.31	0.25	0.44	0.36	0.22	0.42
1997-98	-1.07	5.56	9.03	5.02	0.30	0.25	0.45	-0.06	0.27	0.79
1998-99	6.50	4.47	8.31	6.81	0.29	0.25	0.46	0.28	0.16	0.56
1999-2000	0.43	6.15	10.49	6.48	0.28	0.25	0.47	0.02	0.23	0.75

Source: Computed from the data on Overall and Sectoral GDPs at factor Cost at 1993-94 prices, available in the National Accounts Statistics, published by the Central Statistical Organisation (CSO), various issues.

Note: Sectoral Shares = Sectoral GDP *divided by* Overall GDP, Sectoral Contribution = Adjusted Sectoral Growth Rate[9] *divided by* Overall Growth Rate.

[9] Adjusted sectoral growth rates are computed by multiplying the sectoral growth rates by the two-year averages of the sectoral shares. They are not reported in Table 2.4 for space considerations.

Figure 2.2
Growth Rates of Primary, Secondary and Tertiary Sectors: 1970-71 to 1999-2000



The growth rates of the primary sector show wide fluctuation in the 1970s which somewhat lessened during the 1980s and the 1990s.In the 1970s, the growth rates in this sector have dipped to substantial negative figures, mainly due to the impact of drought on the agricultural sector, which is the predominant sub-sector in the primary sector. The adverse impact of droughts on growth rates in the subsequent decades has been less severe. The secondary sector growth rates also fluctuate and it follows the downward cycle in the primary sector after a lag. The same is the case with the tertiary sector, though the association in fluctuation pattern is much weaker. The tertiary sector is the least fluctuating sector among the three.

If we proceed to analyse the sub-sectoral contributions to get a more disaggregated view, it can be seen that agriculture, manufacturing and trade have contributed maximum to the sectoral GDPs of Primary, Secondary and Tertiary sectors respectively. Contrary to the popular perception there has not been any statistically significant expansion in the sub-sector, Public Expenditure and Defence, a measure of traditional government. Details of the sub-sectoral growth and contributions have not been reported as it is beyond the province of our study.

Decadal Average Growth Rates: Overall and Sectoral

Let us also briefly examine the decadal average growth rates of the aggregate economy as well as of the sectors for the period 1970-71 to 1999-2000, as they are a convenient summary measure. These growth rates are computed using the kinked exponential method on the premise that there have been significant structural break in the growth rates, as these decades have witnessed substantial shifts in economic policies.

The statistical tests like the Kinked exponential method to detect a break in growth rates become relevant, when there is need to examine whether the upward shifts in overall growth rate are significant or not, especially in the context of economic policy changes. The methodology of the statistical tests on the movements in growth rates, that is, testing for a statistically significant structural break is given in the appendix to this chapter. The kinked exponential method shows a statistically significant break, first during the beginning of the 1980s and then during the beginning of the 1990s for the overall growth rates. This corroborates the result of the Markov Switching Regressions done in RBI (2001). This implies that the apparent upward shifts noticed from the trend path of the overall growth rate (Figure 2.3) are statistically significant.

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It can be seen (Table 2.5) that the growth rates for all the three sectors and the aggregate are highly significant for all the three decades. The growth rate of the primary sector showed an increase during the 1980s, over that of the 1970s but was almost stagnant during the 1990s. As regards the secondary sector, the growth rates showed increase during the 1980s. But the increase during the 1990s was marginal. The tertiary sector showed steady increase throughout the period. The overall growth rate also showed the same trend as the tertiary sector, which has been the dominant contributor to growth during most of the period, during the three decades.

The fluctuations measured by the coefficient of variation revealed that among the sectors, the tertiary sector had the least fluctuation, followed by the secondary sector and the primary sector. The fluctuations in the primary exhibited a continuous downward trend, where as the other two sectors showed a decline in the 1980s and an increase in the 1990s. The fluctuations in the overall growth rate declined throughout from the 1970s to the 1990s.

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Table 2.5
Exponential Growth Rates: Overall and Sectoral: the 1970s, the 1980s and the 1990s

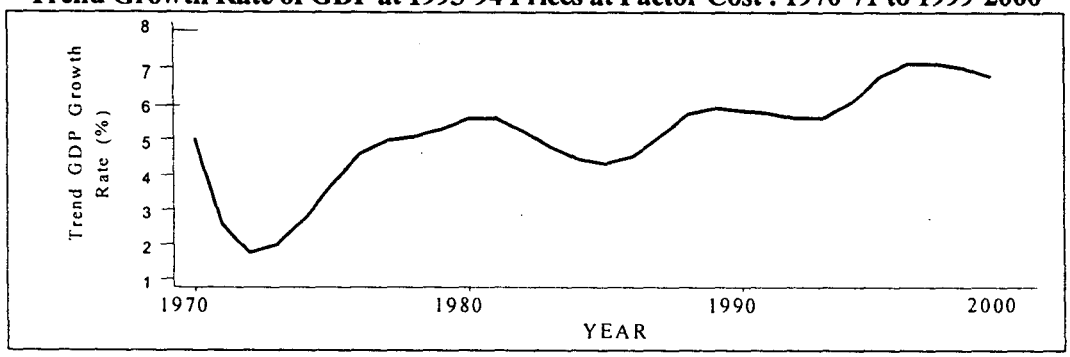
Decades	Growth Rates (%)				Coefficient of Variation (%)			
	Primary	Secondary	Tertiary	Overall	Primary	Secondary	Tertiary	Overall
1970s	2.15	4.28	4.60	3.45	5.76	1.04	0.34	1.44
1980s	3.49	6.19	6.41	5.25	1.25	0.36	0.19	0.39
1990s	3.45	6.51	7.53	6.02	1.08	0.57	0.26	0.31

Having briefly examined the overall and sectoral movements, let us analyse the underlying trends in overall and sectoral growth rates after segregating cyclical and irregular fluctuations from them, to get a clearer idea about the economic performance.

2.3.4 a) Underlying Trends in Overall Growth Rates: 1970-71 to 1999-2000

As already observed, the growth rate during the whole period as illustrated in Figure 2.1, showed fluctuations throughout the period, which abated in the 1990s. Cyclical and irregular fluctuations of a short-term nature have got superimposed over the underlying long-term trend of the growth rate. When we enquire about the growth performance, it is pertinent to examine the underlying structural pattern, as it throws more light into the process of growth, by eliminating factors of short- term consequences. Structural patterns are also important from the policy point of view, for which, identifying the constraining factor of growth, having more than short- term consequence is extremely important. Let us analyse the trend growth rate of India for the period 1970-71 to 1999-2000 after eliminating cyclical and irregular fluctuations[10]. The movements of cyclical and irregular fluctuations over the same period are also separately examined.

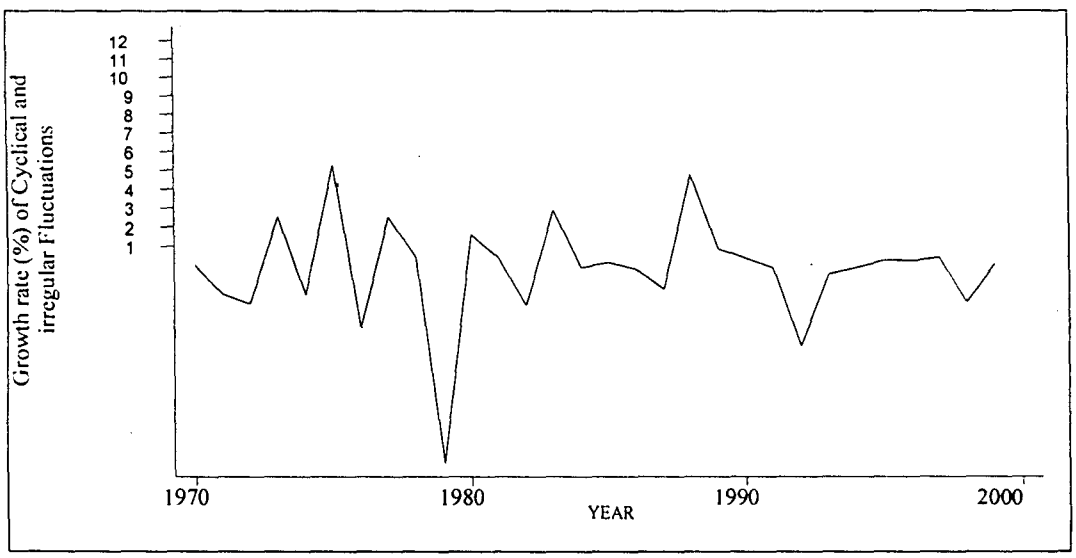
Figure 2.3
Trend Growth Rate of GDP at 1993-94 Prices at Factor Cost : 1970-71 to 1999-2000



[10] This is done using a compound filtering technique of running medians of different spans in combination with hanning (¼, ½ and ¼ th weighted averages of span 3) in statistical package STATA 7.0. For a discussion on this, see Hamilton (2003: 278-283)

When we observe the trend growth rate, that is, after removing cyclical and irregular fluctuations, it can be seen that it has three distinct humps (Figure 2.2)- the first one during 1976-77 to 1980-81, the second one during 1985-86 to 1989-90 and the third one during 1992-93 to 1995-96. But the two marked upward shifts in the trend growth rates, are the ones during 1985-86 to 1989-90 and the next higher shift during 1992-93 to 1995-96, though they are followed by a downward movement. The movement of the cyclical and irregular fluctuations (Figure 2.4) shows that there has been an abatement of regular three-year fluctuations during the 1990s.This could be due to i) continuous decline in fluctuation in the primary sector over the three decadal period and ii) the tertiary sector which has shown the least fluctuation during the period is having a steadily rising share of sectoral share as well as contribution (Tables 2.4 and 2.5). Let us also examine the trends in growth rates of three sectors primary, secondary and tertiary, to get an idea of their underlying pattern and interrelations.

Figure 2.4
Cyclical and Irregular Fluctuations in Growth Rates of GDP: 1970-71 to 1999-2000



b) Analysis of the Trend Growth Rates of the Sectors

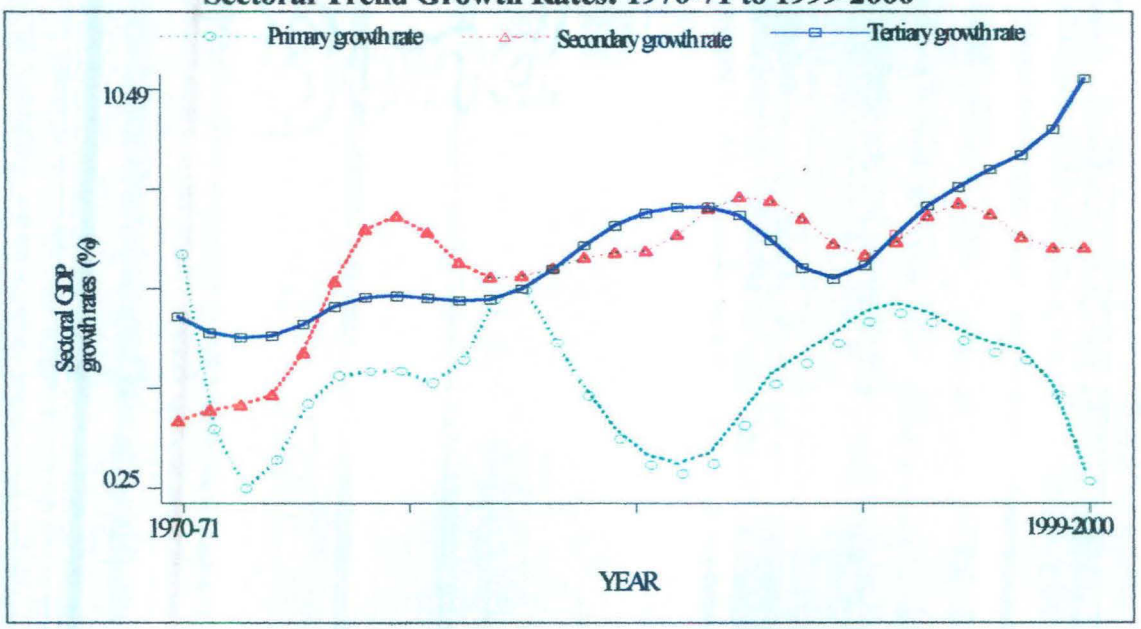
An illustration of the trend growth rates of primary, secondary and tertiary sectors are given in Figure 2.5.There is clear indication that secondary and tertiary sectors have been growing at a higher rate than the primary sector (as evident also from Table 2.5). The primary sector showed an upward movement from 1973-74 to 1976-77, from 1979-80 to 1981-82 and from 1988-89 to 1993-94, a movement, which was followed

by upward shifts in the secondary as well as tertiary sectors. A downswing in the primary sector produced similar movements in the other two sectors during the 1970s and the 1980s. For the secondary sector, the same upward and downward cycle is witnessed during the 1990s also. There was an upward trend in the secondary sector growth rates during 1985-86 to 1989-90 and from 1993-94 to 1996-97. This could be due to the policy impacts of relaxation of controls, but the increases were accompanied by subsequent downswings, probably indicating demand side problems, that is, once the pent up demand was exhausted, the sub-sectors like manufacturing faced excess capacities and lower growth rates[11] [Desai (2000), RBI (2001), Chandrasekhar and Ghosh 2002)].

The tertiary sector growth rates show the least fluctuations among the three, showing more or less an upward trend throughout. In the 1970s and the 1980s, the fluctuations in the tertiary sector have also followed that in the primary sector with a lag, but this linkage breaks down in the 1990s. The noticeable difference in the 1990s is that despite the primary sector showing a downward trend since 1993-94, the trend growth of the tertiary sector has moved consistently upwards, though the secondary sector does not show such a delinking. Throughout the three decadal period, the primary as well as secondary sectors have shown upswings and downswings, but the tertiary sector has shown a more or less continuous upward trend. The reasons for the delinking of primary sector and tertiary sector growth rates in the 1990s could be due to the shift in demand patterns for its output services, which probably does not emerge from the downward sliding primary sector. But to formulate a hypothesis on this, a deeper analysis of the sub-sectoral growth patterns, especially of the tertiary sector is necessary. We do not attempt this here as we focus on observing only the composition of economic growth, as a prelude to exploring the sources and determinants of overall growth.

[11] The argument on demand side problems gets strengthened when we observe the movements of the primary sector growth rates during the period of the downward movement in secondary sector growth rates after its continuous increase. The deficiency of demand could be due to lower growth in the primary sector where 59 percent of the labour force is still employed. But there is a contrary view by Vyas (1998) that the demand side linkages between agriculture and industry are weakening, while the backward linkages via purchased inputs is improving significantly.

Figure 2.5
Sectoral Trend Growth Rates: 1970-71 to 1999-2000



2.4 Conclusion

Our findings based on the analysis done so far can be summarised as follows

1) When we examine the sectoral contributions, the largest contribution has come from the tertiary sector, especially in the 1990s when it led the other two sectors in every single year. During the thirty-year period it led others in twenty-one years.
2) The regular three -year fluctuations in the overall growth rates abate during the 1990s. On examination of variability in the sectors, a continuous decrease is found in the primary sector. Another feature is that the sectoral share and contribution of the tertiary sector, which has shown least fluctuation has been steadily going up.
3) When we remove the cyclical and irregular fluctuations, the trend growth rates reveal that the inter- sectoral growth movements have been different in the 1990s as compared to the 1970s and the 1980s. There is a delinking of the trend growth rates of the tertiary sector from that of the primary sector.
4) The aggregate trend growth rates showed two upward shifts in the second- half of the 1980s and in the first- half of the 1990s, the latter being more marked than the former. But these upward shifts were followed by loss of speed or a downturn. One testable hypothesis that can be put forward as a reason for these

upward shifts is . . the policy reforms and liberalisation. But the immediately following downward trend since 1996-97, could be due to exhaustion of pent-up demand resulting in deficient aggregate demand.

5) Using Kinked exponential model, it is found that the increase in growth rates in the 1980s and the 1990s are statistically significant.

We observed the movements in overall and sectoral growth rates and its trends as an analytical prelude to examine the two major hypotheses, which emerge from the studies on performance of economic growth in India during 1970-71 to 1999-2000, in the next chapters. They are i) Productivity improvement consequent to the economic policy reforms by way of internal liberalisation and external sector reforms led to the increase in growth rates and ii) the growth being demand led due to increase in government spending.[12] The former view has been stated by Virmani (2001), Acharya (2002a, 2002b) and Dholokia (2002) and the latter by Joshi and Little (1994)[13]. Srinivasan (2001) viewed the increase in growth rate during the 1980s as led by increase in government spending and fiscal profligacy and described it as debt led.

In following chapter, we test the first hypothesis by examining the sources of growth during the period 1970-71 to 1999-2000, to disentangle the contribution of growth of Total Factor Inputs (TFIs), like capital and labour and productivity measured by the residual commonly called the Total Factor Productivity Growth (TFPG) to verify the contribution of productivity increase to economic growth.

[12] As stated in the objectives of the study in Chapter 1, we confine the scope of our study to only examining whether the productivity increase has contributed to the increase in growth rates and do not go into the deeper analysis of links between productivity increase and economic policy reforms.

[13] Virmani (2001) and Joshi and Little (1994) acknowledge the importance of the other factor, but the views are classified on the basis of emphasis.

APPENDIX

2A.1 Statistical Significance of Structural Break in the Growth Rates

While analysing the trend component of the overall growth rates, we found two marked upward shifts, one in the 1980s and the other in the 1990s. The question here is to test whether these upward shifts constitute statistically significant breaks in growth rates. Let us first review a few studies which have attempted to test the statistical significance of a structural break in the Indian context for the period 1970-71 to 1999-2000.

Nagaraj (1990, 2000) and RBI (2001) have tested the statistical significance of growth rates over time.[14] The methodology used by Nagaraj (2000), was to test the statistical significance of the difference of the trend growth rate for the period 1980-81 to 1990-91 and the whole period 1980-81 to 1999-2000. It was found that there was no statistically valid break in the series in the 1990s. The result held good even when the year of abnormal growth 1991-92 was excluded. It was also found that there was a minor, but statistically significant slowdown in the growth rate of the secondary sector, after 1991-92.

The RBI (2001) found that the growth in GDP encountered the first break in 1981-82 followed by a second break in 1991-92. The study also found that the post 1995-96 phase represented a loss of speed rather than a break in growth. Bhargava and Joshi (1990) found no statistical break in overall growth rates during the period 1960-61 to 1986-87, though they found substantial increases when 1975-76 and 1980-81 were taken as the break years. They tested the statistical significance using Chow's test. Their study draws a line of distinction between substantial increase and statistically significant increase. The dividing line seems more apparent than real.

We test the statistical significance of a break in growth rates during the period of our study using Kinked exponential method and the dummy variable method, the former using a linear constraint and the latter without it. The assumption in the latter is that the growth rates during the periods compared are discontinuous. In the Kinked exponential method, we test the existence of a significant break in growth rates in the 1980s and the 1990s. Using the second one, which was employed by Nagaraj (2000) to test whether the growth rates during the 1990s was different from that of the 1980s

[14] The time period of study for Nagaraj (1990) is 1950-51 to 1987-88, for Nagaraj (2000) is 1980-1998 and for RBI (2001) is 1970-2000. The former studies use the log quadratic and dummy variable methods and the latter uses Markov switching regression process.

based on a spliced series of GDP of two different base years (1980-81 and 1993-94), it is tested whether there was a significant increase in growth rates during the 1990s when compared with that of the 1980s, using GDP series at 1993-94 prices throughout.

Kinked Exponential Method

The model we are using here is the kinked exponential with linear constraints imposed. The methodology has been elaborated in Boyce (1987). The two kinks are taken at 1981 and 1991.[15] The results are given in the table below.[16]

Table 2A.1

(a) Kinked Exponential Model for Structural Break

LnGDP	Coefficient	Standard Error	t-value	Probability
D1	0.0345	.0014	23.885	0.00
D2	0.0525	.0018	29.486	0.00
D3	0.0602	.0025	23.880	0.00
Constant	12.523	0.013	947.618	0.00

Note: For explanation of D1, D2, D3, see footnote 16

(b) Residual Properties[17]

Auto regression	0.510 (0.606)
ARCH	1.547 (0.225)
Normality	0.031 (0.984)
Homoscedastcity 1	0.944 (0.487)
Homoscedasticity 2	0.730 (0.648)
RESET	0.837 (0.368)

[15] The kinks are assumed at the beginning of the two decades. Though, Kinks are to be observed before testing for significance, we are imposing them at the time periods, for which we want to test the significance of break. This has been done in other studies, which had a similar aim (see Pushpangadan 2003).

[16] D1, D2 and D3 are artificial variables created using the Dummy variables and the kink terms. The dummy variable1 takes value 1 for the first period, that is,1970-71 to 1980-81 and 0 for others, dummy variable2 takes values 1 for the second period. that is, 1981-82 to 1990-91 and 0 for others, dummy variable3 takes values 3 for the third period, that is, 1991-92 to 1999-2000 and 0 for others. We take k_1 and k_2 as the two kink points. We impose the linear constraints $a_1+b_1k_1=a_2+b_2k_1$ and $a_2+b_2k_2= a_3+b_3k_2$. The artificial variables formed are:

D1=(Dummyvariable1*time)+(Dummyvariable2*k_1)+(Dummyvariable3*k_1),

D2=(Dummyvariable2*time)-(Dummyvariable2*k_1)-(Dummyvariable3*k_1)+(Dummyvariable3*k_2),

D3=(Dummyvariable3*time)-(Dummyvariable3*k_2).

The equation we get is $\ln Q=a_1+ b_1D1+b_2D2+b_3D3+u$, where lnQ is the natural log transformation of the GDP and u is the error term. The statistical significance of the coefficients of the variables D1, D2, D3 indicate whether there has been a break in the growth rates.

[17] Since we are using time series data, the residual properties are checked for model adequacy. The null hypotheses which are tested are there is no autoregression, there is no autoregressive conditional hetroscedasticity, there is normality, there is no hetroscedaticity, and there is no model mis-specification. The t-statistic for all properties and chi-square value for normality are shown. In parentheses, the probabilities are shown. A high probability indicating non-rejection of the null hypotheses and ensures model adequacy. This table format for reporting residual properties are followed in all the subsequent chapters of this study.

It shows that growth rates during the 1970s, the 1980s and the 1990s are statistically significant. There is a significant increase in growth rates from 3.5 percent in 1970-79 to 5.25 percent to 1980-89 to 6.02 percent to 1990-99.

Markov switching process used by RBI (2001) also yielded significant breaks in two different points for the early 1980s and the early 1990s. The stated advantage of this method is that there is no assumption of kink or break before testing unlike in the Kinked Exponential Model.

Dummy Variable Method (Without linear constraint)

As stated earlier, Nagaraj (2000) using tests without linear constraint for the sub-periods the 1980s and the 1990s found that there was no break in growth rates in the 1990s. When we use the same method, we get a significant break in the growth rates for 1990s. We use the 1993-94 prices uniformly, whereas Nagaraj (2000) had to do splicing, probably due to non-availability of entire data in 1993-94 prices. We use the following model to test whether the growth rates of 1990s were significantly different from that of 1980s.

$\ln GDP = a + a_0 \ln GDP_{t-1} + a_1(D) + bt + b_1(Dt)$, where lnGDP is the natural log transformation of GDP, $\ln GDP_{t-1}$ is the lag of lnGDP, D is the dummy variable which takes the value 0 for 1980-81 to1991-92 and 1 for 1992-93 to 1999-2000, t is time and Dt is the variable created by multiplying D and t and its coefficient gives the compound growth rate of the second period. The results are given in the following tables. The lag term is included after doing model adequacy tests for getting standard residual properties, about which we have discussed in the previous sub-section dealing with Kinked Exponential Method.

Table 2A.2

(a) Results of the model $\ln GDP = a + a_0 \ln GDP_{t-1} + a_1(D) + bt + b_1(Dt)$:1980-81 to 1999-2000

LnGDP	Coefficient	Standard Error	t-value	Probability
lnGDP-1	0.341	0.197	1.730	0.105
D	-0.108	0.037	-2.926	0.011
T	0.036	0.010	3.483	0.003
Dt	0.006	0.002	2.315	0.036
Constant	8.464	2.525	3.352	0.004

(b) Residual Properties

Auto regression	0.052 (0.949)
ARCH	2.520 (0.138)
Normality	2.241 (0.326)
Homoscedastcity 1	1.001 (0.507)
RESET	1.387 (0.259)

The long- term growth rate is 5.46 percent [0.036/(1-0.341)] during 1980-81 to 1989-90 and 6.37 [that is, (0.036+.06)/ (1-0.341) during 1990-91 to 1999-2000. The t-probability of Dt indicates the significant break in the growth rates during 1990s as compared with the 1980s.

CHAPTER 3

SOURCES OF ECONOMIC GROWTH IN INDIA: AN ANALYSIS

3.1 Introduction

While analysing the nature and trends of economic growth in India for the period 1970-71 to 1999-2000, it was noticed that there had an upward shift in trend growth rates in the 1980s and the 1990s and they have been statistically significant. The pattern of growth rates and certain hypotheses on the underlying causes have been discussed in the Chapter 2. As already discussed, the increase in growth rates during the period 1970-71 to 1999-2000, especially since the 1980s was attributed by some to increase in government spending and therefore demand-led, and by others to productivity increase due to policy reforms. To test these hypotheses, i) it is necessary to analyse the sources of growth to empirically verify the contribution of productivity to economic growth ii) analyse the impact of government expenditure on economic growth and iii) test whether there is any relation between productivity growth and government spending in order to verify whether these hypotheses are complementary. We do the first part in this Chapter.

Since the focus of our study is the policy impacts on economic growth, it is important to analyse, what has driven the growth. Starting from the 1970s, through the 1980s and the 1990s, there were shifts in many economic policies and this adds to the relevance of looking at the sources of growth in the Indian economy during the period of three decades, 1970-71 to 1999-2000. Our actual period of study for examining the sources of growth of the Indian economy truncates to 1973-74-1999-2000, because the National Sample Survey Organisation (NSSO)'s quinquennial data on overall employment is available only from 1972-73.

We are attempting in this Chapter, a decomposition of growth rate at the aggregate level, for analysing the contributions of total factor inputs, namely capital, labour and human capital (for human capital we use the proxy of employment in organised sector) and the residual, commonly called total factor productivity and described as 'zone of ignorance' by Abramovitz (1956). However, an arithmetical decomposition of the residual term is not attempted. For analysis of sources of growth,

growth accounting method is used. In this Chapter, we briefly describe growth accounting and related concepts, survey the findings of some studies on sources of growth in the international and Indian context, compute productivity' s share in the growth rates and analyse the results.

3.2 Growth Accounting and Related Concepts

The main concepts used for analysis of sources of growth are growth accounting and Total Factor Productivity (TFP). We define these terms briefly in this sub- section.

A) Growth Accounting

Growth Accounting refers to allocation of growth rates of national output or output per person employed, among the sources of output that changed and caused growth. It is a way to organise quantitative information in a convenient way. Sources of growth estimates are used to explain changes in growth rates from period to period. Growth accounting starts by recognising that many different determinants govern the size of a country's output at any time and that changes in these determinants cause changes in output or growth. (Palgrave 1987)[1]. In the growth accounting exercise, we disentangle the share of growth of Total Factor Inputs (TFIs) like labour and capital from that of the increases in output per unit of input or efficiency in use of the factor inputs.

B) Productivity

Factor productivity is the measure of efficiency in production of land, labour and capital, separately or together, unit quantities of mixes of various commodity inputs or financial expenditures or investments (Palgrave 1987).

C) Total Factor Productivity (TFP)

The core of the analysis in growth accounting is the determination of the contributions of the labour and capital to the growth of output. That part of growth still unaccounted is alternatively described as technical progress, our ignorance, increased efficiency or Total Factor Productivity (Palgrave 1987). To state otherwise, the share of increase in output per unit or efficiency in use of the factor inputs is called Total Factor

[1] Note the use of the word 'determinants' by Dennison in Palgrave dictionary. In our study, we term these as sources, as we specifically distinguish between sources and determinants, as clarified in Chapter 1. But some like the one mentioned here use these words interchangeably.

Productivity (TFP). There are different methods for measuring increases in productivity, which we discuss later in this Chapter.

Before outlining the methodologies for estimation of TFP Growth (TFPG), let us briefly examine the classical and neo-classical views on productivity and the relevance of the residual component (measured as the TFPG) in the neo-classical framework.

3.2.1 Productivity: Classical and Neo-classical Views

In the classical system, we include the Physiocrats, Adam Smith, David Ricardo and J.S. Mill. We discuss Marx separately. The classical school perceives various sectors of the economy as productive and non-productive and favours the sectors, which are considered productive. Let us briefly examine the views of the different classical schools on this subject.

a) Classical Views

The Physiocratic School considered the agricultural sector as productive and the manufacturing sector as sterile. Manufacturing at that time was considered largely as luxury goods production and a drag on the productive sector. Smith considered manufacturing also as productive and referred to three main sources of productivity improvement 1) improvements in machinery facilitating and abridging labour 2) alterations in employment in favour of productive employment and 3) increasing returns of greater division of labour. Smith had noted that improvements involve a saving in labour, but the division of labour improved skill and dexterity of the workers, economised on production time and helped to originate productive improvements and innovations.

Ricardo widened the concept of productive activities to include all the wage goods, which were directly or indirectly necessary for the subsistence and work performance of labour. He considered the national product as consisting of depreciation provision for machinery and tools, replacement provision for circulating capital and conventionally necessary wages for employed labour and profits. As accumulation proceeded, the rate of profits goes on falling due to diminishing returns and the relative share of depreciation and wages with the share of output going up. The accumulation would then come to a stop at the stationary state. The law of diminishing returns,

which led to stationary state could be checked only by technical improvements in input output ratios of wage goods production (Brahmananda 1982:1-10).

b) Marx's Views

Marx enlarged the scope of productive activities to include not only wage goods as Ricardo, but also the tools and instruments which were involved in their manufacture. Marx visualised competitive capitalism in which each entrepreneur under competitive pressure adopted profit maximising technology. This fact lies behind the technologically progressive character of capitalist production. Individual entrepreneurs adopted profitable technologies. The adoption of these technologies raised labour productivity and real wages as a consequence. If technological change took "Marx biased form", there would be a fall in profit rate[2]. Capitalists could avoid this outcome only through an agreement, that is, not to pursue their individual self-interests by pursuing profit maximising technical change. This is described as fallacy of composition. (Foley and Michl 1999).

c) Problem of Apportionment of Shares to the Factors of Production in the Classical School

Having described briefly, the classical and Marxian views on productive sectors and technological improvements, let us turn to the issue of apportionment of shares to land, labour and capital. There is no effort in the classical school to apportion intrinsically these shares. The actual shares of the product depend on differential rents for factors of production, like differences in expenses of production at the final dose of the product, average expenses per product et cetera. For wages depend on trade union bargaining and profits, on society's conventions concerning how much of the surplus should be ploughed back into accumulation. Production is a flow occurring during an annual period as a result of application of labour to raw materials and goods-in –process. If we take out depreciation and stock- replacement provisions, we get the product-added during the year. Though the classical economists consider production as a result of co-operation among the three agents (land, labour and capital), they recognised that there was no way by which, the quantities of the three

[2] Marx described the tendency of profits to fall due to increase in organic composition of capital. For a discussion and critique, see Sweezy (1964).

could be combined. For an explanation of this, let us briefly examine the neo-classical views.

d) Neo-classical Views on Productivity

Neo- classicals or marginalists as they are called, viewed the object of production as not production itself, but the satisfaction of consumption wants. The three different agents of production would get precise reward rates, depending on the potential scope for substitution in the consumption and methods of production. The postulate of scope of variation in mixes of consumption goods and methods of production in an ordered manner yields a determinate theory of distribution based on marginal productivity. For all the three factors, variability at the margin, keeping the other two fixed could yield their marginal products. With the output indices available for the economy, the weights based on relative distribution shares of the input factors (which by assumption is equal to the marginal productivity) offering a way of combining the factors, a measure of productivity change for the total of all the three factors becomes possible. This is commonly described as Total Factor Productivity (TFP).

3.2.2 Measurement of TFP: Alternative Methods

Having found that using the assumptions in the neo-classical framework like 1) complete exogenous and neutral technology 2) factors of production receiving rewards equal to their marginal products and 3) elasticity of substitution among factors equal to unity, it is possible to combine the factors of production using distributional weights, that is, the factor income shares, which equal their respective contributions, we can attempt measuring the increase in output per unit or total factor productivity using alternate methods.

a) Kendrick's Method

This method measures the levels of Total Factor Productivity rather than its growth rate. In this method, it is a ratio of actual output to the output, which would have resulted from increased inputs in the absence of technological change.

$$A_t = \frac{Y_t}{w_o L_t + r_o K_t}$$

Where A_t is the technological change, Y_t is the actual output and W_0 and r_0 are base year share of capital and labour income and L and K are labour and capital[3].

b) Solow's Residual

This method measures the growth rate of total factor productivity. This has been used to measure growth of productivity in the studies by Dennison (1974) and Dholokia (1974). Labour and capital enter as arguments in the production function along with technological change over time. The technological change and savings are exogenous. The production function can be described as X= F (K, N, T), Where X is the output, K is capital and N is labour and T is technical change over time. Increase in output per capita is described by the equation below:

$$\frac{\Delta X}{X} = \frac{F_k K}{X}\frac{\Delta K}{K} + \frac{F_n N}{X}\frac{\Delta N}{N} + \frac{F_T}{X} \quad \text{.....(4)}$$

Where F_k and F_N is marginal product of capital and labour respectively and F_T is technological progress overtime. This can be rewritten as below

$$g_x = \left(\frac{F_k K}{X}\right) g_k + \left(\frac{F_N N}{X}\right) g_n + \frac{F_T}{X} \quad \text{.....(5)}$$

The term on the right hand side is growth rate of output and the first and second terms in the left hand side are growth rates of capital and labour adjusted by the share of profit and share of labour (the assumption is that share of profit and labour together exhaust the output). The last term on the right hand side is the residual, which represents, the increase in output per unit of input or Total Factor Productivity Growth (TFPG). This is the residual after deducting from the per capita growth rate, the weighted growth rates of factor inputs like labour and capital. The weights are the factor income shares, which by assumption is the contribution of the respective factors. Denoting share of profit by $\prod$ and share of Labour by $(1-\prod)$, equation (5) can be rewritten as

$$g_x = \prod g_k + (1 - \prod) g_n + F_T \quad \text{.....(6)}$$

While the Kendrick index measures TFP at levels, the Solow Residual measures the growth rate of TFP (or TFPG).

[3] For a discussion, see Goldar (1986).

c) Surplus-Output Ratio Method

If we deduct the conventionally or normally necessary wage for subsistence performance of work from the output, we get the surplus. If surplus is divided by the capital, we get the surplus ratio. The wage rate of the initial year can be taken as a proxy for the conventional wage rate.

$S=Y-W_c$ where S is the Surplus, Y is the output and W_c is the conventional wage. Surplus ratio is the ratio of surplus and capital $S_r = S/K$. where S_r and K are surplus ratio and capital respectively. The surplus can be used for accumulation and also partly for improving real wages. The economy's productivity level is measured by the magnitude of the surplus. The use of surplus concept links productivity analysis to Physiocratic, Classical and Marxian theory (Brahmananda 1982).

3.2.3 Relevance of Growth Accounting: Distinguishing the Classical and Neo-classical Perspectives

Foley and Michl (1999) have described the necessity of growth accounting in the neo-classical framework and its irrelevance in the classical framework. The new technique of production is as (P', x') where P' is capital productivity and x' is gross output per worker or labour productivity. The expected rate of profit is

$$V^e = (1-w/x')\, p', \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where $x' = (1+\gamma)\, x$ and $p'=(1+\chi)\, p$ where γ and χ are labour augmenting and capital augmenting technical change respectively. Taking wage share as $w=(1-\Pi)\, x$ we can derive the expected rate of profit as

$$V^e = p\,(1+\chi)(\gamma+\Pi)/1+\gamma\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Whereas the prevailing rate of profit is $V=\Pi p$. When expected rate of profit is greater than the prevailing rate of profit ($p\,(1+\chi)(\gamma+\Pi)/1+\gamma, > \Pi p$), that is, when Π is less than $\gamma(1+\chi))/\gamma-\chi$, technical change that saves labour but requires more capital will be profitable, if labour costs constitute a sufficiently large proportion of total cost. In the classical framework the viability condition between the expected rate of profit and the prevailing rate of profit is satisfied as an inequality and this distinguishes this from the neo-classical theory, where this is an equality. Herein comes the significance of

growth accounting in neo-classical perspective and its irrelevance from the classical perspective. From the classical perspective, Solow residual appears to be a device for explaining the discrepancy between viability coefficient and the profit share, because in the neo-classical view viability condition is recalculated as equality. The classical model, however, dispenses with the need for Solow residual to interpret macroeconomic data, by attributing all the growth in labour productivity to technical change. In other words, classical model assumes that its technical change patterns are identical to the measured increases in capital and labour productivity [$\chi = g(p)$ and $\gamma = g(x)$]. Contrary to that, in the neo-classical model labour productivity, $g(x) = \Pi gk + \gamma$ that is, capital intensity and a factor.

To state in brief, it is the recalculation of the viability condition that makes the necessity for the Solow residual in growth accounting in the neo-classical theory. Another major difference between the classical and neo-classical approaches is the treatment of capital. The classical theory regards capital as a social relationship between two classes, the owners of wealth (the actual capital goods) and the direct producers, workers. It regards profit as a form of the social surplus appropriated by the capitalists through the capitalist property relations. The neo-classical theory, with its essentially harmonious vision of the economy, imputes a definitive productive contribution to capital as well as to labour. It explains profit and wage symmetrically, as the equilibrium of supply and demand in the capital and labour markets. (Foley and Michl 1999:124-125). It is in this neo-classical production function framework that the growth accounting exercises are normally done.

3.3 Review of Studies on TFP Measurement

International context

The following are a few important empirical studies done in the measurement of productivity of factors at the aggregate economy level. Dennison (1974), Dholokia (1974, 2002) Mankiw, Romer and Weil (1992), Young (1995), Klenow and Rodriguez (1997), Bernanke and Gurkaynak (2001) Jorgenson and Stiroch (2002) and Kohli (2003).

Dennison (1974), Jorgenson and Stiroch (2002) and Kohli (2003) focus on the U.S. economy and Young's (1995) study focuses on East Asian economies. Dholokia

(1974,2002) are studies of the Indian economy. Klenow and Rodriguez (1997) and Bernanke and Gurkaynak (2001)' s studies are critical examination of Young's study and Solow model respectively. Mixed evidence has emerged from these studies. Let us first briefly discuss the study of Denison (1974).

Table 3.1
Sources of Growth of the U.S. Economy, 1929-1969: Dennison's Estimations

Sources of Growth	Growth rate per year (%)
I. Total Factor Input (TFI) a+b	1.18
a) Labour	0.89
b) Capital	0.29
II Output per Unit of Input c+d+e	1.58
c) Advances in Knowledge and not else where classified	0.92
d) Improved Resource Allocation	0.30
e) Economies of Scale	0.36
III) National Income (I+II)	2.76

Source: Dennison (1974:340 Table R-5)

The most significant finding of Dennison's study was that no single critical source of real income growth could be identified. In the cross-country study of Mankiw et al (1992), human capital was included in the total factor inputs and the productivity measured as a residual. In effect the Solow model was augmented. In this study secondary enrolment rate was used as a proxy for human capital and it was found that when physical capital was augmented by human capital, it explained 78 percent of the growth as against 58 percent in Solow model, when only physical capital was used.

Young (1995) found the relatively insignificant contribution of Productivity growth to the growth rate of East Asian economies. He also found that factor accumulation explained the extraordinary post war growth of Hong Kong, Singapore, South Korea and Taiwan. The study concluded that, while the growth of output and manufacturing exports in the newly industrialising countries of East Asia had been virtually unprecedented, the growth of total factor productivity in these economies was not. Klenow and Rodriguez (1997) called into question the findings of Young (1995) and found that productivity explained a much larger part of growth. By stating that Y/L, that is, the per capita output per labour was the variable of interest, and by adjusting TFP by a factor of 1/(1-capital share), to take care of the effects of TFP on capital accumulation,

they found that productivity accounted for a large part of growth of per capita output[4] in East Asian countries.

Another recent study by Bernanke and Gurkaynak (2001) examined the validity of the Solow's model and found in their cross- country growth accounting exercise that the saving rate and the growth rate of labour force were correlated with estimated TFP growth. This finding was inconsistent with the standard Solow model, even if we do not assume steady states, according to the study. In their study, they raised the question whether the growth rates of TFP were independent of variables such as the savings rate, schooling rate or labour force growth rate. They found that whether we included human capital or not, the TFP growth was cross sectionally strongly correlated (in both economic and statistical senses) to the savings rate and in most cases with the growth rate of the labour force. When both savings rate and schooling rate were included in the regression, the coefficient on the schooling rate tended to become statistically insignificant. Further as might be expected, when labour force was adjusted for human capital accumulation, the effect of the schooling variable is reduced. To state in brief, Bernanke and Gurkaynak (2001) found that there was economic and statistically significant relationship between the coefficients of total factor inputs and the residual estimated, which we call the Total Factor Productivity (TFP)[5]. Caselli and Romer (2001), while discussing the study of Bernanke and Gurkaynak (2001) cited above, considered these points and Romer used instrumental variable method to evaluate the findings regarding correlation of the residual with the coefficients of factor inputs. Externalities from capital were suggested the reason for this correlation by Caselli and Romer (2001), but there was no clear way to interpret the magnitude.

Jorgenson and Stiroch (2002) analysed the sources of growth for the U.S. economy for the period 1973-1998 and found that the Total Factor Productivity rose from an average rate of 0.33 percent in 1973-1990 to 0.36 percent in 1990-95 to 0.99 percent per year during 1995-98. This jump has been characterised as a major source of growth in output and average labour productivity. This increase in TFP was attributed

[4] Per capita output is total output divided by the labour force, that is, output per worker.
[5] This in effect is the error term being correlated with the regressors, rendering OLS estimators biased.

to technical change in the production of computes and the resulting acceleration in the price decline of computers.

Kohli (2003) attempted a decomposition of GDP of U.S.A for the time period 1948-1998, into five component outputs, viz. Consumption, Investments, Government Purchases, Exports and Imports. Imports were considered as negative outputs. During the period of study, GDP grew at 7.2 percent and the component outputs at 2.2,0.6, 0.6, and 0.4 and –0.5 respectively, adding to 3.3 percent. Increases in GDP were largest in the 1970s, when factor payments were largest. Total Factor Productivity Growth was highest in the 1950s and the1960s, declined dramatically in the 1970s, but increased in recent years.

Having surveyed some of the cross-country and country-specific studies on sources of growth, we now come to certain specific studies regarding China and India on sources of growth over time. We first review the recent literature on this, in the case of China, a country, though having many differences with India, has one striking similarity, that is, in taking a gradual road to market reforms.

Studies on China

In a study by Zulu and Khan (1997), using Divisia index and trans-log production function, it was found that of the sources of growth, total factor productivity had increased after 1978, that is, the post- reform period in contrast with the pre- reform period (1952-1978). This was so even when politically unstable periods of the pre-reform period were excluded. Wang and Yudong (2001) critically reviewed this study for not including human capital. However, both the studies for China, the one including human capital and the other excluding it in the total factor inputs reached more or less the same conclusions. Zulu and Khan (1997) found that the share of productivity increased to 41.6 percent in the period 1979-94 as compared to 18.0 percent for the period 1952-78. The argument in the study was that since the initiation of economic reforms, productivity growth had become a more significant force in driving the Chinese economy. The conclusion of Borensztein and Ostry (cited in Zulu and Khan 1997: 121) was that once the political turbulence of pre-reform China was taken into consideration, the difference in the growth rates of GDP per worker in the pre- reform and post- reform periods would become less dramatic. The study also

found that once the politically disruptive years from 1958 to 1970 were excluded, the growth rate in output per employee was 4.5 percent in the pre-reform period, rather than, 3.8 percent. Nevertheless the TFP growth rate excluding the politically disruptive years, in pre-reform period amounted to 1.6 percent, only marginally higher than the TFP growth for the entire pre-reform period at 1.1 percent. The study by Zulu and Kahn attributed this to the fact that politically stable years were also years of high investment.

However Wang and Yudong (2001) found that the TFP growth rates were always negative in the pre- reform period 1953-77, using alternative labour shares of 0.67, 0.60 and 0.40. It was positive for the post- reform period 1978-99. The following Tables illustrate the findings of the studies by Wang and Yudong and Zulu and Khan respectively.

Table 3.2A
China's TFPG: Pre- and Post-Reform

Alternative Labour Shares	Pre- Reform period 1953-77 TFP growth rate (%)	Post – Reform period 1978-99. TFP growth rate (%)
0.67	-0.87	2.98
0.60	-0.74	2.72
0.40	-0.38	1.92

Source: Wang and Yudong (2001:16: Table2)

Table 3.2B
China's TFPG: Pre- and Post-Reform

Alternative Labour Shares	Pre- Reform period 1953-78 TFP growth rate (%)	Post – Reform period 1978-99. TFP growth rate (%)
0.30	0.7	3.2
0.50	1.1	3.7
0.60	1.8	4.6

Source: Zulu and Khan (1997:125: Table 10)

Studies on India

Studies so far made in India on the sources of growth mainly relate to the manufacturing sector [6] and for the aggregate economy, only a few studies, which we discuss below, appear to have been made. One of the early studies was by Dholokia (1974) for the time period 1948-49 to 1968-69. There was a later study by Dholokia in 2002, for the time period 1960-2000. Brahmananda (1982) examined productivity of the entire economy

[6] For details of citations. See RBI (2000-01: III-35).

and its sectors for the period 1950-51 to 1980-81. Mohanty (1992) analysed the sources of economic growth at the aggregate level for the period 1970-71 to 1988-89.

Dholokia (1974) calculated TFPG for the period 1948-49 to 1968-69 and various sub-periods from 1948-49 to1968-69. For the whole period, the real Net national Product (NNP) grew at 3.24 percent and the total factor inputs grew at 2.32 percent, leaving the residual (TFPG) at 0.92 percent. For the various sub- periods the growth percent per annum of the residual is given in the table below:

Table 3.3
TFPG Estimates for India: 1948-49 to 1968-69 (% Per annum)

Year	Real NNP growth	TFI	TFP
1948-49 to 1954-55	2.59	1.67	0.92
1954-55 to 1960-61	3.97	2.42	1.55
1960-61 to 1968-69	3.18	2.74	0.44
1948-49 to 1968-69	3.24	2.32	0.92

Source: Dholokia (1974 Table VI-2: 206)

The study stated that the differences observed in the sizes of the residual between different sub-periods were due to differences in either the intensity of resource utilisation or the effect of weather on farm output, both of which affect the measured national income to a much greater extent than the measured factor input, when the measure of capital input did not take into account the cyclical differences in the intensity of utilisation of capital stock. A prediction that national income would grow at 4.08 percent during the period 1968-69 to 1980-81, out of which 3.0 percent by Total Factor Inputs and 1.08 percent would be contributed by Total Factor Productivity was made in the study.

Brahmananda (1982) in the concluding remarks of his study for the period 1960-61 to1980-81, predicted a fall in productivity in the future and described the 1970s as a decade of productivity fade out. In this study, productivity was measured by the surplus ratio method. The study estimated the TFPG for the decades of 1950s and 1960s at 1.72 and 1.83 percent per annum respectively. But during the 1970s it declined to 0.47 percent per annum. The reasoning given by him for the productivity fade out in the 1970s and prediction of low future productivity was the declining proportion of surplus to the national product[7].

[7] Elaborate reasons have been given in Brahmananda (1982:208-231) for the probable causes of productivity fade out in India during the 1970s.

Mohanty (1992) examined the TFP growth rates using the elasticities of the Cobb-Douglas model. The estimates indicated that there was no contribution of TFP growth to the growth of the economy during the period 1970-71 to 1988-89. The study calculated TFP for the sub- sectors, and found that the number of sub- sectors showing negative TFP growth rate declined from seven during the 1970s to five during the 1980s. Using the exponential growth model, it was seen that the growth of TFP growth rate during the period 1973 to 1988 was not statistically significant. RBI (2000) found that there had been an improvement in the TFPG since the 1980s. The study used the regression method for estimating the TFPG for the period 1982-83 to 1999-2000.[8] Dholokia (2002) found that since 1985,[9] growth had been accelerating and there was a distinct improvement in the contribution of total factor productivity growth in the latter period[10].

On an examination of four studies, we find that they have reached different conclusions regarding the Total Factor Productivity Growth (TFPG). Since it is measured as only a residual, we can get different estimates and there is room for competing hypotheses. It should be noted that when we accept the notion of marginal products being equal to factor income shares, there is scope for variation of the residual, which we measure as Total Factor Productivity Growth (TFPG), depending on the different estimates of factor income shares,

3.3.1 Gaps in Literature on Growth Accounting for Aggregate Economy: Indian Case

The studies, which, we reviewed here, have certain gaps, which are summarised below.

1) Dholokia (2002) has not considered human capital
2) Mohanty (1992) has used ordinary least squares (OLS) to estimate factor shares. Since variables like capital stock and aggregate growth are likely to be non-

[8] Since there is problem of non-stationarity and structural break, the study avoided using the earlier period. It has perhaps considered the period from 1982-83 to 1999-2000 as having no structural break in the variables like growth rate of output.
[9] The time period of the study was 1960 to 2000.
[10] The study divides the time period of 1960-61 to 2000 into two sub periods 1960-61 to 1985 and 1985 to 2000.

stationary over time[11], the estimates of OLS will be biased. Testing for unit roots has not been done. Even if tests for unit roots are carried out (Using Augmented Dicky-Fuller tests), structural breaks can make stationary variables appear non-stationary.

3) In the Reserve Bank of India Annual Report 2001, the period of study has been truncated to 1982-2000, probably due to the problems in estimation of coefficients due to presence of structural break in the variables and unit root test failing to give a correct indication regarding stationarity[12].

3.4 Growth Accounting for 1973-74 to 1999-2000

An exercise of growth accounting for the Indian economy for the period 1973-74 to 1999-2000 is done in this sub-section. Here, we estimate share of total factor inputs-capital and labour in the aggregate growth rate and attribute the residual to increase in output per unit or total factor productivity growth. As stated earlier, we are not attempting a break up of the sources normally treated as the residual. The residual we compute will include all the effects separately analysed by Dennison (1974) and Dholokia (1974, 2002). A number of sources of growth including, improvements in resource allocation, (that is, movement of labour away from low productive farm and non- farm self-employment to productive sectors), economies of scale, knowledge effects, fluctuation due to weather effects on farm output, intensity of utilisation of resources due to demand pressures, work stoppages and labour disputes were identified by Dennison (1974).

Measurement of Growth Rates of Factor Inputs

In our study, land has not been included as a separate factor. The reason is that there are problems in measurement of factor income for land. Rent is usually taken as the return to land. But from the CSO's published data, we are not able to get this because, the rent given is inclusive of rent to machinery, capital goods et cetera. taken on hire. Even estimating a crude measure of the return to the factor land is difficult. In view of this we are limiting the total factor inputs to labour and capital. The latter includes land.

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[11] In our study, as we shall see later, the results of the Augmented Dickey Fuller (ADF) tests fail to reject the null hypothesis of existence of unit roots in natural log transformations of NDP and NFCS.

[12] ADF tests fail in the case of a structural break. Peron's test will have to be used. See Peron (1989) for a discussion.

We need to measure growth rate of capital stock, labour force and the aggregate growth rate. As a measure of capital stock, we use the Net Fixed Capital Stock (NFCS) at constant prices computed using the perpetual inventory method. This is taken from various issues of National Accounts Statistics published by the Central Statistical Organisation.

Next we need the measure of labour force. The problem encountered here is that year-wise data of aggregate employment is not available. Only quiquennial data from the National Sample Survey Organisation are available. Though NSSO thin rounds have published annual figures, they are only since 1986 and for obvious reasons have been found to be not comparable with the quinquennial data[13]. This forces us to estimate the employment figures for the intervening years, using available data under certain reasonable assumptions. It should be noted that, when the estimates of factor growth rates or factor income shares from different methods vary, the TFP measured as the residual can also vary. The quinquennial sample figures of employment from the NSSO are available for 1972-73, 1977-78, 1983, 1987-88, 1993-94 and 1999-2000. The year- wise population figures are available from the CSO's National Accounts Statistics. Worker- Population ratios for the quinquennial years were computed from these published data, and they were observed to be more or less stable at 42 percent, (41 percent for 1988 to 1993-94), except for 1999-2000, when it has declined to 40 percent.[14] NSSO No.442 (paragraph 3.4.1.1) reports that Worker Population Ratios (WPR) for rural and urban, at the all India level, had generally remained stable. The following table illustrates the quinquennial worker population ratios.

Table 3.4
Worker Population Ratios: 1972-73 to 1999-2000

Year	Population (Millions)	Employment (Millions)	Worker-Population Ratio (WPR)
1972-73	567	236	0.42
1977-78	634	269	0.42
1983	723	302	0.42
1987-88	788	324	0.41
1993-94	891	375	0.42
1999-2000	991	397	0.40

Source: Computed from CSO National Accounts Statistics, NSSO quinquennial reports, various issues.

[13] See Dehspande and Deshpande (1998) for reasons of non-comparability between thin rounds and quinquennial rounds.

[14] There are competing views on the reasons for the decline in the WPR in the period 1993-94 to 1999-2000. For a detailed discussion, see Kumar and Sharma (2001).

For the intervening years from 1993-94 to 1999, we assume a gradual decline in the WPR for estimation. For other intervening years the Worker-Population Ratio is stable, and it is assumed to be that of the ending quinquennial year[15]. (Appendix Table 3.1A). Other alternatives for estimating employment figures for the intervening years are:

1) To estimate using growth rates for the intervening years,
2) To estimate aggregate employment from the yearly data available for the organised sector employment, using the ratio for the quinquennial years,
3) To compare the data from the thin rounds and quinquennial rounds of the NSSO.

The last method is unacceptable, as stated earlier and the method of growth rates will necessitate the assumption of employment growing at constant rates in the intervening years. The yet another alternative method is to estimate aggregate employment figures from the yearly figures available for organised employment. The organised sector employment has been 7 to 8 percent of the aggregate employment. But exact year-wise percentage are not available and even a minor change of 1 percent can result in large deviations. Considering these facts, estimation of aggregate employment for the intervening years using worker population ratios appears to be better among the possible approximations.

From the above information we can compute the growth rates of the factor inputs capital and labour. The yearly growth rate of Net Domestic Product (NDP) at factor cost at constant prices can also be computed, from the data is available in CSO's National Accounts Statistics[16].

We now need factor income shares, which act as the yearly weights of the growth rate of capital stock and labour in the estimates of their contribution to NDP. Before proceeding to the estimation aspects of factor income, let us briefly describe the terms related to factor income.

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[15] The WPR is the same except for the period 1983- 1987-88. For intervening years in this period, it is assumed as 0.41.

[16] We use Net Domestic Product instead of Gross Domestic product for compatibility, since we have used the Net Fixed Capital Stock as the measure of capital.

Classification of Factor Incomes: Indian Context

The various factors of production, capital, labour et cetera. receive a share of the output as remuneration for their contribution and these are described as factor incomes. The factor income received by capital is termed as Operating Surplus (OS) and that received by labour is Compensation to Employees (CE). In the Indian context, since there is a large presence of unorganised or informal sector, a sizeable proportion of factor incomes fall in the category of Mixed Income (MI).

From the Operating Surplus, some portion is paid out as rent for the use of land and machinery, interest for borrowed funds and the rest pertaining to entrepreneurship, which, is distributed as dividend or retained for further investment. Compensation of Employees (CE) includes all payments by resident producers of wages and salaries in cash or kind and of contributions paid or imputed in respect of social security schemes and to private pension, family allowance and similar schemes. It also includes salary and wage payments in the unorganised sector. The Mixed Income consists of wage income of own account workers and profits and dividends of unincorporated enterprises. This consists of an element of wage/salary remuneration for the work done by the owner of the enterprise or members of the same households as well as surplus accruing from production. It is 47 percent of the Net Domestic Product (NDP) at factor cost and 79 percent of the factor payment in unorganised sector. (The definitions and the comments are from CMIE, January 2003:311-312).

3.4.1 Apportionment of Mixed Income: Two Methods of Estimation

The factor incomes are available in the National Accounts Statistics, published by the Central Statistical Organisation (CSO). The break-up of factor incomes given is Compensation of Employees (CE), Operating Surplus/Mixed income (OS/MI) for both organised and unorganised sectors, after 1985. Prior to that the break up of Operating Surplus (interest, rents, profits and dividends) used to be published and the entire mixed income was treated as being generated in the unorganised sector. The problem we encounter here is to apportion the Mixed Income between Compensation of Employees and Operating Surplus. Bifurcation of Mixed Income into Compensation of Employees and Operating Surplus for the period of our study is done

using two alternative methods. The second method is used as a sensitivity analysis for the estimates derived from the first method.

1. Pre-1985:- Compute the proportion of reported CE to NDP. Use that proportion to compute the share of CE in Mixed Income. The balance is treated as OS component of Mixed Income. Add these figures to the reported CE and OS to get the total figures of CE and OS, which would include the respective portions apportioned out of Mixed Income.

2. Post-1985:- As stated earlier, the break up of OS is not published but OS and MI together are published for this period. Here we assume that the entire Mixed Income is from the unorganised sector[17] that is we treat the reported OS/MI figures of unorganised sector as MI. Then using the proportion of reported CE in NDP, we apportion MI into CE and OS components and arrive at the total CE and OS figures. (Estimation in 1 and 2 is hereafter referred to as Method-I)

3. As an alternative method, we deduct MI [18] from NDP and arrive at the CE and OS as proportions to the NDP-MI. Then we apportion MI into CE and OS in the proportions obtained. This alternative is done as a sensitivity analysis for the residual. (Estimation in 3, is hereafter referred to as Method-II)

We need the factor income shares as proportions of the labour income and capital income at constant prices to Net Domestic Product (NDP) at constant prices. Since the CE and OS obtained are in current prices, we estimate OS at constant prices using the deflator for Gross Fixed Capital Formation and take CE at constant prices after deducting OS at constant prices from NDP at constant prices[19].

Decomposition of Growth into Sources.

Let us denote the factor income shares of capital and labour obtained as α_K and α_L respectively. Let capital and labour growth rates be denoted by Kgr and Lgr

[17] This is not an unrealistic assumption because a substantial part of the mixed income is in the unorganised sector. Moreover, the CSO, prior to 1985 used to classify the entire mixed income in the unorganised sector only.

[18] As stated earlier, OS/MI of unorganised sector is treated as MI for the post-1985 period.

[19] The assumption is that OS and CE together exhaust the Net Domestic Product (NDP).

respectively. Denoting overall growth rate as Ggr, we get the equation of growth accounting as Ggr = α_K Kgr + α_L Lgr + Tgr, where Tgr is the residual commonly called the Total Factor Productivity Growth (TFPG). The coefficients α_K, α_L and Tgr can be obtained either through the process of estimation discussed above or by the regression method. Let us now discuss the estimation of factor income shares and TFPG through the regression method.

3.4.2 Examination of Sources of Growth in India: 1973-74 to 1999-2000

A) The Regression Method

In this method, we are dealing with economic variables over time, which are likely to be non-stationary. Yet another problem is the possible the presence of a structural break, which can give misleading results in unit root tests. Here we have three variables: the growth rate of Net Domestic Product (NDP) at factor cost at constant prices as the dependent variable and the growth rate of Net Fixed Capital Stock (NFCS, measured by Perpetual Inventory Method) and growth rate of employment as independent variables.

When we test these variables, for unit roots using Augmented Dickey Fuller (ADF) tests, we find that the variable NFCS is having unit root at the first difference, where as the others are stationary at first difference. To state in other words, NDP and Employment are I (1) processes, stationary at first difference, while NFCS is stationary at second difference, an I (2) process.

Table 3.5
ADF Test Results (with constant and Trend)

Variable	ADF Statistic
NDP Growth Rate	-4.7787**
Employment Growth Rate	-4.0207*
NFCS Growth Rate	-2.2987
DDNFCS	-3.8257*

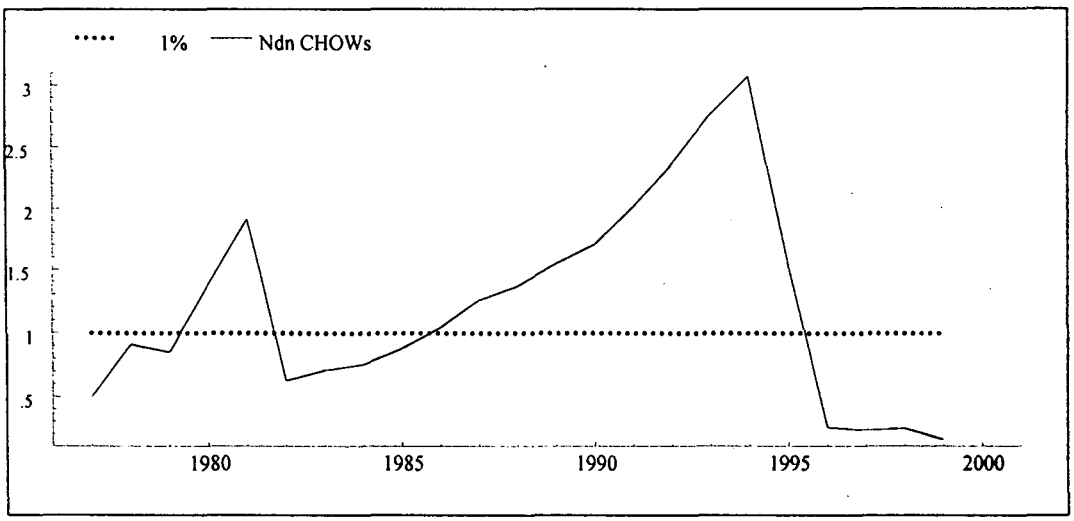
Note: Critical Values at 5 percent level = -3.622, 1 percent level = -4.417, * significant at 5 percent level, ** is significant at 1 percent level. DDNFCS is the second difference of NFCS. The growth rates are logarithmic first differences.

Since the variables are of different order of integration, we cannot combine them in a co-integrating relation and estimate the coefficients, which will be the factor income shares. Here one more aspect has to be considered. Of the three variables, NDP and

Employment are not having structural breaks (when analysed using the Chow's test), but NFCS is having structural break at 1 percent level of significance. (Figure 3.1). It is quite possible that the structural break in NFCS is appearing as a unit root.[20]

Figure 3.1

Result of Chow's Test for Structural Break in NFCS: 1973-74 to 1999-2000



We now proceed with the alternative method of growth accounting and measure TFPG as the residual after accounting for the increases in capital and labour, weighted by their average of factor incomes for consecutive years. We attempt this exercise by excluding and including human capital as a Total Factor Input (TFI). One additional limitation in the growth accounting method is that we have to assume constant returns to scale, whereas this is not necessary in the regression method.

B) Growth Accounting: TFI and TFP Growth Rates: 1973-74 to 1999-2000

i) Without Human capital

The Tables 3.6 and 3.7 show the factor income shares, TFP growth rate, growth rate of output, labour and capital, adjusted by average of factor income shares using Method-I and Method-II.

[20] Peron's test for unit root can detect a structural break. However, we are not attempting this here.

Table 3.6
Growth Rates of TFPG and Factor Inputs-1

YEAR	NDP	NFCS	Employment	Labour share	Capital share	Adjusted Employment Growth Rate	Adjusted Capital Growth Rate	TFPG
1973-74	4.54	3.84	3.28	0.60	0.40	1.93	1.59	1.03
1974-75	0.85	3.35	2.24	0.58	0.42	1.31	1.40	-1.85
1975-76	9.38	2.95	2.36	0.59	0.41	1.35	1.26	6.77
1976-77	0.85	3.65	2.14	0.55	0.45	1.20	1.60	-1.95
1977-78	7.72	3.63	3.24	0.57	0.43	1.90	1.50	4.32
1978-79	5.48	3.72	1.41	0.60	0.40	0.85	1.48	3.15
1979-80	-6.22	4.19	2.47	0.61	0.39	1.52	1.61	-9.35
1980-81	7.34	3.67	2.26	0.62	0.38	1.40	1.40	4.54
1981-82	6.34	3.99	1.91	0.61	0.39	1.22	1.44	3.67
1982-83	2.52	5.94	2.31	0.67	0.33	1.48	2.14	-1.10
1983-84	7.59	4.74	1.32	0.61	0.39	0.83	1.77	5.00
1984-85	4.56	4.10	1.41	0.64	0.36	0.86	1.59	2.10
1985-86	4.47	4.03	2.17	0.58	0.42	1.36	1.50	1.61
1986-87	3.88	4.07	2.12	0.68	0.32	1.43	1.32	1.13
1987-88	3.12	4.29	1.40	0.67	0.33	0.94	1.41	0.77
1988-89	11.22	3.72	3.36	0.67	0.33	2.27	1.21	7.74
1989-90	6.48	3.84	2.11	0.68	0.32	1.42	1.26	3.80
1990-91	5.23	3.73	2.07	0.66	0.34	1.36	1.28	2.59
1991-92	0.95	4.31	2.03	0.66	0.34	1.33	1.47	-1.86
1992-93	4.35	4.52	1.87	0.66	0.34	1.14	1.76	1.45
1993-94	5.94	4.02	3.37	0.56	0.44	1.88	1.78	2.29
1994-95	6.86	3.68	1.45	0.55	0.45	0.82	1.62	4.42
1995-96	7.07	6.58	0.39	0.57	0.43	0.21	2.94	3.92
1996-97	7.47	8.03	1.48	0.54	0.46	0.81	3.64	3.02
1997-98	4.80	6.93	1.45	0.55	0.45	0.78	3.18	0.83
1998-99	6.81	5.64	0.18	0.53	0.47	0.10	2.54	4.17
1999-2000	6.47	4.84	0.79	0.51	0.49	0.45	2.08	3.94

Source: Computed from data published by Central Statistical Organisation (CSO) and National Sample Survey Organisation (NSSO) using Methodology explained in the text.

Note: I indicates that the factor income shares are computed using Method-I described earlier. Adjusted Growth rates = Growth rate *times* Average of Factor shares.

The Karl Pearson's Correlation Coefficient between the TFP growth rates using Method-I and Method-II is 0.98, indicating a very high correlation and very little variation in TFP growth rates computed from the two methods. The sensitivity analysis shows that the estimation of factor income shares using two different methods has not affected the computation of TFPG. Hence we will use the factor income shares estimated using of Method-I for computing TFPG by including Human Capital as one of the factor inputs. The Table 3.7 below gives the computation of TFPG using factor income shares estimated by Method-II.

Table 3.7
Growth Rate of TFPG and Factor Inputs-2

YEAR	NDP	NFCS	EMP	Capital Income Share	Labour Income Share	Adjusted Employment Growth Rate	Adjusted Capital Growth Rate	TFPG
1973-74	4.54	3.84	3.28	0.33	0.67	2.20	1.26	1.07
1974-75	0.85	3.35	2.24	0.31	0.69	1.52	1.08	-1.75
1975-76	9.38	2.95	2.36	0.27	0.73	1.67	0.86	6.85
1976-77	0.85	3.65	2.14	0.32	0.68	1.51	1.08	-1.74
1977-78	7.72	3.63	3.24	0.30	0.70	2.24	1.12	4.36
1978-79	5.48	3.72	1.41	0.29	0.71	1.00	1.09	3.39
1979-80	-6.22	4.19	2.47	0.29	0.71	1.76	1.20	-9.19
1980-81	7.34	3.67	2.26	0.24	0.76	1.66	0.97	4.71
1981-82	6.34	3.99	1.91	0.28	0.72	1.42	1.04	3.88
1982-83	2.52	5.94	2.31	0.23	0.77	1.72	1.51	-0.72
1983-84	7.59	4.74	1.32	0.27	0.73	0.99	1.19	5.41
1984-85	4.56	4.10	1.41	0.26	0.74	1.03	1.10	2.43
1985-86	4.47	4.03	2.17	0.41	0.59	1.44	1.34	1.68
1986-87	3.88	4.07	2.12	0.23	0.77	1.44	1.29	1.14
1987-88	3.12	4.29	1.40	0.23	0.77	1.08	0.99	1.06
1988-89	11.22	3.72	3.36	0.23	0.77	2.59	0.86	7.77
1989-90	6.48	3.84	2.11	0.24	0.76	1.62	0.90	3.97
1990-91	5.23	3.73	2.07	0.24	0.76	1.57	0.89	2.77
1991-92	0.95	4.31	2.03	0.25	0.75	1.53	1.05	-1.64
1992-93	4.35	4.52	1.87	0.23	0.77	1.42	1.08	1.84
1993-94	5.94	4.02	3.37	0.30	0.70	2.47	1.07	2.40
1994-95	6.86	3.68	1.45	0.32	0.68	1.00	1.14	4.72
1995-96	7.07	6.58	0.39	0.33	0.67	0.26	2.15	4.66
1996-97	7.47	8.03	1.48	0.34	0.66	0.98	2.70	3.78
1997-98	4.80	6.93	1.45	0.35	0.65	0.95	2.38	1.47
1998-99	6.81	5.64	0.18	0.36	0.64	0.12	1.99	4.71
1999-2000	6.47	4.84	0.79	0.33	0.67	0.52	1.67	4.28

Source: Computed from data published by Central Statistical Organisation (CSO) and National Sample Survey Organisation (NSSO) using Methodology explained in the text. Note: 2 Factor income shares are computed using Method-II described earlier. Adjusted Growth rates same as that for Table 3.6.

ii) Estimation of TFPG with Human Capital

We now bring into consideration human capital as one of the factors of production. In the neo-classical growth model, human capital can be considered an additional production factor, alongside physical capital and labour. In the new growth theory, it is assumed that human capital plays a role as an engine of growth that increases total factor productivity, in particular within research and development activities that produce innovations (Berthelemy, Pissarides and Varoudakis 2000).

Mankiw (1995) considered investment in human capital as important but hard to measure. He took the view that it was possible that equipment investment could also

serve as a proxy for investment in human capital. Because equipment requires workers to operate it, economies with highly skilled workers may attract more equipment investment than economies with less skilled workers. The study also discussed the effects of human capital on movement and utilisation of physical capital. It was argued that since human capital and physical capital were complementary inputs in production, imperfections in financing human capital could impede the movement of physical capital as well. Including human capital could make the share of capital larger than we traditionally assume.

Coming to the proxies for human capital, secondary enrolment ratios as a measure of human capital can be criticised on the ground that it cannot explain contemporaneous improvement in the human capital of the work force as the increased educational endowment can operate after a time lag. But human capital measured through school enrolment ratios was one of the key variables in Barro's (1997) growth equation. De Long and Summers (Cited in Mankiw 1995:324) had obtained insignificant negative coefficient for secondary school enrolment. This could be due to large divergence between measured schooling and actual skills learned. Though this was stated with regard to cross-country studies, the secondary school enrolment ratio can as well have limitations of not being a good proxy in time series studies also for the same reason. Yet another proxy for human capital is the employment in the organised sector, which requires at least secondary education (RBI Annual Report 2001, II: 27,28). This takes into consideration secondary school education, but at the same time takes care of the obvious limitations like non-contemporaneous effect on growth by secondary enrolment numbers and divergence between actual skills necessary and learnt.

Before proceeding with the growth accounting exercise, by including proxies for human capital, another view on impact of human capital on economic growth is worth mentioning. Berthelemy et al (2000) found that the empirical existence of positive impact of human capital on economic growth was controversial, They discussed the diversion of human capital to rent seeking activities and found that once these activities were removed, the relation between human capital and economic growth would be more robust. We are not attempting this in our study. Here, we consider employment in organised sector as a proxy for human capital, for the advantages stated in the foregoing paragraphs.

We now examine the total factor productivity growth when organised employment used as a proxy for human capital is appearing as one of the total factor inputs and compare it with the earlier estimate of TFPG computed without human capital. The share of the organised labour income to the total compensation of employees is taken as the coefficient of human capital. The coefficient for labour will be the share of the unorganised labour to the compensation of employees[21].

Computing TFPG with Human Capital- Organised Sector Employment as Proxy

As can be seen from the Table 3.8, when we use organised sector employment as a proxy for human capital, we don't get any significantly lower figure of TFP when compared with the result of growth accounting without human capital, especially in the decade of the 1990s. This implies that the proxy does not explain satisfactorily a good portion of the residual. One plausible reason for this could be the slowing down and even negative in the rate of organised sector employment in the decade of 1990s.

The logic for taking organised labour as the proxy for human capital, as already explained, is that, when compared with the unorganised sector, entry in the organised sector requires a certain minimum of skills and educational attainment. But what is to be viewed with caution here is that it cannot be straight away interpreted that the slowing down of organised sector employment is due to the reduced educational attainments. It can be due a plethora of reasons including reduction in public sector employment as a matter of conscious policy and even be linked to the shift in policy paradigms during economic liberalisation. These factors, which resulted in the slowing down of growth of organised sector employment, have rendered the application of this as a proxy for human capital limited.

[21] This will satisfy the assumption of constant returns to scale in the growth accounting process.

Table 3.8
Growth Rates of TFPG and Factor Inputs- with Human Capital

Year	NDP	Employment Growth Rate	Capital Growth Rate	Organised Employment Growth Rate	Labour Share	Capital Share	Human Capital Share	Adjusted Employment Growth Rate	Adjusted Capital Growth Rate	Human Capital	TFPG
1973-74	4.54	3.28	3.84	1.88	0.38	0.40	0.22	1.25	1.59	0.41	1.29
1974-75	0.85	2.24	3.35	2.26	0.36	0.42	0.22	0.80	1.40	0.51	-1.85
1975-76	9.38	2.36	2.95	2.51	0.36	0.41	0.23	0.85	1.26	0.57	6.70
1976-77	0.85	2.14	3.65	3.48	0.33	0.45	0.22	0.71	1.60	0.77	-2.23
1977-78	7.72	3.24	3.63	3.36	0.35	0.43	0.22	1.14	1.50	0.77	4.31
1978-79	5.48	1.41	3.72	4.44	0.36	0.40	0.23	0.52	1.48	1.06	2.42
1979-80	-6.22	2.47	4.19	-1.97	0.36	0.39	0.24	0.90	1.61	-0.49	-8.25
1980-81	7.34	2.26	3.67	2.33	0.37	0.38	0.25	0.84	1.40	0.58	4.52
1981-82	6.34	1.91	3.99	4.06	0.36	0.39	0.25	0.70	1.44	1.08	3.12
1982-83	2.52	2.31	5.94	1.39	0.38	0.33	0.28	0.89	2.14	0.38	-0.89
1983-84	7.59	1.32	4.74	1.82	0.35	0.39	0.26	0.47	1.77	0.49	4.87
1984-85	4.56	1.41	4.10	1.75	0.36	0.36	0.28	0.51	1.59	0.43	2.02
1985-86	4.47	2.17	4.03	0.16	0.37	0.42	0.21	0.79	1.50	0.03	2.14
1986-87	3.88	2.12	4.07	2.32	0.45	0.32	0.22	0.96	1.32	0.51	1.09
1987-88	3.12	1.40	4.29	0.31	0.46	0.33	0.22	0.64	1.41	0.07	1.00
1988-89	11.22	3.36	3.72	0.97	0.45	0.33	0.21	1.52	1.21	0.21	8.27
1989-90	6.48	2.11	3.84	1.50	0.46	0.32	0.22	0.98	1.26	0.45	3.80
1990-91	5.23	2.07	3.73	1.48	0.29	0.34	0.37	0.59	1.28	0.43	2.93
1991-92	0.95	2.03	4.31	1.20	0.44	0.34	0.21	0.90	1.47	0.25	-1.68
1992-93	4.35	1.87	4.52	0.44	0.46	0.34	0.21	0.85	1.76	0.09	1.65
1993-94	5.94	3.37	4.02	0.74	0.38	0.44	0.18	1.29	1.78	0.11	2.76
1994-95	6.86	1.45	3.68	0.55	0.42	0.45	0.13	0.61	1.62	0.09	4.54
1995-96	7.07	0.39	6.58	1.49	0.38	0.43	0.19	0.15	2.94	0.27	3.71
1996-97	7.47	1.48	8.03	1.11	0.36	0.46	0.18	0.54	3.64	0.20	3.09
1997-98	4.80	1.45	6.93	-0.28	0.37	0.45	0.19	0.53	3.18	-0.05	1.14
1998-99	6.81	0.18	5.64	-0.21	0.35	0.47	0.18	0.06	2.54	-0.04	4.25
1999-2000	6.47	0.79	4.84	-0.21	0.33	0.43	0.24	0.26	2.08	-0.09	4.22

Source: Computed from data published by Central Statistical Organisation (CSO) and National Sample Survey Organisation (NSSO) using Methodology explained in the text. Note: Factor shares are the same as that given for Method-I in Table and adjusted factor income growth rates are their growth rates weighted by the factor income shares.

When we compare the TFP including organised sector employment as a factor of production, and otherwise, the Pearson's correlation coefficient is 0.99. Human capital as a factor proxied by the above measure does not account for much of the residual. For these reasons, we will use the results of the estimates TFPG derived from Method-1, without including Human Capital as one of the factor inputs, for our analysis.

3.5 An Analysis of Decadal Average Trends in TFPG

The year-wise TFPG do not show any clear picture and there are fluctuations. To capture certain trends we need to look at TFP growth rates at longer intervals than year-wise. There are some sources of growth other than employment, education and capital stock or the state of knowledge that do not have pronounced long-term trends, but neither are they of the type that simply impose irregular annual movements. Changes in these sources if they occur at all tend to affect growth rates over periods of intermediate length. They are

1. Changes in "other personal characteristics" of workers, such as effort exerted, experience on present job, training other than formal education.
2. Changes in the extent to which the allocation of individual workers among individual jobs departs from that which would maximise national income.
3. Changes in the amount by which output obtained with average production techniques actually used fall below that had best technique been used.
4. Changes in aspects of human and business environment (Dennison 1974)

To consider these aspects, we analyse at the trends of TFPG over decadal periods .The Table 3.9 shows the decadal mean and coefficient of variation of TFPG.

Table 3.9
Decadal Averages, Fluctuations in TFPG

Period	Mean (%)	Coefficient of Variation (%)
1973-74 to 1979-80	0.29	17.54
1973-74 to 1979-80#	1.91	1.82
1980-81 to 1989-90	2.92	0.86
1990-91 to 1999-2000	2.48	0.78
1990-91- 1999-2000*	2.96	0.42

excluding 1979-80,*excluding 1991-92, years of crisis and negative growth

The decadal average[22] of TFPG shows a marked increase in the 1980s when compared to the 1970s (the increase is less marked when we exclude the abnormally low growth

[22] We are computing arithmetic means of the TFPG and its contributions. Though means of ratios and ratios of means are different, geometric mean is not used here as there are a few negative TFPG years. For a discussion on means of ratios and ratios of means, see Wyuts (2000) in the website www.thinkwithdata.com.

year of 1979-80). It has more or less been sustained in the 1990s with no substantial increase. The fluctuations in TFPG have continuously declined from the 1970s to the 1990s.

3.5.1 Contribution of Factor Inputs and TFPG

We also analyse the decadal contribution[23] of Factor Inputs and TFPG to the growth rate of Net Domestic Product to verify hypothesis, whether the increase in growth rate of output during the period 1970-71 to 1999-2000, was due to productivity improvement.

Table 3.10
Contribution of TFI and TFP to Growth Rate of Output

Period	Contributions of Capital stock	Employment	TFP
1973-74 to 1979-80	0.58	0.53	-0.11
1980-81 to 1989-90	0.32	0.27	0.42
1990-91 to 1999-2000*	0.37	0.14	0.49
1990-91 to 1999-2000	0.50	0.27	0.23

*excludes 1991-92

TFPG contribution shows an increase in the 1980s (when growth rate of aggregate output also shows an increase), but is stagnating in the 1990s (whether we exclude the abnormal year of 1991-92 or not). The possible reasons for stagnation in TFPG, especially in the1990s will have to be verified. The testable hypotheses could be 1) weather-induced fluctuation in farm output and/or 2) less capacity utilisation in the industrial sector. Nevertheless, TFPG contributes to one-half of the overall growth rates during the 1980s and the 1990s(excluding 1991-92), indicating that increase in growth rates during these decades had productivity increase as an important source.

3.6 Trend Movements in Growth Rate of Factor Inputs and TFPG

We will now proceed to compare the trend growth rates of GDP and that of trend TFPG and trend capital and labour growth rates. The figures below show trend TFP, NFCS and Employment growth rates (with cyclical and irregular fluctuations removed).

[23] Contribution is calculated as the (Growth rate of the factor* its factor income share)/ Growth rate of Net Domestic Product.

Figure 3.2
Actual and Trend Growth Rate of TFPG

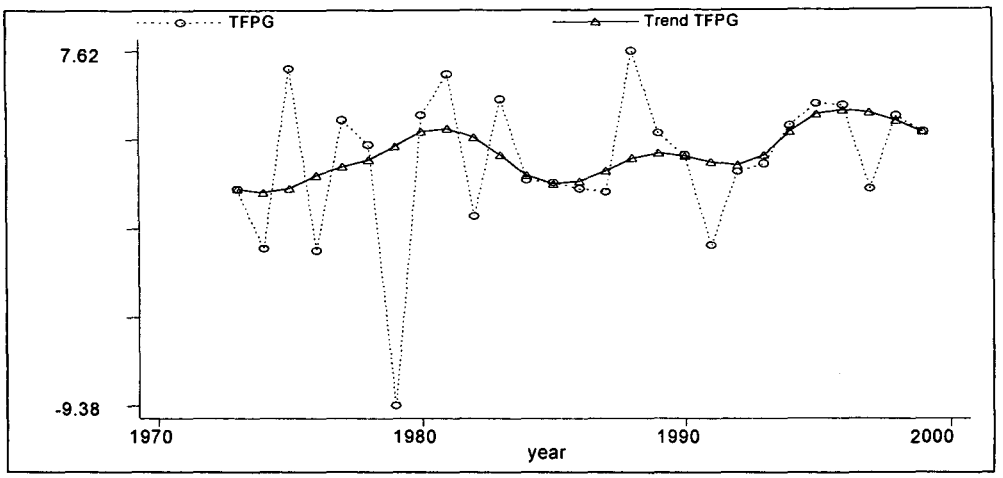


Figure 3.3
Actual and Trend Growth Rate of NFCS

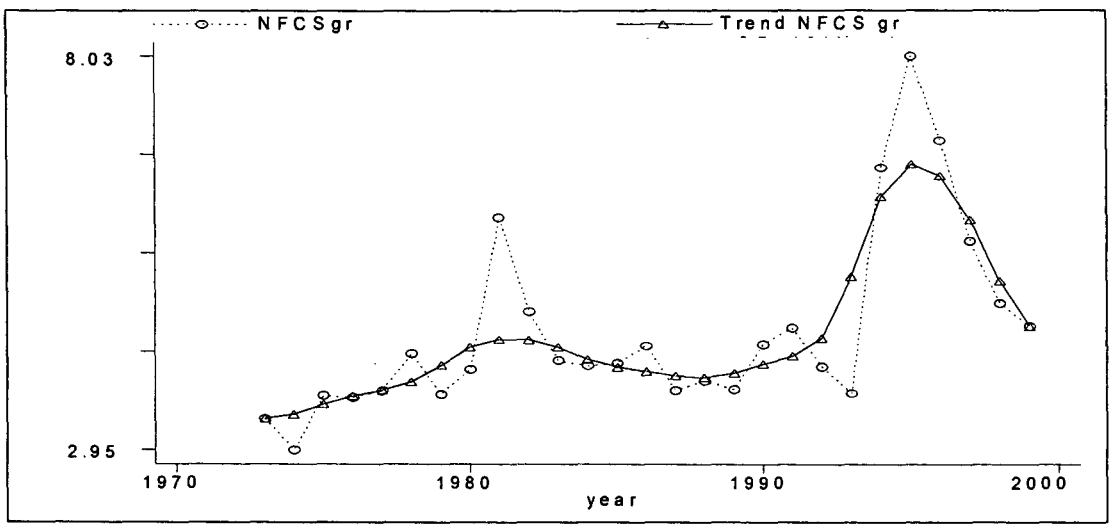
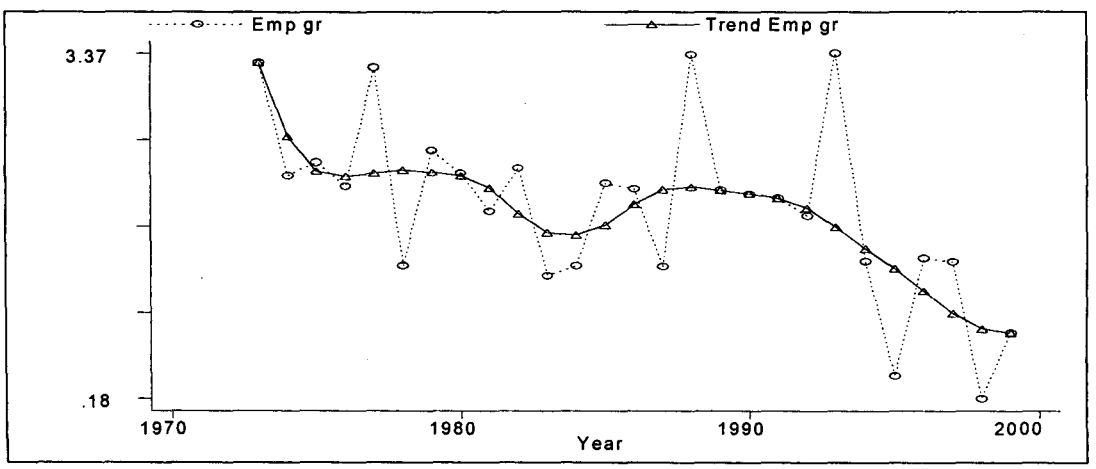


Figure 3.4
Actual and Trend Growth Rate of Employment



From the Figures 3.2, 3.3 and 3.4, showing the trend movement of TFPG, and growth rates of Capital (NFCS) and Labour, it can be inferred that the trend movement in the TFP growth rates has a relation with the movement in the trend growth rates of GDP (Figure 2.3). We attempt to explain this relation in the following paragraphs.

TFPG trend shows an upward movement from 1975-76 to 1980-81 (the peak level at 1980-81)[24]. During 1981-82 to1985-86, trend movement in TFPG is downward, but it started reversing during 1986-87 to 1989-90, though it is at a lower level than the first upward shift. Since the trend in TFPG as well as the TFIs do not show any substantial upward shift during the period 1985-86 to 1989-90, the upward shift in the trend growth rate of GDP during this period can be reasonably attributed to the lagged impact of the previous increase in trend of TFPG[25]. Though the increase in trend TFPG from 1992-93 to 1994-95 is higher than the one during 1986-87 to 1989-90, the peak during 1995-96 is not higher than the one at 1980-81. But a more careful look would reveal that the rate of increase during the first half of the 1990s is higher than that during the period 1975-76 to 1980-81, warranting an analysis more than the statement that the movement in trend TFPG consists of only cyclical upward and downward movements. The TFPG has been contributing a substantial one-half proportion to the overall growth rate during the 1980s and the 1990s (excluding the low growth year of 1991-92). It can also be argued that but for this upward movement in trend TFPG in the first half of the 1990s, the upward shift in overall trend growth rate during this period, which could be explained as the result of the combination of the lagged impact of the reversal of the downward movement in trend TFPG since the mid-1980s and the upward movement in the first half of the 1990s,would not have occurred.

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[24] It is noteworthy that the increase in trend TFPG starts from 1975-76 and peaks at 1980-81, that is, the period before the internal and external sector reforms were launched on a substantial basis. It could be argued that the reforms were a gradual process or a continuum starting even before the 1980s (Lewis 1995). Another argument can be that, but for the policy shifts, there could have been decline in productivity. A separate analysis will be necessary to establish the period- wise links between various reforms and trends in productivity. As already clarified in the concluding part of Chapter 2, in our study, we focus only on examining how well productivity increase explains the trends in overall growth rates independently or along with an important determinant of growth, that is, the change in total government spending and its components.

[25] An analysis of the components of the residual measured as the TFPG, like sectoral shifts in employment to more productive sectors, adoption of best practice technology et cetera. may throw more light into this lagged effect. These aspects do not form part of the objectives of our study. There can be problem of data availability also when the analysis of the components of the residual is attempted.

The increase in trend GDP during the first half of the 1990s can also be attributed to the upward shift in trend NFCS during 1992-93 to 1995-96.This increase as well as the subsequent downturn in trend NFCS could be due to economic policy reforms and subsequent demand side problems respectively, which we have already discussed in Chapter 2. But going by the possibility of interaction effects of TFPG on capital stock, part of the trend increase in NFCS could be because of the previous and contemporary increase in trend TFPG. The trend TFPG also reveals that the upward movement in the first half of the 1990s has not been sustained since 1996-97. This movement can be associated with the slowdown of the trend overall growth rate during the same period, about which we have discussed in Chapter 2. To state in brief, the trend movements in TFPG offers a better explanation for the trend movements in overall growth rates than the trend movements in NFCS and employment[26].

Whether the reasons for productivity increase can be linked to the trends in components of government expenditure and its components like capital and social service sectors need to be analysed. Ascahuer (1989) found that the U.S. economy offered detailed evidence of how an expansion of public capital stock impacts on the private sector capital-labour ratio and on total factor productivity, while increases in total government expenditure had no measurable effect. Ford and Poret (1991) extended Aschauer's time-series analysis of the correlation between infrastructure and TFP to individual OECD countries. Country specific time- series results provide mixed support, but their cross-section results suggest high and significant elasticities of TFP, with respect to infrastructural capital. We will analyse the association between the movement of TFPG total and specific components of government expenditure in the next Chapter.

3.6.1 Association between TFPG and Economic Growth

As discussed in the beginning of this Chapter, the contention in one of the two hypotheses on the causes of increase in growth rates in the 1980s and the 1990s, is

[26] The discussion on trends on employment and growth is not done here, as it is a separate field of study with a large body of literature. For a discussion on this and citations of studies, see Hari (2000).

that it is due to the productivity increase (measured by TFPG), on account of gradual economic reforms. Let us now test the association between TFP growth rate and overall growth rate. The scatter plot 3.5 below indicates a very strong association between TFPG and growth rate of Net Domestic product, implying that TFPG had a substantial role as a source of growth rate. Such an association is not found between the growth rates of Total Factor Inputs (TFIs) and overall growth rate as can be seen from Figures 3.6 and 3.7.

Figure 3.5
Scatter Plot showing Association between Growth Rate of TFP and NDP: 1973-74 to 1999-2000

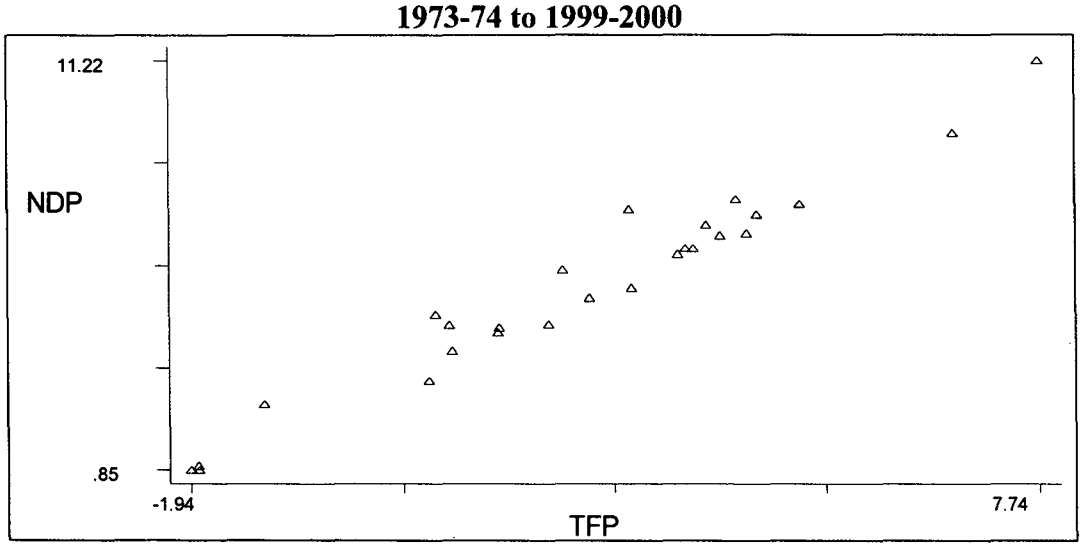


Figure 3.6
Scatter Plot showing Association between Growth Rate of Capital (NFCS) and NDP: 1973-74 to 1999-2000.

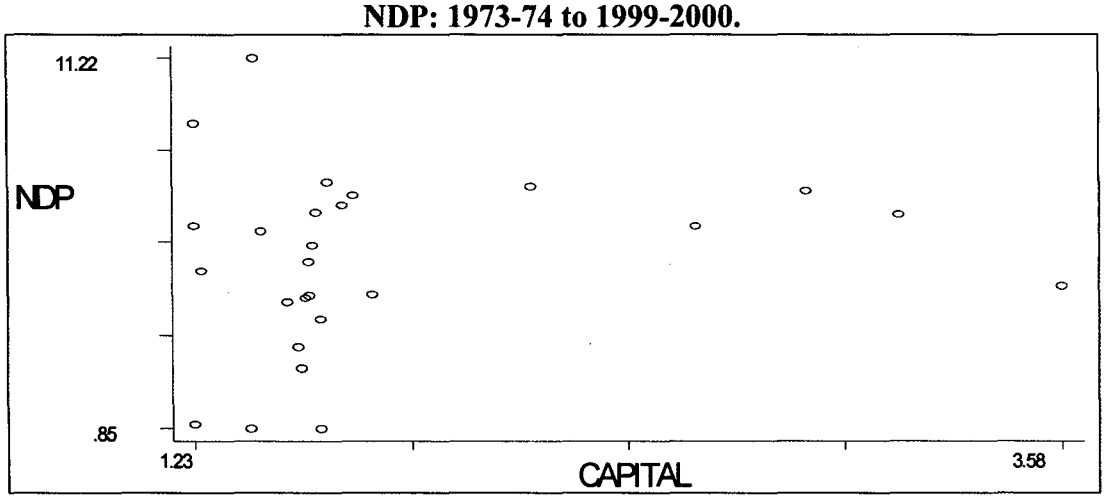
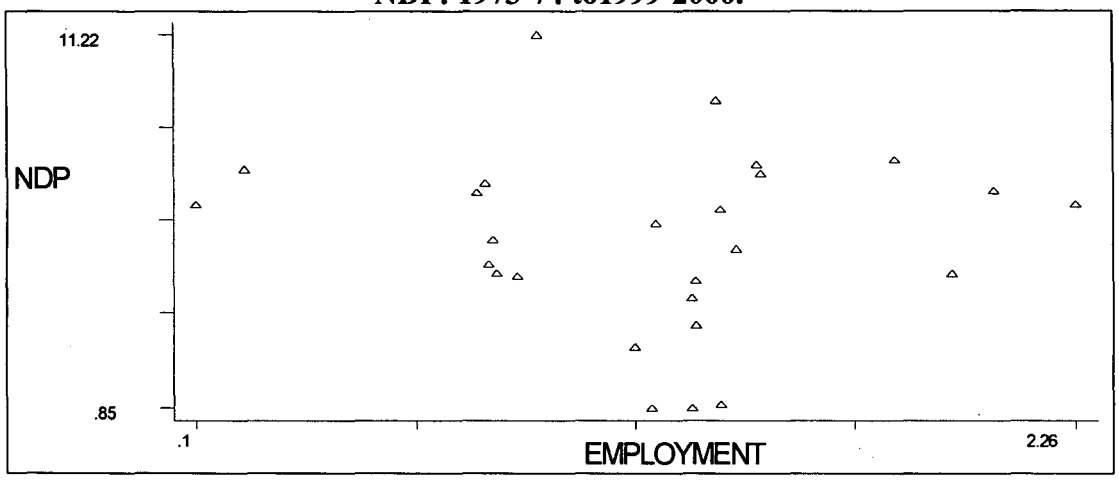


Figure 3. 7
Scatter Plot showing Association between Growth Rate of Employment and NDP: 1973-74 to1999-2000.



3.7 Conclusion

Based on our analysis of the Total Factor Productivity Growth rates, the following broad conclusions can be drawn.

1) There has been an increase in decadal average TFP growth rate in the 1980s as compared to the 1970s (whether we include or exclude the year of abnormal fluctuation 1979).
2) There has been stagnation in TFPG from the 1980s to the 1990s. The TFP growth rate attained in the 1980s has been just sustained in the 1990s.
3) If we consider the coefficient of variations, (Table 3.9) the fluctuations in TFPG can be seen declining since the 1970s.
4) The movements in trend growth rates of TFPG offer a better explanation for the trend growth rates of GDP during the period 1970-71 to 1999-2000, than that of the TFI.
5) There is a very strong association between TFPG and overall growth rate, unlike that of the TFIs, as can be seen from the scatter plots (Figures 3.5, 3.6 and 3.7).

Another noticeable aspect in our study is that when we try to explain a part of the residual, using the proxy for human capital, it does not explain substantially any portion of the residual. This could be due to the falling of organised sector employment due to other reasons, which can in no way be construed as fall in human

capital formation. Other proxies may have to be tried for human capital. This is not attempted in our study.

Given the findings that i) TFPG contributes to approximately one-half of the growth rates in the 1980s and in the 1990s, ii) the association between TFPG and economic growth is quite strong and iii) trend movements in TFPG offering a better explanation for the overall trend in growth rates than the trend movements in the TFIs, it can be concluded that increase in growth rates in the 1980s and the 1990s was to a large extent due to productivity increase. But we need to separately test the other hypothesis of association between total government expenditure, which is a measure of the size of government in the economy, and overall growth. The analysis of TFPG movements also facilitate examination of possible relation between components of government expenditure and productivity, for example, whether there has been any significant association of TFP growth rate with public expenditure as a whole, and capital expenditure and expenditure on social services in particular. These analyses are done in the next Chapter. This becomes relevant because, the basic argument for increasing public expenditure, particularly, capital and social service expenditure is that they will have positive externalities and help improve output per unit of input in the economy.

APPENDIX

Table 3.A1
Variables Used in the Computation of Growth Accounting

Year	NDP*	NFCS*	Population*	Worker Population Ratio (WPR)@	Total # Employment	Organised Sector Employment $	Labour Share #	Capital Share#	Organised Sector Labour Share#	Unorganised Sector Labour Share#
1970-71	275244	760725	541			17.8	0.54	0.46	0.19	0.35
1971-72	277159	785429	554			18.7	0.56	0.44	0.21	0.36
1972-73	274943	811261	567	0.42	236	19.1	0.52	0.48	0.19	0.33
1973-74	287429	842408	580	0.42	244	19.5	0.60	0.40	0.22	0.38
1974-75	289874	870632	593	0.42	249	19.9	0.58	0.42	0.22	0.36
1975-76	317067	896281	607	0.42	255	20.4	0.59	0.41	0.23	0.36
1976-77	319756	929024	620	0.42	261	21.1	0.55	0.45	0.22	0.33
1977-78	344430	962718	634	0.42	269	21.8	0.57	0.43	0.22	0.35
1978-79	363292	998557	648	0.42	273	22.8	0.60	0.40	0.23	0.36
1979-80	340684	1040403	664	0.42	280	22.4	0.61	0.39	0.24	0.36
1980-81	365693	1078594	679	0.42	286	22.9	0.62	0.38	0.25	0.37
1981-82	388867	1121610	692	0.42	291	23.8	0.61	0.39	0.25	0.36
1982-83	398648	1188209	708	0.42	298	24.1	0.67	0.33	0.28	0.38
1983-84	428910	1244576	723	0.42	302	24.6	0.61	0.39	0.26	0.35
1984-85	448465	1295600	739	0.41	306	25.0	0.64	0.36	0.28	0.36
1985-86	468504	1347822	755	0.41	313	25.1	0.58	0.42	0.21	0.37
1986-87	486683	1402628	771	0.41	320	25.6	0.68	0.32	0.22	0.45
1987-88	501869	1462759	788	0.41	324	25.7	0.67	0.33	0.22	0.46
1988-89	558172	1517233	805	0.42	335	26.0	0.67	0.33	0.21	0.45
1989-90	594366	1575554	822	0.42	342	26.4	0.68	0.32	0.22	0.46
1990-91	625460	1634309	839	0.42	349	26.7	0.66	0.34	0.37	0.29
1991-92	631378	1704760	856	0.42	356	27.1	0.66	0.34	0.21	0.44
1992-93	658825	1781854	872	0.42	363	27.2	0.66	0.34	0.21	0.46
1993-94	697992	1853469	891	0.42	375	27.4	0.56	0.44	0.18	0.38
1994-95	745866	1921762	908	0.42	380	27.5	0.55	0.45	0.13	0.42
1995-96	798592	2048289	927	0.41	382	27.9	0.57	0.43	0.19	0.38
1996-97	858234	2212699	943	0.41	388	28.3	0.54	0.46	0.18	0.36
1997-98	899418	2365943	959	0.41	393	28.2	0.55	0.45	0.19	0.37
1998-99	960694	2499312	975	0.40	394	28.1	0.53	0.47	0.18	0.35
1999-2000	1022826	2620206	991	0.40	397	28.0	0.57	0.43	0.24	0.33

Notes:

*Net Domestic Product (NDP), Net Fixed Capital Stock (NFCS) using Perpetual Inventory Method and year-wise population are obtained from various issues of Central Statistical Organisation (CSO)'s National Accounts Statistics.

@ Worker Population Ratio computed from Population figures obtained from CSO and Quinquennial Employment figures obtained from National Sample Survey Organisation (NSSO) reports,

$ Organised Sector Employment is obtained from various issues of Economic Survey, Government of India,

Labour share, Capital Share and Organised and Unorganised labour share have been computed from the data on factor incomes obtained from various issues of CSO's National Accounts statistics using the Method-I described in Section 3.4.1 of Chapter 3.

NDP and NFCS,(Crores) Population, Total Employment and Organised Sector Employment are in Millions.

CHAPTER 4

FISCAL POLICY IMPACTS ON ECONOMIC GROWTH

4.1 Introduction

In the last Chapter, we examined the hypothesis that growth of productivity had a very strong association with the overall growth rate. Here we examine the other hypothesis that the significant increase in growth rate during 1970-71 to 1999-2000 had government expenditure as an important determinant. We use a model which is similar, though not identical with the conventional sources- of- growth model, with capital and labour as inputs, but includes two more variables to measure the size effect of the government sector, which are the government size change, and productivity differential in the government sector. The government size is measured by the total expenditure of the centre and the states net of central transfers to the states. The primary aim in this Chapter is to analyse the impact of government size on overall economic growth.

The analysis of sources- of- growth in Chapter 3 revealed that Total Factor Productivity growth (TFPG) had a strong association with the overall growth rate. In addition to examining the association between size of government and economic growth, we also attempt to analyse whether there has been any significant association between TFPG, government expenditure and its components.

In this Chapter, we analyse the externality effect of the government size on growth and also inter-sectoral factor productivity differential between government and non-government sectors separately. Some views on the role of the state and its nature or character are also discussed. The latter is a very important and fundamental determinant of the former. It is felt that, the political economic framework of discussions on nature of the state and classes in the society would be useful in interpreting the relations thrown up by the quantitative exercises.

4.2 A Survey of Some Views on the Role of the State

Before starting the discussions on government spending, let us examine how the state came to assume a major role in the macroeconomy.

The traditional laissez- faire view is often summarised as the government, which governs least is the best one. With the market mechanisms ensuring equilibrium, there would be full employment and full utilisation of resources and interventions beyond ensuring law and order and enforcement of third party contracts were considered not with in the scope of state activity. With the competitive capitalism giving way to monopoly capital, the perception regarding state intervention began to change. The emergence of monopoly capital socialised more and more capital costs and expenses of production, for example social investments in vast road projects, higher education, medical costs and workers' retirement income. Shifting of these expenses to the taxpayers, that is, the state sector, permitted profits and wages in the monopoly industries to expand more rapidly (O' Connor 1973).

But the real turning point in the economic role of the state happened after the Great Depression of 1929. This was the starting point of a new thinking, which is now famous as the *Keynesian Revolution.* The government started stepping in with spending programmes to prop up deficient aggregate demand (for example, the New Deal in the USA). The perception of borrowing for spending on programmes to prop up deficient aggregate demand during times of depression gained ascendancy and borrowing, though a private vice came to be regarded as a public virtue under certain situations[1].

Classical *laissez faire* variety of capitalism was transformed into welfare state capitalism with an important role for the public sector. The fact that the Soviet state had by then stabilised and emerged as a major world power insulated from the effects of Great Depression, gave moral authority for the advocates of welfare state within the capitalist system.

By mid- twentieth century, the state was envisaged as having a role in taking industries into its ownership for national good. The examples of such industries were gas and water, railways, mail and parcels and telecommunications (Gentle 1996). In newly independent countries like India, the dominant role of the state was reiterated through the plan documents and industrial policy resolutions. The First Five Year Plan (1951-56) document stated that the problems of capital formation, introduction of new techniques, extension of social services, and the overall realignment of the productive forces and class relationships within the society, inevitably led to the

[1] Keynesian economics came to be popularly regarded as depression economics.

conclusion that a rapid expansion of economic and social responsibilities of the state would alone be capable of satisfying the legitimate expectations of the people (Srinivasan 2001). The second five year plan led to establishment of state sector heavy industries and vast expansion of public sector and thereby the role of the state. The industrial policy resolution of 1956 reserved certain industries exclusively for the public sector and the state was vested with the right to take over private industries. Public sector was set to attain commanding heights and the state's role began to be considered as far wider than the traditional *laissez-faire* view.

This enlarged perspective of state is reflected in Lewis (1960), who stated that no country had made economic progress without positive stimulus from intelligent governments. The functions of the government have been characterised as maintaining public services, influencing attitudes, shaping economic institutions, influencing use of resources and the distribution of income, controlling the quantity of money and fluctuations and ensuring full employment. It was the stagflation of the early 1970s, which heralded the end of what has been widely described as the 'Golden age of capitalism', brought into prominence the critique of Keynesian interventionist policies and arguments for roll back of the state. The process includes liberalisation of government and a movement away from big government and the vogue has been for administrations to withdraw from ownership of industries (Gentle 1996). But there is a recent revival of arguments favouring the role of government in ensuring growth in developed as well as developing country context [Vatter and walker (2002), IMF, 2002]. The Tenth Five Year Plan Document (2002-2007, 1.26 and 1.27:7-8) discussed the redefining of the role of the state, instead of no role or a minimalist role. The areas requiring state role were identified as social sector, rural infrastructure and road development, which were unlikely to attract private investment. The Plan Document in effect suggested a complementary, but substantial role of the state[2].

4.2.1 State Spending: Neo-Classical, Marxian, Keynesian and Kaleckian Views

a) Neo-classical View

While summarising the neo-classical views of state spending, Foley (1978) stated that it characterised state expenditure as decision for collective choices, which best

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[2] This in the perspective of O'Connor (1973) is a case of socialising of expenses and ensuring private monopoly profits.

substitute for the market in meeting individual wants and needs and respecting individual ownership, under certain circumstances of "market failure". The mechanism through which individuals make collective choices is needs and wants of the independently constituted individuals, the commodities with their arbitrarily given technical peculiarities, and some mechanism of information transfer or collective decision to determine the scope and direction of public expenditure. The argument put forward for public expenditure is that, for technical reasons like costs of exclusion and jointness of production, certain commodities are not well suited to market exchange and are more efficiently provided by the collective conscious action of the individual commodity owners. The neo-classical theory of public decisions rests on the concept of the individual owner of commodities as its fundamental unit of analysis. Any coalition of these individuals depends on an essentially accidental convergence of their individual goals.

Srinivasan (2001) discussed the neo-classical political economy, which assumed state as far from being exogenous, and at least partly endogenous and the policies it instituted would reflect the vested interests in the society. According to him, this view was admittedly not new and went back to Marx, if not earlier.

It was from the neoclassical perspective, that Krueger (1974) and Bhagavati (1982) concluded that the state regulations result in rent seeking and Directly Unproductive Activities (DUP). Bhagavati (1982) stated that DUP was associated not only with regulations and quotas, but also with other forms of government activity including tariffs. Krueger (1990) was of the view that there could be little question about government failure outweighing market failure.

b) Marxian View

In contrast to this, in the Marxist perspective, state is a human creation, but not the creation of everyone interacting equally. People came to the political process already partly determined by their roles in production. They came not as abstract individuals but as workers or capitalists and not as equals. In other words, the constituency of the modern state was not a collection of abstract individuals, but of classes and class fractions created and recreated by capitalist relations of production. It was in this perspective that Foley (1978), looked at the state expenditure on military, education and interventions to lift a sagging aggregate demand. The view was that in any

historical period the state would have a particular content related to the development of relations in that period.

The central questions for the Marxist study of the state expenditure are: a) what are the central relations of the society in question (for example Capitalist relations or some others?); b) how is the state linked to these relations (for example a bourgeois state or a workers state?) c) what development in relations of production are shaping and altering the state?

To state in brief, Foley (1978) took the view that the problems of capital have created the agenda for the modern state's expenditures and the conflict between classes and class functions were the primary pressures on state's spending decisions.

O'Connor's (1973) views cited earlier were also in the Marxist perspective. The Monopoly capital aims to maximise private profit and tries to pass on expenditure on social infrastructure and social consumption to the taxpayer, through state spending. This is successful because monopoly capital is a dominant interest group.

c) Keynesian View

We have already briefly discussed the Keynesian viewpoint while tracing the evolution of changing perspectives on the role of the state. The influence of Keynesian ideas was so profound among the capitalist nations after the Great Depression of 1929 that, it came to be described as the *Keynesian Revolution.* Essentially, it meant recognising the role of the state through increasing public expenditure or pump priming, when there was deficiency of aggregate demand and investment decision, leading to a cumulative effect of shrinking of output and unemployment. The state can play a positive role in lifting the economy out of sagging demand by incurring deficits without inflationary pressures. The Keynesian view held sway in Europe almost through out the period from 1940s till the mid 1970s, when stagflationary tendencies resulted in abandoning of these ideas[3].

[3] The inapplicability of Keynesian principles in developing countries due to supply side bottlenecks causing inflationary pressures was discussed by Rao (1952). But presently demand side problems are being recognised in India (RBI 2001).

d) Kaleckian View

Giving a different perspective to the enlarged role of states in the capitalist society, Kalecki (1943) stated that "Captains of Industry" would oppose government intervention by larger spending to ensure full employment for socio-political reasons. They would want to confine government expenditure to objects, which do not compete with the equipment of private business. Opposition to government spending for maintenance of full employment is that it would undermine their power over labour force and lead to decline in their social power, even though profits could be higher due to higher wages affecting prices rather than profits. Kalecki's views on government spending, though based on a class framework is at variance with that of O'Connor (1973), cited earlier[4]. The latter is of the view that the capitalists would support increasing government expenditure as it helped increasing private profit, while former viewed that they would oppose it for socio-political reasons.

We have briefly surveyed some perspectives on state spending. But the fundamental factor underlying the state spending is the character of the state, which is in effect the balance of power of the dominant social groups or classes in the society. We analyse them later in this Chapter while discussing the empirical findings of the impact of government spending on economic growth.

4.2.2 State Expenditure in Developed and Developing Country Contexts: An Examination of Views

In a developed country context, the state expenditure is essentially considered as a remedy for demand side problems, while in a developing country context it is a necessity for overcoming structural problems. We survey one representative view each for both the contexts in this sub-section.

a) Developed Country Context

Large government spending and associated deficits are considered necessary only in demand deficient situations. Buchanan and Wagner (1978) stated that the pre-Keynesian norm of budget balance served to constrain spending proclivities so as to keep budgets roughly within the revenue limits generated by taxes. They stated that

[4] The distinction seems subtle. It is more on at which point of state intervention the resentment of the monopoly capital starts. O'Connor also emphasies on the fact that state sector exists to serve the interests of the monopoly sector.

the Keynesian destruction of this norm without adequate replacement, effectively removed the constraint. Predictably, politicians responded by increasing spending more than tax revenues, by generating budget deficits as a normal course of events. Deficits of recession were not matched by surpluses of the boom. Their argument is that the underlying economic realities are not of those in the 1930s or those that are implicitly assumed as parameters for the application of Keynesian policy norms. According to Buchanan and Wagner cited above, the Keynesian policy was centered on the use of the government budget as the principal instrument for ensuring maintenance of high employment and output. In their view, the Keynesian Revolution resulted in an allocative bias towards the public sector, monetary bias towards inflation and an interventionist bias, which arose directly from a shift in paradigm against the balanced budgets.

b) Developing Country Context

For developing countries, the argument for government spending is based on an entirely different logic [for example, Chakravarthy (1979)]. For example, in the Indian context, the inducement to invest on the part of the private investors is significantly affected by the behaviour of public investment. The critical role of the state as an investor and the dual role of state investment in sustaining demand as well as creating capacity has neither been envisaged in the simple Ricardian model nor in the Marxian schemes of expanded reproduction. In the Ricardian framework, the requirements of agricultural growth was largely defined in terms of the amount of "corn" that was directly or indirectly needed for producing it. Capital largely meant advances to labour along with the seed corn that was planted. Marx was dealing with a situation, which allowed for the role of fixed capital and recognised ruthless competition leading to a situation of growing capital intensification with a predominantly labour saving bias. In the Indian case, facts of demography and compulsions of an agro-climatic character require different types of investment in agriculture, which include prominently items such as irrigation. This makes state intervention essential. In the developing country context, there is need for investment in infrastructure such as transport and electricity, which enlarge the market and provide a suitable energy base for sustained growth, Chakravarthy (1979). The need

for state intervention in developing country context is essential from the structural as well as the cyclical point of view.

Having discussed the role of state, state spending and various perspectives on it, let us now proceed to empirically test the impact of government spending on economic growth in the Indian context for the period 1970-71 to 1999-2000. Before that we would briefly survey the results of a few empirical studies in this area.

4.2.3 Empirical Findings on Government Spending: A Survey

Stern (2002) emphasised the role for government expenditures on the ground that public expenditures on social programmes with high positive externalities, such as primary education and health and protection of the environment, made good economic sense. Public spending on an effective safety net, that reduced and mitigated downside socio-economic risk or helped cope with its occurrence, was just as important. He however pointed out that high government spending created large and inefficient bureaucracies, so that many resources were wasted, and were overextended into production and services that the private sector could perform more efficiently. Government is considered as having a role in building institutions for the market (theme of the World Development Report, 2002). There is the prevalent view that the government has a role in providing infrastructural facilities. Positive and statistically significant coefficients for public infrastructural investment have been reported in RBI (2001), when private investment has been taken as the dependent variable. Aschauer (1989) found a strong and positive correlation between non-military public capital stock and private sector productivity in the United States. The study identified a subset of core infrastructure facilities (utilities and transportation facilities) as having the greatest impact. Sahoo and Saxena (1999), Sahoo (2000) found a positive and significant impact of public infrastructural investment on economic growth. Munnel (1992) sounded a few words of caution in interpreting the high positive coefficient of public infrastructural investment in regression results, because of a) when seen for smaller geographical areas, the coefficients would be smaller due to predominance of leakage effects and b) much of the externality benefits of infrastructural investment would not be captured in the conventional National Income Accounts. Alesina et al (2002) found that increase in public expenditure had a negative effect on economic growth, in a study of OECD countries for the period

1960-1998. The study also concluded that fiscal consolidation through expenditure reduction led to expansion of output, while that through tax increase led to output contraction.

Tanzi and Zee (1997) pointed out that whereas many public investment projects could be wasteful, while some of the public consumption expenditures like certain kinds of educational training, operations and maintenance on existing infrastructure and even targeted spending on research and development activities could be enormously beneficial to long run growth. Devarajan, Swaroop and Zou (1996: Cited in RBI Currency and Finance, 2000-01: IV-2) found that increase in current expenditure had positive and statistically significant growth effects, while a negative relationship was detected between the capital component of public expenditure and per capita growth in a cross-country study. These studies suggested that productive expenditures, when used in excess, turned unproductive and that several components of current expenditure, such as operations and maintenance, might have higher rates of return than capital expenditure

4.3 Indian Context

a) Historical Background

During the British period, the public expenditure was slow to change and public revenue was slow to increase because of government's difficulties in raising taxes and its conservatism over public borrowing. In the distribution of public expenditure, defence and civil administration absorbed half of the total expenditure of the central and provincial governments.

There was a steady growth of public investment from 1898 to 1914. It has been estimated that central, provincial and local governments together accounted for about one- fourth of the country's total fixed capital formation. As regards borrowing for expenditure, the great bulk was raised for public expenditure, which generally earned more than interest payment. The criticism of the government's expenditure policy during the early 1930s, the period of great depression, was that an expansionist programme of expenditure, perhaps on public expenditure would have prevented the fall in income during these years (The Cambridge Economic History of India: Vol II: 930-964).

b) International Trends in Public Expenditure: Comparison with India

Late 19th and early 20th Centuries

In most of the advanced economies, public expenditure has been growing very rapidly since the late nineteenth century. In England, it grew from 9 percent of GNP in 1890 to 30 percent in 1930 to 39 percent in 1950. In Japan, it grew from 10 percent of GNP in 1879-1883 to 25 percent in 1950-52. In India, growth of public expenditure stagnated since 1870. Coinciding with the slow and stagnant growth in public expenditure in the first half of the twentieth century, was the growth of output at a very slow rate during this period. The trend growth rate from 1950-52 to 1970-72 at 3.6 percent was almost double that of the rate of growth in the first half of the twentieth century. In 1970-72 the aggregate real output averaged slightly more than double that of 1950-52 (The Cambridge Economic History of India Vol II: 930-964).

Superficial examination can take us to a prima facie conclusion of a positive relationship between growth of output and growth of public expenditure. After independence, the economic role of the state was viewed from a totally different perspective by those who took over the reins of power. There was expansion in scope and range of economic activities undertaken by the government. In 1950-51, the share of the public sector in government was marginal and government expenditure accounted for barely 8 percent of the aggregate national expenditure and the income generated in public sector, including administration and enterprises was about 7.5 percent of the country's output (The Cambridge Economic History of India Vol II: 963). The share of Public Sector GDP and Public Expenditure as a proportion of GDP increased from 15 to 28 and 22 to 32 percent respectively during 1970-71 to 1999-2000.

During 1970-71 to 1999-2000

Garret (2000) stated that total government spending doubled from 1960 to 1994 in OECD countries, from 28 to 56 percent of the GDP. When we compare India (Tables 4.1 and 4.2) with OECD countries, we find that the proportion of total government expenditure of centre and states in India to GDP is lower, except for a few like Ireland, Korea and United States.

Table 4.1
Government Expenditure Pattern in OECD Countries

Country	Share of Total Government Outlays in GDP (1999)
Australia	32.3
Austria	50.7
Belgium	47.9
Canada	40.2
Denmark	54.3
France	52.2
Germany	45.6
Iceland	33.4
Ireland	31.5
Italy	48.3
Japan	38.1
Korea	25.5
Netherlands	43.2
New Zealand	40.8
Norway	46.1
Portugal	44.7
Spain	38.6
Sweden	55.9
Switzerland	....
United Kingdom	39.9
Unites States	30.1

Source: (Table1: 19, OECD Economic Studies No.33, 2001/II)

The Table 4.2 below shows the proportion of total government expenditure and its components, capital and revenue expenditures to GDP. The Centre-State transfers are deducted from the aggregate, so that they appear only as state expenditure. Otherwise, they will be reflected in both Central and State expenditures. While segregating expenditure into capital and revenue, the central loans and grants are deducted from centre's capital expenditure on the assumption that the transfers are substantially capital in nature.

Let us now look at the trends in government expenditure in India. The size of government as a proportion of GDP has risen from 0.22 in 1970-71 to 0.32 in 1999-2000. The Figure 4.1 shows that the proportion of total expenditure to GDP was higher during the 1980s (the decade during which overall growth rates started showing increase) than both the1970s and the1990s.

Table 4.2
Pattern of Total Expenditure and its Components in India: 1970-71 to 1999-2000 (in rupees crores)

Year	Total Expenditure (1)	Central Loans and grants (2)	Net Expenditure (1)-(2)	Net Expenditure Constant Prices (3)	Capital Expenditure Constant Prices (4)	Revenue Expenditure Constant Prices (5)	GDP Constant Prices (6)	(3)÷ (6)	(4)÷ (6)	(5)÷ (6)
1970-71	10798	1571	9227	64782	30281	34501	296435	0.22	0.10	0.12
1971-72	13062	2045	11017	73482	32802	40680	299631	0.25	0.11	0.14
1972-73	15136	2876	12260	74018	32753	41265	298335	0.25	0.11	0.14
1973-74	16446	2490	13956	71781	34049	37727	311483	0.23	0.11	0.12
1974-75	18550	2097	16453	72773	36265	36508	315290	0.23	0.12	0.12
1975-76	22660	2513	20147	91786	44897	46888	344915	0.27	0.13	0.14
1976-77	25498	2951	22547	96500	44409	52091	348307	0.28	0.13	0.15
1977-78	28766	3749	25017	100778	46568	54210	374160	0.27	0.12	0.14
1978-79	34455	5702	28753	112970	50656	62314	392202	0.29	0.13	0.16
1979-80	36884	4752	32132	109917	49560	60356	372616	0.29	0.13	0.16
1980-81	45432	5645	39787	122601	53990	68611	401129	0.31	0.13	0.17
1981-82	50435	6098	44337	123996	58266	65730	425252	0.29	0.14	0.15
1982-83	59533	7547	51986	134340	63932	70408	438079	0.31	0.15	0.16
1983-84	69074	8996	60078	142685	66713	75971	471744	0.30	0.14	0.16
1984-85	83489	10672	72817	160892	74280	86612	492076	0.33	0.15	0.18
1985-86	97533	14691	82842	170629	75840	94789	513990	0.33	0.15	0.18
1986-87	114702	14688	100014	192746	87543	105204	536257	0.36	0.16	0.20
1987-88	128132	17309	110823	195270	87864	107406	556778	0.35	0.16	0.19
1988-89	146189	19597	126592	205729	93666	112063	615099	0.33	0.15	0.18
1989-90	169690	19763	149927	224651	103618	121034	656331	0.34	0.16	0.18
1990-91	196386	26618	169768	230212	104333	125878	692872	0.33	0.15	0.18
1991-92	219343	28296	191047	227622	103670	123952	701863	0.32	0.15	0.18
1992-93	241953	30859	211094	231340	104399	126941	737791	0.31	0.14	0.17
1993-94	276502	35586	240916	240917	107474	133441	781347	0.31	0.14	0.17
1994-95	322293	39256	283037	257978	116495	141483	835864	0.31	0.14	0.17
1995-96	355859	40596	315263	263491	119368	144123	897020	0.29	0.13	0.16
1996-97	403776	46937	356839	276734	127252	149482	964390	0.29	0.13	0.16
1997-98	460188	54994	405194	295234	133599	161635	1012816	0.29	0.13	0.16
1998-99	545701	64205	481496	322332	146449	175883	1081834	0.30	0.14	0.16
1999-2000	617331	52212	565119	363310	165712	197598	1148500	0.32	0.14	0.17

Source: Hand Book of Statistics on Indian Economy, RBI 2001.

Note: The expenditures at current prices are converted into constant at 1993-94 prices using GDP deflator obtained from National Accounts Statistics, published by Central Statistical Organisation (CSO) various issues.

Figure 4.1
Total Government Expenditure as a Proportion of GDP

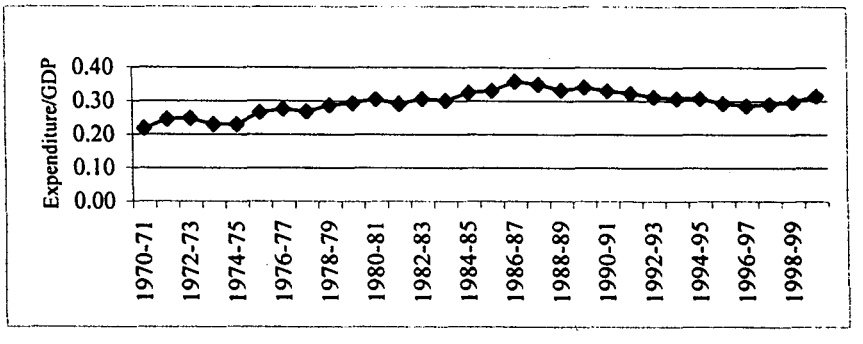

Figure 4.1 A
Change in Total Government Expenditure as a Proportion of GDP

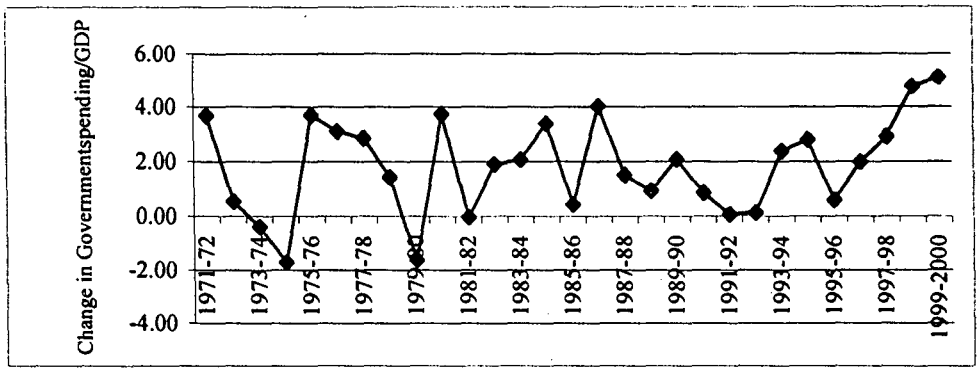

Figure 4.2
Capital and Revenue Expenditure as a Proportion of GDP

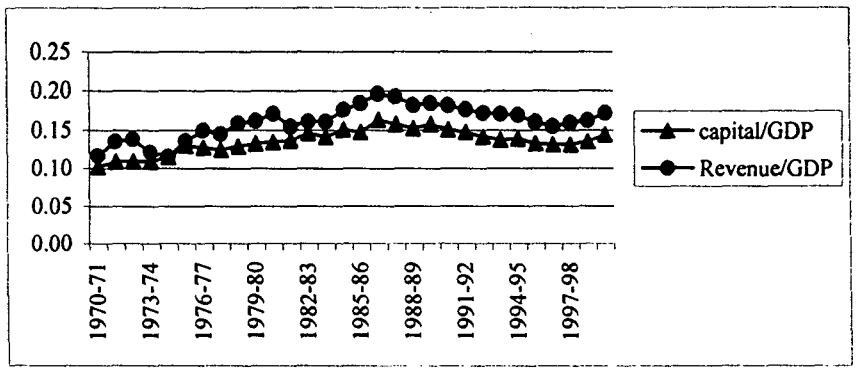

Figure 4.2A
Capital and Revenue Expenditure Change as a Proportion of GDP

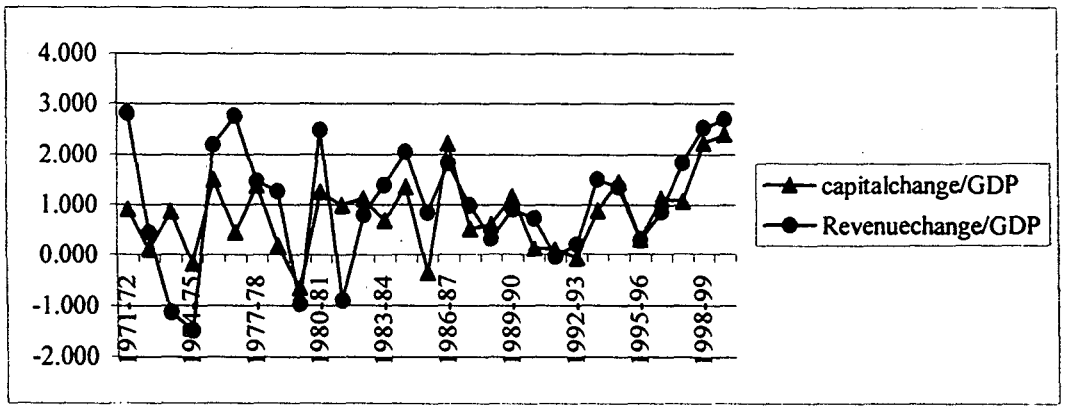

Figure 4.2 shows that the proportion of revenue expenditure to GDP has been higher than that of capital expenditure to GDP since the 1970s. The total expenditure as well as its components as a proportion of GDP is showing a rise in the 1980s as compared to the1970s and a decline in the 1990s when compared to the 1980s.

When we look at the proportion of change in the expenditure[5] to GDP and its components, it can be seen that the total expenditure change as a proportion of GDP was higher during the 1980s and started falling in the 1990s, before starting to rise since 1997-98 (Figure 4.1A). Much of this rise since 1997 appears to be due to rise in revenue expenditure change as a proportion of GDP (Figure 4.2A). It can also be noticed that the rise in change of revenue expenditure as a proportion of GDP has been ahead of the same for capital expenditure.

Analysing the growth of total expenditure and its components during the 1990s, Pant (2003) stated that the total expenditure of the central government as a proportion of GDP declined from 18.52 percent in 1990-91 to 15.64 percent in 2001-02 (Revised Estimates). Among the components, the revenue expenditure as a proportion of GDP declined from 12.93 percent in 1990-91 to 11.62 percent in 1996-97, but after that it increased to 13 percent in 2001-02 (Revised Estimates). Capital expenditure as a proportion of GDP declined from 5.59 percent in 1990-91 to 2.64 percent in 2001-02 (Revised Estimates). The pattern of the central government expenditure is similar to the pattern of the centre and states put together, as can be observed from the above figures.

Having observed the broad trends in overall government expenditure and its components, let us now proceed to empirically verify the impact of government spending, (which is in effect the measure of size of government in the economy) on economic growth and the association of growth with the components of total expenditure.

4.4 Size and Productivity Differential Effect of Government Sector: An Analytical Framework

The focus of our study is the analysis of impact of policies, especially the size of the government on economic growth. We follow the methodology used by Ram (1986) to test the size and productivity differential impact of government size on the non-governmental sector. Ram (1986) analysed the relation between government size and economic growth with evidence from cross section and time series data. It is pertinent to mention here the views of Slemrod (1995), that partial cross-country

[5] We us this as an independent variable in the model to test the impact of government spending on economic growth.

association between growth and measures of government involvement is not so robust to several aspects of empirical verification. This can be due to several problems like exclusion of aspects like environmental quality (for which the government intervenes substantially) from National Accounts, arbitrary conventions of government budgeting in different countries and non- budgetary aspects of government economic involvement [for example, while one country might rely on extensive government social insurance programme, another might achieve the same objective by regulating private pension plans. Effects on growth might be similar, but the measured size of government sector would differ (Henry Aaron- Comments to Slemrod 1995: 425)], which do not get reflected in the measure of the size of the government. This is a limitation encountered generally in attempting to measure the impact of government size on output growth, especially in cross-country framework.

The methodology employed by Ram (1986) was earlier used by Feder (1982), while discussing the determinants of growth for a group of semi-industrialised countries for the period 1964-1973, to analyse the externality and productivity effects of the export sector on growth of output. The study found that the marginal factor productivities were significantly higher in the export sector. The difference seemed to derive in part from inter- sectoral beneficial externalities generated by the export sector. The same methodology was used for the Government sector and the non -government sector. The estimated model not only provided an assessment of the overall effect of government size on economic growth, but also enabled one to assess whether a) the (marginal) externality effect of government size on the rest of the economy was positive or negative and b) input productivity in the government sector was higher or lower than in the non government (private) sector.

Ram (1986) in his study examined data for Less Developed Countries (LDCs) and Developed Countries (DCs) for the time period 1960- 70 and 1970-80 separately. The model used is briefly described below[6].

The economy consists of two broad sectors, the government sector (G) and the non-government sector (C) and the output in each sector depend on inputs of labour (L) and capital (K) and in addition the size of government sector exercises an additional

[6] See the appendix to this Chapter for a discussion of the full model.

externality effect on output in the other sector (C). The production functions for the two sectors can be written as

$$C = C(L^c, K^c, G) \quad \ldots\ldots\ldots\ldots (1)$$

$$G = G(L^g, K^g) \quad \ldots\ldots\ldots\ldots (2)$$

$L^c + L^g = L$ and $K^c + K^g = K$, where L^c, L^g, K^c and K^g are L and K in C and G sectors respectively.

The total output is $C + G = Y$, where Y is the total output

The relative factor productivity in the two sectors differ

$$G_L/C_L = G_K / C_K = (1+\delta) \quad \ldots\ldots\ldots (3)$$

The upper case subscript describes the change in G and C with respect to the subscripted input. The sign of δ indicates which sector has higher marginal productivity. If it is positive the government sector has higher marginal productivity. The model used an approximation of the aggregate growth function, which is

$$\dot{Y} = \alpha(\frac{I}{Y}) + \beta\dot{L} + (\frac{\delta}{1+\delta} - \theta)\dot{G}(\frac{G}{Y}) + \theta\dot{G} \ldots\ldots\ldots\ldots\ldots (4)$$

If we assume the parametric constraint, $\delta/(1+\delta)=\theta$[7], the equation (4) becomes

$$\dot{Y} = \alpha(\frac{I}{Y}) + \beta\dot{L} + \theta\dot{G} \ldots\ldots\ldots\ldots (5)$$

The variable on the left-hand side of (4) is the growth rate, measured by the growth rate of Gross Domestic Product (GDP) at factor cost at constant prices. The coefficient α, is the marginal product of capital in the non-government sector and β is the elasticity of non- government output with respect to labour, θ is the elasticity of non- government output with respect to government output, reflecting the percentage increase in non- government output, given labour and capital in the non-government sector, with a one percentage increase in government output. The coefficient $\delta/(1+\delta)$ gives the factor productivity differential between the two sectors. The term I in I/Y is the investment, which is the difference in net capital stock, Y is the output, G is the

[7] This cannot be presumed when the coefficient of the term $\delta' - \theta$ is statistically different from zero, where $\delta' = \delta/(1+\delta)$

government size measured by total government expenditure, $\dot{Y}, \dot{G}$ and $\dot{L}$ are growth rates in output, size of government and labour force respectively.

If we do not measure the externality effect and the inter-sectoral productivity differential effect separately, the equation (4) becomes,

$$\dot{Y} = \alpha(\frac{I}{Y}) + \beta\dot{L} + [(\frac{\delta}{1+\delta}) + C_G]\dot{G}(\frac{G}{Y}).....(6)$$

The coefficient of the third term on the right hand side represents the overall effect of government size directly, but will not measure the externality effects and productivity differential effects separately.

The term C_G is similar to marginal product and gives for constant L^c and K^c the increase in non-government output and consequentially total output, as G, the government size, increases by one unit. Though similar, unlike C_G the parameter θ is an elasticity measure, which reflects the percentage increase in non-governmental output, given L^c and K^c with a one- percent increase in government size change (the fourth term on the R.H.S. of (4). Ram (1986) stated that in model (4), the third and fourth explanatory variables could be correlated leading to the problem of multicollinearity.

Since, the coefficient of the third term in equation (4) was not significantly different from zero in the results, Ram (1986) focussed on the simpler version, equation (5). Using the equation (5), the study found that the coefficient of change in government size was positive and statistically significant at 1 percent level in every case implying that externality effect of the government size on the rest of the economy, and hence on economic growth, was positive on all cases. In equation (6) the coefficient of third term on the R.H.S., which gives the overall effect of government size on growth, were large positive numbers in every case, and statistically significant at 1 percent level. The coefficients of increase in change in government size were higher for 1970-80 than for 1960-70.

The main results of the study of Ram (1986) were

1) The overall impact of government on growth was positive in almost all cases

2) The marginal externality effect was generally positive

3) Compared with the rest of the economy, factor productivity in government sector was higher

4) Although the number of time series observations was small, there was broad harmony between the estimates obtained from cross section and time series data.

5) As compared with the 1960s, the positive externality effect of government size on growth might have become somewhat stronger during the 1970s, but the relative factor productivity might have declined during the 1970s.

6) The size effect of government on growth was stronger in lower income context.

4.5 Application in the Indian Context

The model used by Ram (1986) is applied to the Indian context for the period, 1970-71 to 1999-2000, to analyse the impact of the size and productivity effect of government sector on economic growth. As stated earlier, we measure the size of the government by the total government expenditure of Central and State governments. The size of government has been measured by using different measures in various studies. Rubinson (cited in Ram 1986:191) measured it by the share of government revenue in GNP, whereas Landau (cited in Ram 1986:191) measured it using share of government consumption in GNP. The above-mentioned studies reached contrasting conclusions. The former found that a larger government size indexed by the share of government revenue in GNP, promoted economic growth by reducing "dependence" especially in poorer, less developed countries, whereas the latter found that a larger government size, proxied by the share of government consumption in GDP, depressed growth of per capita income.

We treat the comprehensive measure of total expenditure as the government size since the focus of our study is on impact of total government spending on economic growth. As stated in earlier, while computing the size of government, we do the summation of the total expenditure of the centre and all the states and deduct the centre's loans and grants to the states from the aggregate, to avoid the problem of double counting centre-state transfers, first as central expenditure and again as state expenditure. With this framework, we proceed to analyse the results of models (4), (5) and (6). In all the models the dependent variable is the growth rate of GDP.

Table 4.3

(a) Results of Model (4)

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	6.643	3.637	1.826	0.082
I/Y	-6.62	19.683	-0.336	0.739
Employment	-1.0471	0.884	-1.184	0.249
Government size change/GDP	-0.509	2.267	-0.225	0.824
Government size change	0.358	0.657	0.547	0.591

$R^2 = 0.266$, F-value (probability) = 1.902 [0.1474] DW = 2.18

(b) Residual Properties

Auto regression	0.42886 [0.6574]
ARCH	0.52508 [0.4775]
Normality	6.4068 [0.0406] *
Homoscedasticity-1	0.50735 [0.8291]
Homoscedasticity-2	0.29007 [0.9736]
RESET	0.39687 [0.5358]

The model adequacy test indicates that the null hypothesis of normality is rejected, while other properties are satisfied. The results indicate that the coefficients of government size change as a proportion of GDP and government size change are not statistically significant. The sign of δ which can be computed from the coefficients of model (4), is negative at –0.131, indicating lower input factor productivity in the government sector.

However, the model is affected by multicollinearity as is revealed in regression of the independent variables, treating each one of them as dependent variable. If R_k^2 is the coefficient of determination obtained by regressing one of the independent variables, X_k on all other X variables in the model, the higher the R_k^2, the greater is the degree of multicollinearity. If $R_k^2 = 1$, there is perfect multicollinearity. The Tolerance of X_k is computed as $1 - R_k^2$. With perfect multicollinearity, tolerance tends to zero (Hamilton 1992). When we test by regressing the independent variables treating each one of them as the dependent variable, we get the following results.

(c) Tolerance Test for Multicollinearity between Independent Variables 3 and 4 in Model (4)

Variable	R_k^2	Tolerance $1 - R_k^2$
I/Y	0.258	0.742
Employment growth rate	0.294	0.706
Government Size Change/ GDP	0.978	0.022
Government Size Change	0.978	0.022

The Tolerance is near zero, when the Government size change as a proportion of GDP and government size change are the dependent variables, indicating a high degree of multicollinearity between these two variables.

We can estimate model (5) by dropping the third term of (4), as its coefficient is insignificant implying that it is not significantly different from zero. The exclusion of this term also results in avoiding the problem of multicollinearity discussed above.

Table 4.4

(a) Results of Model (5)

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	6.494	3.498	1.857	0.0768
I/Y	-6.293	19.20	-0.328	0.746
Employment Growth	-1.018	0.856	-1.190	0..246
Government size change	0.212	0.096	2.198	0.038

$R^2 = 0.264$, F-value (probability) = 2.634 [0.075] DW = 2.21

(b) Residual Properties

Auto regression	0.510 [0.608)
ARCH	0.646 (0.430)
Normality	5.82 (0.054)
Homoscedasticity-1	0.623 (0.709)
Homoscedasticity-2	0.457 (0.876)
RESET	0.442 (0.512)

Here, we get the result that the externality effect of change in government size is having a positive and statistically significant coefficient. The coefficient indicates that, one hundred percent increase in government size is significantly associated with a 21 percent increase in size of non-governmental sector.

We can also test the overall size effect of government without segregating externality and input factor differential effect, using model (6)

Table 4.5

(a) Results of Model (6)

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	6.388	3.549	1.800	0.085
I/Y	-6.057	19.339	-0.313	0.757
Employment Growth Rate	-0.995	0.865	-1.150	0.0262
Government size change/GDP	0.711	0.334	2.126	0.049

$R^2 = 0.255$, F-value (probability) = 2.518 [0.084] DW = 2.27

(b) Residual Properties

Auto regression	0.621(0.547)
ARCH	0.770(0.390)
Normality	5.19 (0.4762)
Homoscedasticity-1	0.59 (0.074)
Homoscedasticity-2	0.61 (0.714)
RESET	1.02 (0.322)

Here the coefficient, which measures the overall size effect of the government without segregating it into productivity differential effect and the externality effect is positive and statistically significant at 5 percent level. As seen from the results of Model (4), the coefficients of input factor differential and the externality effects are not the same sign, the former having a negative and the latter having a positive sign. This implies that irrespective of the sectoral productivity differential, the impact of total government size on growth is positive. The negative value of δ, indicating lower input productivity in government sector, is not substantial to overcome the positively significant externality effect of government size.

The summary of the results of the models (5) and (6) clearly imply the following

a) The impact of change in government size has a positive and statistically significant impact on non-government size and consequentially on overall growth

b) The input factor productivity in government sector is lower than that of the non-government sector [using model (4)].

c) The total size effect of the government on economic growth is positive and statistically significant as the positive externality effect overcomes the negative factor productivity differential effect.

When we analyse the models (5) and (6) by dropping the statistically insignificant coefficients I/Y and employment growth rate one by one, we still get their coefficients as statistically insignificant and that of government size change and proportion of government size change to GDP as statistically significant. The results are reported below:

(a) Table 4.6
Results of Model (5) By dropping I/Y

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	5.492	1.670	3.288	0.003
Employment Growth Rate	-0.877	0.725	-1.210	0.238
Government size change	0.216	0.093	2.311	0.030

$R^2 = 0.260$, F-value (probability) = 4.054 [0.031] DW = 2.22

(b) Residual Properties

Auto regression	0.485 (0.622)
ARCH	0.691 (0.415)
Normality	5.513 (0.063)
Homoscedasticity-1	0.996 (0.434)
Homoscedasticity-2	0.825 (0.548)
RESET	0.913 (0.439)

(a)Table 4.7

Results of Model (5) by dropping Employment Growth Rate

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	2.271	2.113	1.075	0.292
I/Y	10.581	17.332	0.610	0.546
Government size change	0.220	0.093	2.364	0.025

$R^2 = 0.182$, F-value(probability) = 2.908 [0.072] DW = 1.93

(b) Residual Properties

Auto regression	0.024 (0.975)
ARCH	0.394 (0.535)
Normality	2.354 (0.308)
Homoscedasticity-1	0.791 (0.544)
Homoscedasticity-2	0.619 (0.686)
RESET	0.959 (0.336)

(a)Table 4.8

Results of Model (5) by dropping I/Y and Employment Growth Rate

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	3.462	0.801	4.323	0.0002
Government size change	0.217	0.092	2.361	0.025

$R^2 = 0.171$, F-value (probability) = 5.572 [0.025] DW = 1.184

(b) Residual Properties

Auto regression	0.011 (0.988)
ARCH	0.363 (0.552)
Normality	2.685 (0.261)
Homoscedasticity-1	1.337 (0.281)
Homoscedasticity-2	1.337(0.281)
RESET	0.886(0.355)

Table 4.9

(a)Results of Model (6) by dropping I/Y

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	5.419	1.706	3.176	0.004
Employment Growth Rate	-0.858	0.731	-1.173	0.252
Government size change	0.727	0.324	2.42	0.034

$R^2 = 0.252$, F-value(probability) = 3.881 [0.035] DW = 2.27

(b) Residual Properties

Auto regression	0.596 (0.559)
ARCH	0.836 (0.370)
Normality	4.885 (0.086)
Homoscedasticity-1	0.977 (0.444)
Homoscedasticity-2	0.888 (0.510)
RESET	1.898 (0.182)

Table 4.10

(a)Results of Model (6) by dropping Employment Growth Rate

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	3.063	2.074	1.477	0.153
I/Y	5.200	16.797	0.310	0.759
Government size change	0.806	0.326	2.468	0.021

$R^2 = 0.210$, F-value(probability) = 3.073 [0.065] DW = 2.17

(b)Residual Properties

Auto regression	0.135 (0.874)
ARCH	0.790 (0.383)
Normality	4.005 (0.134)
Homoscedasticity-1	0.771 (0.557)
Homoscedasticity-2	0.636 (0.675)
RESET	2.164 (0.155)

Table 4.11

(a) Results of Model (6) by dropping I/Y and Employment Growth Rate

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	3.653	0.808	4.518	0.0001
Government size change/GDP	0.803	0.320	2.507	0.019

$R^2 = 0.207$, F-value(probability) = 6.287 [0.019] DW = 2.13

(b) Residual Properties

Auto regression	0.086 (0.917)
ARCH	0.818 (0.377)
Normality	4.102 (0.128)
Homoscedasticity-1	1.761 (0.196)
Homoscedasticity-2	1.761 (0.196)
RESET	1.858 (0.186)

As discussed earlier, the coefficients of the employment growth rate and I/Y represent the elasticity of non-government output with growth in employment and marginal product of capital in the non-government sector respectively. They are both statistically insignificant in all the results of empirical verification. The non-significance of the coefficient of labour change on non-government output could be most probably due to substantial portion of the labour force engaged in low productive and overcrowded occupations. The latest 55th quinquennial round of the NSSO survey revealed that though the share of agriculture in GDP is only 26 percent, the proportion of employment engaged in agriculture is around 59 percent. The non-

significance of the other coefficient, that is, that of the marginal product of capital in the non-government sector, needs a detailed examination, which is outside the scope of our study.

4.5.1 Model Specification Test vis-à-vis an Alternative Model

Other studies on impact of government size on economic growth have used the size of government as the independent variable, instead of its change (Ram 1986). The examples of such studies are Landau ((cited in Ram 1986: 194), Barro (1997) et cetera. The model used by Landau is as follows

$$\dot{Y} = \alpha_K\left(\frac{I}{Y}\right) + \beta_L \dot{L} + \gamma\left(\frac{G}{Y}\right) \text{.....(7)}$$

Where G/Y is the proportion of government size to total output and other variables are similar to those in model (5). The results of this model indicate that the effect of government size on growth is not statistically significant. The tests for model adequacy reveal that all properties of the residuals except normality are satisfied.

Table 4.12
(a) Results of Model (7)

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	6.116	6.772	0.903	0.376
I/Y	-12.811	20.891	-0.613	0.546
Employment Growth Rate	-1.467	0.915	-1.603	0.123
Government size	10.675	19.659	0.543	0.592

R^2 = 0.114, F-value(probability) = 0.948 [0.434] DW = 2.58

(b) Residual Properties

Auto regression	2.195(0.137)
ARCH	0.153(0.699)
Normality	8.875(0.011)*
Homoscedasticity-1	0.294(0.930)
Homoscedasticity-2	0.341(0.942)
RESET	0.027(0.869)

The results are different from the model, which used change in government size as a proportion of GDP and change in government size. This necessitates a comparative analysis of the two models.

Ram (1986) considered G/Y as an inappropriate regressor and using Davidson and Mackinnon's J test verified the statistical preference of this model over the model having change in government size as a regressor. Following Ram (1986) we also test the statistical preference of model (7) over model (5) using Davidson and Mackinnon's J-test. We include the predicted values of the dependent variable in (7)

as one of the explanatory variables in Model (5), and test whether the coefficients are statistically significant. If it is significant, the J-test prefers (7) over (5). The null hypothesis is (5) being true and the alternative hypothesis is (7) being true. Since the coefficient of predicted values of (7) is not statistically significant, the null hypothesis fails to reject.

Table 4.13

(a) Results of Davidson and MacKinnon's J-test: H_0 Model (5) is True

Variable	Coefficient	Standard error	t-value	t-probability
Intercept	0.961	10.239	0.094	0.9261
I/Y	-8.299	21.147	-0.392	0.6989
Employment Growth Rate	-1.022	0.887	-1.152	0.263
Government size change	0.228	0.105	2.171	0.042
Predicted Value of (7)	1.08	2.003	0.540	0.595

$R^2 = 0.282$, F-value (probability) = 1.969 [0.138] DW = 2.21

(b) Residual Properties

Auto regression	0.808 [0.461]
ARCH	0.830 [0.374]
Normality	4.582 [0.101]
Homoscedasticity-1	0.633 [0.736]
Homoscedasticity-2	0.679 [0.739]
RESET	2.672 [0.118]

We test the reverse also, by including the predicted values of (5) as an explanatory variable in (7). The null hypothesis is (7) being true and the alternative hypothesis is (5) being true. The null hypothesis is rejected, as predicted values of (5) are statistically significant.

Table 4.14

(a) Results of Davidson and MacKinnon's J test: H_0 Model (7) is True

Variable	Coefficient	Standard error	t-value	t-probability
Intercept	-0.676	7.700	-0.088	0.930
I/Y	-10.104	19.783	-0.511	0.615
Employment Growth Rate	-1.028	0.886	-1.159	0.260
Government size	12.770	20.876	0.612	0.547
Predicted Value of (5)	0.963	0.440	2.188	0.040

$R^2 = 0.284$, F-value (probability) = 1.986 [0.135] DW = 2.24

(b) Residual Properties

Auto regression	0.805 [0.462]
ARCH	0.859 [0.366]
Normality	4.122 [0.127]
Homoscedasticity-1	0.591[0.767]
Homoscedasticity-2	0.874 [0.616]
RESET	2.645 [0.120]

Since the predicted value of the dependent variable of model (5), when included as an explanatory variable in model (7) is statistically significant, the results of the J-tests indicate the preference of models with change in government size over the one, which includes proportion of government size to GDP.

4.6 Impact of Components of Government Expenditure on Economic Growth and TFPG

a) On Economic Growth

Let us also examine the impact of the components of total expenditure, that is, capital and revenue on economic growth in the light of the views surveyed in section 4.2.3. When we do multiple regression controlling for one of the explanatory variables, the results show that the impact of growth of capital expenditure is statistically significant and that of revenue expenditure is not statistically significant.

Table 4.15
(a) Association between Growth Rates of GDP, Capital Expenditure and Revenue Expenditure: Dependent Variable Growth Rate of GDP

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	3.132	0.813	3.851	0.0001
Capital Expenditure Growth	0.288	0.131	2.195	0.037
Revenue Expenditure Growth	-0.012	0.985	-0.131	0.897

$R^2 = 0.237$, F –Value (probability) = 4.06 [0.029] DW = 1.93

(b) Residual Properties

Auto regression	0.082 [0.920]
ARCH	0.980 [0.332]
Normality	2.196 [0.333]
Homoscedasticity-1	0.681 [0.612]
Homoscedasticity-2	0.772 [0.580]
RESET	2.016 [0.167]

The composition of total expenditure is such that the revenue expenditure is higher than that of the capital expenditure (Table 4.2 and Figure 4.2). The results of the empirical examination (Table 4.15), suggests that there is a case for reallocating expenditure in favour of more capital expenditure, albeit with the ensuring of efficiency in utilisation. But to examine what stymies this process of reallocation in favour of capital expenditure, we will have to look into the political economic aspects of government spending. Here the underlying nature of the state, which determines its spending composition, assumes critical importance. Before proceeding to do this, let us briefly examine the association of productivity measured by TFPG with total and certain components of government expenditure.

b) On TFPG

Here, we examine the association between TFPG and government spending. As seen in the last Chapter, there is a strong association between TFPG and overall growth. Already, we have found a positive and statistically significant relation between government size, capital expenditure component of government expenditure and economic growth. As stated in Chapter 3, we are examining the hypotheses of the factor/s behind the apparent increase in growth rates during the period of study. Productivity growth and government size change, have been cited as the factors behind it, in various studies reviewed earlier. We have seen the impact of these two separately on aggregate growth rate. Now we proceed to see the relation between these two factors, with the aim of verifying whether the two hypotheses regarding the factors underlying growth, that is, whether it is due to productivity increase and/or due to increase in government spending, are actually competing or complementary. For this, we test the association between TFPG and the total and relevant components of government expenditure.

i) TFPG and Growth Rate of Total Government Expenditure

The association between TFPG and growth rate of total government expenditure of the centre and the states is positive and statistically significant at 1 percent level. The results are reported below:

Table 4.16
(a) Association between Growth Rate of TFP and Total Government Expenditure: Dependent Variable TFPG

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	0.349	0.837	0.418	0.679
Change in Government expenditure	0.277	0.099	2.803	0.009

$R^2 = 0.246$, F-value (Probability) = 7.857 [0.009] DW = 2.21

(b)Residual Properties

Auto regression	0.478 [0.626]
ARCH	0.765 [0.390]
Normality	6.24 [0.044]*
Homoscedasticity-1	1.810 [0.188]
Homoscedasticity-2	1810 [0.188]
RESET	1.310 [0.264]

The properties of the residual except normality are satisfied. The results clearly bring out the significant association between productivity change measured by TFPG and change in government size measured by growth rate of government expenditure. Let

us now analyse the association between TFPG and components of government expenditure.

ii) TFPG and Growth Rate of Capital and Revenue Expenditure

From the results, it is seen that the association between TFPG and the growth rate of capital expenditure of the centre and the states is positive but statistically significant only at 10 percent level. The association with growth rate of revenue expenditure is not statistically significant.

Table 4.17

(a) Association between Growth Rates of TFP and Components of Government Expenditure: Dependent Variable TFPG.

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	0.121	0.882	0.138	0.891
Growth rate of Capital Expenditure	0.243	0.143	1.701	0.092
Growth rate of Revenue Expenditure	0.069	0.108	0.636	0.531

$R^2 = 0.276$, F-value(probability) $= 4.58(0.02)$,DW$= 2.26$

(b) Residual Properties

Auto regression	0.402 [0.673]
ARCH	0.838 [0.370]
Normality	5.808 [0.054]
Homoscedasticity-1	1.246 [0.327]
Homoscedasticity-2	1.091 [0.400]
RESET	2.873 [0.104]

iii) TFPG and Growth Rate of Expenditure on Social Services

To get a still clearer picture of the association between TFPG and government spending, we examine its association with the social services component of government spending. The social services in the government spending include a) General Education b) Technical Education c) Sports and Youth Affairs d) Arts and Culture e) Medical and Public health f) Family Welfare g) Water Supply h) Housing i) Urban Development j) Information and Publicity k) Broadcasting l) Welfare of SCs STs and OBCs m) Labour and Employment n) Social Security and Welfare (Source CMIE, Public Finance: 2002). The impact of government spending on education, health et cetera. will improve the productive potential of the workforce and should in turn contribute to increase in TFPG.

In our federal setup, most of the expenditure on social services falls on the state governments as they are either in the concurrent list or the state list of the

Constitution. So the association between the growth of aggregate social sector expenditure of all the state governments and TFPG should be a clear indicator.[8] When we test the association between growth rate of TFPG and growth rate of social sector spending (with TFPG as the dependent variable), we find that it is statistically significant at 10 percent level.

Table 4.18
(a) Association between Growth Rate of TFP and Government Spending on Social Services: Dependent Variable TFPG

Variable	Coefficient	Standard Error	t-value	t-probability
Intercept	0.969	0.884	1.096	0.284
Growth rate of Social Sector spending	0.197	0.112	1.754	0.092

$R^2 = 0.109$, F-value (probability) = 3.08 (0.091) DW= 2.55

(b) Residual Properties

Auto regression	1.931 [0.167]
ARCH	0.127 [0.724]
Normality	9.355 [0.009]*
Homoscedasticity-1	0.444 [0.647]
Homoscedasticity-2	0.444 [0.647]
RESET	0.347 [0.561]

Figure 4.3
Change in Government Expenditure on Social Services as a Proportion of GDP

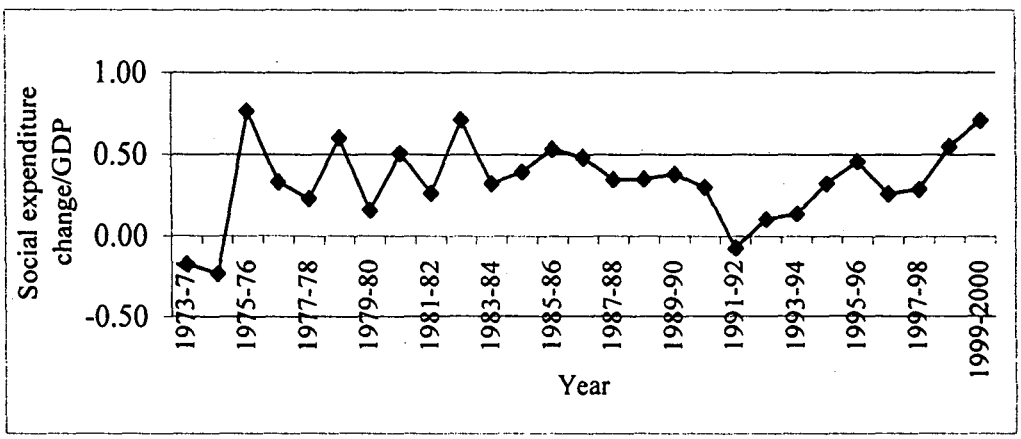

Figure 4.3 shows the change in social sector spending as a proportion of GDP [similar to the variable measuring change in government size in Model (6)]. The change in social sector spending shows a regularly fluctuating pattern in the 1970s and became stable in the 1980s. In the 1990s it was at a lower level, though showing an upward

[8] We are not aggregating the expenditure of the centre and the states for social services as most of the central expenditure will be transfers to states under central schemes either as grants or loans, since most of the subjects fall in concurrent or state list.

moving trend till 1994-95. It started declining before rising again since 1997-98. There appears to be a clear association between the increase in growth rates in the 1980s and the trend in spending on social services, which has a statistically significant association with productivity change.

Apart from the empirical results, we would look at another important reason for the linkage between productivity increase and state spending. R.M.Godwin 's "Chaotic Economic Dynamics", (cited in Patnaik 1994:684,689) elaborated the association between innovations and state spending. Innovations are an important determinant in productivity increase. In the above-cited view, major innovations were scarcely possible without the support of the state. The Schumpeterian innovations have limitations, when there are problems in aggregate demand. In a demand constrained situation, a cluster of innovations could well give rise to economic retrogression than economic growth and therefore an exogenously given floor of economic activity, which the state could provide was necessary, if innovations were to give rise to growth rather than growing unemployment and economic retrogression. Patnaik (1994) stated that the need for state intervention to sustain innovation process was far greater in the present times, and should not be confined only to macro level demand management, but to be extended to even micro level support. These views offer an intuitive explanation for the role of state spending in productivity increase in addition to the empirical results obtained by us.

4.7 Relation between Productivity Increase, Government Spending and Overall Growth Rates

Total government expenditure and its components, capital expenditure and expenditure on social services have a positive and statistically significant impact on TFPG. Total government expenditure and capital expenditure also have a positive and statistically significant impact on overall growth rate. We have observed in Chapter 3 that there is a strong association between Total Factor Productivity Growth and the overall growth rates, whereas the association between Total Factor Inputs like Capital and Labour and the overall growth rates are not so strong (Figures 3.5, 3.6 and 3.7).

Given the association between productivity increase and total government spending and its components, it can be concluded that government spending is a determinant of increase in growth rate through productivity increase. In other words, there is a

significant association between productivity increase and government spending, an important source and determinant respectively of overall growth rates.

4.8 Political Economy of State Spending and Resource Mobilisation in India

The results of the quantitative exercises show that the impact of government size measured by the change in government expenditure has a positive and statistically significant association with economic growth. Among the components of expenditure, the growth rate of capital expenditure has a positive and statistically significant association while that of revenue expenditure has no statistically significant association with economic growth. The government spending on social services has a positive and significant impact on productivity growth, which is strongly associated with growth rates. When the components of growth are examined, we find that revenue expenditure is rising ahead of capital expenditure, and the trend is marked, especially since the beginning of the 1980s (Figure 4.2). The question that arises here is whether a process of growth, with increases in current spending outpacing the capital spending is sustainable, as borrowings for spending would render it unsustainable[9]. This question is in fact an extension of the hypothesis that the rise in growth rate in the 1980s had the increase in government expenditure as a strong determinant.

There is a proposition that the increase in expenditure led to rise in debts and rendered the growth process unsustainable [Joshi and Little (1994), Acharya (2002b)]. Srinivasan (2001) stated that the spurt in growth rates in the 1980s was associated with fiscal expansion and the unsustainable fiscal profligacy of the decade of eighties was financed in part by external borrowings at hard commercial terms. The expenditure increased to 33 percent of the GDP, while revenue receipt was only 21 percent, leaving a gap of 12 percent. Though Rakshit (1991) argued that increase in government expenditure in relation to revenue collections might have played an important role in enabling the Indian economy to scale the barrier of Hindu rate of growth, he took the analysis to components of growth and problems in resource mobilisation. He stated that the demand driven growth was unsustainable due to the non-viability of borrowings for

[9] Here it can be hypothesised that if this is met out of taxation receipts the sustainability problem will not arise. But there are several constraining factors in mobilisation of resources, which we will examine in this sub-section.

current spending yielding little or no returns, and the lack of will to collect revenues from beneficiaries of investments. This implies that the real problem is not the increase in expenditure, but its composition in which current expenditure, which does not yield returns and consequentially leads to unsustainable debt dominates. The unsustainability of debt and there by of the growth process itself is exacerbated by constraints in resource mobilisation. Both tax and non-tax revenues have been stagnating since the beginning of the 1990s [Chandrasekhar (2000), RBI (2001), Kelkar Task Force Report (2003)].

The altering the composition of expenditure in favour of capital expenditure, which yields return, can make the impact of change in size of government on overall growth more sustainable. Here, the efficiency in utilisation of expenditure and cost recovery from beneficiaries assume paramount importance. From the sustainability point of view and impact on growth, an alteration in the composition of expenditure in favour of productive capital investment and social sector spending, curtailment of expenditure cornered by interest groups and more effort at cost recovery seem necessary.

Social sector spending does not seem to have a powerful constituency to champion its cause with a long- term perspective, among the dominant classes. To analyse what are these dominant classes and how they impede altering the composition of expenditure, we look into issues, which are in the realm of political economy.

The political economic constraints operating against alteration of expenditure composition are compounded by the fact that the same operate in the resource mobilisation side also. The will to break these constraints on the part of the state would depend fundamentally on the influences of dominant classes and social coalitions, which determine the nature of the state and in turn its economic role through spending and resource mobilisation. We will briefly discuss them in the Indian context.

Raj (1973) analysed the nature of the Indian state from the Kaleckian intermediate regimes perspective, as one dominated by an alliance of lower middle class and rich peasantry. Contrary to this, are the views of Namboothiripad (1973) and Patnaik (1974). The former considered the Indian state as one in which the bourgeoisie headed

by the big business in alliance with the feudals were the dominant classes with lower middle classes and rich peasantry being their camp followers; and the latter described the dominant classes as an uneasy alliance of rural landed classes and the big industrial bourgeoisie, influenced also by the interaction with metropolitan capital (or rather a love hate relationship with the metropolitan capital). Bardhan (1984) argued that state and its spending were completely subordinated to the pressures and pulls (which are some times conflicting) of the dominant proprietary classes, viz. industrial bourgeoisie, rich farmers and professionals (both civil and military), including white-collar workers. These mainly aim at garnering the state's resources by way of explicit and implicit subsidies, concessions, protection for monopoly rents, high administered prices et cetera. Datta-Chaudhary (1990) expressed similar views regarding dominant social groups in India and identified them as the affluent peasantry, the big industrialists and the working classes and other employees in the organised sector.

The state is considered as enmeshed in a complex web of socio-political relations and class configurations, socially embedded as an integral part of the way the polity and the society themselves evolve. This is the incorporative view of the economic role of the state. Much of the literature classified as incorporative is part of the Marxist tradition. (Ghosh1995:161). These perspectives of the nature of the state provide the background for analysing the composition of state expenditure.

When the state, which is dominated by proprietary classes, fails to cut or prune the expenditure championed by powerful constituencies of interest groups, the obvious consequence is that capital expenditure is cut. This happens because the Indian state has always been very inflation sensitive[10] and has felt the need for keeping budget deficit and later fiscal deficit under control through a check mainly on capital expenditure side. This line of argument involves the assumptions of linkage between budget deficits and inflation through increase in money supply, if there is automatic monetisation of deficit by the Central Bank, and the effects of price increases exacerbating the deficits by upwardly affecting the value of expenditures faster than revenues.

[10] For a discussion on this see, Patnaik (1988), Lewis (1995).

The revenue expenditure and capital expenditure as a proportion of GDP in India (Table 4.2), and their movement as seen from Figure 4.2, raises the question of changing the composition of expenditure. It has been pointed out by International Monetary Fund (IMF) that, "Allocating a higher share of public spending to physical and human capital formation can also promote growth. Investments in physical capital such as roads and other infrastructure can increase the economy's productive capacity. Although the efficacy of such investment varies across projects and countries, recent research indicates that it may have a significant impact on economic growth. Physical and human capital spending should also be protected during fiscal adjustments." (IMF 2002:8) That capital expenditures should not be cut instead of revenue expenditures for keeping the budget or fiscal deficit within target was also emphasised by Gulati (1991). But as stated in the beginning, the constraint is socio- political. Given the political economic structure in which the dominance of certain classes succeed in preserving expenditure beneficial to them, it is capital expenditure, which would face the cut, as the fiscal deficit targets are fixed in advance.

As discussed already, the state's ability to alter the expenditure composition is stymied by the fact that the same interest groups, which stall the altering the composition of expenditure, also circumscribe its effort in tax mobilisation. Income of the rural rich is outside the tax net, despite several recommendations, right from that of V.K.R.V.Rao in the 1930s (The Cambridge Economic History of India, Vol II: 930) to the Chellaiah committee in 1993 and Kelkar Task Force in 2003. The Economic Survey of India, 2002 (Paragraph No.1.115) admitted that the emerging self-employed professionals in the services sector were a hard to tax group. Harris-White (2003) analysed the problem of substantial tax evasion in small town and rural economies dominated by a loose coalition of small-scale capitalist class, agrarian and local agribusiness elites and local state officials. This combination has been described as intermediate class and the bulk of the economy dominated by these coalitions is outside the control of the state.

The twin constraints of inflation barrier of yester-years and the fiscal deficit target of recent years along with constraints in revenue mobilisation and problems in cutting revenue expenditure have resulted in a fall in capital expenditure, which has a significant positive association with economic growth.

Analysing the constituencies, which fight for retaining their share in the current expenditure, Bardhan (1984) proposed that it led to frittering away of resources, which otherwise could have been used as investible resources by the state[11]. Given the nature of the interest groups in the social coalition, they tend to protect the state expenditure, which is beneficial to their interest which more often than not leads to less than optimal allocation of resources. Examples, which can be illustrated are political decisions to raise procurement prices over and above what has been fixed by Commission for Agricultural Costs and Prices (CACP), non-payment of user charges, implicit subsidies in addition to explicit subsidies et cetera.

The salaried classes and professionals in government and public sector are another example of interest groups[12]. In the very recent period, many organised trade unions in public sector undertakings and government sector went on agitational path[13], protesting against the withdrawal of certain long enjoyed benefits. They drew their moral support from the fact that the state is not collecting the potentially collectible revenues, and is yielding to interest groups.

Another aspect, which cannot be glossed over, is the frittering away of subsidies or it reaching the pockets of corrupt officials and sections, which are not intended as targets[14]. These constitute wastage of resources in the economy, probably with the implicit support of the enforcers[15]. The group of undeserving beneficiaries and corrupt enforcers is also powerful fraction of the interest groups having influence over the state and impeding the change in composition of government expenditure.

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[11] It can be argued that interest groups also act as a check on efficiency of capital utililisation. For a detailed discussion, see Bardhan (1984).

[12] A view has been expressed by Godbole (2002) that phenomenal increase in private sector salaries especially in the 1990s, most often without any sound basis, and the absence of a national wages and incomes policy has led to demands from government and public sector employees.

[13] Government Employees in Kerala, Transport workers in Tamil Nadu agitated in January –March 2002 for retaining the benefits enjoyed by them hitherto, like leave surrender for cash and festival bonus.

[14] RBI report on Currency and Finance (2001) discussed about Minimum Support Price not reaching the needy farmers but brokers who buy cheap from the farmers (who in fact make a distress sale to the middle men). Kannan and Pillai (2001) discussed about ummetered power theft being camouflaged as free power to the agriculturists.

[15] One interesting question can arise here. Even if diversion of resources take place, is it not emerging as private final consumption expenditure, though in the luxury goods and in real estate. But another aspect is capital flight overseas of this money. Whatever be the answers to these questions are, it is a fact that such diversion erodes the resource base of the state and thereby limits its capability in the expenditure side.

Yet another problem is the inadequate surplus generated in the public sector, which further imposes a fiscal constraint on the state. Raj (1973) found that the interest of the intermediate classes made public enterprises under price its products. Even when, we look at the Indian State from the views expressed by Namboothiripad (1973) and Patnaik (1974), the same constraints from the resource mobilisation side and expenditure side would emerge. As in the intermediate regimes, here also the big business has interest in public sector providing goods cheap, the rich peasantry, has demands for not taxing their income and retaining subsidies which explicitly and implicitly benefit them.

One question arising here is that it is the interest expenditure and not subsidies and wages and salaries, which ranks highest among the categories in terms of outgo of the government, and how the dominance of interest groups and dominant classes protecting favoured expenditure constituencies offers an adequate explanation for the present composition of expenditure. Analysing the macro economic outcomes in the 1990s, Rao (2002) observed that contrary to popular perception, the expenditure on subsidies has fallen from 1.6 to 1.2 percent and defence expenditure has remained unchanged. Primary deficit dropped perceptibly and it is the interest payment, which increased on an average from 4.3 to 4.5 percent.

In the trend of interest payments also, the issue of dominant interest groups and composition of expenditure is relevant. The small savings and the provident funds constitute a source of high cost borrowing for the government. Their interest rates are high compared to that of other instruments like the government securities and is given tax rebate and deductions both at the time of investment and withdrawal, still further increasing the real rate of return. The salaried class including the top bureaucrats and the vocal urban upper middle class has a powerful interest, which resists any cut in this rate[16]. When the government uses this borrowing for current spending the problem is compounded and leads us to the question of necessity of using these borrowings for income yielding capital expenditure. But as Rakshit (1991) pointed out, finding projects, which yield more than high real interest outgo on this costly source of borrowing, is difficult. The point sought to be emphasised here is that the

[16] Though there has been downward movement in these rates, there has been stiff resistance and the tax benefits have stayed on, despite Kelkar Task Force recommendations and the real interest rate on these instruments is still high compared to bank deposits and government securities.

downward stickiness of the interest expenditure is also in substantial measure due to the influence of powerful dominant classes over the state.

Bardhan (1984) viewed that in a non-single heterogeneous coalition of dominant proprietary classes, shedding of interests by one class is difficult and will be excruciatingly slow. Datta-Chaudhary (1990) also pointed out that the size and heterogeneity of the country prevented a single homogeneous group from dominating the polity and the state.

The neoclassical framework focuses on rent seeking, leading to diversion of productive resources, which also is in effect frittering of resources and leading to parallel economy, constraining the state's resource base and thereby affecting its manoeuvarability in changing expenditure composition [Krueger (1974), Bhagavati (1982), Srinivasan (2001)][17].

To summarise, the change in composition of expenditure, with capital expenditure, productive investment and social services getting a larger share than the expenditure for placating the constituencies of interest groups, is likely to have a more positive and significant association with sustainable economic growth[18]. In the Indian context, for time period 1970-71 to 1999-2000, the contrary view that capital expenditure can have negative impact (cited in Section 4.2.3) does not seem to hold good. There are very strong political economic impediments in altering composition of expenditure, given the influence of dominant classes and social coalitions over the state. This conclusion can be drawn, irrespective of whatever perspective one has on the nature of the state, which determines its role in economy through government spending and resource mobilisation.

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[17] Chang (2002) criticised the neo-classical view of the state as comprising self-seeking individuals. He pointed out that human motivations were multifaceted and there were just too many non-selfish human motivations and complex interactions between them. The institutionalist political economy (IPE) approach, which has been elucidated by him, does not see these motivations as given, but as fundamentally shaped by institutions surrounding the individual. Institutions influence how individuals perceive the legitimacy of particular types of political action. So, for example, rent seeking is likely to be less widespread in societies where open lobbying is, even if legal, considered to be of 'poor taste' than in societies where it is not, even if both societies have the same scope for rent seeking.

[18] It should not be construed that the argument for a cut in revenue expenditure is always desirable. The link of some components of revenue expenditure with the efficiency of utilisation of capital assets has been pointed out in this Chapter. There are other reasons also. When there is deficiency of aggregate demand, it can prop it up also. See Currency and Finance (2001: III-5) for a discussion on this. What is undesirable is cutting capital expenditures, while leaving expenditure in the interests of pampered groups, which in many ways is wasteful, untouched. Like changing the composition of expenditure, composition of revenue expenditure has to be changed with caution.

4.9 Conclusion

In this Chapter we have analysed the impact of change in government size, measured by growth rate of total government spending and its components on overall growth rates. We also examined the impact of growth rate of capital expenditure and expenditure on social services on productivity growth measured as TFPG. The input factor productivity differential between government and non- government sectors, the externality effect of change in government size on economic growth and the impact of overall size effect of government on economic growth were also separately analysed.

The externality effect as well as the overall size effect of government on overall growth rate is positive and statistically significant. When components of expenditure were analysed, it was found that the association of overall growth rate with capital expenditure was positive and statistically significant, whereas the same with the revenue expenditure was not statistically significant. When we examined the association between TFPG and the growth rate of total government expenditure, capital expenditure and expenditure on social services, they were found to be positively and significantly associated. The results indicate that the two hypotheses regarding the reasons for increase in growth rate in the period of study, viz., productivity increase and rise in government spending are neither independent of each other nor competitive, but complementary.

The results of the empirical exercise also imply that instead of an across the board reduction of expenditure, what is required is an alteration of its composition. But here caution need to be exercised because, only on the mere ground that the externality and size effect on growth rate is statistically insignificant, a reduction in all components of revenue expenditure is not desirable. Repairs and maintenance of capital assets and certain social services fall in the category of revenue expenditure. Hence a cut in repairs and maintenance of capital may adversely affect the functioning of capital assets and can result in lower capacity utilisation. A careful exercise needs to be done here. But the change in composition of expenditure is likely to be impeded by political economic constraints.

APPENDIX

Model

In this appendix, we discuss the derivation of the model used by Feder (1982), which was followed by Ram (1986) for modeling growth of output using changes in government size. We have used total expenditure of the central and state governments as the measure of the size of government. Let us discuss the derivation of the model.

$$C = C(L_c, K_c, G).....(1)$$

$$G = G(L_g, K_g).....(2)$$

Where, C and G are non-government expenditure and government expenditure respectively and L_c K_c, L_g, K_g are labour and capital in non-government and government sector respectively.

$$L_c + L_g = L .....(3)$$
$$K_c + K_g = K .....(3b)$$
$$C + G = Y .....(3c)$$
$$\frac{G_L}{C_L} = \frac{G_K}{C_K} = (1 + \delta).....(3d)$$

We can represent the ratio of marginal products of labour and capital in government and non-government sector in the following manner.

Where G_L, G_K, C_L and C_K are partial derivatives of G and C with respect to L and K.

δ is the input factor productivity in the government sector. Differentiating (1) and (2) with respect to time, we get (4) and (5),

$$G_L = \frac{\partial G}{\partial L}, C_L = \frac{\partial C}{\partial L} and C_K = \frac{\partial C}{\partial K}, G_K = \frac{\partial G}{\partial K}$$

$$\dot{C} = C_K I_C + C_L \dot{L}_C + C_g \dot{G}.....(4)$$

$$\dot{G} = G_K I_g + G_L \dot{L}_g.....(5)$$

(the dot indicates derivative with respect to time) I_C and I_g are first derivatives of capital with respect to time and denote investment.

From the identity C+G=Y -----(3c), we derive (6) Using equation (3d), we get G_L $=(1+\delta)C_L$. Substituting this in (6), we get (7)

$$\dot{Y} = C_K\dot{I}_c + C_L\dot{L}_c + C_g\dot{G} + G_K\dot{I}_g + G_L\dot{L}_g \quad \ldots\ldots(6)$$

$$\dot{Y} = C_K\dot{I}_c + C_L\dot{L}_c + C_g\dot{G} + (1+\delta)C_K\dot{I}_g + (1+\delta)C_L\dot{L}_g \quad \ldots\ldots(7)$$

Rearranging (7), we get (8) and (9).

$$\dot{Y} = C_k(\dot{I}_c + \dot{I}_g) + C_L(\dot{L}_c + \dot{L}_g) + C_g\dot{G} + \delta(C_k\dot{I}_g + C_L\dot{L}_g) \quad \ldots\ldots(8)$$

$$\dot{Y} = C_k\dot{I} + C_L\dot{L} + C_g\dot{G} + \delta(C_k\dot{I}_g + C_L\dot{L}_g) \quad \ldots\ldots(9)$$

Denoting changes in capital and labour of both sectors as below, we get

$$\dot{I}_c + \dot{I}_g = \dot{I}$$

$$\dot{L}_c + \dot{L}_g = \dot{L}$$

Using equation (3d), we get (10) which can be reduced to (10a).

$$C_k\dot{I}_g + C_L\dot{L}_g = \frac{1}{(1+\delta)}(G_k\dot{I}_g + G_L\dot{L}_g) \quad \ldots\ldots(10)$$

$$C_K\dot{I} + C_L\dot{L}_g = \frac{1}{(1+\delta)}\dot{G} \quad \ldots\ldots(10a), \textit{where}$$

$$\dot{G} = G_K\dot{I}_g + G_L\dot{L}_g$$

Substituting (10a) in (8), we get (11).

$$\dot{Y} = C_k\dot{I} + C_L\dot{L} + \left(\left(\frac{\delta}{1+\delta}\right) + C_g\right)\dot{G} \quad \ldots\ldots(11)$$

Dividing (11) by Y throughout, we get (12). Feder (1982) in his paper assumes that a linear relationship exists between the marginal productivity of labour in a given sector and average output of labour in the economy, say $F_L=\beta(Y/L)$. When we divide (11) by Y and denote $C_k=\alpha$ and $C_L=\beta$, we get (12).

$$\frac{\dot{Y}}{Y} = \alpha(\frac{I}{Y}) + \beta(\frac{\dot{L}}{L}) + ((\frac{\delta}{1+\delta}) + C_g)\frac{\dot{G}}{G}(\frac{G}{Y}) \text{.....(12)}$$

Following Feder (1982) and extending (12) to bring in the externality effect of government sector, we get

$$C = C(L_c, K_c, G) = X\hat{}\theta\varphi(L_c, K_c)$$

$$\frac{\partial C}{\partial G} = C_g = \theta(\frac{C}{G})$$

Where θ is a parameter, (12) can be rewritten as (13).

$$\frac{\dot{Y}}{Y} = \alpha(\frac{I}{Y}) + \beta(\frac{\dot{L}}{L}) + [(\frac{\delta}{1+\delta}) + \theta(\frac{C}{G})](\frac{\dot{G}}{G})(\frac{G}{Y}) \text{.....(13)}$$

$$\theta(\frac{C}{G}) = \theta(\frac{C}{Y}) \div (\frac{G}{Y}) = \theta(1 - (\frac{G}{Y})) \div (\frac{G}{Y}) \text{.....(14)}$$

$$\frac{\dot{Y}}{Y} = \alpha(\frac{I}{Y}) + \beta(\frac{\dot{L}}{L}) + [(\frac{\delta}{1+\delta}) - \theta](\frac{\dot{G}}{Y})(\frac{G}{Y}) + \theta(\frac{\dot{G}}{G}) \text{.....(15)}$$

We can also derive (15) by using (14) and rearranging (13).

If $\frac{\delta}{1+\delta} = \theta$, equation (15) becomes (16)

$$\frac{\dot{Y}}{Y} = \alpha\ \frac{I}{Y} + \beta\ \frac{\dot{L}}{L} + \theta\ \frac{\dot{G}}{G} \text{.....(16)}$$

CHAPTER 5

SUMMARY AND CONCLUSIONS

In this study, we examined the nature and trends of economic growth for the time period 1970-71 to 1999-2000 for India, and empirically verified two major hypotheses on the movements in the growth rates during this period. As discussed, in Chapter 2, the rate of growth of Gross Domestic Product at factor cost at constant prices, increased during the 1980s and the 1990s, when compared to their respective preceding decades. The two main reasons advanced for it were i) Productivity increase due to the impact of economic reforms ii) The increase in growth was caused by expansion of demand through rise in government spending in the 1980s, which led to internal and external debts rendering the process of growth unsustainable. In Chapters 3 and 4, we empirically analysed these hypotheses.

5.1 Trends in Growth Rate: 1970-71 to 1999-2000

The decadal average growth rates of the aggregate economy and its three sectors, namely, primary, secondary and tertiary were significant in all the three decades. The primary sector growth rate increased during the 1980s when compared to the 1970s and almost stagnated during the 1990s. The secondary sector growth rates also increased during the 1980s when compared to the 1970s but showed only a marginal increase during the 1990s. The tertiary sector growth rate however increased in all the three decades, like the overall growth rates, which, as evidenced by the above trends, was led by the tertiary sector.

When we analysed the trend of the aggregate growth rate, it was found that it underwent two noticeable upward shifts, one in the second half of the 1980s and the other in the first half of the 1990s. On examining the sectoral growth rates and their underlying trends, it was found that the tertiary sector had been more or less showing a consistent upward movement. The Primary sector fluctuation had impacts on the secondary and tertiary sector with a lag, though substantially weaker on the latter than the former. The noteworthy feature emerging from the trend growth rates is that there is complete delinking between the trends of tertiary sector growth rate and the primary sector growth rate during the 1990s, with the first one showing a continuous upward

movement and the second one moving in a downward direction. The discussion on the composition of the growth showed that the tertiary sector led the other sectors in twenty- one out of the thirty years and in every single year in the 1990s, by way of its sectoral contribution to the aggregate growth rate. The sectoral share of the tertiary sector also showed a consistent increase during the three decadal period, making it the dominant sector of the Indian economy.

5.2 Trends in Growth Rates and Productivity increase

Using the conventional growth accounting method, we computed the increase in output per unit of input or Total Factor Productivity, as a residual after subtracting the growth rates of capital stock and labour adjusted by their average factor incomes as proportion to GDP from the aggregate growth rates and analysed the sources of growth. This was done in Chapter 3. We could not use the regression method for computing the coefficient of capital and labour growth rates, as the variables, viz. the overall growth rate, the capital stock growth rate and the labour growth rate could not be combined in a co-integrating relationship.

We found that the movement in trend growth rate of TFPG, (i.e. after removing cyclical and irregular fluctuations), could offer a better explanation for the overall trend growth rate during 1970-71 to 1999-2000, than the trend growth rates of Total Factor Inputs (TFIs), like capital and labour could. The contribution of TFPG to growth rate was around one-half during the 1980s and the 1990s. When we tested the association of Total Factor Productivity Growth (TFPG) and Total Factor Inputs' (TFIs) growth rates respectively, with the overall growth rate, the scatter plot showed a very strong association between TFPG and overall growth rate. But it showed no noticeable relation between the growth rates of TFIs and overall growth rates. On the basis of the above, we conclude that the overall growth rate was strongly associated with productivity increase measured by TFPG.

5.3 Impact of Size of Government on Growth Rate

We used the total expenditure of Central and State governments, after netting out centre-state loans and grants, as a comprehensive measure of government size. It was found that impact of aggregate government expenditure on economic growth was positive and statistically significant. When we analysed the impact of components of

government expenditure on economic growth, it was observed that the impact of growth of capital expenditure on economic growth was positive and statistically significant, whereas there was no significant association between growth of revenue expenditure and economic growth.

To test whether there was any relation between productivity increase and government spending and its components, we tested the significance of association between TFPG and total expenditure and its components, viz. capital expenditure and expenditure on social sector spending. The impacts were positive and statistically significant.

It was found that there was a strong relation between productivity increase and growth rates. The association of government spending and growth rates was also observed to be significant. Though, the two major propositions appear to be substantiated independently by these findings, the empirical results reveal that they are not independent and competitive. The hypotheses emerging from our study can be stated in two parts i) productivity increase, a very important source having a strong relation with economic growth, is significantly influenced by growth of total government spending as well as its components, namely, capital and social sector expenditure and ii) growth of government spending and its capital expenditure component significantly influences the overall growth rates. In effect, the earlier hypotheses in the studies on economic growth in India during 1970-71 to 1999-2000 are complementary and not competitive.

5.4 Trend in Government Spending

Government spending as a proportion of GDP increased from twenty-two to thirty-two percent during the period 1970-71 to 1999-2000. This was higher during the 1980s, when compared with the other two decades. The ratio of government spending to GDP in India, however, was, much lower than that in the OECD countries. The contribution of Public Administration and Defence to the tertiary sector did not show any noticeable increase over the three decades.

The analysis in Chapter 4 revealed that the proportion of revenue expenditure to GDP was outpacing that of the capital expenditure and this trend was accentuated since the 1980s. The change in social sector spending as a proportion of GDP, which was fluctuating in both the 1970s and the1990s, had been stable in the 1980s. As discussed

in the foregoing section, the empirical analysis on the association between components of government expenditure and economic growth, revealed that it was the growth rate of capital expenditure and not that of revenue expenditure that had a significant impact on economic growth. Identical results were obtained when association between the components of expenditure and TFPG was tested. This raises the question of the need for a change in the composition of expenditure, against which there are strong impediments. To examine what impedes the alteration of the composition of government expenditure, we have attempted a short analysis of certain questions, which are essentially in the realm of political economy.

5.5 Case for State Intervention in Productive Investment and Social Sector

The empirical findings reached in Chapter 4 support the necessity for capital expenditure in the form of productive investment and spending on social sector, due to their significant association with economic growth and productivity (output per unit measured by TFPG) increase respectively. The expenditure by the state in the social sector, like education, public health et cetera. can make a decisive contribution to the improvement in human capital quality. An enhancement of human capital quality and skills, leads to improvement in labour productivity and also more efficient operation of physical capital. Human capital of superior quality attracts equipment investment, and facilitates improvement in capital productivity. A higher capital productivity has positive externality effects on output per unit, as observed in the discussions in Chapter 3.The empirical findings also reveal a positive and statistically significant relationship between state spending on social sector and TFPG. Improved productivity in labour, capital and their effects on a higher Total Factor Productivity, undoubtedly contribute to more goods and services with the given resources and thereby a higher economic growth. State intervention seems necessary from another aspect also. Innovations and productivity, though necessary are not sufficient factors for a higher economic growth. The demand side interventions from the state may be necessary to at least ensure a floor level demand for the products resulting from innovations and improved productivity.

If indiscriminate cut in state spending is effected in the social sector side, it will adversely affect productivity, and through that, overall economic growth. Whatever be the views on the role of the expanded state in the 'Golden Age of Capitalism' in the

West European countries and in countries like India during the early decades of independence, the evidence that is emerging from the empirical exercise in our study is that social sector spending and productive investment through capital expenditure, (especially in roads, rural infrastructure etc. where private sector is expected to seldom step in) are prime movers of economic growth, of course, with the guarantee that there is efficiency of utilisation and delivery of services. These are areas where state intervention has been accepted as a necessity across the ideological spectra. The debate among those who belong to the Marxian, Keynesian and the Neo-classical schools is only with regard to factors which motivate the state to intervene in the economy and not on interventions per se.

Our conclusion is that careful reallocation and pruning of wasteful expenditure, rather than an overall cut in expenditure is what is called for, to make expenditure pattern more productivity oriented and conducive for a fiscally sustainable growth. But, given the powerful interests of dominant classes over the state, which stymie both reallocation of expenditure and revenue mobilisation efforts, this recommendation is easier said than done. It is, however, an essential pre-requisite for achieving a growth process that is sustainable from a fiscal point of view.

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