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Growth Acceleration and Potential in Gujarat

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ABSTRACT

The paper begins by considering the growth experience of Gujarat in 17 sectors compared to the nation during the pre-reform period of 1980-92 and reform period of 1991-2004 identifying areas of strength and weaknesses. It then identifies episodes of high economic growth over 4 and 10 consecutive years in each sector in the state over the last two decades and derives plausibly optimistic growth potential of the state in future. In order to examine the feasibility of such optimistic growth targets, a preliminary attempt is made to estimate traditional sources of economic growth in Gujarat in the neoclassical growth accounting framework for the primary and non-primary sectors in the two sub-periods. Sources of growth acceleration are derived and implications of targeting substantial growth acceleration implied by earlier estimate of optimistic growth potential in the state are examined. In the process, the paper provides first estimates of capital stock, growth of land input, factor shares and total factor productivity growth for Gujarat broadly comparable and consistent with the national level estimates. A simultaneous equations model to identify the prime-movers or drivers of economic growth in Gujarat is also fitted before concluding the paper with suggested strategy and policy changes based on the findings of the study to achieve faster growth in the state.

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Growth Acceleration and Potential in Gujarat

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I. Introduction

Gujarat is a frontline performer state ever since the accelerated economic reforms began in India in 1991-92. Liberalisation and increasing globalisation benefited Gujarat more than most of the states in the country (Ahluwalia, 2002; Dholakia, 2000). This was largely attributed to the entrepreneurial culture of *Gujaratis* and positive attitude of the state government to promote rather than curb private initiative and people's participation in development efforts (Dholakia & Iyengar, 2002; Dholakia, 2003; Parekh, 2004). It was also pointed out that Gujarat enjoyed several natural advantages of location like the longest coastline in the country and better access to oil and natural gas (Bajpai, 2004). Gujarat by now has a very well diversified and dynamic structure of the economy with a large and expanding industrial sector, a high degree of commercialised agriculture and allied activities, and a relatively large extent of urbanisation. Rapid progress on various fronts in Gujarat is visible and the state economy is on a proclaimed exploding path of economic growth and development. The present paper attempts to examine the state's growth experience by estimating sources of growth during the pre and post 1991-92 periods to gain insights into the magnitude of the effort needed if the state were to achieve its growth potential already exhibited in the recent past.

The paper is accordingly divided into seven sections. In the second section, Gujarati's growth experience is compared with the national experience over two sub-periods of 1980-92 and 1991-04, and better performing sectors are identified. Sectors contributing to the acceleration in growth both for the national and the state are also identified. The third section examines the medium term and long term growth potential in state on the basis of the sectoral growth experience over the last 24 years in Gujarat. The fourth section makes a preliminary attempt to estimate growth of capital, labour and land, and factor income distribution needed for growth accounting exercise. The fifth section discusses the sources of growth and acceleration in Gujarat. In the sixth section, a simultaneous equation model to explain macro linkages and growth experience in the state in the recent past is attempted so as to identify drivers of growth in the state. The seventh section concludes with some suggestions for the growth strategy and policy changes.

II. Growth Acceleration in Gujarat and India

The estimates of GDP at national level and GSDP at the state level are available for 9 broad sector and 17 sub-sectors. The most recent base year is 1993-94 for all these estimates at constant prices. Estimates of GDP at 1993-94 prices at the national level are available for earlier years in a consistent and comparable series (CSO, 2005). Similar estimates of GSDP for Gujarat, however, are not available officially. We have obtained them by splicing, *i.e.*, by taking the trend in GSDP at 1980-81 prices and applying it to the GSDP at 1993-94 prices to carry the GSDP series backward in each of the 17 sub-sectors. We, then, estimate the annual trend rates of growth during the last two decades in all these 17 sub-sectors in All-India and Gujarat. Appendix *Tables 1 and 2* report the detailed results and *Table 1* summarises the comparison.

Sector	1980-81 to 1991-92		1991-92 to 2003-04	
	Gujarat	India	Gujarat	India
1	2	3	4	5
Agriculture	--	3.1	--	2.5
Forestry & Logging	--	--	1.7	1.5
Fishing	8.2	5.8	--	4.6
Mining & Quarry	6.2	7.4	1.0	4.4
Manufacturing	6.9	6.8	8.6	6.5
Elect., Gas & Water	9.4	8.9	5.6	5.7
Construction	4.6	4.5	6.2	5.4
Trade & Hotels	5.2	5.6	8.0	7.9
Transport & Communication	7.1	5.6	9.7	9.3
Banking & Insurance	13.5	11.9	7.0	9.2
Real Estate & Dwellings	3.0	8.1	5.5	6.0
Public Administration	5.9	6.6	7.4	8.9
Other Services	5.4	5.6	9.1	7.4
Total GDP	4.5	5.3	6.7	5.9
-- implies statistical insignificance				
Basic Source: DES (June 2005); and NAS, 2005				

Table 1 shows that Gujarat was not a better performing state than the nation in terms of economic growth during the eighties. It lagged behind the nation in almost all sectors except fisheries, electricity, and transport & communication. However, with increased speed of economic policy reforms in 1991-92 period, Gujarat improved in its growth performance remarkably achieving an overall acceleration of 2.2 percentage points in its annual trend rate of growth compared to the acceleration of only 0.6 percentage points in the country as a whole. Thus, Gujarat contributed almost one-fourth of the total growth acceleration achieved in the nation during the reform period. If growth acceleration in the post 1991-92 period is attributed to economic policy reforms at the national level, it is obvious that Gujarat has benefited from such reforms much more than other states¹.

Table 1 also reveals that out of the 17 sub-sectors, the growth performance of Gujarat is better than the nation during the reform period in only eight sub-sectors. These sub-sectors are: forestry & logging; registered & unregistered manufacturing; electricity, gas & water supply; transport by other means; storage; trade & hotel; and other services. In the remaining nine sub-sectors, Gujarat lags behind the nation. Thus, apart from the primary sub-sectors of agriculture, fishing and mining & quarrying, Gujarat's growth performance during 1991-04 is not better than the nation in the secondary sub-sector of construction, and tertiary sub-sectors of railways, communication, banking & insurance, real estate & dwellings, and public administration. All these sub-sectors except public administration can be considered as relatively weak in Gujarat and represent areas requiring attention, improvement and reforms in the state government's policies. It may, however, be noted that in the sub-sectors of construction, communication, and real estate & dwellings, Gujarat achieved a considerable acceleration in annual growth during 1991-04 over 1980-91. Thus, in these sectors, the state government has already initiated the policy reform efforts. It only needs to further step up the speed of reforms and tighten implementation mechanism.

It is also clear from Table 1, that 11 out of 17 sub-sectors in Gujarat experienced considerable acceleration in annual growth during the reform period and thus contributing positively to the growth acceleration in the state and the nation. The sectors that experienced deceleration in their growth are fishing, mining & quarrying, electricity & gas, railways, and banking & insurance. These sectors have negatively contributed to the growth acceleration in Gujarat and hence need urgent attention and revitalising steps by the state government.

¹ Gujarat's share in the nation is 4.94% in population, 5.03% in land-area, and 6.8% in income.

III. Growth Potential in Gujarat

In order to examine the growth potential of the state in the immediate future, we need to consider a few similar efforts made for Gujarat. The Planning Commission (2002) has assigned the real growth target of **10.2%** p.a. to Gujarat for the 10th Plan period. Although it does not provide the precise methodological basis for its targets to different states, it has decomposed its target into the primary, secondary and tertiary sectors. Accordingly, Gujarat should achieve annual real growth rates of **4.3%, 12.23% and 10.44%** respectively in the primary, secondary and tertiary sectors. *The Agro-Vision 2010*, prepared by the Ministry of Agriculture (2001) in Gujarat, on the other hand, puts a very optimistic target of 6.8% p.a. for the real growth in agricultural sector in the state. However, by considering the trends in area, yield and productivity of 30 crops over last 30 years in Gujarat and other states in the country, it is possible to derive a plausibly optimistic growth target of about 5% p.a. for agriculture in Gujarat (see, Dholakia, 2003).

For the remaining sectors, we can derive the growth potential by considering the past performance of the state during the last two decades. In order to identify the best episodes of growth in each sector and sub-sector of the economy, we should consider periods of four and ten *consecutive* years over the last two decades in the state. Such best growth episodes would reflect growth potential of the state in the medium term and long term respectively. *Appendix Tables 3 and 4* report the annual growth rates over 4 and 10 *consecutive* years in different sectors in Gujarat over 1980-81 to 2003-04, and *Table 3* gives the potential growth rates as the maximum observed in each sub-sector of the state.

Sl. No.	Industry Group	Share in Real GSDP		Max Growth (Potential %)	
		1980-81	2003-04	4 Years	10 Year
1	Agri.& Allied	0.4081	0.2009	14.62	11.48
1.1	Agriculture	0.3754	0.1888	15.70	12.32
1.2	Forestry & Logging	0.0170	0.0050	2.67	1.96
1.3	Fishing	0.0116	0.0070	13.86	11.15
2	Mining & Quarrying	0.0353	0.0172	9.30	6.41
	Sub-total: Primary	0.4545	0.2181	13.50	10.48
3	Manufacturing	0.1993	0.3190	20.09	11.03
3.1	Registered	0.1334	0.1999	22.13	10.35
3.2	Un-registered	0.0667	0.1191	15.20	11.91
4	Elec., Gas & Water	0.0156	0.0265	14.22	12.04
5	Construction	0.0511	0.0352	15.64	10.42
	Sub-total: Secondary	0.2639	0.3806	16.64	9.71
6	Trade& Hotels	0.1064	0.1227	13.45	9.39
7	Tran., Stor.& Comm.	0.0503	0.0796	14.28	9.41
7.1	Railways	0.0198	0.0091	5.11	4.39
7.2	Other Transport	0.0259	0.0466	18.71	10.24
7.3	Storage	0.0004	0.0002	10.99	6.55
7.4	Communication	0.0105	0.0236	21.40	16.21
	Sub-total(6&7)	0.1554	0.2023	13.09	8.42
8	Finance Sector	0.0898	0.1128	11.52	9.92
8.1	Banking & Insurance	0.0237	0.0592	22.59	16.64
8.2	Real Estate	0.0850	0.0535	7.91	5.97
9	Comm. Services	0.0801	0.0862	11.94	8.56
9.1	Public Adm.	0.0294	0.0261	13.95	8.25
9.2	Other Services	0.0506	0.0800	12.35	9.74
	Sub-total: Tertiary	0.3213	0.4012	9.31	8.20
10	Total GSDP	1.0000	1.0000	11.93	8.89

Basic Source: DES (2005): State Domestic Product, Gujarat State, 2003-04; GoG, June

It is clear from *Table 2* that Gujarat has achieved an overall GSDP growth of 11.9% p.a. in the medium term and 8.9% p.a. in the long-term. However, if we consider all the sectoral and sub-sectoral performance simultaneously, we find that the potential could be much higher for the state both in the medium term as well as in the long term. In order to get the idea about such an overall potential, we need to consider shares of the sub-sector in total GSDP at factor cost as reported in *Table 2*. Considering the sectoral shares in the latest year as the weights and the maximum growth rates over four consecutive years achieved in the recent past, the overall growth potential of the state works out to 16.3% p.a. in the medium term and 10.9% p.a. in the long term. If we replace 5% p.a. growth potential for Gujarat's agriculture over the next ten years, the long run growth potential for Gujarat works out to 9.4% p.a. These targets are certainly very optimistic though falling on the outer border of feasibility. The targets of 11.9% p.a. and 8.9% p.a., on the other hand, are quite feasible considering that the state had actually achieved them in recent past. Any targets in between may be plausibly optimistic and need examination for consistency with other macroeconomic parameters of the state economy.

IV. Estimates of Factor Growth and Factor Shares in Gujarat

If Gujarat has to achieve a faster rate of growth in future, we need to know what the major sources of growth have been in the recent past. What have been the sources of the significant acceleration (about 50%) achieved in Gujarat? This would provide an idea of the required resources on one hand, and the broad strategy to follow on the other hand. It would also help us in critically examining the feasibility and plausibility of the growth targets. In order to address these questions, in the present section we attempt to prepare a preliminary estimates of some crucial aggregates. In the next section of the paper, we estimate the sources of growth and acceleration in the state.

Neoclassical framework of growth accounting popularised by Denison (1962 and 1967) is most appropriate for empirically examining these questions. Given the importance of these concerns, we would expect that a large number of studies would have examined and estimated the sources of growth for All India and different states. Surprisingly however, there are no estimates for Indian states and only two serious efforts made at the national level by individual scholars in the recent past (Bakul Dholakia, 2001; and Sivasubramonian, 2004). The reason perhaps is the state of data availability including issues of comparability over time. The required data on several variables in the exercise are simply not available for Indian states, and at the national level where they are available in the crude form, they require a lot of cleaning up before they can be meaningfully used. What is surprising, however, is the complete apathy and lack of interest shown by the Planning Commission in this regard. As a result, states have not been induced to take up these matters and the data issued have also not been resolved satisfactorily and officially. Under these circumstances, estimation of sources of growth in Gujarat would need a huge research project with considerable time and resources. However, given the constraints on time, effort and resources, we propose to prepare only preliminary estimates of sources of growth in Gujarat in the spirit of making the first cut. These estimates can be refined, modified and sharpened with more careful research and data cleaning. Such efforts are always welcome, but our assumption is that they may not result in major modifications and reversal of broad direction and magnitude of our preliminary estimates.

For estimating sources of economic growth we need estimates of the growth of income, the growth of primary factors of production, and relative factor shares in income. In Gujarat, we already have official estimates of growth of income at constant (1993-94) prices. However, we do not have any estimate of the growth of capital stock at constant (1993-94) prices; and no reliable and comparable estimate of growth of labour (employment) in the economy. Growth of land in real terms is obtainable, but relative factor shares in income are simply not available. We have tackled these estimation problems by making some bold assumptions. We describe briefly the method of deriving these basic estimates.

We first consider estimation of the real capital stock in Gujarat. DES in Gujarat regularly prepares and publishes the estimates of GSDP and NSDP by 17 sub-sectors. The difference between the two is depreciation or capital consumption. The estimates of capital consumption by all sub-sectors for every year are provided by the CSO to all states for their use (DES, 2005). The CSO derives the estimates of capital consumption by all the sub-sectors for each state based on some basic criteria that are not revealed. However, the CSO has to be allocating the capital consumption estimated by it at the national level based on some rudimentary estimates of the capital stock at the state level. Since capital consumption estimates are generally based on the economic life of capital assets, we can work backwards to estimate the capital stock for each year for each sector for any given state, say Gujarat, from the estimates of depreciation. We have assumed that for each sub-sector in each year, the depreciation as a percentage of the net stock of fixed capital remains the same as at the national level. We readily have the estimates of both these aggregates at the national level (CSO, 2005) and depreciation by sub-sectors for Gujarat. Thus, preliminary estimates of net stock of fixed capital at 1993-94 prices for Gujarat are derived in each of the 17 sub-sectors for each year. Recognising approximation involved, we have grouped the estimates into three broad sectors of Primary, Secondary and Tertiary sectors. These estimates are presented in *Appendix Table 5*. From these estimates, we can estimate the trend rates of growth of real fixed capital stock in Gujarat over the two periods, 1980-92 and 1991-04. These growth rates are presented in *Table 3*.

We may note that difference between the Net Capital Stock in two consecutive years is the net fixed capital investment. Thus, our estimates in *Appendix Table 5* also generate estimates of net capital investment at 1993-94 factor cost in Gujarat by broad sectors. If we add the estimates of depreciation to so obtained estimates of net investment, we would get the estimates of gross real investment by sectors in Gujarat.

Table 3: Annual Trend Rates of Growth in Net Fixed Capital Stock at 1993-94 Prices, Gujarat (In %)

Sectors	1980-91			1991-04		
	Intercept	Slope	R ²	Intercept	Slope	R ²
Primary	14.06 (1724.70)	0.0378 (34.15)	0.99 (1166.7)	14.53 (1270.79)	0.0131 (9.14)	0.88 (83.6)
Secondary	14.66 (581.59)	0.0705 (20.59)	0.98 (424.1)	15.34 (248.82)	0.1086 (13.98)	0.95 (195.5)
Tertiary	15.11 (1819.54)	0.0277 (24.62)	0.98 (606.4)	15.40 (174.82)	0.0411 (36.15)	0.99 (1306.9)
Non-Agriculture	15.60 (1211.37)	0.0472 (26.94)	0.99 (725.9)	16.05 (428.06)	0.0812 (17.18)	0.96 (295.3)
Total	15.81 (342.94)	0.0463 (7.40)	0.85 (54.8)	16.31 (302.09)	0.0647 (9.51)	0.89 (90.5)

Note: Figures in parentheses are t-statistics for intercept and slope and F-statistics for R²

For the year 2002-03, our estimates of the real net capital stock imply the overall investment rate (at constant factor cost) of 30.6% in Gujarat. It is significantly higher than the national rate. A recent study providing some preliminary estimates of regional accounts in Gujarat (*see Dholakia, 2006*) estimated the overall investment rate of 28% in Gujarat at (current) market prices. If we account for the differences in the concepts – the former being at constant factor cost and the latter being at current market prices, these two estimates of the overall investment rate in Gujarat may be considered broadly comparable and close.

We may now consider the growth of labour or employment in Gujarat. It is very well recognised in the literature that the Census data on working force are not strictly comparable across Census on account of changing definitions of a worker (*see, Sivasubramonian, 2004*). However, all the incomparabilities arise largely for the marginal workers rather than the main workers. The main workers estimated in 1981 Census, 1991 Census and 2001 Census are broadly comparable since their definition has remained the same. Several researchers (*e.g. Chadha & Sahu, 2002*) still

prefer to ignore the Census data on workers and depend on the National Sample Survey (NSS) data on employment collected through quinquennial surveys. Since the NSS surveys are designed with stratification for rural-urban and male-female categories, their results have to be adjusted for the trends in population interpolated based on two Censuses. While Sivasubramonian (2004) did not adjust for the proper population weights obtained from 2001 Census, Chadha & Sahu (2002) made the necessary adjustments to derive the growth of labour by states and broad sectors in India. Such population adjustments do make substantial changes in the magnitude and even direction of the estimated growth of labour at broad sectoral level. It is indeed very difficult to say which of the two data-sets is better for estimating growth of labour at a state level. We present estimates of growth of labour in Gujarat by both the sets of data in *Table 4*.

<i>Annual Compound Growth Rate During</i>		<i>Sectors</i>		
		<i>Primary</i>	<i>Non-Agri.</i>	<i>All Sectors</i>
1	1981-91	2.01%	3.34%	2.53%
2	1991-2001	(-) 0.22%	4.47%	1.91%
3	1983-93	0.52%	4.70%	1.89%
4	1993-99	2.39%	2.01%	2.19%

Note: Rows 1 and 2 are based on Main Workers from Census 1981, 1991 and 2001. Rows 3 and 4 are based on NSS Survey adjusted for population weights by Chadha & Sahu (2002).

We can see from *Table 4* that the two sources of data on employment differ sharply in capturing even the trend and direction of changes in the growth of labour in Gujarat. Having flagged this issue about the data quality and availability for growth of labour, however, we follow other researchers and accept the sample survey data for further analysis. Thus, we accept the implication that Gujarat experienced acceleration in its employment growth after 1991-92, only on account of employment in agriculture, because the employment growth decelerated in non-agricultural sector after 1991-92.

For estimating the growth of land in Gujarat, we broadly follow the practice well-accepted in the literature (see, *B. Dholakia, 2001; and Sivasubramonian, 2004*). Accordingly the basic source of data is the land utilisation statistics. For the non-agricultural sector, the common practice is to consider the land area put to non-agricultural uses and take its growth over time. However, for the agricultural sector, the land input can be defined in two ways. One is to take addition of the net area sown and current fallow land; and the other is to add gross cropped area and the current fallow land. Since we have considered primary (agriculture) and non-primary (non-agricultural) sectors for analytical purposes, we have modified the definition of land in the primary sector to include forest land, cultivable waste, permanent pasture & grazing land, and land under miscellaneous tree crops & other groves not included in the cultivated area, besides the Net or Gross area sown depending on narrow or broad definition of land. Since gross area represents intensity of factor use, ideally it should be considered a part of “the residual” in the neo-classical growth accounting framework. But, if our intension is to reduce the residual as much as we can with available information, we should consider gross cropped area rather than the net sown area. *Table 5* presents estimates of annual compound rates of growth of land input in Gujarat.

<i>Period</i>	<i>Primary Sector</i>		<i>Non-Primary Sector</i>
	<i>Narrow Definition</i>	<i>Broad Definition</i>	
1980-91	0.08%	0.18%	0.50%
1990-2001	0.01%	(-) 0.16 %	0.18%

Note: Narrow definition is based on net area sown while the broad definition is based on gross cropped area (see, the text for details).

Source: DES (2005), p.S-46

Table 5 shows that land input in the non-primary sectors grew at only 0.5% p.a. during the eighties. The growth during the nineties was only a third of the growth during the eighties. The non-primary sectors in Gujarat are increasingly facing the constraints on the availability of land input. In the primary sector, the land input as per the narrow definition is almost stagnant. However, the broad definition of land shows variation in the land input over the past two decades. During the eighties, it shows positive growth and during the nineties, it shows almost the same magnitude of a negative growth. We consider the broader definition of land input in the primary sector for our purpose in this study.

As a next step, we have estimated the trend rates of growth in NSDP by sectors for the two sub-periods, 1980-92 and 1991-04. Table 6 reports the estimates of the time trends fitted. For the agricultural (primary) sector, since the time trends were not statistically significant, we have considered average annual compound rates of growth with the averages of trienniums around the end points. The estimate of the overall acceleration during the nineties is the same as in the case of GSDP.

Finally, we consider estimation of factor income distribution in Gujarat into three broad factors – labour, capital and land in the primary and non-primary sectors. There are practically no estimates available for these parameters for even one year. At the national level also, what is available officially is the distribution of income by labour, capital, land and mixed income. However, at the national level, B. Dholakia (2001) and Sivasubramonian (2004) have estimated the required factor income shares by sectors for recent years. The estimates in both the studies differ substantially. B. Dholakia's study provides the average estimates for two sub-periods, 1960-86 and 1985-2001, whereas Sivasubramonian (2004) provides detailed estimates for each year

Sectors	1980-81 to 1991-92			1991-91 to 2003-04		
	Intercept	Slope Coeff	R ²	Intercept	Slope Coeff	R ²
Primary	--	0.0117	--	--	0.0255	--
Secondary	13.143 263.252	0.0658 9.702	0.904 94.127	13.960 201.010	0.0704 8.041	0.855 64.655
Tertiary	13.501 693.231	0.0608 22.990	0.981 528.521	14.106 1109.387	0.0817 51.011	0.996 2602.143
Non Agri	14.031 485.096	0.0629 16.004	0.962 256.128	14.730 437.682	0.0766 18.061	0.967 326.211
Total	14.702 266.971	0.0411 5.499	0.752 30.242	15.122 318.899	0.0631 10.560	0.910 111.516

Note: Both the regressions in Primary Sectors are statistically insignificant. Therefore, the annual compound rates are calculated by taking three years averages at the end points.

over the period 1950-2000. We have, therefore, considered the latter for deriving the relevant parameters. For the primary and non-primary sectors, we have derived the estimates of interest rate and rent implied by the estimates of factor shares for each year by Sivasubramonian (2004). This can be derived easily by taking the ratio of absolute share of capital to the stock of capital and the ratio of absolute share of land to the value of land. Thus, both interest rate and rent in every year in the primary and non-primary sectors for all India are estimated and are presented in Table 7.

Table 7: Rates of Interest and Rent (in %) Implicit in Factor Income Distribution (All-India)

Years	Primary Sector		Non-Primary Sectors	
	Interest	Rent	Interest	Rent
1980-81	9.19	9.19	8.58	8.58
1981-82	9.33	9.33	9.07	9.08
1982-83	9.02	9.02	8.54	8.55
1990-91	10.44	10.44	9.67	9.67
1991-92	10.22	10.22	9.56	9.56
1992-93	9.86	9.86	9.22	9.22
1998-99	15.51	15.51	11.73	11.73
1999-00	15.52	15.52	12.06	12.06

Source: Derived from Sivasubramonian (2004), pp. 328 to 334, 238, 342 and 346.

We can see that within each broad sector, the rates of interest and rent are taken as the same in a year. However, this assumption has not been made explicit by Sivasubramonian (2004). What is surprising is that both interest and rent rates are consistently higher in agricultural sector than the non-agricultural non-residential sector. These rates do show variation over years and display a rising trend over time. We do not intend to question these estimates, but use them as basis to derive the factor shares in Gujarat. We assume that these implicit average interest and rent rates apply to Gujarat in each year. Then, with the help of the estimate of the stock of capital and value of land in Gujarat in the respective year, we can obtain the estimates of absolute factor share in Gujarat. Dividing them by NSDP, we obtain relative factor shares.

In order to derive estimates of the stock of capital, we need estimates of the stock of inventories since we already have the estimated Net Fixed Capital Stock (NFCS) by sectors in Gujarat. Sivasubramonian (2004) provides the estimates of the proportion of the stock of inventories in NFCS for the two broad sectors for each year (pp. 220 and 326-7). We have assumed that these proportions would be valid for Gujarat and estimated the capital stock for the state. Similarly, we have taken the estimates of land value per hectare of agricultural land and non-agricultural land used by Sivasubramonian (2004, pp.238-9) in his study to apply to Gujarat and estimated the total land value in the state for different years². Finally, NSDP originating in the residential dwellings part of the sub-sector called “Residential Dwellings, Real Estates and Business & Legal Services” is separated and taken as the rental value in the non-agricultural sector. Assuming that the 1999-2000 rates and proportion apply to the subsequent years, we have derived factor shares for later years. The labour share is derived as a residual in both the broad sectors. Thus, the problem of non-comparability and non-availability of reliable estimates of labour force is avoided for our purpose. Moreover, we have taken three yearly averages of relative factor shares at the end-points of our sub-periods to avoid undue annual fluctuations in factor shares. The estimates, so derived for Gujarat are presented in *Table 8*.

Table 8: Estimates of Relative Factor Shares in Gujarat

Period	Primary Sector			Non Primary Sector		
	Capital	Land	Labour	Capital	Land	Labour
1980-83	12.27%	25.28%	62.45%	45.98%	6.37%	47.65%
1990-93	18.04%	25.09%	56.87%	42.40%	6.16%	51.44%
2001-04	25.72%	27.35%	46.93%	52.42%	6.03%	41.55%
1980-92	15.16%	25.19%	59.65%	44.19%	6.27%	49.54%
1991-04	21.88%	26.22%	51.90%	47.41%	6.10%	46.49%

Source: See the text.

² The land value per hectare of agricultural land and non-agricultural land at 1993-94 prices implied by Sivasubramonian’s (2004) estimates work out to be Rs.17,743 and Rs.7,611 respectively.

V. Sources of Economic Growth and Acceleration in Gujarat

Now, we can attempt to present preliminary estimates of the sources of economic growth in the growth accounting framework in Gujarat for two sub-periods, 1980-92 and 1991-04. The famous neoclassical growth equation is written as:

$$G_Y = R_K G_K + R_L G_L + R_N G_N + \text{residual} \quad \dots (1)$$

Where G stands for annual growth; and R for relative factor share; and sub-scripts Y for real income (NSDP), K for capital, L for labour and N for land (*For details, Dholakia and Dholakia, 1998*). $R_K G_K$ represent absolute contribution of capital, $R_L G_L$ of labour, and $R_N G_N$ of land. *Table 9* present these estimates.

Table 9 shows that capital is playing an increasingly important role in Gujarat's economic growth and contributes about 49% of the growth acceleration in the state during the reform period. However, absolute as well as relative contribution of capital input sharply declined in the primary sector. This happened only due to sharp decline in the agricultural investments during the reform period (*see Table 3*) because the share of capital showed marked increase over time in the primary sector (*see Table 8*). This became possible because of sharp increase in the price of capital (*see Table 7*). Similarly, land in agriculture in Gujarat also marginally declined making its contribution negative not only in agricultural growth but also in the whole economy during the reform period.

Source	Absolute Contribution			Relative Contribution		
	1980-92	1991-04	Acceleration	1980-92	1991-04	Acceleration
<i>Primary Sector</i>						
Capital Input	0.57	0.29	(-) 0.20	48.7%	11.4%	(-) 20.3%
Land Input	0.05	(-) 0.04	(-) 0.09	4.3%	(-) 1.6%	(-) 6.5%
Labour Input	0.31	1.24	0.93	26.5%	48.6%	67.4%
Residual	0.24	1.06	0.82	20.5%	41.6%	59.4%
NSDP	1.17	2.55	1.38	100%	100%	100%
<i>Non-Primary Sector</i>						
Capital Input	2.09	3.85	1.76	33.2%	50.3%	128.5%
Land Input	0.03	0.01	(-) 0.02	0.5%	0.1%	(-) 1.5%
Labour Input	2.33	0.93	(-) 1.40	37.0%	12.1%	(-) 102.2%
Residual	1.84	2.87	1.03	29.3%	37.5%	75.2%
NSDP	6.29	7.66	1.37	100%	100%	100%
<i>All Sectors</i>						
Capital Input	1.55	2.63	1.08	37.7%	41.7%	49.1%
Land Input	0.04	(-) 0.02	(-) 0.06	1.0%	(-) 0.3%	(-) 2.7%
Labour Input	1.01	1.05	0.04	24.6%	16.6%	1.8%
Residual	1.51	2.65	1.14	36.7%	42.0%	51.8%
NSDP	4.11	6.31	2.20	100%	100%	100%

Source: Tables 3 to 8 above.

Labour, on the other hand, had the same contribution in absolute terms in the growth in pre-reform period as during the reform period. In relative terms, however, its contribution declined during the reform period and as a result, labour has a negligible role to play in accounting for the

growth acceleration in Gujarat. However, these economy-wide estimates hide the substantial swings in the sectoral growth pattern. In agriculture, labour's absolute contribution showed a four-fold increase, accounting for two-thirds of the growth acceleration in the sector in the state. Thus, during the reform period, Gujarat agriculture became significantly more labour intensive than before. It also experienced substantial increase in the total factor productivity growth during the reform period although growth of land and capital sharply declined. The non-agricultural sector in Gujarat experienced a substantial fall in the contribution of labour during the reform period compared to the pre-reform period. As a result, labour turned out to be the single most negative contributor to the growth acceleration in the sector. The non-agricultural sector in Gujarat had substantially higher contribution from capital input due largely to higher investments. Thus, the non-agricultural sector in Gujarat became increasingly more capital intensive during economic reforms than before. Simultaneously, the sector also experienced increasing total factor productivity growth. In fact, our estimates in *Table 8* show that technology improvement or the total factor productivity growth was a significant factor contributing to growth as well as growth acceleration during the reform period in both the agricultural and the non-agricultural sectors in Gujarat.

Given these findings, we may now speculate how Gujarat can achieve a further acceleration in its economic growth by 4 percentage points. If the recent pattern observed in the sources of growth acceleration is taken to apply for the future 10 years, capital input will have to contribute additional 1.96 percentage points out of the acceleration of 4 percentage points in the economic growth. Thus, the total absolute contribution of capital input should be 4.59 percentage points out of the overall future growth of 10.31%. Land and labour would not make any substantial contribution to growth acceleration; and technology or total factor productivity growth would contribute 2.07 percentage points making its absolute contribution 4.72 percentage points out of the 10.36% growth p.a. Assuming that the relative share of capital would remain the same as the average over the period 1991-92 to 2003-04 (40.72%), the required annual growth of capital input would be 11.27%. This would imply a gross investment rate of more than 41% of GSDP in the state. Compared to the current investment rate of around 28% to 30% in the state as found earlier, the requirement is more by almost 35% to 40%. In a short time span, this is a real challenging task. However, as estimated in a recent study, Gujarat's saving rate is around 38% of GSDP (Dholakia, 2006); and the 41% investment rate then may not appear unattainable. But, it requires a huge government effort to retain the savings in the state, reverse the flow and attract net investment from outside the state to the tune of 3% to 4% of GSDP. This calls forth a very well directed effort by the state government at various administrative and economic reforms. Even then, accelerated growth in Gujarat may not result into an overall acceleration of growth in the country because it would largely be achieved by diverting the investment and growth from elsewhere.

Secondly, the implication of the required rate of growth of the total factor productivity on the targeted Internal Rate of Return (IRR) on projects in the state can be worked out from these estimates following the well laid out methodology (See, *Dholakia, 1986; and Dholakia, 1988*). Accordingly, absolute contribution of the residual of 4.72 percentage points and investment rate of about 41%, the IRR target consistent with 10.36% economic growth would be about 22% in real terms. This is indeed a tall order. It implies that all future projects in Gujarat should have a payback period of 3 years or less. The above analysis based on the assumption of continuation of the past pattern of growth acceleration recently observed in the state, therefore, needs to be replaced with some clear policy oriented changes in the sources of growth and their patterns. Labour and land are too important sources of growth to be neglected. The future growth has to be labour intensive and land intensive – rather than increasingly capital intensive as is the case recently. There is moreover, a need to bring down the interest rate in the economy – particularly prevalent in the unregistered and informal sector by improving the institutional credit delivery. Similarly, the skill and educational levels need to improve among the workers increasing their productivity and wage rates. This coupled with labour intensive methods and technology in the farm and non-farm sectors would bring down the incremental capital-output ratio without

increasing IRR for the projects. Actually, the required IRR should fall from 22% to around 17% to 18%.

VI. Drivers of Growth – An Econometric Model

In order to achieve specific growth target, it is important to identify certain drivers of growth in the system. Very distant past experience may not be of much use in such estimation of the current relationships. The econometric exercise is, therefore, inherently limited to considering relatively recent time series data. We can consider the last two decades as the relevant time span for our purpose. The number of observations are, therefore, limited to 22, from 1980-81 to 2001-02. There are hardly any quarterly or monthly series on relevant variables available at regional or sub-regional level. Any question of using panel data or sub-annual data simply does not arise. Moreover, the constraint on the number of observations also imposes restrictions on the size of the model in terms of number of exogenous variables. We must recognise and appreciate that with all such constraints, the econometrically estimable and meaningful model will have to evolve slowly. It would need careful scrutiny, interpretation and validation. What we are now discussing can only qualify as exploratory and tentative effort.

We can begin by identifying a few most relevant growth-oriented and targeted variables, called endogenous variables. We need to determine or target their values in future. Each of these variables depends on several of those variables where either the government exercises some control or outside factors determine their values putting constraint on our postulated relationships. These are the exogenous or pre-determined variables. Our drivers of growth would belong to this category. Based on intuitively appealing causal links, we can postulate the structural form of the model. *Table 10 and 11* provide respectively the description of the endogenous and the exogenous variables used in the model. All the nominally measured variables are in real terms after correcting for the inflation through the GSDP deflator. The income variables are, however, available at constant base period prices and do not require any further deflation. We consider 8 endogenous and 14 exogenous variables in the model.

<i>Table 10: The Endogenous Variables of the Model</i>	
<i>Endogenous Variables (8)</i>	<i>Variable Notation</i>
Agriculture (Agri.) and Fishery	Y_1
Manufacturing (Mfg.)	Y_2
Trade and Transport (TT)	Y_3
Financial, Administrative & Other Services (Service)	Y_4
Government Total Non Interest Expenditure (GTNIE)	Y_5
Government Own Tax Revenue (GOTR)	Y_6
State Income (GSDP)	Y_7
Modern Inputs in Agriculture (MAI)	Y_8

<i>Table 11: The Exogenous Variables of the Model</i>	
<i>Endogenous Variables (14)</i>	
Forestry (Forest) $\rightarrow X_1$	Man-days Lost (Man DL/MDL) $\rightarrow X_8$
Government Expenditure on Human Capital (GEHK) $\rightarrow X_2$	Government Non Tax Revenue (GNTR) $\rightarrow X_9$
Government Expenditure on Physical Capital (GEPK) $\rightarrow X_3$	Real Estate, Ownership of dwelling & Business services (RE) $\rightarrow X_{10}$
Rainfall (Rain) $\rightarrow X_4$	Transfer from the Centre (TFC) $\rightarrow X_{11}$
Storage & Communication (Storcom) $\rightarrow X_5$	Electricity, Gas & Water (EGW) $\rightarrow X_{12}$
Construction (Const) $\rightarrow X_6$	Mining & quarrying (MQ) $\rightarrow X_{13}$
Wage Rate (WR) $\rightarrow X_7$	Capital-Output Ratio (COR) $\rightarrow X_{14}$

The simultaneous equation model is fully spelt out and tested for identification of each equation in *Table 12*. We can see that all except the second equation for the variable “manufacturing” are over identified. The second equation is exactly identified. Thus, our model is technically identified and can, therefore, be estimated. The estimation, however, cannot be through the Ordinary Least Squares method but should be through such methods as 2 Stage Least Squares (2SLS) that can effectively take care of the simultaneity bias. *Table 13 reports* the results in the form of the fitted equations of the structural form.

Eqn. No.	Dependent Variable	Independent Variable	k	m	(K-k)	(M-m)	Inference
1	Agri	Storage & Communication, Electricity Water & Gas, Rainfall, Modern Inputs , Government Expenditure on Physical Capital	4	1	10	7	Over Identified
2	Manufacturing	Agri, TT , Forestry, EWG, Govt. Exp. On PK, M&Q, Construction, Wage Rate, Mandays Lost, COR	8	2	6	6	Exactly Identified
3	TT	Agri, Manufacturing , EWG, Storage & Communication, Real Estate, Govt Exp on PK,	4	2	10	6	Over
4	Service	Manufacturing, TT , EWG, Real Estate, Govt Exp on HK, Storage & Communication, Construction	5	2	9	6	Over
5	Govt. Total Non Int Exp	Govt. Own Tax Revenue , Govt. Non Tax Revenue, Transfer from Centre, GSDP	2	2	12	6	Over
6	Govt. Own Tax Revenue	Manufacturing , Construction, EWG	2	1	12	7	Over
7	GSDP	Agri, Manufacturing, TT, Services	0	4	14	4	Over
8	Modern Inputs	Government Expenditure on PK, EWG, Storage & Communication, Rainfall	4	0	10	8	Over
Identity							
	Govt. Total Non Int Expenditure	Govt Exp on HK, Govt Exp on PK	-	-	-	-	-
<p>Notes: T=Total number of variables included in the model =8+14=22 M=Number of endogenous variables included in the model =8 K=Number of exogenous variables included in the model =14 m=Number of endogenous variables in the given equation k=Number of exogenous variables in the given equation N=Number of Observations =22</p>							

Endg. Variables	Model in Equation Form	Adj R ²
$Y_1 =$	$6809.293 + 0.1899Y_8 - 1.6998X_3 + 0.4841X_4 + 1.0756X_5 + 0.8229X_{12} + e_1$	0.6647
$Y_2 =$	$-170.4563 + 0.0996Y_1 + 0.4699Y_3 - 0.0207X_1 - 0.3473X_3 + 0.2647X_6 + 0.0611X_7 + 0.0539X_8 + 0.705X_{12} - 0.0927X_{13} - 0.0528X_{14} + e_2$	0.9898
$Y_3 =$	$39.826 + 0.0783Y_1 + 0.3859Y_2 + 0.1686X_3 + 0.3531X_5 + 0.1095X_{10} - 0.0484X_{12} + e_3$	0.9868
$Y_4 =$	$-1886.94 + 0.1758Y_2 + 0.2206Y_3 + 0.0194X_2 - 0.2255X_5 + 0.3321X_6 + 0.1584X_{10} + 0.3351X_{12} + e_4$	0.9966
$Y_5 =$	$540.155 + 0.7563Y_6 - 0.5017Y_7 + 0.2803X_9 + 0.0078X_{11} + e_5$	0.9635
$Y_6 =$	$-32.3395 - 1.377Y_2 + 4.072X_6 + 3.746X_{12} + e_6$	0.9671
$Y_7 =$	$1231.982 + 0.1449Y_1 + 0.3858Y_2 + 0.204Y_3 + 0.3302Y_4 + e_7$	0.9998
$Y_8 =$	$31.811 + 1.5973X_3 - 0.0175X_4 - 1.2657X_5 + 0.5182X_{12} + e_8$	0.9379

We can see that the model has *prima-facie* fitted the data from Gujarat very well. Each of the eight equations has a very high and statistically significant explanatory power as revealed by the value of the adjusted R^2 . Thus, all of our eight endogenous variables can be well predicted by our model. This is the first cut and the results are encouraging. We can run the model in the double-log form to get estimates of elasticities rather than simple slope co-efficients. Similarly, we can work out the final effects of each of the exogenous variables on each of the endogenous variables on the basis of *Table 13*. Such final effects are available in *Table 14*. The table reveals that the most important drivers of growth in Gujarat are electricity & gas (EGW), storage & communications (Storecom), construction (Const.), real estates (RE), and of course, rainfall (Rain). Out of all these factors, EGW and construction have positive influence on all our endogenous variables, particularly the government's own tax revenues (GOTR). Our results have important implications for growth strategy and policies in the state.

Variables	Partial Effects on							
	Agri Y_1	Mfg Y_2	TT Y_3	Service Y_4	GTNIE Y_5	GOTR Y_6	GSDP Y_7	MAI Y_8
Forest X_1	0.0000	-0.2529	-0.0976	-0.0660	0.3332	0.3482	-0.1392	0.0000
GEHK X_2	0.0000	0.0000	0.0000	0.0194	-0.0032	0.0000	0.0064	0.0000
GEPK X_3	-1.3965	-0.5601	-0.2569	-0.1551	0.8452	0.7713	-0.5221	1.5973
Rain X_4	0.4808	0.0801	0.0686	0.0292	-0.1457	-0.1103	0.1242	-0.0175
Storcom X_5	0.8353	0.3418	0.5504	-0.0440	-0.5319	-0.4707	0.3507	-1.2657
Const X_6	0.0000	0.3233	0.1248	0.4165	2.5986	3.6268	0.2877	0.0000
WR X_7	0.0000	0.0746	0.0288	0.0195	-0.0983	-0.1028	0.0411	0.0000
MDL X_8	0.0000	0.0658	0.0254	0.0172	-0.0868	-0.0907	0.0363	0.0000
GNTR X_9	0.0000	0.0000	0.0000	0.0000	0.2803	0.0000	0.0000	0.0000
RE X_{10}	0.0000	0.0629	0.1338	0.1990	-0.1243	-0.0865	0.1172	0.0000
TFC X_{11}	0.0000	0.0000	0.0000	0.0000	0.0078	0.0000	0.0000	0.0000
EGW X_{12}	0.9213	0.9869	0.4046	0.5978	1.4069	2.3871	0.7942	0.5182
MQ X_{13}	0.0000	-0.1132	-0.0437	-0.0295	0.1492	0.1559	-0.0624	0.0000
COR X_{14}	0.0000	0.0645	0.0249	0.0168	-0.0850	-0.0888	0.0355	0.0000

Source: Based on Table 12

VII. Conclusion and Suggestions:

The paper examines the areas of strengths and weaknesses of the Gujarat's economy in comparison to the national economy. Agriculture, fishing, mining & quarrying, construction, railways, communications, banking & insurance and real estates & dwellings are the weaker sectors in Gujarat, where special attention needs to be focussed to achieve better performance. Policy reforms in these sectors need urgent attention both in terms of their timely introduction and effective implementation. If Gujarat has to achieve growth acceleration of about 4 percentage points to attain a double digit growth rate comparable to the best performers in the globe, the required rate of capital investment is about 35% to 40% higher than what it is right now. This is based on the continuation of the trends in recent past. The implications of such an investment rate in Gujarat would be that Gujarat's growth would be at the cost of other areas in the country. Under such circumstances, the country does not gain from Gujarat's growth. The only sensible solution is that Gujarat concentrates on land and labour intensive growth and does not encourage increasing capital intensity in its growth strategy. Skill formation, educational development, and

land intensive production aided by water availability would help controlling and reducing the incremental capital output ratio in the state without raising the required IRR of projects above 18%. Growth acceleration of about 60 to 66% can be achieved in Gujarat only by systematically managing technology and its change. Labour and land have stopped contributing substantially to the growth in Gujarat because in both these areas the required economic and administrative reforms are seriously lagging behind. With appropriate policy reforms like stamp duty reforms, land revenue administrative reforms, land market oriented growth facilitating policy reforms, etc. are urgently needed if Gujarat has to attract and capitalize on the liberal stance of the Central government on the FDI in the real estate sector. Labour reforms and public sector restructuring can go a long way to promote labour employment and labour intensity in the state's export sector. Making institutional credit available effectively and efficiently to small and medium enterprises at reasonable cost and in right time is critical to bringing down the ICOR and generating more employment growth in the state.

The most important policy and strategy implications of the exercise of model fitting have been to establish and empirically validate the basic drivers or the prime-movers of growth in Gujarat. Electricity, Gas and Water Supply sector is the most significant engine of growth and state's own revenues followed by Construction sector. Similarly, Storage and Communication sector as well as Real Estates and Dwelling are also very important drivers of economic activities in the state. Policies pertaining to all these sectors would have direct bearing on growth of the economy. Gas is the future of the state because of its natural advantages. The state should make all efforts to ensure that it utilises whatever gas lands in Gujarat very productively. Sales tax on natural gas needs to be rationalized immediately (see, Dholakia, 2004). SEZ and EPZs need to be planned along and around the gas-grid in the state. This sector, moreover, has tremendous potential also to attract FDI and also spur considerable domestic investment opportunities in sectors like power, ceramics, tiles, glass-ware, etc. in the state.

Storage, construction and real estates & dwellings await enabling environment where state and city administrations become transparent, efficient and investment friendly. The land laws, stamp duty, and zoning restrictions need to be reviewed quickly and rationalised. This can again attract considerable domestic and foreign investment. Maharashtra has liberalised development of big land areas and facilitated developers of 300 acres or more area exempting them from the requirement of seeking any formal approvals from state urban authorities. Such policy steps need to be quickly identified and followed. They have the potential to attract domestic investments to build quality soft-infrastructure and hence to attract highly skilled manpower, business leaders and hence multiple economic activities. Ahmedabad has a great potential to emerge as an international centre of attraction for financial services including BPO.

In summing up, we need to agree that Gujarat can grow at a rate higher than 10% p.a. on long term only if it takes initiatives in bold policy decisions and innovative designs to help small & medium sized entrepreneurs; leadership in providing efficient and transparent administration; and constant vigilance and alertness in providing the most friendly policy environment to business in the state. Guaranteeing quality of soft-infrastructure, valuing high skilled professionals and entrepreneurs, and providing basic amenities to the masses is the key to achieve such difficult looking targets.

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<i>Appendix Table 1: Estimation of Trend Rates of Growth for Gujarat GSDP at 1993-94 prices</i>							
No.	Dependent Variable	1980-81 to 1991-92			1991-92 to 2003-04		
		Intercept a	Slope b ₁	R ²	Intercept a	Slope b ₁	R ²
1	AGRI. & ALLIED	13.90 (-93.81)	-0.0048 (-0.240)	0.01 (-0.06)	14.01 (110.73)	0.0211 (1.326)	0.14 (1.76)
1.1	AGRICULTURE	13.84 (-84.44)	-0.0090 (-0.407)	0.02 (-0.17)	13.91 (100.91)	0.0224 (1.292)	0.132 (1.67)
1.2	FOREST & LOG	10.66 (-445.64)	-0.0028 (-0.869)	0.07 (-0.75)	10.63 (1315.49)	0.0167 (16.373)	0.96 (268.09)
1.3	FISHING	10.08 (-177.37)	0.0821 (-10.640)	0.92 (-113.22)	11.27 (252.24)	0.0003 (0.055)	0.00 (0.003)
2	MINING & QUARRY	11.19 (-266.04)	0.0615 (-10.754)	0.92 (-115.65)	11.91 (475.69)	0.0105 (3.314)	0.50 (10.98)
1+2	SUB-TOTAL PRIMARY	13.96 (-106.06)	0.0016 (-0.091)	0.00 (-0.01)	12.40 (660.000)	0.0272 (11.472)	0.92 (131.60)
3	MANUFACTURING	13.11 (-219.70)	0.0687 (-8.484)	0.88 (-71.98)	13.92 (204.35)	0.0862 (10.053)	0.90 (101.06)
3.1	REGISTERED	12.71 (-183.49)	0.0714 (-7.593)	0.85 (-57.65)	13.58 (145.17)	0.0785 (6.666)	0.80 (44.43)
3.2	UN-REGISTERED	12.01 (-275.65)	0.0632 (-10.688)	0.92 (-114.24)	12.67 (259.36)	0.1011 (16.419)	0.96 (269.57)
4	ELECT, GAS, WATER	10.41 (-389.27)	0.0938 (-25.806)	0.99 (-665.96)	11.63 (356.21)	0.0704 (17.128)	0.96 (293.36)
5	CONSTRUCTION	11.59 (-189.00)	0.0461 (-5.539)	0.75 (-30.68)	12.15 (151.97)	0.0564 (5.600)	0.74 (31.37)
3+4+5	SUB-TOTAL SECOND.	13.36 (-330.91)	0.0671 (-12.236)	0.94 (-149.74)	11.98 (616.01)	0.0618 (25.206)	0.98 (635.34)
6	TRADE, HOTEL, REST.	12.47 (-359.53)	0.0523 (-11.112)	0.93 (-123.48)	12.99 (341.04)	0.0799 (16.634)	0.96 (276.9)
7	TRAN,STORAGE,COMM	11.85 (-206.20)	0.0710 (-9.091)	0.89 (-82.64)	12.44 (523.93)	0.0969 (32.395)	0.99 (1049.43)
7.1	RAILWAY	10.75 (-387.49)	0.0307 (-8.155)	0.87 (-66.50)	11.03 (315.43)	0.0289 6.565	(0.79) (43.11)
7.2	OTHER TRANS.	11.13 (-104.12)	0.0948 (-6.531)	0.81 (-42.66)	11.91 (454.34)	0.0961 (29.088)	0.99 (846.13)
7.3	STORAGE	6.99 (-111.25)	0.0269 (-3.154)	0.50 (-9.95)	7.01 (115.49)	0.0479 (6.262)	0.78 (39.22)
7.4	COMMUNICATION	10.11 (-641.02)	0.0624 (-29.149)	0.99 (-849.67)	10.70 (219.35)	0.1443 (23.471)	0.98 (550.87)
8	FIN.INS,R.ESTATE	12.39 (-532.42)	0.0633 (-20.030)	0.98 (-401.19)	13.15 (578.68)	0.0621 (21.692)	0.98 (470.56)
8.1	BANKING INSURANCE.	10.71 (-163.68)	0.1350 (-15.184)	0.96 (-230.54)	12.43 (238.15)	0.0699 (10.633)	0.91 (113.06)
8.2	REAL ESTATE	12.23 (-6258.18)	0.0303 (-114.120)	1.00 (-13023.11)	12.47 (499.76)	0.0547 (17.412)	0.97 (303.16)
9	COMMU. SERVICE	12.16 (-537.99)	0.0560 (-18.231)	0.97 (-332.37)	12.67 (396.73)	0.0853 (21.198)	0.98 (449.37)
9.1	PUB. ADMIN	11.68 (-205.78)	0.0588 (-7.948)	0.86 (-63.18)	11.71 (180.81)	0.0737 (9.030)	0.88 (81.54)
9.2	OTHER SERVICES	11.68 (-679.07)	0.0540 (-23.136)	0.98 (-535.28)	12.18 (502.83)	0.0911 (29.852)	0.99 (891.16)
6+7+8+9	SUB-TOTAL TERTIARY	13.63 (-773.07)	0.0598 (-24.966)	0.98 (-623.29)	12.49 (93.47)	0.0862 (5.118)	0.70 (26.19)
10	TOTAL GSDP	14.77 (-320.84)	0.0415 (-6.643)	0.82 (-44.13)	15.25 (345.78)	0.0671 (12.072)	0.93 (145.74)

Note: The trend rates are based on regression: $\ln Y = a + bt$

Source: DES (June 2003): SDP of Guj. State 2001-02

<i>Appendix Table 2: Estimation of Trend Rates of Growth for Indian GDP at 1993-94 prices</i>							
No.	Dependent Variable	1980-81 to 1991-92			1991-92 to 2003-04		
		Intercept <i>a</i>	Slope <i>B₁</i>	<i>R</i> ²	Intercept <i>a</i>	Slope <i>b₁</i>	<i>R</i> ²
1	AGRI. & ALLIED	13.90 (-93.81)	-0.0048 (-0.240)	0.01 (-0.06)	14.01 (110.73)	0.0211 (1.326)	0.14 (1.76)
1.1	AGRICULTURE	13.84 (-84.44)	-0.0090 (-0.407)	0.02 (-0.17)	13.91 (100.91)	0.0224 (1.292)	0.13 (1.67)
1.2	FOREST & LOG	10.66 (-445.64)	-0.0028 (-0.869)	0.07 (-0.75)	10.63 (1315.49)	0.0167 (16.373)	0.96 (268.09)
1.3	FISHING	10.08 (-177.37)	0.0821 (-10.640)	0.92 (-113.22)	11.27 (252.24)	0.0003 (0.055)	(0.00) (0.003)
2	MINING & QUARRY	11.19 (-266.04)	0.0615 (-10.754)	0.92 (-115.65)	11.92 (475.69)	0.0105 (3.314)	0.500 (10.983)
3	MANUFACTURING	13.96 (-106.06)	0.0016 (-0.091)	0.00 (-0.01)	12.40 (660.00)	0.0272 (11.472)	0.92 (131.60)
3.1	REGISTERED	13.11 (-219.70)	0.0687 (-8.484)	0.88 (-71.98)	13.92 (204.35)	0.0862 (10.05)	0.90 (101.06)
3.2	UN-REGISTERED	12.71 (-183.49)	0.0714 (-7.593)	0.85 (-57.65)	13.58 (145.17)	0.0785 (6.666)	0.80 (44.43)
4	ELECT, GAS, WATER	12.01 (-275.65)	0.0632 (-10.688)	0.92 (-114.24)	12.67 (259.36)	0.1011 (16.419)	0.96 (269.57)
5	CONSTRUCTION	10.41 (-389.27)	0.0938 (-25.806)	0.99 (-665.96)	11.63 (356.21)	0.0704 (17.128)	0.96 (293.36)
6	TRADE, HOTEL, REST.	11.59 (-189.00)	0.0461 (-5.539)	0.75 (-30.68)	12.15 (151.97)	0.0564 (5.600)	0.74 (31.37)
6.1	TRADE	13.36 (-330.91)	0.0671 (-12.236)	0.94 (-149.74)	11.98 (616.01)	0.0618 (25.206)	0.98 (635.34)
6.2	HOTEL & RESTAURANT	12.47 (-359.53)	0.0523 (-11.112)	0.93 (-123.48)	12.99 (341.04)	0.0799 (16.634)	0.96 (276.69)
7	TRAN,STORAGE,COMM	11.85 (-206.20)	0.0710 (-9.091)	0.89 (-82.64)	12.44 (523.93)	0.0969 (32.395)	0.99 (1049.43)
7.1	RAILWAY	10.75 (-387.49)	0.0307 (-8.155)	0.87 (-66.50)	11.03 (315.43)	0.0289 (6.565)	0.79 (43.11)
7.2	OTHER TRANS.	11.13 (-104.12)	0.0948 (-6.531)	0.81 (-42.66)	11.91 (454.34)	0.0961 (29.09)	0.99 (846.13)
7.3	STORAGE	6.99 (-111.25)	0.0269 (-3.154)	0.50 (-9.95)	7.01 (115.49)	0.0479 (6.26)	0.78 (39.22)
7.4	COMMUNICATION	10.11 (-641.02)	0.0624 (-29.149)	0.99 (-849.67)	10.70 (219.35)	0.1443 (23.471)	0.98 (550.87)
8	FIN.INS,R.ESTATE	12.39 (-532.42)	0.0633 (-20.030)	0.98 (-401.19)	13.15 (578.68)	0.0621 (21.692)	0.98 (470.56)
8.1	BANKING INSURANCE.	10.71 (-163.68)	0.1350 (-15.184)	0.96 (-230.54)	12.43 (238.15)	0.0699 (10.633)	0.91 (113.06)
8.2	REAL ESTATE	12.23 (-6258.18)	0.0303 (114.120)	1.00 (13023.11)	12.47 (499.76)	0.0547 (17.412)	0.97 (303.16)
9	COMMU. SERVICE	12.16 (-537.99)	0.0560 (-18.231)	0.97 (-332.37)	12.67 (396.73)	0.0853 (21.198)	(0.98) (449.37)
9.1	PUB. ADMIN	11.68 (-205.78)	0.0588 (-7.948)	0.86 (-63.18)	11.71 (180.81)	0.0737 (9.030)	0.88 (81.54)
9.2	OTHER SERVICES	11.68 (-679.07)	0.0540 (-23.136)	0.98 (-535.28)	12.18 (502.83)	0.0911 (29.852)	0.99 (891.16)
6+7+8+9	TOTAL SERVICES	13.63 (-773.07)	0.0598 (-24.966)	0.98 (-623.29)	12.49 (93.47)	0.0862 (5.118)	0.70 (26.19)
10	GDP at F.C.	14.77 (-320.84)	0.0415 (-6.643)	0.82 (-44.13)	15.25 (345.78)	0.0671 (12.072)	0.93 (145.74)

Note: The trend rates are based on regression: $\ln Y = a + bt$

Source: CSO (2003): NAS

Appendix Table 3: Average Annual Compound Growth rates in Four Consecutive Years in Gujarat, 1980-04

Sl. No.	Industry Group	1980-85	1981-86	1982-87	1983-88	1984-89	1985-90	1986-91	1987-92	1988-93	1989-94	1990-95	1991-96	1992-97	1993-98	1994-99	1995-00	1996-01	1997-02	1998-03	1999-04	Max Gr.
1	Agri. & Allied	5.67	-4.71	-1.23	-17.95	2.08	5.63	4.28	14.67	1.05	-2.34	7.64	8.76	6.37	10.84	3.34	-1.71	11.45	-3.71	-8.38	13.37	14.67
1.1	Agriculture	5.82	-5.42	-1.77	-19.94	2.14	6.01	4.14	15.70	0.47	-3.29	7.90	9.54	6.75	11.72	3.70	-2.13	12.39	-3.83	-9.24	14.79	15.70
1.2	Forestry & Logging	0.64	2.17	0.60	-1.47	-2.12	-2.09	-1.52	1.93	1.60	1.00	2.18	1.54	1.62	2.48	1.47	0.87	1.77	1.01	1.84	2.67	2.67
1.3	Fishing	7.49	8.21	11.80	8.93	4.43	5.08	11.93	12.82	13.86	12.29	6.67	2.55	2.22	3.07	-2.14	3.08	-3.14	-4.26	0.65	-4.09	13.86
2	Mining & Quarrying	2.12	4.89	7.60	7.45	6.56	8.32	9.30	7.16	4.87	1.40	1.37	2.34	2.61	1.84	0.20	-1.23	-1.69	-0.44	2.16	3.39	9.30
	Sub-total: Primary	5.40	-3.96	-0.51	-15.48	2.41	5.90	4.81	13.50	1.39	-1.93	6.96	7.96	6.03	9.87	3.05	-1.65	10.51	-3.40	-7.34	12.39	13.50
3	Manufacturing	8.55	10.99	10.59	3.76	9.93	5.66	6.50	1.64	8.81	9.15	10.46	19.95	11.44	10.99	8.37	6.34	2.67	4.32	8.40	7.87	19.95
3.1	Registered	9.10	12.44	11.50	3.38	9.85	6.13	6.68	1.02	8.48	8.24	11.15	22.13	13.75	12.76	8.47	5.48	-1.44	0.35	5.94	5.19	22.13
3.2	Un-registered	7.40	8.06	8.73	4.59	10.09	4.62	6.11	2.91	9.49	11.19	8.89	15.20	6.25	6.95	8.12	8.41	11.76	12.98	13.81	13.26	15.20
4	Elec., Gas & Water	7.05	6.76	8.49	9.74	10.93	12.12	12.17	11.23	14.22	13.90	11.20	12.09	7.65	6.85	8.61	6.13	5.73	4.03	7.44	6.33	14.22
5	Construction	-1.03	4.98	5.53	9.72	7.41	2.45	0.84	7.07	2.69	8.91	8.93	1.81	7.45	7.29	10.28	15.64	10.59	1.94	0.00	-3.93	15.64
	Sub-total: Second.	6.81	9.75	9.69	4.92	9.64	5.61	6.12	3.20	8.44	9.47	10.34	16.64	10.77	10.21	8.60	7.40	3.70	4.04	7.46	6.34	16.64
6	Trade & Hotels	5.65	4.20	5.11	1.82	7.19	8.24	6.11	5.99	4.83	2.14	5.83	10.55	10.46	13.45	10.18	6.37	3.97	3.91	5.99	10.25	13.45
7	Tran., Stor. & Comm.	18.71	17.09	17.61	10.38	9.40	10.50	1.06	-0.34	-0.45	-1.08	8.38	9.55	9.93	12.66	11.14	12.80	11.96	8.14	8.53	6.30	18.71
7.1	Railways	0.06	0.70	4.41	4.93	5.11	3.99	2.21	2.94	-0.84	1.95	2.71	2.85	4.52	1.41	2.16	0.48	2.87	3.75	3.32	4.80	5.11
7.2	Other Transport	18.71	17.09	17.61	10.38	9.40	10.50	1.06	-0.34	-0.45	-1.08	8.38	9.55	9.93	12.66	11.14	12.80	11.96	8.14	8.53	6.30	18.71
7.3	Storage	-0.28	5.37	1.06	10.99	4.93	0.62	1.45	-3.83	-0.71	-1.65	-6.96	0.73	2.11	4.83	7.87	3.01	3.21	5.46	8.51	10.67	10.99
7.4	Communication	6.72	4.70	6.12	7.92	5.86	8.54	6.69	5.42	8.60	7.56	10.42	17.17	15.41	21.40	18.71	16.48	18.12	13.21	13.98	8.60	21.40
8	Finance Sector	4.11	4.42	5.15	6.23	8.81	8.63	8.36	7.62	6.92	8.58	7.80	8.73	4.84	4.86	5.61	7.09	7.19	5.92	6.51	5.20	8.81
8.1	Banking & Insurance	7.18	8.24	10.49	15.01	22.59	21.41	19.03	15.59	12.21	15.61	13.71	15.24	7.00	5.42	6.09	7.77	6.52	4.82	5.79	3.43	22.59
8.2	Real Estate	3.20	3.25	3.31	3.00	2.96	2.92	2.95	3.01	2.99	2.97	2.80	2.80	2.72	4.25	5.07	6.26	7.91	7.11	7.31	7.35	7.91
9	Comm. Services	7.32	8.57	7.12	6.71	4.73	4.64	3.67	3.87	3.16	5.17	6.77	6.91	8.65	7.60	9.81	12.96	12.03	10.36	7.22	4.06	12.96
9.1	Public Adm.	9.64	10.63	7.38	9.55	6.09	5.63	1.67	-0.37	-1.11	3.30	6.68	7.92	8.50	5.98	11.85	13.95	12.16	8.35	1.16	-2.10	13.95
9.2	Other Services	5.89	7.33	6.94	4.82	3.80	3.98	4.94	6.71	5.97	6.41	6.82	6.33	8.74	8.57	8.57	12.35	11.96	11.44	10.72	7.45	12.35
	Sub-total: Tertiary	6.45	6.25	6.72	5.49	7.23	7.62	5.51	5.10	4.42	4.55	6.93	9.00	8.26	9.31	8.88	9.02	8.23	6.87	7.07	6.68	9.31
10	Total GSDP	6.50	3.71	5.46	-1.08	6.56	6.79	5.72	6.38	5.00	4.72	8.61	11.93	8.71	9.78	7.16	6.01	2.07	3.45	4.14	7.67	11.93

Basic Source: DES (2003): State Domestic Product, Gujarat State, 2001-02; GoG, June

Appendix Table 4: Average Annual Compound Growth Rates in Ten Consecutive Years in Gujarat, 1980-04

Sl. No.	Industry Group	Average Annual Compound Growth Rates in Ten Consecutive Years in Gujarat, 1980-04										Max Gr.				
		1980-91	1981-92	1982-93	1983-94	1984-95	1985-96	1986-97	1987-98	1988-99	1989-00		1990-01	1991-02	1992-03	1993-04
1	Agri. & Allied	1.37	-1.96	3.33	-1.14	2.12	3.36	6.44	11.50	2.62	0.43	-0.30	3.98	-1.33	6.61	11.50
1.1	Agriculture	1.13	-2.55	3.14	-1.70	1.91	3.34	6.63	12.32	2.53	0.10	-0.50	4.31	-1.56	7.20	12.32
1.2	Forestry & Logging	-0.34	0.22	-0.01	0.37	0.27	-0.03	0.40	1.96	1.73	1.17	1.73	1.59	1.82	1.83	1.96
1.3	Fishing	8.56	8.86	11.15	10.00	8.22	6.54	7.24	7.60	5.45	5.73	1.22	0.76	0.37	-0.73	11.15
2	Mining & Quarrying	5.71	5.77	6.41	5.86	5.40	4.74	4.41	3.61	2.83	0.94	0.08	0.60	1.76	1.73	6.41
	Sub-total: Primary	1.78	-1.23	3.58	-0.53	2.38	3.50	6.25	10.48	2.64	0.49	-0.26	3.58	-0.99	6.12	10.48
3	Manufacturing	8.39	5.97	9.35	6.39	9.15	9.32	9.69	9.30	8.52	9.59	8.09	10.45	8.36	9.08	10.45
3.1	Registered	8.76	6.16	9.47	6.18	9.57	9.73	10.35	9.94	9.01	9.46	6.91	9.64	7.98	8.22	10.35
3.2	Un-registered	7.61	5.62	9.11	6.85	8.20	8.36	8.11	7.81	7.42	9.91	10.37	11.91	9.10	10.72	11.91
4	Elec., Gas & Water	9.48	9.88	11.61	11.58	11.16	12.04	11.27	10.39	10.23	9.61	8.66	7.48	7.56	6.63	12.04
5	Construction	2.06	6.50	4.03	6.69	6.05	5.20	4.79	5.74	7.17	10.42	8.73	3.68	6.04	5.01	10.42
	Sub-total: Second.	7.48	6.35	8.78	6.77	8.89	8.97	9.21	8.89	8.47	9.71	8.21	9.24	8.08	8.44	9.71
6	Trade & Hotels	6.21	4.34	5.35	4.56	6.28	6.84	7.46	9.18	7.45	6.10	6.58	8.32	7.93	9.39	9.39
7	Tran., Stor. & Comm.	6.77	6.18	6.48	5.49	5.46	6.04	5.86	6.98	6.77	7.21	9.88	10.13	10.23	9.64	10.23
7.1	Railways	2.79	2.59	1.54	3.19	3.87	3.46	1.58	1.79	2.69	2.05	1.85	2.11	4.39	3.18	4.39
7.2	Other Transport	9.24	8.39	8.71	5.79	5.33	5.54	5.81	6.66	6.00	6.42	10.24	10.20	9.72	9.53	10.24
7.3	Storage	2.98	2.52	-0.41	1.81	0.16	0.69	0.00	-0.49	1.28	1.64	0.69	3.25	4.94	6.55	6.55
7.4	Communication	6.52	5.89	7.06	7.75	7.99	10.77	10.72	12.95	13.05	13.94	15.32	16.21	15.26	14.38	16.21
8	Finance Sector	6.24	6.41	7.07	7.77	7.73	8.14	6.94	7.21	6.45	7.53	6.48	6.53	6.29	6.18	8.14
8.1	Banking & Insurance	13.45	13.75	14.87	16.45	16.17	16.64	13.41	12.47	9.65	11.21	8.48	8.16	7.09	6.36	16.64
8.2	Real Estate	3.10	3.08	3.07	2.98	2.94	2.90	2.83	3.48	3.78	4.22	4.78	5.11	5.50	5.97	5.97
9	Comm. Services	5.59	5.86	4.78	5.69	5.38	5.22	5.38	6.05	7.39	8.48	8.70	8.65	9.06	8.02	9.06
9.1	Public Adm.	5.68	5.71	3.65	5.63	4.53	4.67	4.08	4.24	6.76	7.90	8.25	7.79	7.74	5.60	8.25
9.2	Other Services	5.54	5.95	5.47	5.73	5.91	5.56	6.17	7.23	7.83	8.87	8.96	9.10	9.74	9.30	9.74
	Sub-total: Tertiary	6.17	5.63	5.95	5.96	6.36	6.72	6.56	7.48	7.01	7.27	7.65	8.20	8.09	8.14	8.20
10	Total GSDP	5.32	3.68	6.38	4.45	6.15	6.89	7.67	8.89	6.39	6.58	6.17	7.69	6.04	7.77	8.89

Basic Source: DES (2003): State Domestic Product, Gujarat State, 2001-02; GoG, June

Appendix Table 5: Estimation of Net Fixed Capital Stock at 1993-94 Pices in Gujarat, 1980-81 -- 2003-04					
<i>(Rs. In Lacs)</i>					
Years	Primary	Secondary	Tertiary	Non-Agri	Total
1980-81	1325004	2444886	3663306	6108192	7433196
1981-82	1397623	2518242	3846268	6364509	7762133
1982-83	1426438	2894383	4021076	6915459	8341897
1983-84	1476134	3245138	4175957	7421095	8897229
1984-85	1527586	3330379	4247109	7577487	9105073
1985-86	1568360	3662634	4352465	8015098	9583459
1986-87	1636716	3997226	4393107	8390333	12669856
1987-88	1767764	4265605	4624856	8890461	10658225
1988-89	1814151	4546464	4685194	9231658	11045809
1989-90	1868881	4756422	4823616	9580037	11448918
1990-91	1926565	4940360	4931066	9871426	11797991
1991-92	1999797	5115898	5080572	10196470	12196268
1992-93	2049124	5483894	5245850	10729745	17174812
1993-94	2221543	7112590	5553060	12665651	14887194
1994-95	2133461	5610949	5625243	11236192	13369653
1995-96	2199200	7569160	5888356	13457516	15656716
1996-97	2206390	8628178	6243790	14871968	17078359
1997-98	2233425	10907032	6590461	17497493	19730918
1998-99	2271548	12180757	6961618	19142375	21413923
1999-00	2315597	12935890	7192669	20128559	22444156
2000-01	2321238	14608928	7350238	21959165	24280403
2001-02	2349352	15327543	7643281	22970824	25320176
2002-03	2352199	15857632	7857031	23714664	26066863
2003-04	2401098	16684643	8208154	24892797	27293895